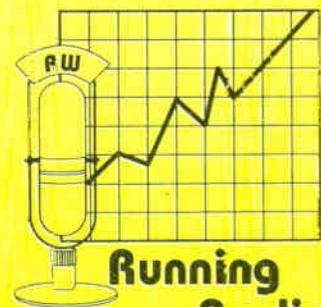


*****3-DIGIT 857
S101903 C11 9007
BARRY MISHKIND

2033 S AUGUSTA PL
TUCSON AZ 85710-7905

Radio World



Running
Radio
See pp. 16-33

Vol 19, No 9

Radio's Best Read Newspaper

May 3, 1995

USA Digital Radio Proves Itself at NAB '95

by Alan Carter
and Charles Taylor

LAS VEGAS There is no question that the USA Digital Radio system works, following the first public mobile demonstrations at NAB '95, but just how well is still a matter of debate.

Developers of the in-band, on-channel digital audio broadcasting (DAB) system offered tangible evidence of their progress with demonstrations of both FM and AM digital systems during NAB.

Bus rides ran every 30 or so minutes throughout the show, April 9-13, featuring live, real-time FM broadcasts

of jazz outlet KUNV(FM) at 91.5 MHz. AM programming originated live from the convention booth of Harris Allied over the temporary KUSA(AM) at 1660 kHz on the expanded band.

FCC reaction

Probably the best news for USA Digital Radio developers came from members of the FCC who, after hearing the system, said they are ready to see a proposed rulemaking come across their desks, according to Project Manager Jeff Andrew.

All members of the commission—except for Chairman Reed Hundt—took the bus ride. While he

listened to the tape presentation in the booth, the Hundt entourage said the chairman didn't have time to ride the bus.

USA Digital Radio officials tried to downplay the incident, which was confirmed by those present at the booth when the chairman visited.

Hundt's office in Washington would only comment, "His schedule would not permit it."

After Hundt heard the tape demo, he asked how much new spectrum the system would require, according to USA Digital Radio officials. Hundt apparently did not know that the in-band, on-channel system does not

continued on page 6 ▶

BSW, Telos, 104 FM Select go live from exhibit floor, see p. 8.



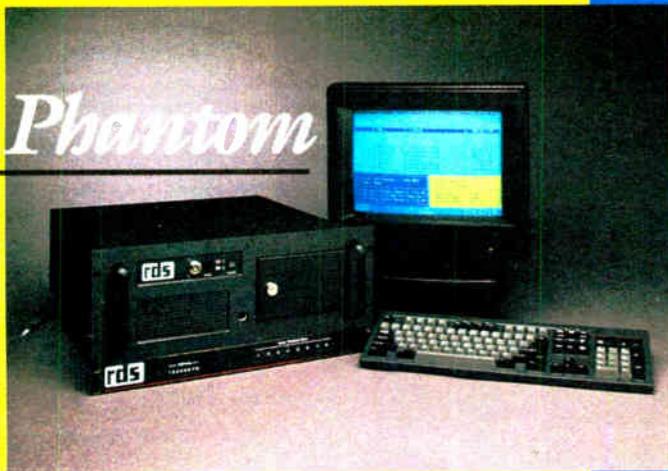
USA Digital Radio takes to the road with live AM and FM demos.



KUSA broadcasts from Harris Allied booth for USA Digital Radio.

NAB95

The Phantom



Hard Disk Digital Audio Automation by RDS

The Phantom ends the confusion of automation by keeping everything organized and under your control. Live all day, satellite all day, or both— the Phantom is the one system that truly adapts to your station's operation. Available from the Harris Allied broadcast audio pros.

1-800-622-0022 Fax 317-966-0623
Southern CA 1-800-690-2828

HARRIS ALLIED

EIA Kicks Off \$3.5 Million RDS Promotional Campaign

by Alan Haber
and T. Carter Ross

PHILADELPHIA If the American radio-listening public hasn't heard of RDS before now, then it's only a matter of time.

The Electronic Industries Association (EIA) gave a strong shot in the arm to the burgeoning Radio Data System (RDS) in the form of a year-long promotional campaign. EIA will target 500 radio stations in the top 25 markets with a program valued at up to \$3.5 million.

"We are trying to break the 'chicken or the egg' dilemma," said EIA Group Vice President Gary Shapiro. "We will be the rooster."

The initiative was announced April 7 at the EIA-sponsored 1995 Mobile Electronics Show here in Philadelphia.

Under the program, kicking off in the City of Brotherly Love, EIA will provide up to \$500,000 in funds matching those received from manufacturers to further RDS in the United States. So far, Delco,

Denon and Pioneer have signed on as industry sponsors and more sponsors are expected.

After Philadelphia, San Francisco will be the next stop for the program, followed by Chicago, Los Angeles, New York, Dallas/Fort Worth, Houston/Galveston, Washington, Baltimore, Boston, Long Island, N.Y., Miami, Tampa, Fla., Atlanta, Detroit, Cleveland, Pittsburgh, Cincinnati, Minneapolis, Seattle, Anaheim, Calif., San Diego, Phoenix, Denver and St. Louis.

RDS broadcasts

According to EIA, the program will make RDS broadcasts available to more than 85 percent of radio listeners in this country.

Targeted radio stations will receive, at no cost, RE America RE533 encoders, as well as technical training from RE. RDS radios from program sponsors also will be provided to stations, as will Specialized Communications RDS control software.

continued on page 11 ▶

NEWSWATCH

Triathlon Eyeing Purchase Of 22 Station Group

WASHINGTON Triathlon Broadcasting Company is in the process of trying to buy 19 radio stations. The cost of the two-part acquisition is estimated at \$43.8 million, according to Norman Feuer, the president of the company.

Triathlon now has a petition before the Federal Communication Commission to acquire Wichita, Kan., stations KRBB-FM, KXLK-FM, KQAM(AM) and KFH(AM), and Nebraska stations KTGL-FM in Lincoln and KZKX-FM in Seward.

The stations' acquisition is still pending

commission approval. "Technically, right now Triathlon does not own anything," Feuer said.

President Signs Bill Nixing Minority Tax Breaks

WASHINGTON President Clinton said in early April he would sign a bill ending a special tax break for selling broadcast and cable stations to minorities.

Both the House and Senate have already voted for the bill. Clinton supports the bill because revenue from ending the tax

break is earmarked to pay for a 25 percent health care cost tax deduction for the country's 3.2 million self-employed, he said during a press conference.

The tax break would start retroactively beginning January 1994, according to a Senate Finance Committee staffer. In 1995, that break would increase to 35 percent.

There is also some speculation that Senator Bob Packwood (R-Ore.) somewhere down the road may propose subsequent legislation that would raise the deduction to 100 percent, according to committee staffers.

NAB Objects to Proposed FCC Fines

WASHINGTON The National Association of Broadcasters (NAB) recently

proposed sweeping changes to the FCC's fine and forfeit schedule, including a 50 percent reduction for most fines imposed for lesser offenses.

Lesser offenses include offenses not threatening safety, evasion of the Federal Communication Commission (FCC) regulatory process or serious interference.

"The agency (FCC) should simply cease its issuance of fines for first occurrences of lesser offenses," the NAB said in comments filed to the commission. "For the detection of these often trivial violations, the commission and its staff should issue a warning and an explanation on how the station can achieve compliance."

Last summer a federal court in Washington threw out the forfeiture and fine schedule stating the commission did not follow correct public notice procedures when establishing it. The commission then issued a Notice of Proposed Rule Making early this year as part of an effort to reestablish the fines.

Success Means Making the Right Decisions



We DID.

OUR NEW R-60 CONSOLE has what stations really want: reliable illuminated switches—*everywhere*; smooth feeling P&G faders; a powerful monitor section. Our exclusive Simple Phone™ module is friendly and easy-to-operate, providing error-free talk segments.

The R-60 is **TOTALLY MODULAR** to streamline service—no motherboard mounted components. The quality of each module is unsurpassed; we even measure every resistor, capacitor, and diode

before it's installed. Completed consoles are burned in prior to final test. Meticulous care is the key here, so you can expect the ultimate in reliability.

Perhaps more important than high technology features and good looks is the fact that the R-60 is built and supported by Audioarts Engineering—a highly professional and dependable company you can count on.

A SUCCESSFUL STATION BEGINS WITH R-60.

 **AUDIOARTS ENGINEERING**

7305 Performance Drive, Syracuse, New York 13212 (tel 315-452-5000 / fax 315-452-0160)

Index

FEATURES

Time-Saving Tips for Tracking Phase	
by Jim Murphy	14
Circuitry Recipes Sure to Please	
by Jim Somich	34
Workbench	
by John Bisset	35
Spring Cleaning Techniques for Tower Sites	
by W.C. Alexander	37
Birds at Root of Antenna Problem	
by Ralph R. Townsley	41
Digital Editing in the Real World	
by Bruce & Jenny Bartlett	42
Springtime Means FCC Forms Are Due	
by Harry Cole	46
Steel Structures Disrupt AM Signals	
by Ron Nott	46

RUNNING RADIO

Oddball Humor Keeps Radio Lively	
by Alan Haber	16
Uncovering the Negotiator Within	
by Sue Jones	17
Australian Radio Speaks Many Tongues	
by Max Thrower	19
Low-Power FM Burgeoning in Japan	
by Thomas Caldwell	27
Many Stations Spinning Webs in Cyberspace	
by Alan Haber	31
Planning for Summer Intern Season	
by Mark Lapidus	32
Key Questions to Ask at Interviews	
by Mary Ruth Austin	33

Technology, Crowds Flock to Vegas

by Thomas Pear

LAS VEGAS NAB '95 wasn't even over—with recording-breaking attendance and high marks for business—before thoughts turned toward 1996 when the show takes a new turn.

The National Association of Broadcasters (NAB) announced the exhibition will expand to the Sands Expo Convention Center because the NAB show has outgrown the Las Vegas Convention Center and the adjoining Las Vegas Hilton Center.

Expanding to Sands

The NAB will move the Multimedia World Conference and Exhibition to the Sands along with additional exhibits and all registration. Interest quickly focused on who those "additional exhibits" will be.

"The NAB show has experienced dramatic growth," NAB Executive Vice President John Abel said in a release. "Since 1990, the show has increased by 270 companies, 25,000 attendees and 150,000 square feet of exhibit space."

Along with the show growing physically, attendance figures have risen too, with a significant increase in international visitors.

Initial attendance figures show 83,408 attendees, including broadcasters, equipment manufacturers and industry professionals. That is 17 percent over the NAB '94 attendance of 71,082.

Adding to a significant change in the NAB show was the number of attendees from overseas: This year registered 17,524 international delegates, a 19 percent jump from last year.

Extensive shuttle service

If exhibitors are leery of the move to the Sands, fearing a drop in floor traffic, and if attendees are worried about trekking between two exhibit sites, consider the apparent success of the center hall this year.

Of the total 990 exhibitors occupying 550,000 square feet, 151 exhibitors used 30,000 square feet in the spill-over center hall on Desert Inn Road, across the street from the convention center.

The center hall also served as the location for all convention registration. The center hall did prove a somewhat lengthy

walk from the main convention floor, but a shuttle service helped connect the two halls.

"We have had a steady flow of traffic," said Vela Research Marketing Coordinator Dave Edwards. "We have been really busy."

Registration went particularly smooth this year, compared to past years.

"This year we knew the show was growing, so we put in additional registration facilities," NAB Spokesperson Lynn McReynolds said.

When the NAB expands to the Sands, a shuttle service will connect all convention major hotels with both facilities. In addition, a continuous-loop shuttle will connect the two convention sites.

The reason for the continual year-to-year attendance increase, said ABC Radio Networks Marketing Vice President Martin Raab Jr. is two-fold: economics and technology.

Technology, like the numerous displays of hard-disk audio systems, attracts people to shop on the exhibit floor, he suggested, and the improved economy has given stations additional revenue.

Others agreed with Raab. "It is just like going to any store," said Brian Evans of Tantara Digital Broadcasting. "It is the major store to be in."

Exhibitors such as Gentner, Corporate

Computer Systems, Harris Allied and 360 Systems all reported a steady stream of business.

Dawn Simmons, who surveyed attendees for the NAB, noted that many registrants came to the "world's greatest broadcast show" to see what manufacturers were displaying.

Attendance figures have risen with a significant increase in the number of international visitors.

And what broadcasters attending NAB saw was the onset of the digital age of broadcasting.

USA Digital Radio offered the first public demonstration of AM and FM digital transmissions, with bus rides where attendees could hear the difference for themselves.

Digital discussion

The digital discussion included a symposium on satellite digital broadcasting involving Larry Irving, assistant secretary of commerce and head of the National Telecommunication Information Association, along with FCC commissioners Andrew Barrett, Susan Ness and Rachelle Chong.

On the exhibit floor, suppliers marketed a vast assortment of digital equipment,

often with creative attention-getting approaches.

Broadcast Supply Worldwide (BSW), Telos and U.S. Sprint, for example, teamed up with Hong Kong radio station 104 FM Select to do a live ISDN remote from the exhibition audio hall.

From the convention floor each afternoon, station air-personalities Steve James and Harry Wong broadcast to early morning Hong Kong listeners with digital quality.

Live broadcast

Another live broadcast from the audio hall was at the Harris Allied booth where the AM station for USA Digital Radio demo originated. The fully digital set up included the new Harris Allied DRC 1000 digital console from Zaxcom and the Radio Systems DDS (Digital Delivery System) live assist/automation system.

When the radio system, dubbed KUSA, wasn't running by automation, it was manned by talent from Gannett, CBS Radio and Group W, the broadcast groups that comprise the USA Digital Radio consortium.

Other convention news included word that the NAB fall show, World Media Expo (WME) to be held this year in New Orleans, is expected to match last year's attendance of 17,000.

Industry speculation is that WME will become another Las Vegas event after next year, but McReynolds said that is not the case.

She said the 1996 WME, for example, will be held in one of three possible sites: Dallas, Los Angeles or Anaheim, Calif. 🌐

Basically excellent

We improved the specs and simplified features until we knew we had created the best bulletproof, no-frills, high-performance FM exciter at the most competitive possible price. As with all BEXT exciters and our full line of RF equipment, the new LEX 25 is backed by our two year warranty and 24-hour customer service hotline.

LEX 25
25 Watt FM Exciter
S/N: >80dB
THD: <0.03%
\$1,995



1045 10th Ave.
San Diego, CA 92101
619-239-8462
FAX: 619-239-8474

BEXT

Circle (162) On Reader Service Card

Going Codec?

Go Comrex.

Beyond superior broadcast quality and rugged reliability, Comrex codecs are backed with an invaluable extra: Direct, personal tech support from someone who is prepared to provide whatever level of assistance you need. Just one toll-free phone call away.

With our full range of codec technology and a reputation for integrity and objectivity, we're able to offer the best sounding, cost-effective solution for SW56, ISDN or dedicated digital lines.

Questions about compatibility, connectivity, delay, system and transmission costs? We have the answers. And we'd be happy to arrange a demonstration.

Dynamic, ongoing support is also available via:

- Comrex ACCESS - quarterly newsletter
- Fax-on-Demand - library of technical and applications information
- Comrex Users' Forum, PC-networked on CompuServe
- Comrex Handbook - "Digital Telephony"

A partial listing of Comrex codecs:

DXR (rackmount) DXP (portable)	DX100	DX200
G.722 (CCITT)	apt-X	ISO/MPEG Layer II MusicLine™
Excellent for Talk, Sports, AM or Voice Programming	Good choice for STL, Studio-to-Studio and higher quality audio	Superb FM remotes, Studio-to-Studio Links, Music Programming

Request your free Comrex calling card.



Comrex Corporation, 65 Nonset Path, Acton, MA 01720
508-263-1800 • Fax-on-Demand 508-264-9973 • Fax: 508-635-0401

Circle (51) On Reader Service Card

Hey Reed, My Phone Line Is Open

LAS VEGAS We miss Al Sikes. Mark Fowler is a fond and all too distant memory. Heck—even Dennis Patrick's coif would be a welcome sight at 1919 M Street these days. Anyone but Hundt. Anyone but FCC Chairman Reed "I can talk for two hours about broadcasting's future and NEVER mention the word radio" Hundt, political appointee *par excellence*.

Anyone but the telecommunications chairman who wouldn't know an IBOC if it hit him in the spectrum. Do I sound a tad harsh? How do you explain his refusal to make time to take the USA Digital Radio first public mobile demonstration ride here in Vegas? Particularly when his fellow commissioners and every broadcaster with a drop of patriotic blood took the ride and heard USA Digital do what many said could not be done.



We are talking about the most significant and fundamental technological change to radio since the medium was first pioneered more than 75 years ago. I heard it. I rode the bus and it was a great ride. (In fact, I did lobby Glynn Walden for an AM DAB system for my car—the minute the receiver is available, I'm buying. And in fact, RW's panel of engineering experts selecting Cool Stuff Awards this year conferred upon USA Digital Radio a Super Cool Stuff Award for Engineering Achievement. No one deserves it more and few will match their tenacity and dedication.)

Make the time Reed Hundt, or give the

job to someone who cares about radio and has the capacity to nurture its future. I know USA Digital is still a work in progress, but man... they are close.

How do you explain an FCC Chairman who (by eyewitness accounts from the

morning team broadcasting with an Elvis impersonator. The program aired from 3 - 7 p.m. Las Vegas time. The duo of Harry Wong and Steve James also was invited to tape the local weather segments for KLAS for broadcast

featured gargantuan booths with names like Microsoft and IBM prominently displayed. Apple, the computer giant, sponsored the newsroom.

Times and industry are a changin'. Will this man know how to steer radio's course? His address to the gathered NAB folk was laced with nostalgia and quotations from Harry S. Truman to Star Trek. But nary a radio highlight. No Fireside Chat. No Harding-Cox election returns that marked the birth of commercially-licensed radio and subsequently television and cable. Does he know that Group W (one of the three USA Digital partners) still holds that license? Does he know radio exists? Does he care?

Technology is a wonderful thing, and radio broadcasters as a whole are a fairly resilient bunch. But it shouldn't be so hard to get the attention of our own regulatory head. This IBOC versus out-of-band debate has roared on for four years in the pages of many trade journals. The debate has involved government, lobbyists, engineers, foreign entities and very public testing going on right now at the NASA facilities in Cleveland. Do this man and his advisors live in a cave?

I challenge Reed Hundt to address radio broadcasters and spell out for them his opinions and plans for the future of radio (instead of his quaint "I don't have an opinion on that" answer at the NAB). Give me a call Reed, let's talk.

As an industry, radio is on the brink of substantial change in the way it is delivered and used. Interconnectivity and National Information Infrastructure ideas pose interesting challenges for the business. Let's hear what the Honorable Chairman has to say for himself and for radio.



Bus Tour '95

**IBOC AM/FM
DAB MOBILE
DEMONSTRATION**

2368



Las Vegas Convention Center

Date: APR 13 1995 Time: 1100

To Guarantee Seats - please meet at bus loading area at least 10 minutes prior to D

No Refunds No Exchanges Admits One Only

AM FM

exhibition hall) wanted to know what spectrum USA Digital would be requesting? Pay attention Reed. In-Band, On-Channel... see?

This NAB spring convention marked, in my mind, the year when all the possibilities became real. All the theorizing and speculating folks like to do (and some in RW) about the future of radio, materialized in the form of products and services available now to broadcasters.

The very setup at the Harris Allied booth for KUSA(AM) included an all-digital console developed for Harris Allied by Zaxcom specifically for radio (NAB 1995 Cool Stuff Award Winner). Radio Systems' DDS Digital Delivery System (NAB 1994 Cool Stuff honorable mention) and... well you get the picture (see photo, page 1). The future is now.

A short walk down the aisle and you were in Hong Kong. Actually, you were really in BSW's booth with a live broadcast to Hong Kong morning drive using the Telos Zephyr (Cool Stuff 1994) and cooperation from U.S. Sprint. The studio (also pictured on the front page) was put together by BSW.

The daily live broadcasts generated so much fun and local interest that KLAS-TV channel 8, the local CBS affiliate, sent a news crew down to cover the



Companies like Harris Allied, Denon and Yamaha scored big with their lapel-saving badge strings.

that Saturday morning (April 15). Congrats for a good show to Telos and BSW.

This phenomenal industry growth and movement toward digital is indicative of a healthy and booming business activity level. It troubles me too, because I keep going back to Hundt. It is obvious to me that our chairman's eye is transfixed on the bright lights of television and HDTV. The "world's greatest broadcast show"

COUNTRY
WESTERN



AM

ARC-16: the logical choice for LMA and duopoly transmitter control.

For more information on the ARC-16 family of transmitter controls, contact Burk Technology.

1-800 255-8090

CLASSIC
ROCK

Put us in your sites.



7 Beaver Brook Rd., Littleton, MA 01460
Phone (508) 486-0086, Fax # (508) 486-0081
email danrau@burk.com

READERS FORUM

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.

Kudos to Fred

Dear RW,
Kudos to Fred Weinberg of KTRT Tulsa on his letter in the March 22 issue. It is time we introduce the Perrier drinkers at NPR to Diet Coke. Time to cut the apron strings and get out on your own NPR. Good luck!

Chris Trace
WKNE-AM-FM
Keene, N.H.

Thanks for RBDS coverage

Dear RW,
A loud round of thanks for your coverage of RBDS in the March 22 issue. We look forward to your continued coverage of the business and programming opportunities which RBDS and high speed subcarriers bring to the broadcasting community.

There is one recurring theme in this issue with which we must take exception: the role of RBDS versus that of the high speed subcarriers now being developed by the subcommittee of the NRSC. We wish to point out most emphatically that the efforts of the NRSC high speed subcarrier subcommittee will in no way reduce the vitality of RBDS, or impair the quality of the signal in anyway. One of the most basic goals of the committee is to maintain compatibility with RBDS. It is a shortsighted view to think of RBDS as a stopgap measure until the high speed subcommittee defines a standard.

The opportunities presented by each service are fundamentally different. RBDS is a modulation designed primarily for the use of each radio station for self-promotion of the main channel. The revenue opportunities of data over RDS are nearly insignificant, with the exception of concepts like CouponRadio. High speed subcarriers, by contrast, will allow

the broadcaster to compete head-to-head with other wireless data carriers for users with applications that may be totally unrelated to main channel content (and who may not even be listeners in real-time).

The point we wish to make here is simple: RBDS may soon be a bread and butter requirement for every radio station. But high speed subcarriers represent a different opportunity with great potential and little conflicting overlap.

David Kelley
Terrapin Corp.
Garden Grove, Calif.

Michael C. Rau
EZ Communications
Fairfax, Va.

Competition or politics?

Dear RW,
As the manager of a small community-based public radio station, I read with interest the invectives and wrath thrown at public radio in your March 22 issue. I find it laughable that any commercial radio station considers public radio a "competitor."

The truth is that public radio fulfills the obligations that commercial radio has forgotten about for years. Commercial radio has long ignored its responsibility to serve the public "interest, convenience and necessity." Whether it's Rush Limbaugh's histrionics or Howard Stern's bigotry and filth, commercial radio consistently and continuously distributes trash.

Let's get one thing straight: the debate over CPB funding is not now nor has it ever been a debate about money. CPB funding constitutes 1/50th of 1 percent of the federal budget. The Defense Department will spend \$8 million more on military marching bands this year than will be spent on public broadcasting.

As revealed by several of your *Readers' Forum* writers, the issue is, of course, politics. The assertion that public broadcasting has a "liberal bias" is preposterous. Unlike any commercial news or public affairs operation, public broadcasting's choice of commentators, guests and analysis is extraordinarily balanced. One only has to look to the steady parade of white male conservatives on the MacNeil/Lehrer News Hour or the presence of Vin Weber, Kevin Phillips and Mickey Edwards on NPR to recognize this.

Public broadcasting's commitment to diversity seems to be where some see the problem. Our mission includes a guarantee of access to those traditionally disenfranchised from the medium. If this is "liberalism," so be it. Is commercial radio ready to dump the money-making claptrap to make room for serious discussion of issues concerning women, African-Americans, American Indians and Hispanics?

Taxpayer support for public broadcasting is ending, that much is clear. We have played by the rules set up for our industry for more than 25 years now. We are planning for a different future. But to pull the rug out from under us instantaneously without warning is both unfair

Heed Call on RDS

The Electronic Industries Association has quashed the argument: Who should come first, the chicken or the egg? RDS transmission technology or receivers? How about a rooster?

Finally, there seems to be some movement on the receiver side of the Radio Data System (RDS) industry that just may make this much-capable, but relatively simple and inexpensive technology thrive in the U.S.

At the Electronic Industries Association Mobile Electronics Show in April, the EIA announced that it is rolling out a new \$500,000 matching-grant promotion to put at least 500 RDS stations on the air within a year. Total value of the promotion is put at \$3.5 million.

Over the past three years, the marketplace mechanism has only managed to put on about 250 RDS stations—not an overwhelming number considering the more than 5,000 FM stations in the United States.

For broadcasters, RDS offers numerous benefits: display of call letters, slogans, scanning by format, automatic translator switching, sub-audible communications between transmitters and studio sites (de-icing, messages, processing control), EAS Alerts (with sub-audible testing), traffic alerts and more.

RDS can provide radio listeners a wealth of data services in the car or home—song title, artist, text messages, etc.

EIA's intervention into the marketplace approach may be the "pump primer" that finally gets the receiver manufacturers who have been successfully making RDS radios in Europe for 10 years, to make receivers for this market.

The lack of receivers is the number one reason why stations have not rushed to RDS. The data technology's benefits are of no use to listeners who do not have radios. Yes, there are a few brave companies out there, especially Denon, making radios but more will be needed to attract the attention of potential users.

The EIA's promotion effort does not guarantee the success of RDS, but with the clout and resources of its members, it may nudge it enough to make it work. EIA is crowing. Radio must heed the wake-up call.

—RW

and unwise. Commercial broadcasters want our frequencies and channel allocations, that much we know. But if you think the average public broadcasting consumer is going to migrate to the illiterate hysterics of what passes for talk radio these days, or the white bread sameness of the Billboard top-25 (over and over), you've got a rude surprise coming.

Joseph W. Pastori, CFRE,
Station Manager
KAZU(FM)
Pacific Grove, Calif.

Why no FM?

Dear RW,
In reference to Gene Boyd (RW, March 8) and Brett E. Miller (RW, Jan. 25), I am wondering why those AM broadcast interests do not have an FM broadcast license? If public service is their goal, a Class A non-commercial license might be had in the lower segment of the FM band. That would fulfill their goals until commercial AM sign-on and later sign-off without deleting clear channel stations covering areas not well served. Many local/regional AM stations and even FM stations outside the top 50 markets go silent between midnight to 6 a.m.

My observation of 50 kW AM clear channel stations has been that it often has a first rate staff that attracts listeners with programming that lesser powered stations sometimes, but not always, measure up to. Many local and regional AM stations are involved in budget clone broadcasting which can make it tough to attract an audience outside the local service area.

What amazes me in this debate is that the "lazy quad" AM broadcast antenna is not being considered if broadcasters want to saturate their primary and secondary AM service areas. I believe the radiated antenna supports and 105 percent reflector

could be installed as a triangle to save on one supporting structure. Such a horizontal antenna would be non-directional. Power could be limited to what would protect co-channel and adjacent channel AM stations. It could be the antennas would need to be fed electrically out of phase for best coverage.

In such manner AM stations would not need to be concerned as much about low angle skywave distance coverage at night like when using an AM vertical antenna which reaches out to the ends of the earth. Also, the skywave skips over potential listeners while the skywave cancels the ground wave in other areas.

FM and TV broadcasters use cross polarization, so why not AM broadcasters?

Ron Erickson
Free-lance Technician
Essex, Iowa

Radio World

Vol. 19, No. 9 May 3, 1995

Editor-in-Chief.....Lucia Cobo
Managing Editor.....John Gatski
Associate Editor (News).....Thomas Pear
Associate Editor.....Whitney Pinion
Contributors.....Frank Beacham/N.Y.
Bruce Ingram, Pamela Watkins
Nancy Reist, Alan Haber
Technical Editor.....John Bisset
Technical Advisor.....Tom McGinley
Editor (International).....Alan Carter
Editor (Radio World Magazine).....Charles Taylor

Radio World (ISSN: 0274-8541) is published bi-weekly by Industrial Marketing Advisory Services, Inc., 5827 Columbia Pike, Suite 310, Falls Church, VA 22041. Phone: 703-998-7600, Fax: 703-998-2966. Second-class postage rates are paid at Falls Church VA 22046 and additional mailing offices. POSTMASTER: Send 3579 forms and address changes to Radio World, P.O. Box 1214, Falls Church VA 22041. REPRINTS: Reprints of all articles in this issue are available. Call or write Regan Deatherage, P.O. Box 1214, Falls Church, VA 22041, (703) 998-7600; Fax: (703) 998-2966. Copyright 1995 by Industrial Marketing Advisory Services, Inc. All rights reserved.

—PRINTED IN THE USA—

Next Issue of
Radio World
May 17, 1995

WANTED:

TECHNICAL EDITOR FOR RADIO WORLD

- Writing/editing experience required
- Strong background in radio production
- General knowledge of broadcast equipment and industry trends
- Must be willing to relocate to Washington, DC metro area

Send resume, clips, salary requirements (a must) to:

Radio World

Personnel Dept., P.O. Box 1214
Falls Church, VA 22041
No phone calls, please.

BE Drops RDS Products from Line

by Alan Haber

LAS VEGAS Broadcast Electronics (BE), the Quincy, Ill., manufacturer of RF and studio products for radio, has decided to bid RDS technology a fond adieu.

According to BE's director of RF and studio products, Tim Bealor, the company discovered that the promotional effort required to successfully market and support the product was not worth its while.

"For us to provide the product and to support it internally, and to support it outside of the factory, was really quite significant," said Bealor. "It wasn't quite worth the expenditure that was required to do the product and to do it effectively."

BE had been making available two versions of a single Radio Data System (RDS) encoder using technology on license from VG Broadcast in the United Kingdom.

Industry wide

Bealor said that BE initially hoped there would be a big demand and that the company could include RDS encoders in an FM package, adding to the viability of its transmitters.

"But RDS really hasn't come down that way. It's come down as a very industry-wide-promoted product. There are two or three main players and two or three other minor players, and we just didn't fit into that mode very well, so (staying with RDS) really wasn't practical," he said.

BE focuses its efforts on two major product groups, according to Bealor: digital and transmission products. On the surface, RDS appears to be a natural for feeding data from BE digital sources through BE transmitters and out into the field, but, Bealor said, "what we found is that most of the RDS interest was after-market."

Bealor also noted that RDS is often initiated as a promotional gimmick, either by the receiver manufacturers or by com-

It wasn't quite worth the expenditure that was required to do the product and to do it effectively.

panies that are giving away encoders to further the consumer electronics end of the RDS business.

BE spends the bulk of its marketing dollars on promoting transmitters, digital products and audio consoles, according to Bealor. "If we handle a small product, like our SCA generator or a stereo generator, it's something that we

promote on a very limited basis. People just have to call us and say, 'We know you have this, we like your products.'

And we just didn't find that happening with RDS."

There's nothing wrong with companies giving away encoders to promote RDS, said Bealor. In fact, such promotion of the technology, in turn, helps the industry.

But the primary people who will profit from RDS "will be the receiver manufacturers."

Promotional program

He also acknowledged that the Electronic Industries Association's (EIA) just-announced RDS promotional program, which hopes to put 500 stations on

the air with the technology within a year, has the potential to be quite good for RDS.

"You have to do this a step at a time," he said. "It's chicken and egg. You have to get receivers into the hands of consumers. That's the only way you're ever going to drive this thing in the long term."

But the consumers don't want RDS receivers if broadcasters are not sending out RDS signals. "Listeners need to get some value out of the receiver."

The EIA program will hopefully lead to both more broadcasters using RDS signals and, in turn, more listeners tuning in with RDS-equipped radios.

Bealor agreed that promotional efforts like EIA's, and those by companies like Denon, are good for RDS. "The only thing that's getting that technology moving forward are these kind of promotional things," he said.

BE may even rejoin the RDS fold sometime in the future. "It's always possible," he said.

USA Digital on the Road

► continued from page 1

require new or additional spectrum, according to USA Digital Radio officials who answered his questions.

Real-world tests

The Las Vegas bus ride featured a number of real-world challenges as it wound past tall glass and steel-encased hotels, concrete shopping centers and overpasses in Las Vegas. Each seat in the bus was equipped with Sony MDR-7506 professional headphones, along with a switch allowing listeners to switch back and forth from analog to digital at will.

On any number of occasions, the analog FM was loaded with typical symptoms of multipath, fading in and out.

According to Tony Masiello, head of engineering at CBS Radio, which is a member of the USA Digital Radio consortium, the KUNV antenna is mounted

away from the center of the city, prompting some of the worst multipath in town.

The digital signal, meanwhile, remained constant and clear—though in a couple instances, engineers on board one bus ride debated whether a particular sound

Probably the best news for USA Digital Radio came from members of the FCC who are ready to see a proposed rulemaking.

was an artifact or merely a drum stick hitting the side of a snare.

In any case, the differences between analog and digital FM were marked. The jazz music sounded full and offered what arguably could be considered CD-quality sound, although the analog signal sounded a bit brighter with signal processing. The digital signal was not processed.

On the AM side, there was no mistaking the differences between analog and the 15 kHz stereo signal of USA Digital Radio AM.

Glynn Walden, head of engineering for Group W, another USA Digital Radio member, made it clear to listeners that developers were still in the midst of exploring potential challenges with the AM signal. The receiver, he said, had only been in operation for two weeks prior to the NAB show demo.

"We're still trying to figure out why it sounds better at night, why power lines are impacting the signal's integrity," Walden said. Tunnels also have proven to create drop-out problems for the digital signal, he said.

Receiver chip

In another development, USA Digital Radio scored notoriety at NAB '95 with the announcement that National Semiconductor Corp. will produce integrated circuits for consumer DAB gear utilizing USA Digital Radio's technology.

"They will help integrate equipment into silicon chips, develop prototypes and work with consumer electronic companies," said Daniel S. Ehrman, vice presi-

dent of business and finance for Gannett, the third broadcast group part of USA Digital Radio.

Keith Jackson, a vice president and general manager at National Semiconductor, speculated that first-generation receivers would cost about 15 percent more than standard receivers.

Others impressed with the system, but still wanting to put it through more vigorous tests, were several Europeans closely involved with European DAB tests, where Eureka-147 is the system of choice.

"I want to invite our American friends to demonstrate the system in Germany," Frank

Müller-Römer, head of the German DAB-Platform committee said in an exclusive interview with RW.

"I think it is a question of having a real test," he said. Müller-Römer proposed a head-to-head test with Eureka-147 in Munich or elsewhere in Europe.

"We'd love to," Andrew said. "We'll take the challenge."

Andrew said the USA Digital Radio Consortium could prepare for a European test once official tests are concluded in San Francisco in the fall.

USA Digital Radio has maintained the system could be adapted for European broadcasting but was initially designed for the U.S. market.

Andrew went another step and offered to take the system to Canada, where officials are also backing Eureka-147.

Another key European broadcaster involved in DAB tests, Christer Grewin, head of transmission for the Swedish Broadcasting Corp., also is in favor of additional tests.

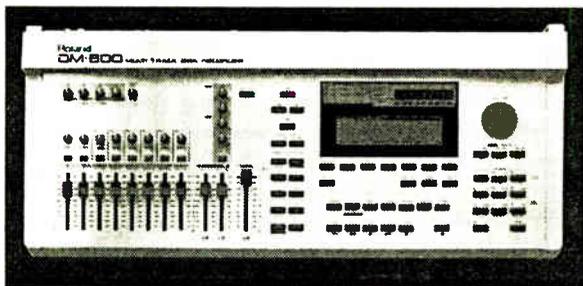
"USA Digital ought to be congratulated," Grewin said. "The system is working under certain circumstances. But they have done it. I would like to see them bring it to Europe for tests under the auspices of the EBU (European Broadcasting Union)."

The EBU previously invited USA Digital Radio to submit the system but developers were not ready.

Both Grewin and Müller-Römer questioned the ability of USA Digital Radio to accommodate as much ancillary data as Eureka-147. But Andrew said the data capacity will be 64 to 128 kbps.

CREATIVE PRODUCTION BEGINS HERE ...

with the Roland DM-800 Digital Audio Workstation. Compact, easy to use, with a price that blows the competition away.



Creative production sells, and with a list price of \$7,495.00 ... the DM-800 is all you need, all in one box and all at one low price!

Please call today for full color brochure and ABG system pricing.

WE ARE THE INDUSTRY STANDARD.



AUDIO
broadcast group inc.

SOUTHEASTERN SALES OFFICE
200 Fareway Drive, Suite 2
Smithfield, North Carolina 27577
Phone: 800-369-7623
Fax: 919-934-8120



AUDIO
broadcast group inc.

MAIN SALES OFFICE
2342 S. Division Avenue
Grand Rapids, Michigan 49507
Phone: 800-999-9281
Fax: 616-452-1652



AUDIO
broadcast group inc.

WESTERN SALES OFFICE
P.O. Box 1638
Palmdale, California 93550
Phone: 800-858-9008
Fax: 805-273-3321

YOU MAY ALSO REACH US ANYTIME VIA ELECTRONIC MAIL

cServe: 75371,144
internet: support@abg.com

Circle (212) On Reader Service Card

NAB Calls for Delay in EAS Start Up

by Thomas Pear

WASHINGTON The National Association of Broadcasters wants a one year extension of the FCC-mandated July 1996 deadline for implementation of the new Emergency Alert System (EAS) by radio stations.

The NAB, in a filing with the FCC, said that broadcasters should be put on an even keel with the cable industry, which has until July 1, 1997, to adopt digital technology that will replace the old EBS analog technology. For the first time, cable will be required to activate emergency warnings under the EAS.

"If the 1997 deadline is acceptable for cable then there does not seem to be any need for broadcasters to do it earlier," NAB Staff Engineer Dave Wilson said.

NAB officials argue that consolidating

the deadlines will help cable operators and broadcasters coordinate their EAS efforts.

The extension would also give stations an extra year to come up with somewhere between \$750 and \$2,500 for the new required EAS gear.

In addition, Wilson believes that pushing back the deadline would allow manufacturers to develop equipment that is stronger on cost efficiency and less expensive to broadcasters.

More economical

"The general idea is that the further back the deadline, the longer manufacturers have to make models of equipment that are better designed and more economical," he said.

But Helena Mitchell, the former EAS chief who recently started a new position as assistant to the Office of Technology

Bureau chief, said the reason for the 1996 broadcasting deadline is so that broadcasters can take advantage of unattended operation of their EAS equipment as soon as possible.

Mitchell notes that by July of 1996, an up and coming FCC rule that allows unattended operation of stations will most likely be in effect. But unattended operation of EAS equipment is written into EAS rules, not the unattended operation rules.

Extending the deadline, she stressed, would hinder stations from taking advantage of full automation because they would be forced to hire someone specifically for the purpose of monitoring EAS gear.

"Do they (stations) really want to pay an operator?" Mitchell asked.

The EAS office did not extend the broadcast deadline for other reasons including the opportunity for stations to quickly replace the 22-second weekly test with an unobtrusive weekly test. Although there would be a monthly test using the tone, it would be reduced to eight seconds.

Because the EAS weekly test would be unobtrusive—totally silent in some cases—engineers would not have to invade disc jockey air-time, said Chuck Condron, the chief engineer for Apollo Radio of Salt Lake City (KKAP-FM, KODJ-FM and KALL(AM)), who believes the FCC should stick with the 1996 deadline.

The 22-second tone would then be reserved for a real emergency, alleviating listener desensitization to the tone. A recent TFT survey revealed about 44 percent of all radio listeners turn off or change radio stations when the weekly EBS test comes on.

Pay attention

With the new system "when you have a real emergency people will pay attention," Mitchell said.

But Tim Hawkins, the program director of oldies/talk station KOKX(AM) and country station KOKX-FM in Keokuk, Iowa, disagrees that the longer tones necessarily hurt listenership. He said his station could use the extra year despite any advantages in incorporating the unobtrusive tests.

"It's not hurting us having the longer tone," Hawkins said. "We would rather have the time to get the equipment in and have it in right."

Also, in arguing for the 1996 deadline Mitchell noted that it allows for the installation digital EAS equipment, so stations trying to go fully digital would not be stuck with federally mandated analog EBS equipment for one more year, Mitchell noted.

One advantage of digital EAS gear, according to Condron, is its ability to

record broadcasted tests. If the equipment is triggered when no one is watching, broadcasters can read an LCD screen to see if an actual test was triggered or if the equipment was triggered by accident.

As for expense, Condron said perhaps FCC could grant waivers for stations having financial hardships. But Condron believes the EAS mandate by July 1996 would not pose a terrible financial burden on too many stations. "You have a year. It (EAS) is the rule, so save up your money," he said, adding that the advantages of EAS far outweigh the disadvantages.

Hawkins, however, said that although EBS needs an overhaul, "small stations need the extra time."

He said his operation only has a part-time engineer, so getting it EAS equipped may take a little longer than stations with full-time engineers.

FCC Stymies EAS Sales

LAS VEGAS A recent mandate from the Federal Communications Commission (FCC) stopped EAS manufacturers from selling their EAS equipment at NAB '95.

Five days prior to the start of the spring convention, the FCC released a statement saying that any current EAS gear is not type-accepted. The commission's rationale is that EAS is unfinished business.

The statement said that in light of several petitions for reconsideration of the December 1994 Report and Order implementing EAS, type-accepting EAS equipment would not be appropriate.

Not only did the commission's move prevent manufacturers from selling EAS equipment, it also restricted what they could tell NAB attendees about their systems.

In demonstrating its EAS system, TFT for instance, was forced to blackout portions of its product literature handed out at the convention that read: "Type-Certified under FCC's part 11."

Instead, TFT Marketing Director Darryl Parker was forced to put a disclaimer on TFT's new EAS system.

The sticker read: "This device has not been approved by the Federal Communication Commission. This device is not, and may not, be offered for sale or lease, or sold or leased until the approval of the FCC has been obtained."

The FCC also stopped Parker and other EAS manufacturers from quoting prices to potential customers. "I am prohibited by law from giving you a price," he told RW during a product demonstration.

Despite the new restrictions, Parker displayed a positive attitude at the show, speculating that the commission will deny the petitions for reconsideration within the next month or so.

Sage Alerting President Gerald LeBow is one of the petitioners. He asked the FCC to include suggestions for setting up RBDS in its EAS Report and Order.

He said he is not surprised the FCC halted the sale of EAS equipment. "It does not make sense to certify equipment until the rules are finished," he said, adding that once the final rules are written, "then it makes sense to type-accept the equipment."

LeBow, by the way, also had to display a disclaimer on the RBDS system he exhibited at NAB.

Some manufacturers at the show viewed the FCC halt of EAS sales as a wise move.

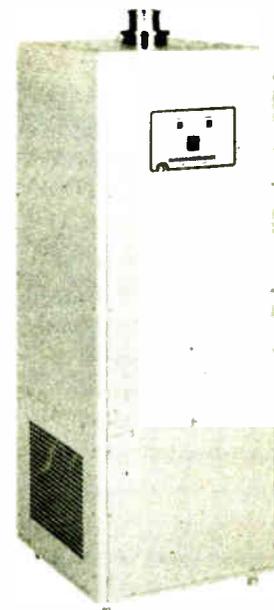
Dan Rau of Burk Technologies expressed concern that some manufacturers are moving too fast to develop encoders and decoders.

In contrast to TFT and Sage, Rau only brought brochures promoting Burk's EAS gear. "We saw too many people in a hurry and too many questions that need to be answered," he said.

Jim Gorman of Gorman-Redlich did bring an EAS equipment display, but he supported also the FCC move.

"The delay could be put to good use—to finalize and clarify some of the technical specifications," he said.

Question:
Ever wonder why transmitter manufacturers operate Altronic dummy loads at NAB and other trade shows?



Answer:
The best performance and the most dependable dummy loads built.



ALTRONIC RESEARCH INC.

WATER AND AIR COOLED MODELS FROM 1000 WATTS TO 1,500,000 WATTS

P.O. Box 249
Yellville, AR 72687
(501) 449-4093

Encore Series - DISTRIBUTION AMPLIFIERS
Isolate, balance and set levels precisely

A small price to pay (for real protection)

AUDIO TECHNOLOGIES, INC. 328 Maple Avenue, Horsham, PA, 19044 • (215) 443-0330
Call or write for free detailed brochures. FAX (215) 443-0394 • 800-959-0307

ISDN Helps Wake up Hong Kong

LAS VEGAS Live from Las Vegas—It's ISDN.

The digital technology shone brightly at many events during NAB '95, including a live international remote involving Broadcast Supply Worldwide (BSW), Telos, U.S. Sprint and Hong Kong's 104 FM Select.

Beginning on April 9 and running through April 12, 104 FM Select air personalities Steve James and Harry Wong originated their morning drive-time show in the Far East island city using the Telos Zephyr and Sprint Integrated Services Data Network (ISDN) service.

"This is outrageous," said 104 FM

Select air personality Harry Wong, expressing his amazement with the setup. "It sounds just as if we are in the studio."

Las Vegas to Hong Kong

Wong was referring to ISDN providing high-quality audio halfway across the globe. The Las Vegas-to-Hong Kong ISDN path was as follows: The local Centel carried the signal to U.S. Sprint in Las Vegas. Sprint carried the signal to New York and handed off to Mercury, a British carrier. Mercury carried the signal to London and on to Hong Kong, where it handed off to Hong Kong Telecom for local routing to 104 FM Select.

The 3:30 p.m. PDT broadcast on Sunday aired the Wong and James program live to Hong Kong's approximately 6 million early risers, who were listening to the remote at 6:30 Monday morning, Hong Kong time.

On the convention exhibit floor attendees heard studio monitors blare a mixture of programming in English and Cantonese—the only such bilingual station in Hong Kong.

It was the first live ISDN remote broadcast from the United States to Asia, said station owner Clayton Caughill.

Caughill contacted BSW Marketing Vice President Tim Schwieger last fall

after the World Media Expo in Los Angeles about doing the remote from BSW's NAB exhibit booth. Telos provided its Zephyr ISO/MPEG Layer III encoder, and Sprint provided the necessary ISDN connection free of charge.

The benefit to the station, said Bob Palitz, a co-owner of 104 FM Select, is that with sponsorship from the Las Vegas Sheraton-Desert Inn and Northwest Airlines, the station achieved this first at very little cost. The programming itself, according to Palitz, is fascinating to Hong Kong residents who are intrigued by Las Vegas.

For Telos, the remote served as an effective attention getter, according to Telos Public Relations Director Cate Cowan, adding that seeing a remote to Asia could cause broadcasters to take a second look at the effective use of ISDN.

"It is amazing," said Telos President Steve Church. "You have this black box with a keypad, you press buttons, and you have CD-quality (audio) around the world."

BSW brought the concept of ISDN closer to broadcasters by giving stations a free station ID recorded from Los Angeles by Joe Cipriano via the digital technology. Cipriano is known as the voice of the Fox Television Network ☺

Quello on Paving Road To Digital

by Whitney Pinion

LAS VEGAS Engineers will lead the broadcasting industry through the digital realm and into the future, according to FCC Commissioner James H. Quello.

The longtime commissioner spoke at NAB '95's Broadcast Engineering Conference opening ceremony.

"Everyone should realize that engineers, with their technological expertise, are the prime inventors and developers of advanced telecommunications technology," Quello said. "It will be engineers, not sales or programming executives, who will lead the way in bringing to the public ... mind-boggling advanced possibilities."

As these new broadcast technologies emerge, they raise a challenging question that the FCC must answer: If broadcast spectrum can potentially be used to offer a number of broadcast and non-broadcast services, what should the commission's regulatory response be?

Quello said that the FCC has three basic options: lead, follow or get out of the way. "Believe it or not," he said, "the right answer is probably a combination of all three."

To lead, he said, the commission should establish the rules necessary to allow broadcasters to utilize the full potential of their spectrum in a fair and reasonable manner, allowing broadcasters to use their existing spectrum flexibly to offer the services they feel best respond to marketplace demand.

There are limits, however, that Quello said he would place on this flexibility. "To the extent broadcast channels are being used to offer for-pay, subscription-based services, I think it both reasonable and consistent with the federal scheme of

continued on page 13 ►



Its mother was an accountant. Its father was a Maserati.

Harris DX Series AM transmitters are truly a breed apart.

On the one hand, DX Series transmitters are a solid investment. In fact, their ability to quickly pay for themselves has been proven in more than 500 installations worldwide. Efficiency is the key. Typical overall efficiency up to 86 percent dramatically reduces energy costs and practically pays for the transmitter itself.

Solid state design — including Harris'

patented Digital Amplitude Modulation technology — eliminates costly, unpredictable tubes, dramatically reducing the cost of upkeep and virtually eliminating unscheduled off-air time.

On the other hand there is performance. High quality, FM-comparable audio performance takes the Harris DX Series right to the top of its class. And you can count on performance that lasts. The MTBF rating for Harris RF modules is 6 million hours.

In short, the DX Series offers everything you want in a solid state transmitter, in power ratings from 10 kW to 1000 kW (and beyond). Call us today to find out how to put the performance and business sense of the DX Series to work for you.

U.S. and Canada: 217-222-8200
or fax 217-224-1439

International: 217-222-8290
or fax 217-224-2764

**HARRIS
ALLIED**

© 1994 Harris Corp.

Circle (124) On Reader Service Card

World Radio History

**a
message
to am
stations
from
frank foti**

Dear Fellow Broadcaster,

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

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

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

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

The true test of a processor is how it sounds. When you listen to the Unity AM, you will hear the improvement you seek over your current processing.

Best regards,



the unity am
the world's **best sounding am processor**



CUTTINGEDGE

2101 SUPERIOR AVENUE • CLEVELAND, OHIO 44114 • TEL: (216) 241-3343 • FAX: (216) 241-4103

Circle (145) On Reader Service Card
World Radio History



Production Directors. Engineers. Even newsroom people swear by the DSE. Which is probably why these stations with one DSE soon wind up with two. Or even three. Learning is fast. Editing is easier. Everybody is more productive. Because not only do your station's multiple personalities get up to speed faster, they stay up there. To see it in action yourself call 1-800-622-0022 for a demo. The DSE 7000. The New Speed Of Sound.

The Only Digital Editing System Created For Multiple Personalities.



"My advice: if you're gonna buy one, buy two. Or you'll never keep the peace."

*John Buffalo, Chief Engineer
KSON, San Diego*

"As quickly as you can conceptualize it, the DSE can do it. Or undo it."

*Bill Schultz, Production Director
103.5 WYNY-FM, New York*

"Radio lives by critical deadlines. With the DSE, time is on my side."

*Barbara Sherry, Production Director
KQQL FM, Minneapolis*



"It's the only digital system in radio that lets you edit by ear. What a concept."

*Ross Wilson, Production Director
K101, San Francisco*

"You install it, it runs, the production department is happy. Next problem."

*Dan Metter, Chief Engineer
WXDE/WFBQ, Indianapolis*

"It gives our air talent so much creative freedom, they won't use anything else."

*Byron Swanson, Chief Engineer
KKRZ, Portland*

orban

H A Harman International Company

For a demo in the U.S. call Harris Allied Broadcast Center: 1-800-622-0022
Or contact Orban: Phone 1-510-351-3500 Fax 1-510-351-0500

Circle (92) On Reader Service Card
World Radio History

EIA to Seed 25 Markets

► continued from page 1

In exchange for the encoders and radios, EIA said the stations will provide advertising or underwriting credits. EIA will use these credits to run advertisements and educational messages informing listeners about RDS. EIA said it expects to receive \$5,000 in credits from each station, a potential total of \$2.5 million.

The potential investment in the program, from funds provided by manufacturers and matched by EIA to the advertising and underwriting credits provided by the radio stations, could be as high as \$3.5 million—a strong vote of confidence in RDS.

Promoting technology

Throughout the program, EIA will help retailers to promote RDS technology and products to consumers, and it will communicate to advertisers and advertising agencies the technology's promotional benefits.

Lynn Bruder, general manager of WPLY(FM), one of the nine area radio stations on-air with RDS prior to the EIA program, called RDS a "revenue booster for the station." In addition to using RDS radiotext to announce song title and artist information and to promote WPLY's call letters, she said, "We can promote advertisers and club nights."

Shapiro noted that the more station managers learn about the technology, the more they are excited by its revenue enhancement possibilities.

The EIA also found that when approaching stations in Philadelphia to join the program, they often had to consult with owners in New York, Washington or elsewhere. As the owners are convinced about the possibilities for RDS in one market, they are keen to add

RDS service to their entire group of stations.

Before the EIA program began, six Philadelphia FM radio stations were incorporating RDS into their broadcast mix—WFLN, WHYI, WMMR, WRTI, WPLY and WXPB.

New RDS stations in Philadelphia, thanks to EIA's efforts, are: WUSL, WIOQ, WWDB, WMGK and WXTU. In addition, three New Jersey stations that serve the Philadelphia market—WCHR, WPST and WKDN—are RDS equipped.

Consumer awareness

EIA's program kicked off in a big way: The association co-sponsored with WPLY an RDS-enabled MusicBoard billboard on the well-traveled I-95. Further promotional support for the program and for RDS was provided in Philadelphia in the form of a seminar at Worldwide Stereo, where consumers saw demonstrations of RDS radios and learned about the technology.

According to a recent EIA survey, public awareness and interest in RDS is on the rise. The survey showed that there was a 6 percent increase in overall national awareness of the technology between spring 1994 and spring 1995—16 percent of U.S. adults are now aware of RDS, according to EIA.

The survey also showed that more U.S. adults are "very interested" in owning portable radios with RDS than ever before: a 7 percent jump in interest, from 11 percent in spring 1994 to 18 percent in spring 1995, was recorded.

EIA's Shapiro noted that as more people became aware of RDS technology, the more they wanted it.

And U.S. adults are hot about other RDS features, chiefly the display of station call letters—20 percent (a 12

percent increase from spring 1994) are interested in this feature, according to EIA, which should make station owners, who spend a lot of time and money promoting their call letters to listeners, very happy.

Interestingly, the survey also found that U.S. adults are interested in seeing advertising displayed on RDS radios—in fact, there was a 10 percent jump in interest in this feature from spring 1994 to spring 1995.

Dynamic RDS on the Road

PHILADELPHIA As RDS achieves greater penetration into the U.S. marketplace one question sure to arise is the difference between car displays and home displays.

Home stereo tuners, such as those offered by Denon, incorporate a dynamic display, which scrolls radiotext information across a screen. With a dynamic display, long messages about the music being played or about advertising or station events can be displayed with ease.

This is not the case with the static displays currently available for cars. Denon Smart Radios, for example, have an eight-character message area that displays a single message at a time. Delco receivers use a two-line, 16-character display that breaks RDS information into pages that can be scrolled through.

While the eight-characters of the Denon radio is perfect for displaying call letters—a prime reason broadcasters and the public are interested in RDS—it does make it difficult to use RDS to provide song title and artist information.

Second-generation mobile RDS receivers may incorporate a means to store and later retrieve the scrolled information, but scrolling displays for the car seem unlikely. However, manufacturers are certain that other RDS features will offset the lack of a scrolling display in the car.

Almon Clegg, chair of the RBDS subcommittee of the Mobile Electronics Division of the EIA Consumer Electronics Group, noted that features such as traffic announcements, the ability to lock to stronger translator facilities or to scan for a specific format on a cross-country drive, make an acceptable tradeoff for the lack of a scrolling display in the car.

Part of the hesitancy to include dynamic displays in car receivers is due to safety concerns. There is a feeling among manufacturers that an active display that is not under the complete control of the driver would potentially be distracting and could lead to accidents, and culpability for the manufacturer.

—T. Carter Ross

IBM Trains Engineers

by Whitney Pinion

LAS VEGAS IBM will give certificates to engineers who complete its workshop sessions on DOS, Windows and computer networking at the Texas Association of Broadcasters (TAB)/Southwest Region of Society of Broadcast Engineers (SBE) annual convention in San Antonio Sept. 30 and Oct. 1.

"This will be the first time a computer company has given an extensive workshop on computers to broadcasters—and it is long overdue," said Gil Garcia, chief engineer for Clear Channel Radio's Austin, Texas, stations.

The computer workshop is the brainchild of Garcia, who is coordinating the conference with John Furr, owner of John Furr and Associates of San Antonio, and Mike Wenglar, vice president of engineering for KVUE-TV in Austin.

Each session, presented by IBM training staff, will be divided into two parts, with extended exhibit hall breaks before and after each part. During these breaks, engineers will have the opportunity to meet with broadcast equipment vendors from all over the country.

The Saturday morning session will be aimed at understanding computer hardware and software. Subtitled "How to Fix the Darn Thing and Make It Run," this session will be a discussion of DOS and its programs, including how to make a bootable disk, new programs in the MS-DOS 6 series, Disk Doctor, virus scan, interlinking computers, AUTOEXEC and CONFIG.SYS, and undeleting, copying, moving and editing files.

The Saturday afternoon session will be a course in understanding Windows, including setup, installation, running programs, icons, graphics, memory space, SoundBlaster-type audio cards, CD-ROM, printer setup and software, hardware and special monitors for Windows.

The Sunday morning session will focus on networking computers, specifically Novell and other networking systems, workstations, servers, LAN cards and cables.

On Sunday afternoon, participants will learn about the Internet and how to ride the information superhighway and the World Wide Web. This session will address questions such as how to get connected, the equipment needed and the cost involved, as well as information about modems and fax software and hardware.

A question and answer period will follow each session.

FULLY AUTOMATED

TIME & TEMPERATURE

Another Wizard For Windows™ exclusive!

This amazing feature plays the correct time and temperature readings in your DJ's voice automatically! Simply schedule a Time or Temperature Announcement into your log and let the incredibly flexible Wizard For Windows™ handle the rest. Satellite liner calls can also be replaced by a time spot, temperature spot, or both!

Wizard For Windows™ is the ONLY true multi-user, fully networked system, providing the ultimate in ease of use, impressive gains in productivity, and superior sound quality.

For more information about radio's premier digital automation system, contact Prophet Systems, Inc.

1-800-658-4403

Outside the U.S. contact Broadcast Solutions Pty Ltd.
in Sydney, Australia at (02) 439-6662.

Wizard For Windows

The Flexible Digital Automation System featuring Windows and Novell

Windows is a registered trademark of Microsoft Corporation, Novell is a registered trademark of Novell, Inc.

Circle (208) On Reader Service Card

MES Offers Clues to Future of RDS

by T. Carter Ross

PHILADELPHIA The fifth annual Mobile Electronics Show (MES) may have been the venue the Electronic

Industries Association (EIA) selected to initiate its nationwide campaign touting RDS technology, but the presence of RDS/RBDS gear on the floor was slim.

But consumer interest and hype are sure to spark receiver manufacture in the near future.

The EIA did give RDS a presence with its array of RDS receivers including

on offer in the United States. The Becker receiver on display is being built for Porsche and will be included in Porsches sold in the states in the near future.

The JVC receiver being shown was designed for the European market, but the EIA hopes JVC will decide to offer a slightly modified U.S. version in the near future.

In addition to the EIA stand, Denon showed its full line of Smart Radios. These RDS-equipped receivers feature in-dash CD or cassette decks and are being heavily promoted by Denon, which has joined with the EIA to promote RDS to the U.S. public. MES was the official inauguration of a print advertising campaign for Smart Radio, featuring the artwork of multimedia artist Hugh Syme.

Pioneer, another major backer of the EIA program, did not have an RDS receiver on display, although models are available in Europe and an early U.S. version was at the show.

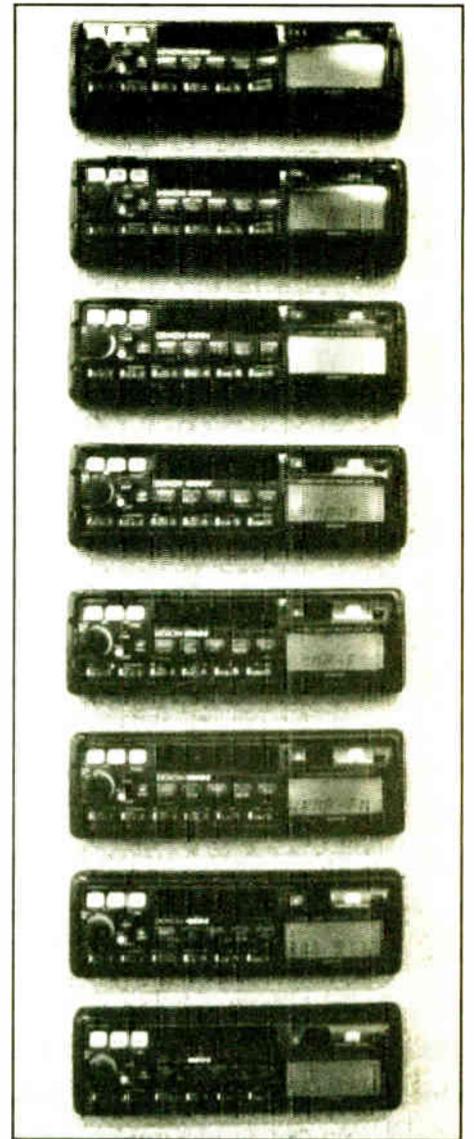
"We have the technology," said Brian Towne of Pioneer, and, as the company is making significant financial contributions to the EIA program, it is certain that Pioneer will offer RDS products here "in the near term."

Others hesitant

Other manufacturers with European RDS equipment were present at MES, but none showed receivers for the U.S. market. Blaupunkt, which offers in Europe more than 20 RDS-equipped mobile radios, is waiting to see the outcome of the EIA's efforts before bringing its RDS radios to the United States.

"Blaupunkt is ready if broadcasters are ready," said Frank Honold, marketing manager for the company. If the EIA program succeeds in sparking public interest in RDS, Blaupunkt will offer RDS car receivers in the states, he said.

According to the European RDS Forum, Clarion, Grundig, JVC, Kenwood, Panasonic, Philips and Sony also offer



Denon's Array of Smart Radios

mobile RDS receivers in Europe, and the EIA hopes that as more stations go online with RDS over the next year, more of these companies will modify their European product and offer it in the States.

One trend that may bode well for the future of RDS in the states was the prevalence of global positioning systems (GPS) at the show. Toshiba, Kenwood, Sony, Pioneer, Sanyo and others had CD-ROM and satellite-based GPS systems on display. These systems may whet consumer interest in GPS services, providing fertile ground for RDS-based differential GPS service.

Differential GPS (DGPS), which is in use in Sweden and is being tested in Australia and the United Kingdom, uses information from the RDS subcarrier signal to determine the position of a driver.

Sales trends

While the potential for RDS may be good news for broadcasters, there also were a number of new products available that would keep drivers from listening to the radio. In-dash cassette decks and CD players were offered by a number of companies, as were several in-dash MiniDisc players.

According to an EIA survey released at the show of mobile electronics sales trends, 30 percent of U.S. households have in-dash cassette decks and 15 percent have car CD players. In 1994, cassette decks and CD players were the most widely purchased aftermarket car audio products.

Most ominous for broadcasters is the number of respondents who plan to buy a car CD player in 1995—10 percent.

The most common reason for purchasing new mobile sound equipment was to "get better sound quality" at 33 percent, followed by to "upgrade stereo technologies" at 13 percent.



The Pennsylvania Convention Center was the site of the fifth annual MES exhibition.

Industries Association (EIA) selected to initiate its nationwide campaign touting RDS technology, but the presence of RDS/RBDS gear on the floor was slim.

Instead, 211 exhibitors offered equipment ranging from cell phones and car alarms to in-dash CD players and speaker systems to the 5,266 attendees.

Denon home and car receivers, as well as mobile units from Delco, Grundig, JVC and Becker. A small MusicBoard-style billboard also was at the stand, displaying RDS messages.

The EIA stand highlighted RDS equipment currently available, although only Delco, Philips and Denon have product

PROOFS IMPROVED

FM and TV-BTSC AUDIO PROOF TESTING is reduced from hours to minutes with System One from Audio Precision... Automatic proofs run properly at constant deviation, plotting the required generator amplitude... and when finished, the results are stored in graphic form for your records.

SPLIT SITE proofs are simple with System One's available separate generator and analyzer configuration. With immediate capability to view and control both instruments, it's like being in two places at once.

THE REST OF THE TIME System One is the universal audio test set for maintaining any audio device or channel... STLs, consoles, carts, cassettes and RDATs, digital recorders and workstations... System One is the only product that can completely test both your analog and digital audio.

Call 800/231-7350 for our 36 page color catalog... and when you're ready our representative will arrange for an on-site demonstration.

Audio precision

P.O. Box 2209
Beaverton, OR 97075-3070
503/627-0832, 800/231-7350
FAX: 503/641-8906



Circle (119) On Reader Service Card



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 (75) On Reader Service Card

Digital Delivery Service in Making

by Thomas Pear

LAS VEGAS VirteX, a new joint-venture capital enterprise intent on making a name for itself in broadcasting, and Infinity, the largest radio group owner in the U.S., have teamed up to give the industry what the two groups call a new programming and information superhighway distribution service—MUSICAM EXPRESS.

The alliance will provide a digital architecture through which radio networks, programmers, record companies and advertising companies can instantly deliver CD-quality audio and information to 3,500 stations. The system will be in place by the fall.

"This will enable radio to better compete in the future than it ever has in history," Infinity President Mel Karmazin said during a press conference on the NAB exhibit floor at the Corporate Computer Systems (CCS) booth.

Karmazin, VirteX Chief Executive Officer Paul Donahue, and CCS President and VirteX Chief Technical Officer Larry Hinderks formally announced the joint venture on April 10.

The value of the deal was not disclosed. "None of this would be possible without

the financing of Infinity," Donahue added. The joint venture, however, does not give Infinity any control in VirteX, he said.

The announcement comes on the heels of the VirteX acquisition of CCS, a company extensively involved in developing the MUSICAM audio compression technology. CCS holds the copyright and license for MUSICAM in North America.

To implement MUSICAM EXPRESS, VirteX will distribute computer terminals to each station that can download digital programming from high-speed digital circuits like Integrated Services Data Network (ISDN), digital audio broadcasts, digital satellite broadcasts and

computer network file servers.

Hinderks defined the move as an "explosive use" of CCS-developed technology. MUSICAM EXPRESS also will use the DaX distribution platform of California Digital, a company owned by Donahue and one on which he built VirteX.

MUSICAM EXPRESS will provide at no cost the hardware needed to digitally link stations with syndicators, programmers and advertising agencies. The network will include a teleport facility in Minneapolis.

The advantage for VirteX and Infinity over other services is that MUSICAM EXPRESS will have the ability to get advertising to the radio stations more rapidly and more

efficiently, said Karmazin.

Karmazin said he would like to see other broadcasting giants join the digital bandwagon.

"I hope CBS and Capital Cities/ABC will join us," he said. "We want to make this available to radio stations everywhere," Karmazin said.

Infinity currently owns 26 radio stations, 22 of which are in the top 10 markets, and has an acquisition pending for one additional top 10 market station. Infinity also has an investment in and manages Westwood One, the nation's largest producer and distributor of radio programs in the U.S. Westwood's holdings include Mutual Radio.

□ □ □

Alan Carter, assistant editorial director for audio, contributed to this report. ☺

Quello on Tomorrow

► continued from page 8

spectrum auctions to require that broadcasters pay a fair value for that use," he said.

"Fair value" does not necessarily mean that broadcasters bid at auction for their spectrum but rather the fair value be set by the value of the spectrum auctioned for similar use.

"By 'fair value' I do not mean that broadcasters should be required to broadcast certain types or amounts of programs, or give up free airtime for political broadcasters, or be made to offer up any other content-based *quid pro quo* on the altar of commission regulation," Quello said.

After taking the lead in this manner, he said, the FCC should step back and follow, as "nothing regulates better than the marketplace."

Finally, the FCC should "get out of the way," validating the results of broadcasters' experiments in offering new services.

Quello said that this new regulatory model is necessary to ensure that broadcasting plays a significant part in shaping the information superhighway.

A lot of the talk about convergence and the national information infrastructure focuses on the telephone, cable and wireless telecommunications industries. However, Quello said, "our broadcasting system is the best in the world, free to the public and very much a part of this emerging infrastructure."

He added that the advantage of over-the-air media are so obvious that they are often taken for granted. "But when you step back and look at the information superhighway of the future, it's very obvious to me that broadcasting has a strong participatory role to play and a very bright future." ☺

Turning 30 Is Not As Difficult As You Think

With this new addition to Continental's 816R Series of FM Broadcast Transmitters, there's no need to think turning 30 will make life more difficult. Features like our patented "Soft-Start"™ SCR circuit, automatic power output control, automatic filament voltage regulation, automatic power interrupt cycle, and dual VSWR protection circuitry all help keep this 30 kW running at peak performance!

And Continental's 816R Series 30 kW is easy to keep in shape. Major components and assemblies are located for easy maintenance access, including the slide-drawer

Continental 816R Series 30 kW FM Transmitter

mounted, solid state IPA. To reduce operational complexity, our 30 kW features complete front panel control and status indicator arrays, breakers, and performance monitors. Unlike "older" competitive units, with designs requiring external help, Continental's 30 kW is completely self-contained. The power supply and harmonic filter are internal to the positive pressure cabinet, significantly reducing floor space and installation requirements.

So turning 30 is not really as difficult as you might think... not with Continental's 816R 30 kW FM Broadcast Transmitter!

11.94-105

For nearly 50 years, Continental Electronics has provided excellence in broadcast transmission products worldwide. Refuse to compromise... call Continental first!

Continental Electronics Corporation
P.O. BOX 270879 • DALLAS, TEXAS 75227-0879 • 214/381-7161 • FAX: 214/381-4949

Circle (135) On Reader Service Card

BOTTOMLINE BROADCASTER

Time-Saving Tips for Tracking Phase

by Jim Murphy

MORGANTOWN, W.Va. In the early days of stereophonic broadcasting, many new phrases and concepts crept into the world of the broadcast engineer. L minus R, sums, matrices, pilot carrier and subchannel modulation quickly became common terms around the radio station.

Another expression, widely ignored, was channel phasing. This overlooked requirement resulted in many consoles coming from the factory with out-of-phase signals at the output terminals. Not knowing exactly where an out-of-phase condition originated drove many technicians to frequently indulge in the consuming of certain liquids somewhat stronger than tea or lemonade.

One method of tracking the phase of a signal came from a major manufacturer and involved the use of a zener diode wired across the audio generator output. When adjusted properly, this arrangement produced a waveform having a flattened top on one of the peaks. Once the reference was determined, i.e., which top was flattened with a particular oscilloscope, you would proceed through the amplifier stages until discovering the phase reversal.

Phase chasing

If this was within the console architecture, the procedure was to reverse the wires where the amp or preamp was connected to the bus. Then, you would move further along until all phase reversals throughout the chain were corrected. Then, to make things electrically proper, the process was repeated on the other channel, which was more than likely flipped out of phase at some point by the first procedure.

The phase checker circuit shown in Figure 1 would have come in handy in those times. Actually, there is no reason

for not having the circuit back then, other than the fact that channel phasing was not perceived as a problem, and was almost completely ignored. Nowadays manufacturers use strict quality assurance programs, and our channel phasing problems are usually limited to external wiring harnesses and our own cabling schemes.

With a few parts from the junk box and a bit of ciphering, you can come up with a foolproof way of checking channel phasing while keeping the costs next to nothing. And for the students, another dab of our handy little analytical friend, ohms-per-volt, to simplify the process of determining meter multipliers and shunts. Because the phasing meter utilizes a

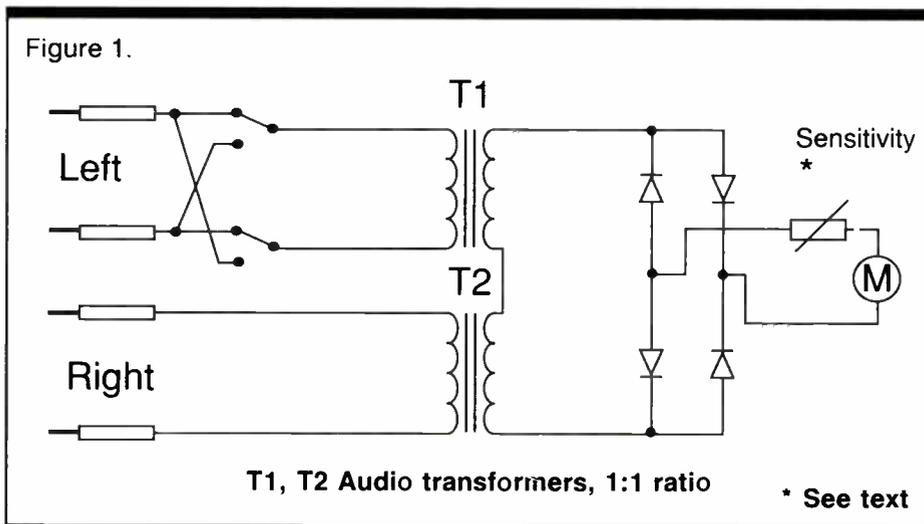
the voltage across the meter terminals, because they are in parallel. This leads to the formula $I_{\text{meter}} \times R_{\text{meter}} = I_{\text{shunt}} \times R_{\text{shunt}}$, because $E = IR$. Rearranging terms, the formula becomes:

$$R_{\text{shunt}} = (I_{\text{meter}} \times R_{\text{meter}}) / I_{\text{shunt}}$$

Using this, you can quickly calculate the unknown value (of the shunt). This is, however, no different from calculating the value of a multiplier resistor, and, as will be shown, it can be done as though you were constructing a voltmeter.

Knowing the basics

Whatever method used, first you need to measure the meter's resistance. This is not a straightforward procedure, for if



meter circuit, it seems like a good place to discuss the design of voltmeters and ammeters.

Theory review

Let's review some meter theory. Most textbooks treat voltmeters and ammeters as two completely different circuits. In the traditional sense, ammeter circuits are developed using the proportional method. First, the formula $E_{\text{meter}} = E_{\text{shunt}}$ that shows the voltage across the shunt equals

you place your VOM probes across the terminals, you will promptly wrap the needle around the right-hand peg. Instead, use a low voltage source and add enough series resistance to limit the current to the full-scale reading.

Using a single flashlight cell, circuit current can be limited to 50 μA by 30 kilohms. Use a 50K pot in series, connect the meter and carefully adjust the pot for full scale deflection. Next, place a 100 ohm variable resistance across the meter terminals and adjust until the meter reading drops to half-scale. Then, remove this resistance and measure it. Your reading will be the same as your meter's internal resistance.

Now, try both methods. Suppose you wish to measure a current path that will have a maximum of 5 amperes. Further, imagine that the only meter you have has a full-scale deflection of 50 μA . Where do you go from here? First, develop the parameters for the formula, then calculate. In this example, you find that the meter has a resistance of 25 ohms. Then, using the current formula, $R_{\text{shunt}} = (I_{\text{meter}} \times R_{\text{meter}}) / I_{\text{shunt}}$, you plug in our numbers, therefore $R_{\text{shunt}} = (0.000050 \times 25) / 5 = 0.00025$ ohms.

Now, for the next method.

The ohms/volt number for the meter circuit is $1 / 50 \times 10^{-6}$ or 20,000. This tells you that for every 20,000 ohms in a circuit, 1 volt will be dropped. Therefore, 10,000 will drop 0.5 volt, 1,000 will drop 0.05, 100 will drop 0.005, and so on. The 25 ohm meter then drops 0.00125 V across the terminals for full-scale deflection. All you need to do now is calculate a resistance that will drop 0.00125 volt when 5 amps are flowing through it. Using ohms law, you arrive at $R = 0.00125 / 5$ or 0.00025 ohms, which agrees with the proportional formula. In either case, this low resistance might be difficult to find, and usually

means cutting special resistance wire to a precise length.

Another way involves calculating the shunt resistor first, then constructing a small multiplier to give the proper meter reading. Take your five amp circuit. If you place a 0.1 ohm resistor—a common value—in the line, it will drop 0.5 volts when 5 amps are flowing. You now construct a voltmeter using the ohms/volt method. Because your meter circuit is 20,000 ohms/volt, you need to have $20,000 \times 0.5$, or 10,000 ohms in the circuit. If you subtract the meter's 25 ohms, you need 9,975 ohms of series resistance.

This approach requires precision resistance to maintain accuracy and stability. Even so, it might be easier to string together the 9,975 ohms rather than construct the 0.0024 required for the first method.

Both methods show that the same approach can be made when designing either an ammeter or a voltmeter. Either way, it is simply a voltage drop in proportion to current with a multiplier circuit constructed to read the drop.

Now, back to the phase meter. You should try to find a sensitive meter, 50 or 100 microamperes full scale, if possible. With this sensitivity of 20K or 10K respectively, you can quickly calculate the series resistance needed by using the ohm/volt method.

Once the two signals from the transformers are placed across the bridge, the sum of the DC pulsating voltage will be: $2 \times 2 \times V_{\text{peak}} / \pi$. Assuming your maximum audio signal to be +10 dBm, that represents an RMS value of 2.45×2 (both channels), our average DC level will be $(4.9 \times 1.414 \times 2) / 3.14159 = 4.41$ VDC. With a 50 μA meter, (20 Kohm/volt) we would need $4.41 \times 20\text{K}$ minus the meter resistance, which is negligible.

Use a 100K pot. Or with a 100 μA meter, you'll need a 50K pot. If your meter has a different value, calculate your resistance accordingly. Also if your transformers have something other than a 1:1 turns ratio, figure your voltage using the necessary step-up ratios. Nearly any transformer around 600 ohms will do, as long as the two have approximately the same electrical characteristics. The diodes can be a fast switching silicon type, or a germanium, such as a 1N34 or 1N60.

Lead labeling

Be sure to clearly identify your leads. A foolproof way is to connect left and right probes in parallel to a source, with the switch in a "normal" position. If you get no reading whatsoever, your probes are out of phase. Reversing them will result in full sensitivity. Mark them clearly so there are no mistakes.

I placed some marks around the perimeter of my sensitivity control to show +10, 0, -10 and -20. That way I have a rough idea of the level as well. Lacking the proper VU ballistics, the meter will not read dynamic audio accurately, but will give you a reasonable indication of level. Phasing errors are quickly spotted if you use a mono source when tracing. The normal-reverse switch makes it convenient to identify a phase reversal.

The phase meter is just another time saver lurking in your junk box waiting to be assembled.

□□□

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

FM FLEXIMOD - destined to become as indispensable as your Swiss Army knife.

Based on 10 years of experience in composite processor design and computer models of human hearing perception, the FM FlexiMod from MicroCon Systems is the FM signal management system that will add sparkle and body to overprocessed, multi-generation audio, and enhance all program material for a consistent, dynamic on-air sound.



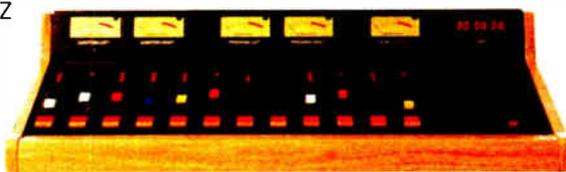
- * Can be configured in a wide variety of operating modes including both broadband and high frequency limiting applications with either and internally generated and phase locked stereo pilot or pilot reuse from the stereo generator.
- * The only processor with the "c-limiter", a hybrid limiter-clipper with extremely low second harmonic distortion products.
- * Combines high-speed limiting and ultra clean, low distortion-clipping for absolute modulation control.
- * List Price: \$1395.
- * Available direct from MicroCon Systems or from your broadcast equipment dealer.
- * 30-day money-back guarantee.
- * Demo units available.

For further information contact:

Jim Somich, President, MicroCon Systems Ltd.
1208 Stoney Run Trail, Broadview Heights, OH 44147
(216) 546-0967

Circle (202) On Reader Service Card

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-Broaddus 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. Chapman College City of Louisville Clements Job Corps Center Cleveland Radio Reading Service College of Staten Island College of William & Mary Columbia College Columbia School of Broadcast Comco Broadcast Community School District 6 Compass Corporation CR Broadcasting Inc. Crouse-Kimzey Company De La Hunt Broadcast Group Defense Electronics Supply Dordt College Drexel University Bit Digital SA Eagle Rock Broadcasting Company East Stroudsburg University Eastern Kentucky University Eastern Montana College EIES of New Jersey Elon College Edinboro University Financial Broadcasting Network Florida's French Broadcast Network Full Compass Systems George Mason University George Washington University Gettysburg College Giesler Broadcast Goetz Broadcasting Corp Grace College of the Bible Greek Radio Harris Allied Haverford College Hawaii Library for the Blind Hispanic Radio Broadcasters Hofstra University Homewood-Flossmoor High School Illinois Eastern Community College Illinois Institute of Technology Independent School Dist #283 of Saint Louis Park, MN Indiana State University Iowa Radio Information Service Jack Straw Foundation Jarad Broadcasting Company Inc. Jersey City State College KAAK Radio KAAR Radio KAFE Radio KALV Radio KAQU Radio KAUS Radio KBCD FM Radio KBIU Radio KBLG & KRKX Radio KBMJ Radio KBOY Radio KBYR & KNIK Radio KCAL AM Radio KCBS & KRQR Radio KCCM Radio KCHX FM Radio KCNA Radio KCWD & KNWA Radio KDDR Radio KDOL Radio KECH Radio KEKB Radio KENI & KBFX Radio KERI Radio KEXS Radio Key Broadcasting KEYF Radio KEYV Radio KEZV & KOTA Radio KJAR & KWLF Radio KFBI Radio KFIA Radio KFUN & KLVF Radio KFXD AM & FM Radio KGA Radio KGEN Radio KGHL & KIDX Radio KGLM FM Radio KGMI & KISM Radio KGNZ Radio KGY Radio KHOT & KXMX Radio KICO Radio KIDO Radio KIKR FM Radio KIOT Radio KIQK & KTOQ Radio Kirkwood Broadcasting Kirkwood Community College KJAV & KUBR Radio KJUN Radio KKBN Radio KKEY Radio KKGQ Radio KKHI Radio KLAV Radio KLBS Radio KLCE Radio KLFE Radio KLFX Radio KLRD Radio KLRZ Radio KLST Radio KLYT Radio KMAC Radio KMSL & KQDI Radio KNCY Radio KNEV & KROW Radio KNLR Radio KNNC Radio KOH Radio KOJJ Radio KOLM & KWWK Radio KOLR Television Kor-Us Community Broadcasting KORD AM & FM Radio KPCL FM Radio KPNT & WFXB Radio KPPL Radio KPRM AM & FM Radio KQEO & KMGA Radio QONS Radio KQTP Radio KQTV Television KRCQ Radio KRKS Radio KRMD AM & FM Radio KROC Radio KROE Radio KROR Radio KRSA Radio KRSO, KDUO & KHTX Radio KRST & KRZY Radio KSGN Radio KSHA & KQMS Radio KSJN Radio KSJO & KSJX Radio KSPN Radio KSQQ Radio KSQY Radio KSVN Radio KTIG Radio KTLO AM & FM Radio KTOZ Radio KTPI & KVOY Radio KTPK Radio KTSR Radio KUBR Radio KUTY & KLKX Radio KVFX Radio KVML Radio KVNF Radio KWBR Radio KWEB & KRCH Radio KWOA AM & FM Radio KWSA & KCHQ Radio KXEQ Radio KXOK AM & FM Radio KXTZ Radio KXXZ Radio KYCR Radio KYRE & KSYC Radio KYUK Radio & Television KYUI Radio KZEN Radio KZKL AM & FM Radio KZPA Radio KZRR Radio KZSR Radio KZUL Radio KZYR Radio KZYX Radio Lafayette College Langston University Lansing Community College Laser 101 Radio LBS Broadcasting Lehigh County Community College Lincoln University Luther College Main Line Academy Manhattan College Manhattanville College Marketing Marc Vallee, Inc. Marywood College Maser Technology Group Ltd. Mcmanus Engineering Mercer County Community College Michael B. Productions Middle Tennessee State University Minot State University MNN Radio Networks Monmouth College More FM Morningstar Radio Network Morse Productions Mr. Gary Horn Nameloc Broadcasting National Religious Media Native Communications Nike Inc. North Carolina State University Northeast Broadcast Labs Northern Michigan University Northwestern College NSE National Satellite Net Oakwood Audio Oakwood College Ohio University Ozark Christian College Ozarks Public Television Pace Audio Services Platinum Music Point Loma Nazarene College Pratt Institute Purdue University Pyramid Broadcasting Radio Information Service Radio Korea USA Radio New Zealand Ltd Radio Santa Fe Ray Communications Rey-Cel Broadcasting Inc. Rhode Island College Richmond Unified Schools Ringling Brothers Roger Williams College Rose Communications Russian American Broadcast Saint Bonaventure University Saint Johns University Saint Lawrence University Saint Xavier University Santa Clara University SCMS SML Communicaitons Southern Connecticut State University Southern Methodist University Southwest Texas State University SPRL Infini Star Cablevision Stereo Mar Stereo Oriente Stonehill College SUNY College at Albany SUNY College at Geneseo SUNY College at Purchase Susquehanna University Taranaki Polytechnic Taylor University Technet Systems Group Temple University Tennessee State University The Kent County Public Schools The Praise Network Inc. Thin Air Investment Topaz Broadcasting Inc. Towson State University Transcom Corp. University of California (Riverside) University of Pittsburgh at Bradford University of Notre Dame University of Central Arkansas University of Hawaii University of Illinois University of Maryland University of Massachusetts University of Wisconsin Upsala College Ursinus College USS Independence Vincennes University Vincent Broderick Vision Broadcasting WAGW Radio WAKX Radio Walmart Stores Inc. WALV & WBAC Radio WANB Radio WANN Radio WARA & WWKX Radio WAYJ Radio WAYL FM Radio WAYM Radio WBBT & WLYU Radio WBDY Radio WBEL Radio WBIZ & WEUZ Radio WBTU Radio WBUX Radio WBVM Radio WCBA Radio WCBM Radio WCBR Radio WCBW Radio WCCK Radio WCEV Radio WCEZ Radio WCFL & WCSJ Radio WCHR Radio WCHZ Radio WCJO Radio WCKX Radio WCMB & WIMX Radio WCMR & WFRN FM Radio WCMT AM & FM Radio WCRA & WCRC Radio WCRB FM Radio WCRH Radio WDBA Radio WDFB Radio WDGY Radio WDNA Radio WDNH Radio WDNO Radio WDOD Radio WDXL & WZLT Radio WDZL Television WEEP & WDSY Radio WELS Radio WELY Radio WENY Radio West Georgia College Westchester Community College Western Broadcasting Services, Ltd. Western Carolina University Western Telephone & Data, Inc. WEVE Radio WEZQ Radio WEZX Radio WFDF & WDZZ Radio WFIW Radio WFON & KFIZ Radio WFPG Radio WFRT Radio, Inc. WFXS Radio WGCO Radio WGHT & WWIN Radio WGMI Radio WGNY AM & FM Radio WGRC FM Radio WGRX Radio WGTH Radio WGTS Radio WGUL Radio WGXL & WTSL Radio WHAT Radio WHBC Radio WHIT & WWQM Radio WHMP Radio WHP, WRVV & WKBO Radio WHRB FM Radio WHSN Radio WHVR & WYCR Radio WIBF FM Radio WIBU Radio WICN Radio WIDA Radio WILD Radio Wilkes University WIOZ Radio WIS Television WISM Radio WITV Radio WJAN Radio WJBX Radio WJCO Radio WJEZ & WPOK Radio WJIC & WNNN Radio WJJR Radio WJKE Radio WJLS Radio WKFX Radio WKGB Radio WKGF Radio WKHJ Radio WKID Radio WKLM Radio WKMY Radio WKSL Radio WKWT Radio WKXH Radio WKZV & WKEG Radio WLAB Radio WLGC FM Radio WLIX Radio WLJN Radio WLKI Radio WLSL & WAXM Radio WLTJ Radio WMAY & WNNS Radio WMMM Radio WMNF Radio WMRH Radio WMXY & WEIZ Radio WNCO Radio WNOI Radio WNNW Radio WNYE Radio WOBM FM Radio WOFM Radio WOGL CBS Radio WOLX Radio WOLZ Radio WOOF Radio WOUR Radio WPHE Radio WPMR AM & FM Radio WPSM Radio WQFE Radio WQGN & WSUB Radio WQLS Radio WQMT Radio WQWM Radio WRCA Radio WRDM Radio WRDR Radio WRFA Radio WRIC Radio WRIX Radio WROD Radio WROM Radio WRQK & WINW Radio WRVM Radio WRXK Radio WRYT Radio WRZK Radio WSEI & WVLN Radio WSHE Radio WSHQ & WSHZ Radio SHO Radio WSJD Radio WSKQ Radio WSPY Radio WTAW Radio WTUZ Radio WTWZ AM Radio WTZE Radio WUBE & WDJQ Radio WUPE & FM Radio & Television WVNE Radio WVNU Radio Radio WWOC Radio WWQQ FM Radio WWRV Radio WXCO & WYCO Radio WXLC & WKRS Radio WXML Radio WXSX Radio WXTR Radio WXXK Radio WYTE Radio WYZM Radio WZBX & WSYL Radio WZZO Radio WZZR Radio Yeshiva University



RADIO SYSTEMS INC.

Almost 1000 broadcasters own one, 601 Heron Drive • Bridgeport, NJ 08014-0458 • (609)467-8000 • FAX (609)467-3044 recommend them, and buy another.

Running Radio

Tips on Being a Strong Negotiator
page 25

Your Resource for Business, Programming & Sales

Oddball Humor Keeps Radio Lively

by Alan Haber

NEW YORK Funny, what you remember—especially about Dan Ingram, resident funny man at New York's late, lamented personality powerhouse, WABC(AM) who now holds court on weekends at WCBS-FM, New York's Oldies Station.

Like the time Big Dan (and he is tall) spliced the letter "G" into Paul McCartney and Wings' "My Love," thereby renaming it "My Glove." "Yeah, that was good," said Ingram. "I wish I had a copy of that. I'd play it and say it was Michael Jackson." Every Kemosabe's best buddy emitted a hearty laugh.

Or when he played "Save It for Me," by the Four Seasons, and added a "Shhh" every time the word "Save" was sung. In other words, Shave it for me. "I still do it," said Ingram.

On WABC, the master of the quick quip—guaranteed to set your funny bone

into motion—tagged a spot for Waldorf bathroom tissue by saying "Waldorf. The only toilet tissue named after a hotel."

And, on a recent WCBS-FM show, he introduced Stevie Wonder's "I Was Made to Love Her" as "the shotgun wedding song."

Still funny

Ba-bing! Daniel Trombley (his grandfather on his mother's side was French-Canadian) Ingram is still funny after all these years.

Ingram was born in Oceanside, N.Y., on the Empire State's Long Island. He moved back to the island, to Malverne, after spending the first seven years of his life in Flushing, Queens, also in New York.

Music was the name of the game in the Ingram household: Dan's mother was a concert cellist, and his father was a dance-band musician who had a hit record called "By a Waterfall," which

Dan played on his 20th anniversary show on WABC on July 3, 1981.

Ingram's dad did most of his work in radio shows. Young Dan spent time at a lot of them. His father worked the Fred Allen Show and Ingram said he "used to sit near the sound man." He remembered that he fell in love with the youngest of

WABC, he actually did. At age 13, he came in dead last in a disc jockey contest on Freddie Robbins' show on WOV(AM) New York. Despite his youth, and with radio pulsating through his veins, he went looking for work in the tri-state metropolitan area. He was turned down at WALK(AM) in Patchogue on Long Island.

Scared to death

Undaunted, he rebounded at WNRC in New Rochelle, N.Y. Somebody had just



Big Dan Ingram now rules the roost at WCBS-FM.

the five DeMarco sisters, who performed on the show. "I fell madly in love with her," said Ingram. "Problem was, she was an older woman (11 years old). I was only nine."

Although one tends to forget that Dan Ingram has had a radio life outside of

quit, so Ingram was put on the air; he was 19 years old, braces still holding his teeth together, scared to death. When the paychecks started to bounce, after only a month of service, he headed back to WALK, which this time hired him.

continued on next page ►



NEWS RADIO NEVER SOUNDED BETTER.



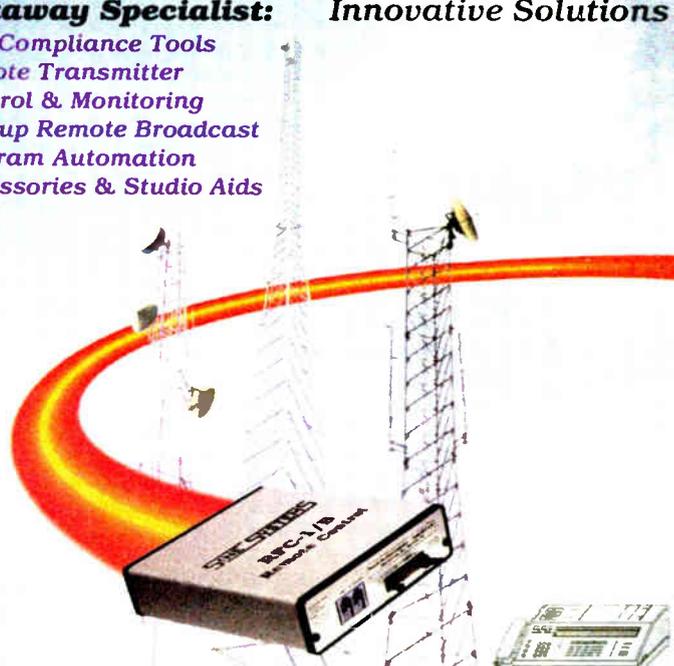
The Most Profitable Format In Radio.

1-800-5 AP RADIO • [800-527-7234]

SINE SYSTEMS

Walkaway Specialist: Innovative Solutions

- EBS Compliance Tools
- Remote Transmitter Control & Monitoring
- Dial-up Remote Broadcast
- Program Automation Accessories & Studio Aids



(615) 228-3500
FAX 227-2367
1020 Maxwell Avenue, Nashville, TN 37206-3554

24 Hour FAX
ON-DEMAND
(615) 227-2393



**HARRIS
ALLIED**

**BROADCAST
EXPRESS**

May 3, 1995

ISSUE NO. 3 VOLUME NO. 4

Pick Your Wedge

The goal: cleanest sound possible. The method: Paramcunt™ Acoustical Products. The source: Harris Allied. The best solution for super critical listening or recording is 2" Ultrax™ Wedge Panels. Kills standing waves and flutter echo. Up to 60% more effective than other name brand foams that can cost many times its price. Long lasting formulation gives you years of service and doesn't crumble like that other stuff.

\$138⁰⁰

Box of 2" 12 ea. 2' x 4' sheets
Covers 96 sq. ft.

Order Today and Get Free Shipping



Direct-To-Air

Some things just get better and better. Like our Audio-Metrics CD 10, Compact Disc Cartridge Machine...now the CD 10E with ORANGE BOOK capability. The same heavy-weight player you've come to rely on to take compact discs direct-to-air.

\$1,149⁰⁰

Price Includes Free Shipping



**Free
Shipping**



800-622-0022

800-622-0022

Monitor This Deal

Your Gentner VRC-2000 Remote Control basic package from Harris Allied includes: 1 VRC-2000 unit, 1 command relay unit and 2 screw barrier strip interfaces.

\$2,230⁰⁰

Price Includes Your \$500 Coupon from Gentner and Free Shipping



Talk Radio Made Easy

Talk radio can be difficult. Your telephone system shouldn't be. Gentner designed the TS612 DCT Multiline Telephone System to make it easy. The way it should be. The TS612 DCT is a six-line (expandable to 12) telephone system.

CALL FOR SPECIAL PRICE

Free Shipping



Hands-Free

Make your telephone an audio workstation with Gentner's Microtel telephone interface. It's portable, battery-operated, and it replaces the handset, quick and easy.

\$225⁰⁰

Your Order Is Shipped Free Of Charge

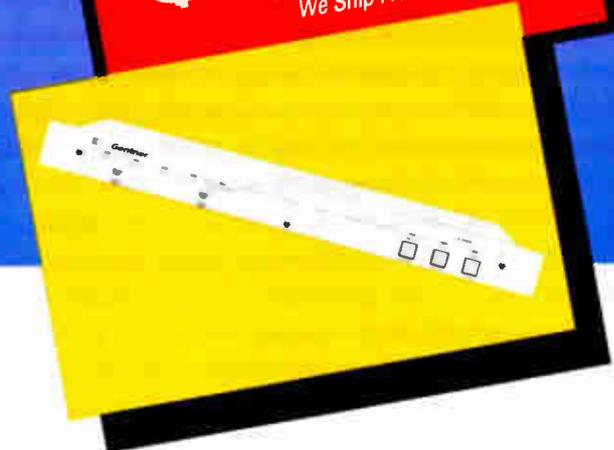


Yakity Yak No Feedback

Don't worry about special console outputs for a telephone hybrid. Gentner's G2500 Superhybrid digitally generates its own mix-minus feed for callers.

\$1,595⁰⁰

We Ship Free



Free Shipping

800-622-0022

Mistake Proof

The fastest, easiest way to edit phone calls and get them on the air! Forget fumbling with tape. VoxPro™ by Audior lets you record, cut, copy paste, track-slip, "bleep," and more-- perfectly and digitally. Play back bits with one button.

\$4,995⁰⁰

Price Includes Power Macintosh w/30 Minutes Stereo Storage, Free Shipping (control panel optional)



Digital Detangler

Untangle your digital audio with this 8 x 8 AES/EBU digital audio crosspoint switch/distribution amp. Also ask about 16 x 16 and serial controlled versions as well as digital converters by Zsys.

\$950⁰⁰

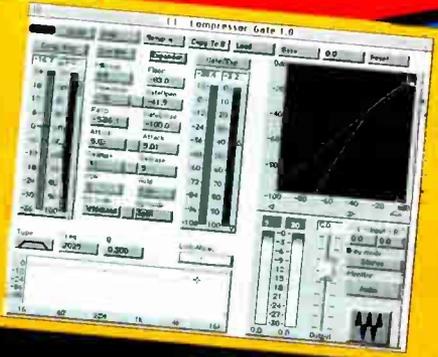


Mac Attacker

Plug in this card and software. While your Macintosh does other things, it will also be a professional audio processor. Includes WAVES L1 Ultramaximizer, C1 Compressor, Q10 10-Band Equalizer, S1 Stereo Imager, and more...even an Editor!

\$2,299⁰⁰

Your Order Is Shipped Free



No More Jitters

Some digital DAs allow jitters and ground loop noise into the process. Not AardDDa by Aardvark. Provides unsurpassed broadcast quality distribution every time, to each of its six output ports.

\$399⁰⁰

Free Shipping With Every Order

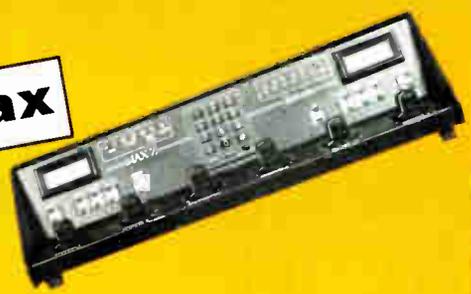


HARRIS BROADCAST ALLIED EXPRESS

800-622-0022

Free Shipping

Remote To The Max



A remote broadcast console, the MAX-Z provides MAXimum flexibility, utility, and above all, audio quality. MAX-Z has no equal when it comes to making your remote broadcasts run smoothly and sound professional.

\$995⁰⁰

The Sequel Rated Z



An abbreviated version of the MAX-Z by Zercom is the MAX-Z II. High quality audio handling is maintained in the two channels of audio input. A world class tradition of excellence continues.

\$605⁰⁰ WITH CASE
Free Shipping With Every Order

Ear-To-Ear Comfort

For intercom and on-air commentary, you need Beyer DT190 Sports Headset Mic. Consistent performance that stands up to environmental changes. Rugged construction you can depend on. And, long-term wear with comfort.

\$225⁰⁰



Gotta Love This One

The Telfax GX440 Phone Remote Mixer is loved by broadcasters because it is so versatile and is loaded with extras to make remote broadcasting easier than ever before. It only weighs three pounds but gives a great big performance.

\$1,110⁰⁰
Order It Today...We'll Ship It Free



HARRIS BROADCAST ALLIED EXPRESS



Charge it with MasterCard or Visa or use your I.D.

It's A Shure Thing

The Shure M267 offers excellent performance and versatility that makes it a superb choice as a compact mixer for studio, remote, or original sound reinforcement use.

\$375⁰⁰

A six-input, portable microphone mixer-remote amplifier specifically designed for pro applications in ENG, EFP and general audio mixing. Shure's M367 sets the standard for portable mixer performance.

\$550⁰⁰

You Buy It... We Ship It FREE of Charge



Micro Mix Master

Get the same high performance electronics and rugged all-steel construction as its famous 'big brother', the CR-1604, with 12-channels and mic/line mixer, but in an ultra-compact size (under 1 sq. ft.). Ask for Mackie's MicroSeries 12C2

\$315⁰⁰

Free Shipping With Every Order



QUANTITIES MAY BE LIMITED AND ARE SUBJECT TO PRIOR SALE.
 ALL SALES SUBJECT TO APPROPRIATE SALES TAX.
 FEDERAL EXPRESS AVAILABLE AT AN ADDITIONAL COST.
 PRICES, SPECIFICATIONS AND PRODUCTS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

800-622-0022

800-622-0022

It's Your Choice

ISDN or Switched 56, it's Adtran's ISU 128, a stand-alone ISDN service unit that connects data terminal equipment to the network. The INC CM-1056S is a dedicated/switched 56 kbps CSU/DSU for critical applications.

\$695⁰⁰ ea.
Free Shipping



One Box Solution

The Intraplex Model 4464 digital audio codec/transceiver for ISDN circuits is designed to facilitate high fidelity audio broadcasts over the switched digital networks. Order now toll-free from Harris Allied and get delivery in June.

\$3,390⁰⁰
We Pay Shipping



Affordable Duo

Two digital audio codecs from Comrex provide an affordable alternative to satellite feeds or expensive dedicated circuits: the portable DXP and the rack mounted DXR. Also sold separately \$1,425 ea.

\$2,850⁰⁰

You Buy It... We Ship It FREE of Charge



Prima Audio Transport

C DQ Prima Series Codecs are built with one goal in mind— to provide the most advanced communications tool in the world. Model 110 is one of five to choose from that will give you better performance, more features and freedom from obsolescence.

CALL FOR SPECIAL PRICE
Free Shipping



Free Shipping

800-622-0022

Arc of Triumph

Burk's ARC-16 is a 16 Channel Transmitter Remote Control that will give you full-time studio control, dial-up control, or both. Control multiple sites with a single unit. A studio controller displays clear text prompts for non-tech operators.

\$3,525⁰⁰

Free Shipping...Our Treat



Make Life Easier

The IP-8 Interface Panel brings all TC-8 connections to barrier strips for ease of installation and rapid transmitter troubleshooting and maintenance. The 5-1/4" rack unit mounts in the rear.

\$455⁰⁰

We Pay the Shipping Bill



Stands On Its Own

This is Burk's stand-alone version of the ARC-16 - Model ARC-16SA. All the same great features and quality, now offered at a great affordable price from the broadcast professionals at Harris Allied. Call toll-free.

\$2,725⁰⁰

Your Shipping Charges Are On Us



Soft Switching

Burk's LX-1 Stereo Switcher is designed to improve your control room operation by reducing demands on your air console and eliminating the need to patch for alternate program sources.

\$1,099⁰⁰

No Shipping To Pay



HARRIS BROADCAST ALLIED EXPRESS

Open Until 5:00 P.M. Pacific Coast Time

800-622-0022

Wart Remover

Don't let wall warts steal all the space in your power strip. Get Dr. Ferd's Wart Removers. Don't buy another power strip. Buy Dr. Ferd's instead.

\$35⁰⁰ **FOR FIVE**
Free Shipping



Get Switched

Our industry's standards are the Switchcraft 3-pin professional audio connectors. Get 25 ea. of A3Ms and A3Fs for one great low price...

We Pay Shipping

\$94⁰⁰



Strong Arm

Superior deluxe mic arm by O.C. White. Model 51900G is designed squeak-free for excellent on-air performance.

\$79⁰⁰

Great Price...And, No Shipping Fee



Acoustic Marvel

High output, low distortion, three-way acoustic suspension system. The Klipsch KP201A for side-fill, foreground and near-field monitoring.

\$250⁰⁰

We'll Pay The Shipping For You



No Ordinary EQ

Roland's E-660 is a programmable parametric equalizer that operates entirely in the digital domain. The ultimate in sound quality.

\$410⁰⁰

Free Shipping



Light Up

Reduce burnouts and save on maintenance with Duro-Test Code Beacon Bulbs.

\$50⁰⁰ (PS-40-682) pkg of 2

No Shipping Charges



Free Shipping



HARRIS BROADCAST ALLIED EXPRESS

800-622-0022

Free shipping applies only to items featured in this circular.

All prices are for North America only.

Orders must be received by 5:00 PM Eastern for same day shipment.

Prices guaranteed through June 28, 1995.

Ingram Keeps Radio Lively

► continued from previous page

While at WALK, Ingram held another job washing ice cream trucks, "and filling up my gas tank when the boss wasn't looking," he said, laughing, his voice sounding very spy-like. His next radio jobs were in Connecticut.

Ingram and a friend, Chuck Johnson, decided they were going to form a morning team and put a tape together. They went to WICC(AM) in Bridgeport, Conn. "They said, 'Thanks, but no thanks,'" Ingram remembered, "We've got this guy named Crane who is on in the morning here, and he is pretty good." The Crane in question was the late Bob Crane, star of television's Hogan's Heroes.

Down, but not out, Ingram brought the tape of him and Johnson to WNHC(AM) in New Haven, whose powers-that-be ultimately decided to hire only Ingram. Because he worked only weekdays at WNHC, he had the weekends free, so he called WICC and asked if they needed anybody for weekend duty. They did, and thus Ray Taylor, Ingram's alter ego, was

WIL' Child is here!" The promo ran constantly all day.

Meanwhile, over at KWK, the "WIL' Child," the pretender to the throne, went on the air at six o'clock. Ingram called him up in the studio, just as he was going on the air, and said "Hello? You're going to fail." Ingram remembered that KWK's man "went on the air, sounding shook. When (Lundy) went on the air at seven o'clock, (the KWK jock) segued four records from five of seven until about ten after," according to Ingram. "You know he was listening to us."

Laughin' and scratchin'

Dan Ingram has been laughin' and scratchin' on the rock and roll radio airwaves since the mid-1950s. Most people will remember him from the nearly 21 years he spent at New York's legendary personality powerhouse, WABC, where many of his catch phrases and bits became legendary.

Some of them, however, were already in place when he was at KBOX. Things like: his nickname Big Dan, his "Honor Group of the Day" (on a recent WCBS-FM show, the honor group was red-heads), and such ear-catching verbiage as "The Ingram Flingram."

Such on-air tomfoolery may not be the norm these days, but it was back in the good old days. "People don't deal in imagery anymore," said Ingram. "And that's what I deal in. I can do three words and a grunt and create an image." Like: coming out of a record, remarking that he didn't love it or hate it, and saying "Now I know how

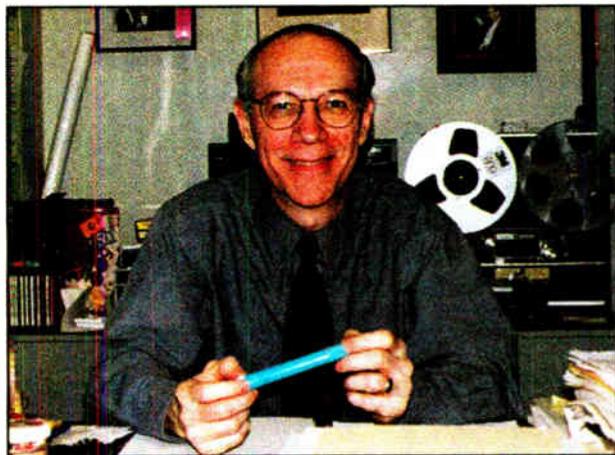
Prince Charles felt on his wedding day." Or: calling the record "I Can't Help Myself" "the song of the midget at the smorgasbord."

Ingram settled into WABC's afternoon drive slot on July 3, 1961, for nearly 21 years—a huge chunk of time that Big Dan refers to as his "misspent youth." Well, if you're going to misspend your youth, you might as well do it on a 50,000 watt clear channel radio station that received skip wave mail from as far away as New Zealand, London and South America.

However you choose to remember WABC, it worked, and it worked well. "We were the rebels, and we talked the rebel's talk," said Ingram. "We played the rebel's music, we were their psyches. We knew that they were going to rebel against the establishment, and guess what? That music, boom, was the biggest rebellion in the history of the country, up until then."

Ingram said, "We were very successful in thinking like and talking like young people." An important element of Ingram's success at WABC, and during his entire career, for that matter, has been his practice of talking to the audience in second-person singular. "When I say 'You,' I mean You," said Ingram. When personalities go on the air and say something like "Good evening, everybody," they're talking to no one, he added. "There's no everybody," he said.

continued on page 25 ►



WCBS-FM, under the direction of Program Director Joe McCoy, nurtures the sounds and personalities of the early days of rock radio.

born. Thanks to a heavy dose of delay reverb, one hour of the Taylor show was called "In the Chamber."

Yes, Ingram worked seven days a week in those days, and, figures he worked that yeoman's duty for "probably 20 years."

Wild child

The next stop on the road to the Big Apple was the legendary KBOX in Dallas. When Ingram came to the Big D, competitor KLIF(AM) was airing hourly announcements that said it had "more audience than all other Dallas stations combined," according to Ingram. KBOX "was a crazy time," Ingram said.

At WIL(AM) in St. Louis, Ingram was involved in one of the most legendary crosstown station rivalries in rock and roll radio history. WIL was in need of a new evening disc jockey. One tape rose to the top of the heap: that of future WABC hall-of-famer, and current WCBS-FM personality, Ron Lundy.

The plan was to come up with a way to promote the new guy on the block. At the same time, competitor KWK(AM) was debuting a new guy on the air, whom they called the Wil' Child; they even took out a center spread advertisement in the St. Louis Post-Dispatch to promote him.

Of course, the real Wil' Child was over at WIL, in the person of Ron Lundy. So, it was arranged for a jingle to be cut that day, saying "The Real

MANAGER'S NOTEBOOK

Uncovering the Negotiator within

by Sue Jones

BURKE, Va. When you think about negotiating skills, techniques for trading air time for a product or service provided by the advertiser probably comes to mind. The truth is you negotiate, or are in a position to negotiate, many other things as well. These other situations might include finalizing a contract for satellite programming, trading extra time off during the week for staff members who are scheduled to do an unpaid weekend remote, or completing a compensation package for a promising new air talent.

Perhaps you do not think of these things as negotiating. That may be the reason you feel you are not as comfortable or successful with them as you might be at finalizing a sale. You may feel that you cave in at the eleventh hour to bring the deal to closure.

Conscious implementation of basic negotiation skills will help you improve your odds in all negotiations.

Define the terms

Think in terms of *win/win* (mutual rewards) for both or all parties involved. Think of what each negotiator can take away from the negotiations and feel good about. If possible, make the person look like a hero to his or her organization. The natural inclination is to think in terms of, "What is the best price I can get?" or "What is the least I have to give to cover the remote broadcasts?" or "What is the lowest salary I can offer and still get the person to join the station?"

In most of these cases you will win the battle but not the war. If you force a company or contractor into the lowest possible price, the company may have to reduce quality and/or quantity of the service to provide the price you demand. You may find yourself very unhappy with the services and have to renegotiate the whole deal again with another company after you have spent a fair amount of money with undesired results.

Alternatively, if you approach the contract with the win/win mind set, you allow the contractor's sales representative to return with a profitable transaction. The company provides the service, and you both establish a long term business relationship that is convenient and profitable for both parties involved.

The same phenomenon occurs in the time-off arrangement for covering unpaid weekend remotes. You could tell staff members it is part of their responsibility to handle one unpaid remote broadcast a month, with no other offsetting factor like time off the following week.

Run on résumés

If you take the "best deal for me only" approach, your staff will most likely do the remote and collectively

update its résumé on the next day off. After all, the station is receiving financial benefit from this event. If you make the staff members feel like heroes to the station because they helped generate profit, and provide some offsetting benefit for them, you will have a willing staff the next time you need to do a weekend remote.

Not only did you get the job done with minimal cost, but you also paved the way for the future. Your hot new air talent may be negotiating with a competing station and may be offered a higher salary or other perk that exceeds your offer. You will not only forfeit the time you spent recruiting this person but you will have to continue the search which will double the recruiting cost. The additional cost of the perk or salary will most likely be a fraction of the additional recruiting costs.

Try to know as much about the person and/or company as possible before beginning the negotiations. Information is power. Talk with other managers who may have contracts with this vendor. You may discover that the company is willing to lower its prices for a longer contract period or to provide services for more than one station.

Consensus first

Discuss the points you agree on first, rather than focusing only on the differences. This will help build a bridge and common area between the negotiators. You may find that you agree on two thirds of the items and only disagree on one third of the points. Listing them with this perspective gives a clearer picture of how close you are to completing the deal. It will hasten both sides to complete the transaction and perhaps provide the initiative to find acceptable alternatives.

Ask questions and listen to the answers. Ask the same question a different way several times, if necessary, to get the best picture and perspective. Ask the service company what alternative deals they have made in the past to other stations. Ask if it will provide discounts for volume purchases, or for extended contracts. Review all of the terms and conditions of the contract. Is there something that could be eliminated that would be beneficial to you without detriment to the company?

Ask each member what would he/she like most as compensation for working long hours. Some might want overtime pay. Others might prefer the time off the following week. Yet another might like to receive something in trade such as dinner for two at a client's restaurant.

For the air talent candidate, if you cannot offer the desired salary, could you offer fewer working hours, longer vacations, or a bonus tied to

continued on page 25 ►

I want a console...

...that can be used for our live morning show, interface with my computer automation system for the rest of the day - except at 7:00 PM when we have a two hour talk program. Oh, and by the way, it'll need to be used for production several nights out of the week!



No problem - the Dynamax MXE Series Console can handle it!

Dynamax MXE Series consoles offer the right set of features to match a variety of format and equipment scenarios.

Opto-isolated remote module control and Euro-style terminal blocks allow easy, direct interface with your automation system. Since fewer inputs are normally required for automation/satellite based systems, the 8 channel version provides a cost effective alternative to bigger consoles.

The MXE's multiple output capability and optional telephone interface help make talk shows a breeze. With pre-fader patch points for outboard processing, optional 5-Band mic EQ and the ability to wire each input for mono or stereo these consoles can be effectively used for

production when not being used on the air.

Regardless of your application, Dynamax MXE Series consoles provide bullet-proof reliability due to true modular motherboard design, superior components such as P&G faders, dbx VCA's, AMP connectors, plated steel construction and Lexan control surfaces. Available in versions from 8 to 18 channels starting at about \$4,000, the MXE Series consoles provide a tremendous value.

So if you're looking for a great all-around console you don't have to pay an arm and a leg for - the Dynamax MXE Series console is the obvious choice!

**To turn your "I want a console" wishes into reality,
Contact BSW about a Dynamax Console today!**

Equipment Solutions To Keep You Number One

BSW

BROADCAST SUPPLY WORLDWIDE

Phone: 800 • 426 • 8434

7012 27th Street West Tacoma, Washington 98466

Fax: 800 • 231 • 7055

Circle (94) On Reader Service Card
World Radio History

INTERNATIONAL UPDATE

Australian Radio Speaks in Many Tongues

by Max Throver

CROWS NEST, New South Wales

What began as an experiment two decades years ago, today, is a prime example of what can happen when given a chance.

This year the Australian Special Broadcasting Service (SBS)—a federally-funded professional network meeting the needs of Australians from non-English speaking backgrounds (NESB)—celebrates 20 years of radio broadcasting.



The Staff of the Multilingual Australian SBS

"From a three-month experiment in June 1975," said Quang Luu, head of SBS Radio, "we have grown to become the first unique, national, multicultural, multilingual broadcaster of the world, and we don't claim that title lightly—we claim it seriously."

The monolingual past

These days Australians are, in general, proud of the nation's cultural diversity and racial harmony.

But there was a time when the very idea of any Australian radio station broadcasting in anything but English was dismissed out of hand. The consensus seemed to be that anyone migrating to Australia should simply give up on his or her mother tongue and become a fluent English speaker.

When I was a child in the '60s I would often witness people being yelled at for not speaking English in public. Some bigoted Aussie would yell at a pair of Creek women having a chat on the train. "You are in Australia now; we speak English here."

A fight or an embarrassed silence would usually ensue. It was ugly, and I did not like it.

By the mid-1970s the idea that immigrants must assimilate completely into Australian culture was challenged. Australia has always been a nation of immigrants.

Originally the majority of immigrants came from the United Kingdom and Ireland. After World War II the immigrant mix began to change—people migrated to Australia in large numbers from Eastern and Western Europe. The collapse of the racist White Australia Policy led to increased immigration from Asia. Public debate began to question the long-accepted notion of Australian cultural superiority.

As the number of people from non-English-speaking backgrounds increased, the state's need to communicate with

citizens from non-English-speaking backgrounds in their own languages became inevitable.

Multilingual radio

"In 1975 the government of the day—in fact, political parties of both persuasions—realized that there was a lack of access to information relevant to Australians of non-English-speaking backgrounds," Luu said. "In particular, at that time, there was a lack of information about the newly introduced national health system, Mediabank."

The result was the establishment of an AM radio station in each of Australia's two largest and most ethnically diverse cities, Sydney and Melbourne.

"The reaction from non-English-speaking communities was such that the government decided to allow it to continue," Luu said. "There were people who'd never heard their music or their mother tongue on air before,

and they reacted emotionally and very positively.

"SBS had fulfilled a role that had not been fulfilled by anyone else in the media industry. So we continued with two objectives: one, to satisfy the communication needs of Australians, particularly Australians of a non-English-speaking background, and to help in the maintenance of the richness of the cultural diversity of Australia.

"We are still pursuing those same objectives today," he said.

Listeners and listening

SBS Radio has a large section of the population to serve. According to the 1991 Australian census, one in four Australians come from a non-English-speaking background. To service this 25 percent of the national population, SBS Radio today broadcasts in 66 languages.

With so many language groups to serve the allocation of broadcast time is a sensitive issue for SBS Radio. To come to an amount of broadcast time for any given language they must take into account five factors:

- The number of people speaking a language in Australia.
- The length of settlement in Australia of a language group.
- The proportion of elderly members in the language group.
- The lack of capacity of the language group in the English language.
- The proportion of unemployment in the language group.

"We are now living in a world that is very competitive," Luu said. "SBS Radio used to be a quasi-monopoly because no one was competing with us. Now we have the community broadcasting sector, subscription language radio and international broadcasting coming to Australia by satellite.

In order to be ahead of the competition, SBS must respond to its listeners, Luu maintained. "Our programming philosophy

is to bring international, national and state news to our listeners," he said. "We also have segments on Australian society, arts and culture. We have programs teaching English to newer communities. We program international music. We broadcast drama and talkback."

And loyal listeners they are. In the mid-1980s the federal government floated a proposal to amalgamate SBS with the other national broadcaster, the Australian Broadcaster Corp. The size, strength and passion of the protests in the streets against the proposal saw the idea disappear quickly.

Expanding multilingual radio

Until 1992 SBS Radio broadcast in Sidney, Melbourne, Wollongong and Newcastle. Doing that served more than 30 percent of Australian population.

Since then, it has expanded to become a national network.

By sending its radio signal to terrestrial transmitters via the Optus B satellite, SBS now reaches Brisbane, Adelaide, Darwin and Perth, with Hobart and Canberra due to come on line by the end of this year.

To accommodate the diversity of the ethnic populations in Sydney and Melbourne,

SBS Radio now operates on two frequencies in each city. Further into the future, it will develop a regional network.

By June 1995, SBS Radio also will broadcast in English to satisfy the needs of second- and third-generation NESB immigrants and offer a wider understanding of

SBS Radio today broadcasts in 66 different languages.

Australia—and the world to Australians whose mother tongue is English.

The English-language broadcasts will help link all parts of the social fabric as well as broadening discussion about issues of national importance.

Staff and facilities

SBS Radio has more than 500 part-time and full-time staff members. Positions at the network are keenly sought after. Thirteen vacancies advertised for the new English language broadcasts brought more than 400 applications.

All on-air and production facilities are located in Sydney and Melbourne. Selections of the Sydney and Melbourne broadcasts are used for the national network.

New facilities in Sydney are designed to

continued on page 27 ▶

STATION/STUDIO SERVICES

427 SOUND EFFECTS
\$89.00

For a 5-CD set with a 30-day money-back guarantee.

Take an extra \$10 off if you mention this ad!

Send \$79 to Ghostwriters
2412 Unity Ave. N., Dept. RW
Minneapolis, MN 55422

For credit card orders call
(612) 522-6256

READER SERVICE 50

DUMP THE FILE CARDS
MusicPro

Music Scheduling Software
DOS and Windows Friendly
Interfaces with Digital Systems
Digilink + Format Sentry + UDS

30-Day Free Trial
\$495 Buy-Out

La Palma Broadcasting
(714) 778-6382

Doing business without advertising is like winking in the dark... You know what you are doing but no one else does!

BUY-OUT MUSIC — \$99

Sixty 60-second music beds for ... \$99
198 :30 & :60 music beds for ... \$198
120 production effects "Zings, Zaps and Zoodads" for \$99
122 New Lasers & Sweepers for ... \$99

For FREE DETAILS on production music, sound effects, call

Ghostwriters (612) 522-6256

READER SERVICE 50

ATTENTION PROVIDERS!

Promote your services to **Radio World's** 22,000+ readers. Reach Radio Station and Recording Studio owners/managers and engineers with your message. For information on affordable advertising call **Simone at 1-800-336-3045.**

STATION SERVICES

News and Services for Business, Programming and Sales

Shadow Broadcast Services Expands with New Affiliates

SAN FRANCISCO Shadow welcomes KEST(AM) San Francisco and KMBY(AM) Capitola, Calif., to its growing family of affiliate stations. Beginning March 30th, listeners of both KEST and KMBY started receiving Shadow's customized traffic reports to help them with their commute each morning.

Shadow, a premier traffic reporting service with some 280 affiliates, now also provides live, local, format specific news, sports and weather reports to more than 80 broadcast outlets in major U.S. markets.

For information, contact Don Bastida at Shadow at 415-777-2151; fax: 415-777-2181; or circle **Reader Service 16**.

ABC Begins News Coverage for 24-Hour Urban Formats

DALLAS ABC Radio Networks has begun broadcasting targeted newscasts for both of its 24-hour Urban formats, The Touch and Urban Gold. For many listeners, the newscasts, which air during morning drive, are the only source of hard news geared directly to African-Americans.

Anchored by Pam Gibson, the newscasts are each two-minutes long and run at :20 and :40 past the hour, respectively. In addition, there are two News Updates during the midday shift. Urban Gold also carries a feature called "Solid Gold Soul Health Tips" that informs listeners of health-related issues that specifically relate to the African-American culture.

For information, contact Leslie Halpern at 214-776-4644; fax: 214-776-4640; or circle **Reader Service 59**.

SW Networks Offers Variety of On-Line Services

NEW YORK SW Networks is developing an extensive on-line service for use by affiliates of its radio programming. The service will provide a wide variety of music and entertainment related services and will be accessible via the World Wide Web.

Affiliate web sites will be local, genre-specific versions of the networks' national web sites. Hard Music fans, for example, will log on at SW Networks' Pure Concrete site. Once at the web site, computer users will be able to investigate Hard Music culture on the macro level, acquiring information about national tours and new releases, downloading samples of the newest Hard Music tunes and brushing up on the backgrounds of favorite rock artists.

SW Networks affiliates will be able to use the service to conduct market research, orchestrate direct sales promotions, increase effectiveness of their advertising sales force and increase tune-in.

Sites will be available of all SW Networks niche-targeted programming, including Hard Music (Pure Concrete), Country (Country's Most Wanted), Alternative (static), Hip-Hop (Street Heat) and New Adult Contemporary (Personal Notes hosted by Dave Koz and Smooth FM).

For information, contact Peter Newcomb at SW Networks at 212-833-8527; fax: 212-833-4994; or circle **Reader Service 99**.

Familiar, Favorite Standards Available for Radio Broadcast

FAIR LAWN, N.J. "Seems Like Old Times," entertains audiences with a mix of pop standards, big band and novelty music from the '30s, '40s and '50s. Each week "Seems Like Old Times" selects a feature year from radio's golden era and a spotlight feature—which can be Big Band hits one week, love songs the next or novelty song hits the next.

Other regular features include: "An American Treasure," a weekly vignette that highlights the career of one classic pop star performer, composer or songwriter; weekly call-or-write-in trivia contests, a mystery artist and a whodunnit-complete with prizes.

A true lover of radio, host and producer Ed Z. Pell, spends a good deal of time and energy researching top hit tunes, pop artists and historical facts to bring a different slice of Americana to the radio each week. In the tradition of old time radio hosts, Ed invites audience participation with contests for prizes, or to make comments, suggestions or requests for favorite songs. Ed personally "mans" the phones to speak in person with each and every listener that calls in on the toll-free 800 number.

For information, contact Ed Pell at Vintage Productions at 800-851-2434; or circle **Reader Service 210**.

SW Networks Sign Mario Cuomo For Syndicated Thought-Talk Show

NEW YORK Former New York State Governor Mario Cuomo agreed to host his own weekly, three-hour, nationally syndicated radio program.

The Mario Cuomo Show will debut this summer. Covering a wide array of political, social and ethical topics, Cuomo's guests will range from influential figures from the worlds of government, science, entertainment, sports and literature to ordinary people whose lives are affected by the day's headlines.

Like all SW Networks' programming, the Mario Cuomo Show will feature an on-line component designed to complement affiliate broadcast of the program.

Mario Cuomo served as Governor of the State of New York for three terms. He has also served as New York's Lieutenant Governor and New York's Secretary of State, under Governor Hugh Carey.

For information, contact Peter Newcomb at SW Networks at 212-833-8527; fax: 212-833-4994; or circle **Reader Service 102**.

Race-Talk and Radio Road Test From Motor Sports Radio

JOHNSON CITY, N.Y. Sportscom Associate's Motor Sports Radio programming is finding a niche at stations across the country.

The weekly, five-minute programs are

offered on a straight barter basis and distributed primarily via Galaxy IV.

Motor Sports Radio also offers single-line Comrex backup feeds and Q&As from major events as part of its affiliate services.

For information, contact Paul Kaminski at Sportscom Associates at 607-770-9165 (voice/fax); or circle **Reader Service 55**.

American Broadcasters Can Take Listeners On Sightseeing Tour Of London

LONDON SMS Studios is offering a package deal to U.S. radio stations interested in broadcasting from London. The package includes local research—all the details of what's on and who's in town—and the booking of guests... from international celebrities to Londoners.

To broadcast one week of breakfast shows live from the SMS studio, including mono audio link in an American station, runs \$4,750. Another package—a week of breakfast shows from the studio and remote locations around London, with celebrity guests arranged by SMS and studio link to the U.S. station—is priced at \$7,500.

SMS is based in the heart of London—next door to Capital Radio and just 100 yards from the nearest subway.

Facilities include: control room—fully equipped for live on-air broadcasts with engineer and producer positions and voice studio for presenter and up to four guests, Clyde mixing deck with nine stereo channels and four mic channels, two Denon CD players, two Studer reel-to-reel machines, two Sony DAT recorders, a Tascam cassette deck, a Yamaha FX unit and a McCart studio storage control and edit system. The connectivity setup includes: 64 kbps permanent audio link with ABC New York; multiple ISDN lines and all types of codecs (CDQ2000 MUSICAM, CDQ1000, G.722, Nica 64 and apt-X100).

For more information, contact Jacky Eames at SMS Studios London at telephone: 44-171-383-4444; or circle **Reader Service 81**.

Morningstar's High Country Grows with North Carolina Combo

NASHVILLE Lifeline Ministries' WIAM(AM) Williamston, N.C., has become a full-time affiliate of the Morningstar Radio Network's "High Country" format, making Lifeline the first group to utilize the brand new format on at least two stations. WIAM sister station, WDRP-FM, added the format to select dayparts when it debuted three months ago.

High Country is an exciting new Christian country format featuring such artists as Paul Overstreet, Ricky Skaggs, Midsouth, Bruce Haynes, Susie Luchsinger and Ken Holloway.

For further information, please contact Michael Stephen Miller, at Morningstar

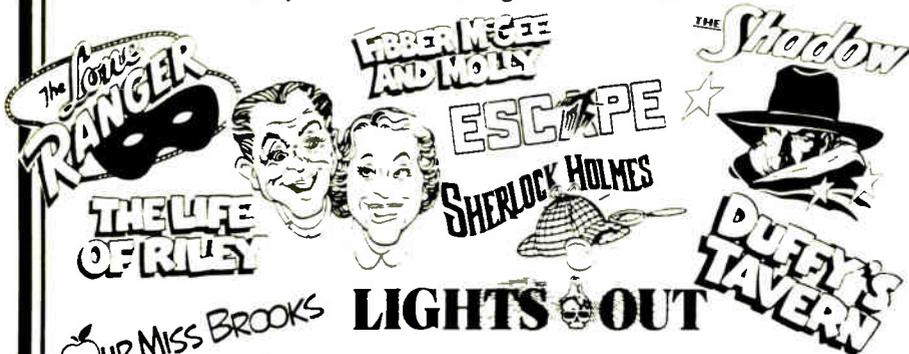
continued on page 22 ▶

ATTENTION P.D.s

Schedule the best in "OLD-TIME RADIO" with

When Radio Was...

Hosted by ART FLEMING, original star of "JEOPARDY"



Five shows per week—54 minutes each.
BARTER, NO CASH PAYMENTS!

For a free demo CD contact David West

DICK BRESCIA ASSOCIATES (201) 385-6566

When Radio Was celebrates its 6th year on 250 stations

Circle (130) On Reader Service Card

Some People Think That Radio Production People Are Too Demanding.

NOT TASCAM. Radio and broadcast production demands durable equipment that performs unrelentlessly twenty-four hours a day. That's why you'll find TASCAM equipment in practically every production facility in the country. And that goes for the TASCAM DA-88 modular digital multitrack, as well. It offers you incredible flexibility and a quicker production alternative to elaborate workstations, yet it costs less than a good cart machine. Bottom line is you get the benefits of digital and the ease of use of analog.

No matter how you look at it, the DA-88 is the smartest way to ease into digital production and it's the essential complement to any digital audio workstation. It gives you one hour and forty-eight minutes of crisp digital audio (8-tracks) on a low cost standard Hi8 video tape. Better yet. It works just like any other TASCAM deck — no learning curve. That means hassle free, quick production, especially on those smaller projects with crazy deadlines.

So if you're a demanding broadcast production person, demand the best value in digital multitrack —

THE TASCAM DA-88



- DIGITAL DEMANDS
- NO LEARNING! SHOULD ALREADY KNOW HOW TO USE
 - LOW COST REMOVABLE MEDIA
 - QUICK PRODUCTION USE
 - SERVICE & SUPPORT WHEN I NEED IT
 - MODULARITY & EASY INTEGRATION
 - BUILT TO TAKE A BEATING



TASCAM
Take advantage of our experience

► continued from page 20

Radio Network at 615-367-2210; or circle Reader Service 118.

New Standards Format Developed

PORTLAND, Ore. Radio DeLuxe developed a new Adult Standards format that transcends the age limits of existing nostalgia programming. Artists like Natalie Cole, Harry Connick, Jr., Tony Bennett, and the Manhattan Transfer have proven the wide appeal of the standards as timeless classics familiar to many generations.

The popularity of the great songs of Cole Porter, George Gershwin or Andrew Lloyd Webber among contemporary artists and audiences is leading nostalgia programming in a new direction.

The Standards of Excellence library is carefully programmed according to sound and style, rather than age, to attract younger listeners while also pleasing the loyal adult standards audience. It was developed by radio veteran Don McCulloch, who recently spent 10 years on the air and behind the programming scenes at Los Angeles MOR giant KMPC.

The format of 1200 tracks is delivered on 60 compact discs, including 10 specialty discs with 200 of the most compatible show and heritage tracks to add depth. It is available as a CD library or as a full-support format including music scheduling, market exclusivity, consulting, and trade name licensing. It also comes with a monthly show-prep sheet with topical artist, song and calendar information.

For information, contact Don McCulloch at Radio DeLuxe at 503-230-7791; fax: 503-236-6271; or circle Reader Service 131.

Interprep Celebrates First Anniversary

CHRISTIANSBURG, Va. Radio's first daily e-mailed show prep service celebrated its one-year anniversary in April. InterPrep was founded in 1994 on the idea that radio personalities wanted a fourth choice in show prep.

InterPrep is delivered to e-mail addresses by 8 p.m. Eastern Time every Sunday through Thursday. Radio personalities can conveniently retrieve their e-mail, including InterPrep, in a matter of seconds, then load it into a word processor for editing and customizing. The ability to edit and localize the material in each personality's favorite word processor is a popular feature.

In addition, InterPrep guarantees a minimum of two full pages of topical one-liners, interview contacts, bits, jokes, birthdays and more five days a week. Subscribers receive all of this for a nominal \$25 a month.

For information on subscribing to InterPrep, you can e-mail Steve Holstein at InterPrep@bev.net or call 703-381-5258; or circle Reader Service 87.

Natural Health Today Launches

LAS VEGAS "Natural Health Today" debuted earlier this month on the Health and Radio Network. Hosted by Dr. Daniel B. Mowrey, a noted authority on herbal medicine and its effective use on total-body wellness, the non-wire network, three-minute show will feature facts and straight talk on natural health.

Dr. Mowrey is president of the American Phytotherapy Research laboratory, organized in 1978 for basic and clinical medicinal botany research. Natural Health Today is sponsored by

Silver Sage, an industry leader in health products.

For information, contact Gayle Haas at the Health and Fitness Radio Network at 801-628-1000; or circle Reader Service 98.

ABC News Presents WAND

WASHINGTON ABC News presents the Washington Audio News Distribution service, WAND, and the Presidential Audio News Distribution audio service, PAND. Listen to live, uninterrupted, unedited feeds from the Congress, State Department, Justice, Pentagon, White House, National Press Club, news conferences, speeches, subcommittee hearings over the telephone.

Dial a toll-free number, enter a passcode, and select the event you want.

For information, contact ABC News at 202-ABC-WAND; or circle Reader Service 120.

Weekly "Branson Live" Debuts on Talk America Radio Network

BOSTON Talk America Radio Network debuted "Branson Live," from the Charley Pride Theatre in Branson, Mo. The two-hour program, hosted by Talk America's Bryan Smeathers and produced for the network by Eagle Productions, will be carried on most of Talk America's 237 affiliates.

The program will feature a mix of live interviews with Branson entertainers, national audience call-ins and music. The Charley Pride Theatre of Branson contains a fully-equipped radio broadcast studio. It features Switched 56 capability as well as a satellite uplink.

The program airs Saturday nights in the 6 - 8 p.m. time slot.

For information contact Bryan Smeathers at "Branson Live" at 502-754-1380; or circle Reader Service 213.

Prime Sports Radio Launches on WWSR(AM) Charleston, S.C.

DALLAS Prime Sports Radio debuted April 17 on Charleston's historic WWSR on 1240 kHz. The news, sports and information network offers 24-hour scores, highlights, interviews and analysis via satellite.

PSR's hosts include a variety of veteran newscasters and top personalities from across the country. The primary on-air line-up includes Bob Dahlgren, a 25-year broadcast veteran; WFAN New York's Rich Lerner and Bryan Stanley of Host Communications.

For information, contact Bob Wheeler at Prime Sports Radio at 214-401-0069; or circle Reader Service 73.

SW Entertainment News to Focus on Music and Entertainment

NEW YORK SW Networks unveiled SW Entertainment News, a service that will gather and disseminate news, interviews and information.

Designed to accompany and complement SW Network's highly-targeted programming, SW Entertainment News will be a global news organization available via both radio and on-line.

Its initial offering will deliver five separate entertainment news feeds, specific to each genre, to SW Networks music programming affiliates (Alternative, Hip-Hop, Country, Hard Music and Mixed bag).

For information, contact Peter Newcomb at SW Networks at 212-833-5400; or circle Reader Service 171.

Running Radio Marketplace

A Supermarket of Radio Station Services

For information on the services shown below, circle the Reader Service number on the enclosed card or contact the advertiser directly.



COUNTS DOWN COUNTRY'S TOP 40

THE NASHVILLE RECORD REVIEW, HOSTED BY LORIANNE CROOK AND CHARLIE CHASE OF TNN'S MUSIC CITY TONIGHT, IS ONE OF RADIO'S FASTEST GROWING COUNTRY COUNTDOWN SHOWS.

A FOUR-HOUR WEEKLY SYNDICATED RADIO PROGRAM PRODUCED ON COMPACT DISC.

FOR MORE INFORMATION CONTACT

EAST: FRANK IACONA,
(203) 965-6217
WEST: CRAIG CHAMBERS,
(303) 771-9800

Reader Service No. 157

ONLY THE BEST CD MUSIC!

- AC, Oldies, Gold, Country formats in stock
- Only *researched* hits... no useless "filler"
- Superb audio quality

►►► For a deal that can't be beat... just "call our name":

1-800-HALLAND



Halland Broadcast Services, Inc.
1289 E. Alostia Avenue · Glendora, CA 91740
tel: (818) 963-6300 · fax: (818) 963-2070

Reader Service No. 134



DON GIOVANNI'S ITALIAN CAROUSEL

SYNDICATED WEEKLY RADIO SHOW

- "Goodtime" Italian Oldies
- Italian Celebrity Interviews
- Unique format

**BARTER BASIS — NO CASH
MARKET EXCLUSIVE**

ICBN

Italian Carousel Bdct Network

For Info & Demo call 607-648-3104

Reader Service No. 180

The New Math for ISDN



- Only Layer III permits mono 15kHz operation on a single ISDN "B" channel or one Switched 56 line.

- Clean, uncluttered front panel for simple operation. Designed for simple operation with full metering, call-duration timer, headphone jack, and mic/line inputs.

- The ISDN terminal adapter is built-in.

- 9600 baud RS-232 bi-directional data for communications and control.

- Four end-to-end "contact-closures" for remote machine operation.

- The ideal solution for remote broadcasts, ad hoc networks, voiceovers, distribution of commercials, backup to satellite and microwave links, and many other applications.

Layer III is recognized as providing the best sounding audio over ISDN. But Layer II products became available sooner and many of you are understandably reluctant to retire your old equipment.

Zephyr™ ends your dilemma because it now provides both the superior quality of Layer III and compatibility with installed Layer II-only equipment. With the push of a button, you select which coding scheme to use.

With Zephyr, Telos puts you in touch with the world and offers the best sound and the most practical features.

Best of all, Zephyr costs about the same as Layer II-only equipment.



Zephyr Transmission Modes

Each unit is fully two-way. Modes can be selected individually for the transmit and receive paths.

Stereo and Dual-Mono Modes using two ISDN "B" channels

- Layer III Joint-Stereo at 20kHz or 15kHz for maximum fidelity.
- Layer III Independent Stereo at 15kHz for lower delay and surround-sound transmission.
- Layer III Dual-Mono at 15kHz when each channel has unique audio.
- Layer II Joint-Stereo at 20kHz for compatibility.
- G.722 Dual-Channel at 7kHz for lowest delay and/or compatibility.

Mono Modes using one ISDN "B" channel

- Layer III at 15kHz for maximum fidelity.
- Layer II at 8kHz or 10kHz for compatibility.
- G.722 at 7kHz for lowest delay and/or compatibility.

Split-Channel Modes using two ISDN "B" channels

- Individual mono signals are sent to and received from separate sites. Can be accomplished using Layer III and/or G.722.

ISDN Telephone Mode

- G.711 is used to call a standard POTS telephone for low-grade voice communications.

only from



2101 Superior Avenue
Cleveland, Ohio 44114
216.241.7225
FAX: 216.241.4103

The Best Way to Hear from There™

Telos Zephyr DIGITAL NETWORK AUDIO TRANSCIVER

Zephyrspace is a listing of Zephyr users interested in collaborating with other users. Access it on the Web at <http://www.tioc.net/users/jcrose/zeplist.html>

Move Up from Tapes to Touchscreen Digital Audio

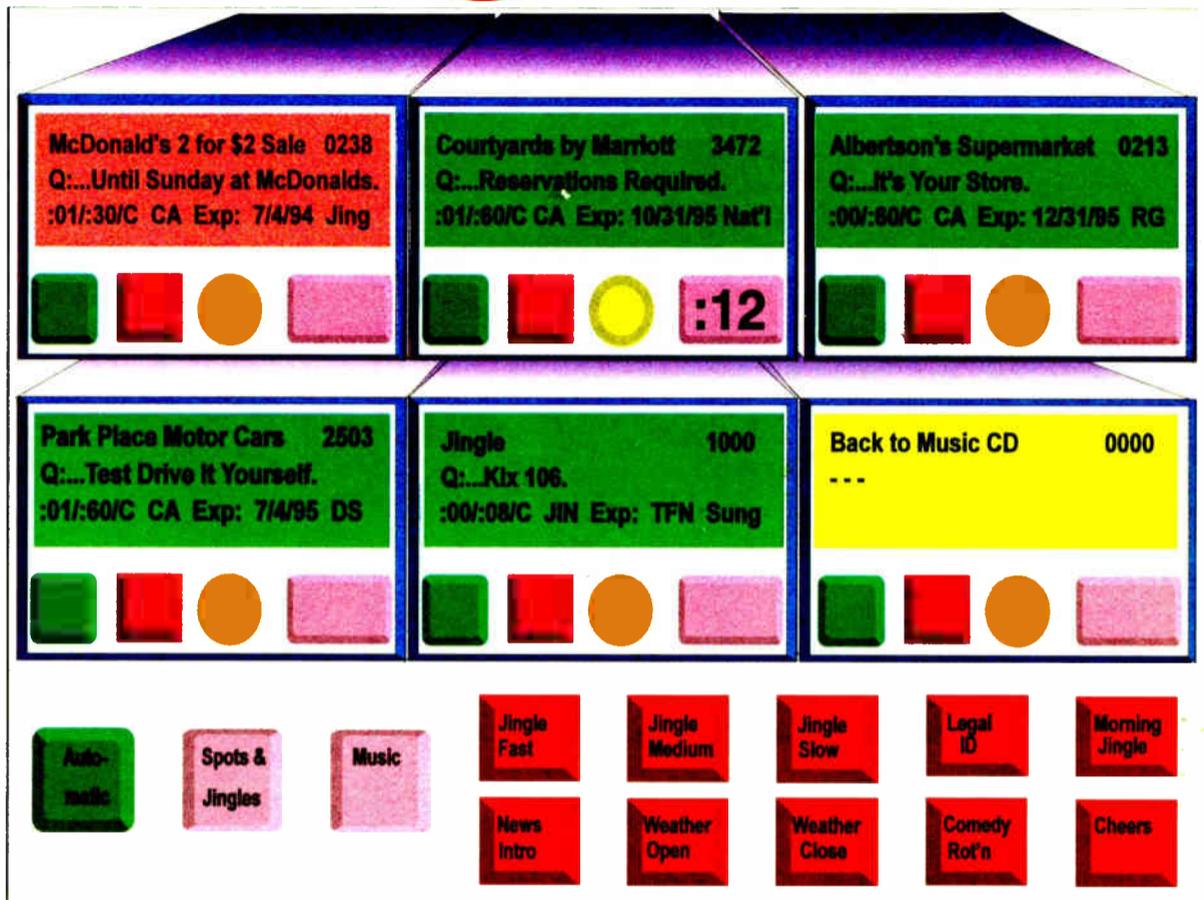
Play Any Audio at a Touch

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

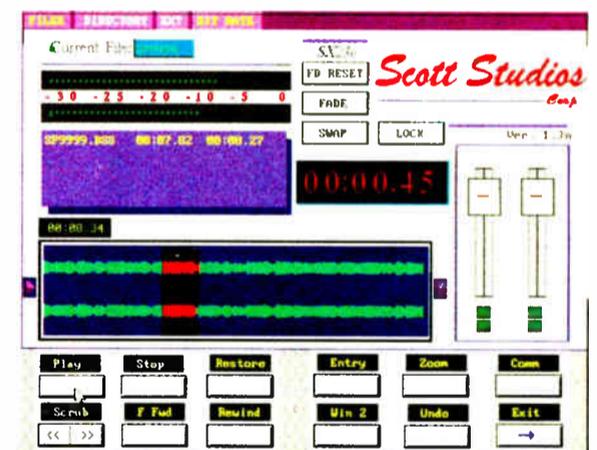
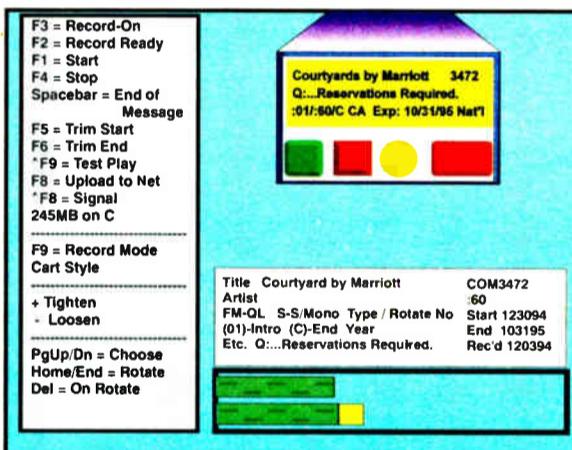
If you've used carts, you already know how it works: Six "cart decks" on the computer touchscreen play what's on your program log. Scheduled spots, promos, PSAs and jingles come in automatically from your Scott Studios' Production Bank and your traffic computer. You see legible labels for everything, showing full names, intro times, lengths, endings, announcer initials, outcues, posts, and years. Your jocks can rearrange anything easily by touching any cart and moving it to any other cart. Spots with one number that rotate several cuts work just like carts, except additions, deletions and changes are much easier. Large digital timers automatically count down event times, and flash end warnings.

At the bottom, 10 "hot keys" start *unscheduled* jingles, sounders, effects, comedy bits or promos on the spur of the moment.

You also can select audio from lists of all your recordings.



Your jocks *already know how to use Scott Studios' CompuCarts!* It's the impressive quality of digital audio without the confusion of keyboards. Each button on the touchscreen plays what you want instantly. Logs come in automatically from your traffic computer.



The World's Fastest Playback!

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

Instant Music on Hard Drive

Our most popular option is 9 gigabyte disks with 1,000 songs pre-dubbed for *free!* The audio quality of digital music from the Scott CompuCart hard drive meets or beats the best CDs. You even get direct digital inputs so you can dub digitally from your CD players!

And nothing could be faster than song requests from Scott Studios' CompuCarts! You also get five "Wall of Carts" with music that plays at a touch! Songs are displayed by title, artist, year, length, category, or any ways you like.

The Easiest Digital Audio

CompuCarts not only work like a "cart" player in the air studio, CompuCarts work like a "cart" recorder in your production studio. You get all the features your radio station needs, including start- and end-dates, rotations, out-cues and easy-to-read label information. And when spots, promos, PSAs, or any other digital audio events are recorded, they're immediately playable in *all* your Scott System air studios. Nobody wastes time carrying carts down the hall or redubbing spots for additional stations.

The Best Digital Audio

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

Sound Better With Digital Editing

Scott Systems' graphic waveform editors work wonders with phone calls in the air studio and creative spots and promos in production.

Your Best Investment

The Scott System *leads the industry* with the biggest broadcast groups like Shamrock, Alliance, Salem, Saga, Liggett, Regent, Tichenor, Heftel, Waterman, Max, Atlantic, and Rawlco in Canada. Our major markets include Detroit, D.C., Dallas, Houston, Miami-Ft. Lauderdale, San Diego, Denver, New Orleans, Oklahoma City, San Antonio, Greensboro, and others from Bangor to Bakersfield.

Scott Studios Corp.
13375 Stemmons Freeway, Suite 300
Dallas, Texas 75234 USA
800 726-8877
(800) SCOTT-77

On the Air with Ingram

► continued from page 17

Ingram's access to WABC's then-vice president and general manager, Hal Neal, which he had thanks to his work at Mars Broadcasting in Stamford, Connecticut (where he worked between WIL and WABC), was instrumental in him coming to the Big Apple's premier radio station. Ingram told Neal that the guy who was on in the afternoon wasn't really helping his station. Neal asked Ingram who would be better. Of course, Ingram said he would be better.

Verbal gymnastics

So Ingram gave Neal two tapes—one from KBOX and the other from WIL. Neal called Ingram the next day and told him he liked the tapes, but didn't know how he would sound on WABC. Ingram told him he'd have a new tape on his desk before he came in to work the next day. Ingram worked through the night, splicing his verbal gymnastics into an aircheck from WABC, so it would sound as though he was actually on the station. After catching about two hours of shut-eye, "sacked out in the ladies room" at Mars, according to Ingram, he drove to WABC, gave a guard a 10 dollar bill to open Neal's office, and deposited the tape on Neal's desk.

Of course, Neal liked the tape, and soon, New York, well, any listener able

to receive WABC's 50,000 watt signal was being treated to the Ingram Mess, as it came to be known.

Power

WABC and the Beatles fit together like ice cream and ice cream cones. Ingram was on the air when Cousin Brucie and Scotso (Scott Muni, now at New York's WNEW-FM) were broadcasting from the hotel in New York City where the Beatles were staying. Ingram was back at WABC's studios, on the air, asking the 10,000 or so kids with transistor radios on the street in front of the hotel to sing along with the station's jingles, which they did.

Wally Schwartz, WABC's general manager at the time, came storming into the studio, according to Ingram, telling him he was breaking an FCC rule about not using commercial radio stations for direct communication. "You're talking to those kids," Ingram remembered Schwartz saying, to which Ingram said he responded, "They're a mass audience." Schwartz: "But you're asking them to do things. That is direct communication. It's against FCC law, and I hope you stop it pretty soon."

Ingram laughed. He went on the air and asked the kids if they'd like him to play nothing but Beatles records for the rest of his show, which he did. Schwartz came in to Ingram about an hour later, and told him he'd better knock it off, which, in true Ingram fashion, he didn't.

That was the power of WABC.

After WABC switched from music to talk in 1982, Ingram worked at, among other places, New York's WKTU (which later became WXRK, or K-ROCK) and attended the first of many New York disc jockey reunions on WCBS-FM, which led to the Saturday and Sunday shifts he began on Oct. 19, 1991. In other words, Dan Ingram is still laughin' and scratchin'.

"Some guys never get enough," said Big Dan Ingram. "I love it. It's fun. It beats working."

I put my index finger on the stop button of my tape recorder, signaling the end of a most satisfying interview. I said, "And on that note..." Ingram, in true Ingram fashion, stopped me cold with these immortal, tender, parting words: "Which is probably an F sharp."

Your Inner Negotiator

► continued from page 17
ratings performance?

Look for options and alternatives. If you find yourself at a deadlock, ask if there is an alternative service. Instead of ordering an expensive deluxe 24-hour service, you might be able to make due with a less expensive eight hours of service at non-peak times. You may need to cover the rest of the time with something else, but the combined solution might be less than the expensive deluxe service package.

Instead of offering five staff members eight hours of overtime pay, you may discover they would be just as happy with a day off later in the week or a trade item. Neither one of these options takes money out of the budget.

Be friendly and courteous. It is not necessary to be tough, abrasive or to raise your voice in negotiations. In fact, befriending the other person and working with him or her will add to your persuasive abilities. If you are harsh, the natural response from the other person(s) is to be guarded, mistrustful or resentful. These undesired types of responses might force the other negotiators to dig deeper into their position and be less willing to bend.

Think back over your last negotiation and compare your success rate with these negotiating skills. If you did not employ all of them, add them to your next negotiation effort and see how they can make a difference to your win/win rate.

□ □ □

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

Put Your Sports Radio Network On Galaxy IV

Home Of Sports Networks Across The Country

Whether it's professional baseball or college basketball—we will help you design a sports net on Galaxy IV—the satellite that many sports networks use to broadcast games to their listeners. The C-band Single Channel Per Carrier (SCPC) service we offer is one of the most trusted and reliable transmission methods—even in inclement weather. The system is flexible enough to transmit the games from virtually any location in the United States. And when you use Galaxy IV for satellite transmission, you have access to thousands of other stations "looking" at that satellite.

Our reputation for quality and service has been earned by our longstanding commitment to radio broadcasters for more than 15 years.

Call us for more information regarding your specific needs at (202) 414-2626.

NPR SATELLITE SERVICES®

635 Massachusetts Avenue, NW ■ Washington DC 20001 ■ (202) 414-2626

Circle (80) On Reader Service Card

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.

S.C.M.S., Inc. Charlotte, N.C.

Low Prices – Experienced Staff
New and Re-built R.F. and Audio

THIS MONTH'S SPECIAL

NEED HELP WITH REPAIR,
CALIBRATION, OR FREQUENCY
CHANGE OF YOUR STL, RPU, OR TSL?

THE SCMS SERVICE DEPARTMENT
CAN SOLVE YOUR PROBLEM!

PLUS P.C. UPGRADES, REPAIR,
AND EBS UPDATES.

CALL FOR DETAILS!

— You Know We Know Radio —
Toll-Free 800-438-6040
FAX 704-889-4540

READER SERVICE NO. 89

Composite Audio DA and Switcher!



The CDS 200 Composite
DA/Switcher

APPLICATIONS

- Switching Between Composite STL's
- Main/Alternate Processing Switching
- Feed Two Transmitters and an RDBS Encoder
- Feed one SCA Generator to Two Transmitters
- Distribute Composite with the Ease of Audio

FEATURES

- 2 Input Switcher
- 3 Isolated Outputs
- Individual Level Control for Each Output
- Front Panel and Remote Control with Full Status
- Power Fail Memory with Bypass Mode
- Inputs Selectable for Balanced or Unbalanced Operation
- Front Panel Test Jack



Broadcast Devices, Inc.
5 Crestview Avenue
Peekskill, NY 10566

Tel: (914) 737-5032 Fax: (914) 736-6916

READER SERVICE NO. 17

MULTIPLE AMPLIFIER ARRAYS



Have them Your Way!

MLA400, MMA400

Four Channel Line and Microphone Amplifiers

MLA800, MMA800

Eight Channel Line and Microphone Amplifiers

CALL OR WRITE FOR A FREE DETAILED BROCHURE.



AUDIO TECHNOLOGIES INCORPORATED
328 W. Maple Ave., Horsham, PA 19044 USA
(215) 443-0330 FAX: (215) 443-0394
(800) 959-0307

READER SERVICE NO. 11

EVEN THE BEST CAN BE MADE BETTER

Introducing the new

MINI-MIX 12A

THE COMPACT MIXER WITH A
COMPACT PRICE FROM THE
QUALITY LEADER



\$3499

12 Channels
25 Stereo Inputs

Service & Affordable Quality for Over 23 Years

AUTOGRAM CORPORATION

1500 Capital Avenue (214) 424-8585
Plano Texas 75074-8118 1-800-327-6901
FAX (214) 423-6334

READER SERVICE NO. 103

THE FINEST STUDIO SYSTEMS IN THE BROADCAST BUSINESS



Audio Broadcast Group Inc.
Studio Furniture & Prewired Systems

Your studio environment specialists
for the last 35 years.

We Are The Industry Standard.

For additional information on how we can serve you, please call today.

SOUTHEASTERN SALES OFFICE
200 Fareway Drive, Suite 2
Smithfield, North Carolina 27577
Phone: 800-369-7623
Fax: 919-934-8120

MAIN SALES OFFICE
2342 S. Division Avenue
Grand Rapids, Michigan 49507
Phone: 800-999-9281
Fax: 616-452-1652

WESTERN SALES OFFICE
P.O. Box 1638
Palmdale, California 93550
Phone: 800-858-9008
Fax: 805-273-3321

For 35 years

YOU MAY ALSO REACH US ANYTIME VIA ELECTRONIC MAIL
75371.144@compuserve.com

AUDIO
broadcast group inc.

READER SERVICE NO. 195

Call MYAT For Rigid Line & Components

Facing a "right now" emergency? Planning a new installation? Upgrading your facility? Whatever the need, MYAT is the solution. MYAT products are quality-built for maximum performance and long life. And we take delivery commitments seriously.

Call your favorite RF distributor or MYAT direct at 201-767-5380, or fax 201-767-4147 for our complete catalog and reference guide.



380 Chestnut St

P.O. Box 425

Norwood, NJ

0 7 6 4 8

READER SERVICE NO. 44

World Radio History

Attention Advertisers

Reach 22,000+ broadcast equipment buying prospects at AM, FM and AM/FM radio stations, networks and groups, recording studios, engineering and consulting firms every month.

Products & Services Showcase appears in every issue of Radio World.

For detailed information, contact
Skip Tash - East Coast
Dale Tucker - Midwest & West Coast

RADIO WORLD

Tel: 1-800-336-3045

FAX: 703-998-2966

INTERNATIONAL UPDATE

Low-Power FM Burgeoning in Japan

by Thomas Caldwell

TOKYO You would think a nation like Japan would have as many radio stations on the air as other developed countries.

However, much to the frustration of listeners, this is not the case. Only four FM radio stations serve the Tokyo area, and they all broadcast essentially the same format.

Japanese government regulations concerning broadcasting date back to the end of, or even before, World War II. As broadcast facilities are considered vital to the welfare and safety of the nation, the government consciously sought to keep the number of stations low by requiring substantial capital investments prior to granting a license and by setting financial solvency rules that insure a given station will never go bankrupt.

All is changing

But that is now changing. A new industry is starting up in Japan that could result in more radio stations per capita than any other nation on Earth.

Low-wattage FM radio stations, what the Japanese call "community FM," is the latest move toward deregulation by the staunchly bureaucratic Japanese government. The licensing requirement for 1 to 10 W FM transmitters is being eased this year, and radio stations are expected to begin popping up all over the country.

Community FM is bringing a level of individuality to broadcasting that Japan has never seen. Unlike established radio stations that try to please all tastes, the low-wattage FM stations are doing all sorts of things the large stations would never dream of.

SBS Serves Many Tongues

► continued from page 19
accommodate the increasing digitalization of radio. Hard disk editing systems, digital time zone delay equipment and recordable CD technology are all in use.

A unique enterprise

According to Luu, some other countries have similar radio outlets to SBS but none have the same mix as the SBS—a national network run on professional basis broadcasting in 66 languages.

"When we speak at international conferences, people are amazed that we broadcast in more languages than the Voice of America and the BBC World Service," said Luu. "People can't imagine that we are using language as both the medium for the message and also as the means of the maintenance of the linguistic skills of Australians."

"In today's world to possess another language skill is a plus in terms of trade," Luu said, "and in terms of economic relationships with the rest of the world."

□ □ □

Max Throver is a creative and technical writer based in Bellingen, New South Wales, Australia. He can be contacted by fax at: +61-6-655-2436.

Take for example Yokoska FM: Located in a busy shopping mall outside the massive U.S. naval base south of Tokyo, the little bare-bones, glass-boothed studio broadcasts to most of the city. The format of the station can best be described as "hodgepodge."

Music is played, poetry is read, community announcements are made and local shopkeepers are interviewed. One show is dedicated to foreign families living in the area; they come on the air to tell stories of their life in Japan or what their home countries are like.

A second very low-wattage FM trend in Japan is called Mini-FM. A loophole in Japanese broadcast regulations allows almost anyone with the money and the equipment to set up a very low wattage transmitter without requiring a license. The only rule is that one station cannot interfere

with the signal of another.

Many of the Mini-FM stations are little more than hobbies for people who always wanted to be DJs. Because of their very low power—much less than one watt—most have a broadcast range of only a few hundred meters. However, some Mini-FM stations can be truly called community FM. The audience they reach is usually just a single neighborhood. The format is usually music and community announcements—things like details regarding an upcoming festival or where the recycling bins for glass and cans are located.

Mini-FMs upgraded

Many of the newer community FM stations originally came on the air as Mini-FMs, but graduated to higher wattage. There are no official government numbers on how many of these stations exist, but some industry watchers think there could soon be about 100 Mini-FMs operating on a semi-regular basis.

As would be expected in a nation that possesses most of the world's gadgets, companies like Teac and Sony are starting to offer "Community FM Sets." These are small, relatively low-cost turnkey broadcast kits that include everything from the transmitter to the CD decks.

This new market also has potential for non-Japanese manufacturers. There is a relative lack of Japanese experience in building "budget" broadcast facilities, and the soaring yen makes the market rather attractive for outside companies.

According to Takashi Hirose, a community FM activist, the potential to sell product in Japan is enormous for foreign manufacturers of budget studio and broadcast gear.

Budget facility

"Japanese engineers are not used to worrying about money when it comes to building a studio," he said. "They have never had to deal with a budget facility because there are so few radio stations and they all have lots of money. But Americans are used to taking the budget into consideration when it comes to putting a facility together."

At the time of this writing, there are only about 20 community FM stations in Japan operating at one watt or less.

most business is done locally, many experts watching the industry here predict that companies who never dreamed of advertising over the airwaves, like local shops, restaurants and even plumbers, may start doing so.

Japan is still pretty much a nation of mom-and-pop businesses. With the new



Community FM activist Takashi Hirose promoted independent radio at InterBEE '94 in Tokyo.

Because the government increased the wattage allowance from one to 10, Mini-FMs are expected to grow exponentially during 1995.

The increased signal strength will mean more listeners and a greater chance for start-up stations to generate realistic advertising revenue. Because

deregulation of the radio industry, it may also become a nation of mom-and-pop radio stations.

□ □ □

Thomas Caldwell, a Tokyo-based freelance writer and radio journalist, covers the industry in Japan for RW. He can be reached via e-mail at caldwell@gol.com.

Want To Know How We Raised DAW Performance To New Heights?

Unlimited tracks. Greater control and flexibility to assemble, manipulate and modify. Amazing speed to edit and playback instantly. Reliability and confidence unique to the world of Digital Audio Workstations. Plus a level of audio quality that is discernably higher, even to the most discriminating ears.

It's the most logical and comprehensive solution for digital audio recording, assembly, processing and mixing. **Perfect for radio and broadcast production**, project studios, and sound for picture.

It's called the **MicroSound Professional Desktop Audio System**, and it represents an essentially different approach to disk based systems. **True** (non-linear) **Random Access Editing™** and proprietary **Floating Tracks™** architecture dramatically enhance creative freedom and save time.

Perhaps the only aspect we didn't raise is MicroSound's surprisingly reasonable price. **MicroSound: Proven, Professional Desktop Audio** from Micro Technology Unlimited. The sky's the limit.



microsound™ The Better Way.

Want to get the rest of the story? Call or write us for a free guide to Professional Desktop Audio.

Micro Technology Unlimited PO Box 2106, Raleigh, NC (USA) 27619
Voice: 919-870-0344 Fax: 919-870-7163

Circle (111) On Reader Service Card

Why is DIGILINK the Hard Disk System fo

Because ...

- ***Over 1,000 Workstations have been sold***
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

#1 IN
STUDIO
FURNITURE

#1 IN
AUDIO
CONSOLES

#1 IN
DIGITAL
AUDIO

DIGILINK

Hard Disk Digital Audio Workstations

#1 Selling for Radio ?



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.

for more information call... (303) 224-2248

arrakis
SYSTEMS INC.

2619 Midpoint Drive, Fort Collins, CO. 80525
Voice- 303-224-2248, Fax- 303-493-1076

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.



Excalibur Electronics
HC-1 Handi-Coupler

Here is the simplest, quickest, most convenient way to connect audio to a telephone. The HC-1 connects in series with the handset of any phone using modular connectors. No connection to the phone line is needed. Press the front panel button and external audio is available on separate send and receive 1/4" TRS jacks on the rear panel. Release the button and the handset is once more connected for normal use of the phone. Nothing could be simpler!

You can find many uses for the HC-1 around your station: on-air studio, production room, newsroom, sales office, field news kits, sports remotes, etc.

EXCALIBUR ELECTRONICS, INC., CHANTILLY, VIRGINIA
Please circle our bingo number for a data sheet and a dealer list

READER SERVICE NO. 60

VACUUM CAPACITORS



Broadcast Capacitors for transmitters, couplers and phasers

- Variable or Fixed Capacitance
- Capacitance Ranges from 3 pF to 6600 pF
- Peak Test Voltages from 3 kV to 100 kV
- Current Ratings to 1000 Amperes
- Custom Designs Available on Request

COMET NORTH AMERICA, INC.

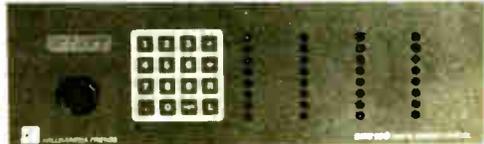
11 BELDEN AVE. • NORWALK • CT • 06850
203-852-1231 • FAX: 203-838-3827

READER SERVICE NO. 83

EXPAND • ABILITY

Expandable Digital Remote Control.

As your station metering requirements grow to additional sites and channels, the DRC 190 from Hallikainen & Friends grows with you. By its inherent, modular-expansion design, the DRC 190 can accommodate a single transmitter or grow to manage up to 100. Reliable firmware includes a multiple access, anti-contention data packet system allowing any site to communicate with any other site over wire-line, sub-carrier or half-duplex UHF radio. The same firmware allows expanding the system by adding additional sites or channels at any time. For a system to grow with, not out of, expand with the DRC 190.



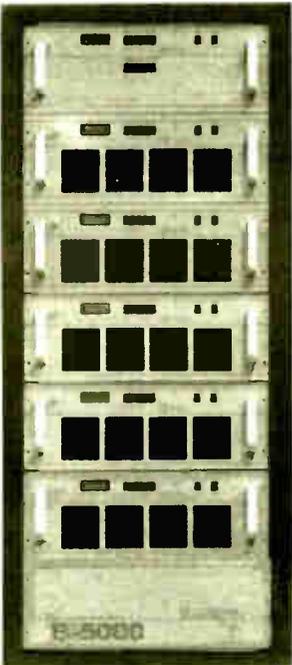
PROGRAMMABLE EXPANDABLE AFFORDABLE DRC 190

HALLIKAINEN & FRIENDS
141 Suburban E4, San Luis Obispo, CA 93401-7590 USA
805-541-0200

READER SERVICE NO. 112

SOLID STATE 2, 4 & 5 kW FM BROADCAST POWER AMPLIFIERS

CALL 800-986-9700



1kW INTERCHANGEABLE MODULES
2 YEAR WARRANTY
HARMONIC FILTER
5" RACK

MODEL	POWER
B-2000	1000 - 2200
B-3000	1500 - 3300
B-4000	2000 - 4400
B-5000	3000 - 5500

Silicon Valley POWER AMPLIFIERS
The RF People

800-986-9700 FAX 408-986-1438
529 FORMAN DRIVE, CAMPBELL, CA 95008

READER SERVICE NO. 14



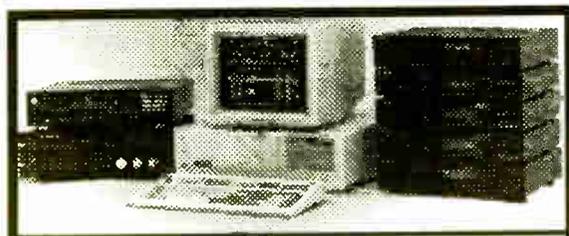
Econco
REBUILT POWER TUBES



Approximately One Half the Cost of New
3,000 Hour Unconditional Guarantee
Call for Our Price List

Econco 1318 Commerce Ave. Woodland, CA 95695
Phone: 916-662-7553 Fax: 916-666-7760 Telex: 176756
Toll Free: 800-532-6626 From Canada: 800-848-8841

READER SERVICE NO. 37



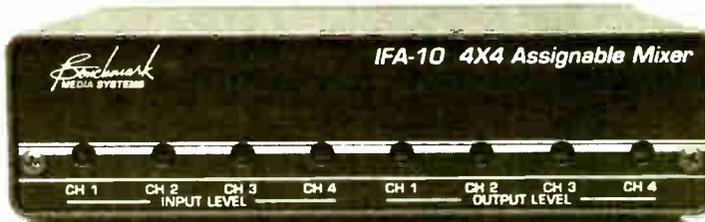
Pristine SYSTEMS INCORPORATED
DIGITAL AUTOMATION SYSTEM

- The Best Integrated Play List Scheduler (Music & Breaks) & On-Air Playback
- Dolby AC2 Overlapping Hard Disk Audio
- Music on Hard Disk and/or CD Jukeboxes
- Digital Multi-Track Production Editor
- Provide Computers/Players & Save \$\$\$ or Buy/Lease From Us

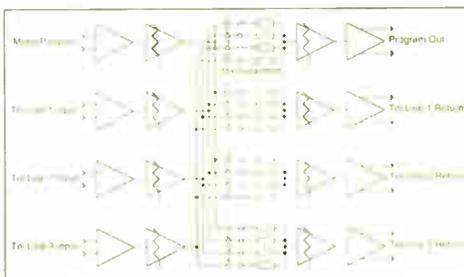
WEST/INT'L 310/670-7500 EAST 803/370-2400
FAX 310/670-0133 FAX 803/370-2314

READER SERVICE NO. 152

Mix-Minus with Ease



The IFA-10 4x4 mixer is the perfect device for creating any simple mix-minus. Use it as a mono input to your console or down stream and get a mix-minus for three telco lines, or use it down stream from a stereo console and conference two lines. Need more lines? Combine two or more units. At \$300, power supply included, it's priced right. Now you can get that talkshow on the air without having to buy a high priced, fancy-dancy console. Call Rory Rall today for details.



BENCHMARK MEDIA SYSTEMS, INC.
Phone 800-262-4675, FAX 315-437-8119

READER SERVICE NO. 106

Many Stations Spinning Webs in Cyberspace

by Alan Haber

WASHINGTON The weather's fine out here in cyberspace; if only I could get an even tan...

I hope you have had a chance to surf the radio-oriented sites on the World Wide Web that I told you about last month; they are fully stocked with links to a wide variety of both commercial and non-commercial stations.

Before I take a look at National Public Radio's (NPR) cool site, and go over the steps necessary for your station to get on line, I would like to point you to Justin Paulson's terrific radio on the WWW site (I inadvertently left out the site's address last month, but it was just as well, because it has moved—check it out at <http://american.recordings.com/wwwofmusic/radio.html>).

NPR blazes trail

NPR has been on the Web since December 1993, when "Weekend All Things Considered" went up solo. Rich Dean, producer for NPR's New Media Services, said he launched Weekend ATC on the Web because he thought it was a "cool thing to do." He was right. It turned out to be so cool that a full NPR site went up on Oct. 1, 1994 (check it out at <http://www.npr.org>).

Dean said he wanted to take NPR and its member stations "into the next method of delivering information to people, which is more of an on-demand way." This information includes program listings.

The goal is not only to help NPR's member stations get on line, but also to get public radio in general into cyberspace. So far, more than 50 public radio stations are on line; some of these reside on NPR's server. Cybersurfers can link to these stations from NPR's home page, via a neat looking, clickable map of the United States.

The benefit of being on line with a Web site, according to Dean, is to reach more people, including those that may not have heard of NPR. By doing this, he said, NPR can increase affinity with its listeners.

NPR's Web site helps member stations get out into their local communities and act as a source of community information for their listeners. Dean said that NPR will eventually be helping member stations to take listener memberships on line.

Graphic upgrades

NPR will soon be upgrading the graphics on its Web site's home page; I've seen the new graphics, and they are absolutely gorgeous! Cybersurfers will soon be greeted with a nostalgia-inducing, radio-oriented graphic that features an old microphone on a stand. It is just about the nicest, friendliest home page I've ever seen: NPR should be mighty proud of it.

Even without a lot of promotion, NPR's Web site is heavily traveled, to the tune of about 9,000 "hits" a day from all over the world. Of course, this doesn't mean that your station will necessarily get this many accesses—although, you certainly cannot argue with success!

The future is so bright for NPR's Web site, well, Dean has got to be thinking about wearing shades (to paraphrase a familiar song title). "I think radio's really poised to go into the next way of delivering information to people," he said.

An exciting world of opportunities awaits your station on line, but, before you can benefit, you have to get there. Robert Davidman, at WQAM(AM)-WKIS-FM in Miami-Ft. Lauderdale, has latched onto these opportunities in a big way—in addition to developing and maintaining his stations' sites, he is working with a group of Web wizards to set up other stations across the country with Web space.

The first thing a station has to decide, said Davidman, is its purpose in erecting a Web site. "That's how (stations) determine if being on the Net is going to be

for them," he said.

The next step is to either contract with a

company to design and erect a site, or decide to do it in-house (if your station decides to go this route, you should make sure the person in charge of the site is

creative, and has a facility for Hypertext Mark Up Language (HTML), which is used in the creation of Web pages).

After that, you'll need to get a line connection to the Internet (regular telephone lines will not perform well against lots of access, so consider a faster 56 kbps or T1 line instead).

It is also wise to keep graphics on your site to a minimum, to enable faster loading of Web pages for visitors.

And, said Davidman, it is a good idea to set your station's site up as a source of information about your station and a

continued on page 33 ►

The benefit of being on line with a Web site is to reach more people.

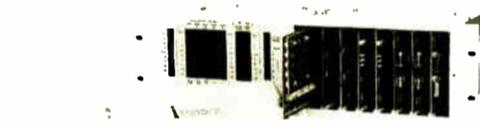
A cast of performers.

For more than 20 years, Inovonics has met the everyday needs of broadcasters the world over with sensible, top-quality broadcast products at down-to-earth prices.



222 Asymmetrical AM Low-pass Processor

Guarantees U.S. NRSC compliance, or is available in several versions for international shortwave service.



250 Programmable 5-band Stereo Processor

Gated AGC, 5-band Compression and EQ, split-spectrum Limiting—all with colorless PWM gain control. Manually pre-program 4 processing presets, or place entirely under computer/modem control via RS-232 bus.



255 "Spectral Loading" FM Processor

Triband-PWM Stereo Processor for contemporary music formats. Gated AGC, 3-band Compression and Limiting; unique "Spectral Loading" feature for a very aggressive sound.



260 Multifunction FM/TV Processor

Stereo AGC—Compressor—Limiter ideal for TV-aural and budget FMs. Split-spectrum dynamic control.

715 "DAVID" FM Processor / Stereo-Gen.

AGC—Compressor—Limiter, plus clean Digital Synthesis of the multiplex baseband signal. Internal RBDS/SCA combining; amazing performance at low cost!



705 & 706 Digital Synthesis Stereo Generators

Choice of a no-frills, basic Stereo-Gen., or a full-featured unit with metering and remote control. Both have patented overshoot compensation and a clean sound.



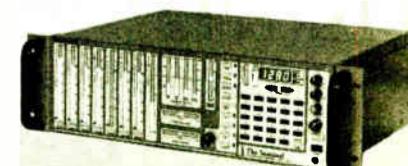
530 Off-Air FM Modulation Monitor

Tunable Mod-Monitor gives accurate measurement of total mod., pilot injection, stereo separation, etc. The peak flasher, metering and alarms may be removed.



550 The "Sentinel" Monitor Receiver

All-mode radio tunes AMAX-spec C-QUAM® Stereo, FM/FMX® Stereo and all analog and digital RBDS/SCA subcarriers. Comprehensive audio diagnostics permit off-air evaluation, comparison and analysis.



Coming soon: An easy-to-use RBDS Encoder, and a Monitor/Decoder for use with any FM Mod-Monitor.

Inovonics, Inc.

1305 Fair Ave., Santa Cruz, CA 95060 • TEL: (408)458-0552 • FAX: (408)458-0554



PROMO POWER

Planning for Summer Intern Season

by Mark Lapidus

WASHINGTON How many interns does it take to change a transmitter tube? Four... and they are in for the shock of their lives! Ah, interns... the young people around the building that seem only to have first names—both the advantage and bane of many a radio station.

Interns do the dirty work, rarely get the credit and are in high demand by most active radio stations. Unfortunately, most stations have interns, but not an intern plan. Whatever happens, happens. Whoever shows up... shows up.

Most of us realize intellectually that this is no way to run a business and yet we do nothing to correct the situation. Before your summer internship program kicks into high gear, turn your tag team into a lean mean intern machine.

Take charge

Assign one person at the station the task of organizing your intern program. Yes, it could be the promotion director, but in my view this is not the best scenario. While it is true that most interns will work with the promotion department, many will not and should not. There is no

reason why you shouldn't have at least one intern in each department in your station. There is a lot an intern can learn in sales, business, programming and engineering.

There are also many ways that an intern can help any department get the job done. So who is the lucky person to handle the interns? My number one choice is the general manager's administrative assistant. General manager's assistants have a hand on the pulse of the station. They know where help is needed. They generally have good phone skills and are typically talented when it comes to dealing with people.

If this scenario doesn't work for you, try this: every three months, rotate the job among your department heads. I've seen effective intern programs where the intern rotates into a different department each week.

Stay in touch

Interns should report to the department head for whom they are working. Once a week, they should also touch base with the intern coordinator mentioned above. Why? Interns who are having problems are sometimes reluctant to say anything to the department head. They may be more candid with the coordinator. This could encourage them to be more productive, help avoid potential problems and

- Sales—monitor other stations' commercials, assist in putting packages together or look through newspapers for leads;
- Business—add up expense reports, mail out billing, update the automatic dial buttons on all office fax machines;
- Promotion—set up at remotes and appearances, screen incoming phone calls, take notes at promotion meetings.

It is impossible to get the most out of an intern without effort on your part; you must plan the list of tasks prior to his or her arrival. It is a shame and a waste to see interns just sitting around a radio station. The sad part is that others on your staff may view them as lazy and worthless just because you've not prepared anything for them to accomplish.

Make sure you set up an In basket for each intern. Write assignments down with completion dates and put them in those baskets. To avoid any intern slow-time, devise one task that always needs to be done. I know one program director who left a phone book out for interns. One would simply start where the last person stopped and make a telemarketing pitch to encourage listening to the station. You'll be surprised how far through that phone book you can get in a year.

Evaluate

Every intern deserves an evaluation. You may do this on an ongoing or weekly basis, or wait until the end of each internship. The advantage to spending a few minutes per week on evaluation is that an intern's work will improve with proper motivation supplied by you.

To find the best interns, post the position at all area college radio stations, broadcast schools and universities with communication departments. Interview candidates carefully, probing interests and accomplishments. Choose high achievers with lofty goals.

Keep in mind that most internships do not

pay a dime. I am not convinced a paying program is advantageous. I do like to take the best interns after they have completed their project and hire them part time. Say this up front and you'll have a win-win. They are motivated to do their best while working for free and then later they have more skills to offer.

Finally, you do owe interns something: knowledge. Unquestionably, they will learn a lot about radio just by hanging out at the station. In between licking envelopes, they may even make a contact that will help them obtain a job someday. You can make a truly positive difference by spending five minutes a day teaching an intern about one thing you do.

Recently, a friend of mine in his fifties told me a story about his first internship at a newspaper. It was more than thirty years ago, but he remembered every detail about a man there who became his first real mentor. Wouldn't it be great if someone remembered you like that long after you were part of radio history?

□ □ □

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.



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.

There's no need to have someone put a cart in a recorder, start the machine, record the actuality, check the cart, and take it into the air studio. Telestor does it automatically.

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.

Telestor is available now from Harris Allied.

1-800-622-0022

Fax 317-966-0623

Southern CA 1-800-690-2828

HARRIS ALLIED

SPECIAL REPORT

Key Questions to Ask at Interviews

by Mary Ruth Austin

TAMPA, Fla. Ever wonder why so many job applicants seem so awful? Or why candidates who seemed so impressive on paper turned out to be big flops? Part of the problem is the applicant pool from which most employers fish. It is stocked, for the most part, with carp—not trout.

At any given time, one-third of all potential applicants are in a job they like or love and would not dream of leaving. Another third are doing jobs they dislike in environments that de-motivate them but for some reason have decided to stay put. They might take another job if it fell into their laps, but they are not pounding the pavement.

So, who is? Who are these people who answer your ads and fill out your applications? Most were fired from or quit their last job in a huff. That means that at any given time, two-thirds of the people who walk through your door looking for work could be chronically unemployed and lack the skills, maturity or common sense needed to work successfully *anywhere*.

Among the carp

Swimming in there, along with the carp, though, could be someone with exactly the skills you seek. Effective interviewing makes deciding exactly which applicants to keep and which to throw back much easier. (So does using an accurate, independently valid employee selection tool.)

Few of us interview enough applicants to become particularly skilled at it. That's why it is so important to plan each interview carefully. Obtain and review each applicant's résumé *before* scheduling the

interview so you can determine if the candidate's experience and credentials warrant the interview. If you did not get the applicant's résumé until the interview, review it in private before meeting with him or her.

Fortune magazine reports that 66 percent of all job applicants stretch the truth on their résumés, either through omission or exaggeration. Candidates "forget" to list jobs they have been fired from, "adjust" employment dates, "change" reasons for leaving and "cost effectively enhance" their educations.

When reviewing a résumé, consider four or more jobs in three years, a sloppy,

dirty, disorganized or unclear résumé, or gaps in employment as warning signs. As you review the résumé, make notes, on a separate sheet about issues you want to discuss with the candidate.

Planning required

Effective interviewing requires planning. The Omnia Group suggests dividing interviews among three people—one to probe the candidate's past, another to determine why she is currently available and a third to determine future professional goals.

Prepare a list of questions ahead of time so that you gather the same information

from each candidate. Do not do all the talking. Begin with the first job listed and ask:

1. I see you worked at _____, from _____ to _____. Why did you choose that firm? This question helps determine commitment and goals.

2. What were your responsibilities? Does his or her answer agree with his résumé? If not, ask for the name of someone who can confirm his duties, accomplishments and positions held. Ask job specific questions.

3. How did your responsibilities grow? A true sales/manager personality will answer this question easily and confidently. "Faux Salespeople" or staff support personalities will have difficulty.

4. Who supervised you? Asking this produces references in addition to those on

continued on page 35 ►

Station WWW Sites

► continued from page 31

place to go for links to other sites of interest to your listeners.

Davidman said that you'll most likely be updating the information on your station's Web site once or twice a month, "unless you're doing a weekly top ten list," for example.

Equipment needs

The equipment your station will need to set up a Web site will depend on what your station is looking to accomplish on line, and the number of cyberspace visitors it gets. You will need at least a very fast 486-level computer to act as the site server (but a faster Pentium is best), and at least a gigabyte or more of hard-disk storage, if you want the server to reside within the four walls of your station. Of course, you can always have your site reside on the server in place at the company you hire to create it.

To find companies in your local area that can erect a Web site, look in your local newspaper, or read the various computer trade publications—Internet-oriented companies are sometimes listed there. You can also e-mail Davidman at IR@Satelnet.org for tips and pointers.

Well, it is time for me to get back to my cyberspace tan. Do not forget to contact me at zoogang@ix.netcom.com with your station's successes on the electronic frontier.

ADX Ensemble

THE FUTURE OF DIGITAL

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.

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

Best of all, the ADX Ensemble is backed by the same team of engineers and support staff that has made PR&E the first choice among the world's leading broadcasters. Call today for your full color brochure.

Pacific Recorders & Engineering Corporation
2070 Las Palmas Drive, Carlsbad, CA 92009
Tel: 619-438-3911 Fax: 619-438-9277
GSA Contract: GS-03F-4064B

DESIGNING THE FUTURE OF DIGITAL



Circuitry Recipes Sure to Please

Learning to Make Your Own Circuits Can Be Both Cost Effective and Innovative

by Jim Somich

BROADVIEW HEIGHTS, Ohio

There is a cookbook approach to circuits of a relatively complex nature without extensive theory. It is based on the "building block" concept. Every circuit, no matter how complex, can be broken down into smaller and smaller blocks until all that is left is a fundamental circuit. And, even though there are scores of variations, most of these fundamental

circuits can be represented by a limited number of component values and circuit topology.

While I can't lay claim to inventing the "cookbook approach," I use it all the time with a great deal of success.

The purpose of this series of columns is not to make you into a seasoned analog or digital design engineer, but rather to give you the necessary tools to train yourself in the fundamentals of design. As you become more confident, you will

naturally progress to more complex designs. The net result is that you will become a better engineer.

Designing circuitry and building projects is not only very cost effective, but also goes a long way to educating you in circuit operation. After you have designed a few projects of reasonable complexity, you will look at schematics in a different way. You will become more proficient in your craft through the practical application of basic circuit design principles.

There are many good reasons for constructing your own designs. Maybe there is nothing on the market to fill your

needs. This happened to me when I needed a stereo demodulator for monitoring my stereo composite. Or maybe you just don't have the budget for store-made box, but can scrounge up the parts necessary to build your own. There is a great feeling of satisfaction when your design is on line and working as well, or better than, a commercial unit.

Designing circuits

Decades ago, in the stone age of radio engineering, it was commonplace for engineers to design and construct most of their own equipment. Such composite equipment often rivaled its commercial counterpart. And while it is true that you can buy almost anything you might need, why not educate yourself and become a better engineer in the process by trying your hand at circuit design?

Through this series of articles I will touch on the various building blocks of most common analog and digital circuits. Once you understand these fundamentals, it is easy to "plug in" values to make them do whatever you want. After a short while you will backlog a library of your own building blocks ready for any new project.

One of the benefits of "rolling your own" is that you can see what parts you have on hand. Most circuits can be designed to work well using a wide variety of op-amp types, capacitors or resistors. Many catalogs specialize in new surplus parts that can be used to fuel your projects. As you continue to experiment, you will find that even though there are hundreds, or even thousands, of transistors and op-amps, a wide variety of types will function perfectly well in most circuits. For this reason, the cookbook approach will point out where you can be creative in your designs and also where you should stick to established practices.



Basic blocks

This series of columns is designed for the engineer who is proficient at installation, adjustment and repairs, but has done little design work. I will show you an easy way to transition from fixer to designer. Designing and building your own equipment can become addictive. The more you build, the more you find new projects to build. Once your cookbook contains the basic blocks plus your own "individual" circuit ideas, you are ready to tackle most any project.

Just one word of caution before I begin: While constructing your own equipment is both educational and fun, there are many times when a commercial piece of gear is "perfect" for your application. If you have the money in your budget and your time is better spent on other projects, it might be a wise choice to buy the commercial gear. Save your special projects for equipment not readily available on the commercial market. Your special ideas will make the most satisfying projects.

Operational amplifiers are designed to operate off bi-polar DC power supplies supplying approximately + and -15 volts

continued on page 45 ►



TM century

It's the Ultimate Digital Studio from TM Century. And it's the ultimate in new technology for giving program directors and air personalities more control than ever before. More local market control than de-centralized satellite networks or other digital systems. More creative control with a design based on live assist but with walk-away capability. More audio quality control, with CD changers rather than multiple hard-disk compressions that decrease your on-air sound quality. And even more risk control,



"I'm sure I'm speaking for the rest of the KVIL personalities...

We absolutely love the UDS. I can't even imagine running a radio show without it."

Ken Barnette
KVIL 103.7 FM
Dallas, Texas

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

The Ultimate Digital Studio®

Circle (61) On Reader Service Card

World Radio History

WORKBENCH

Digital Requires Careful Cabling

by John Bisset

SPRINGFIELD, Va. As more stations turn to the benefits of digital audio work stations, the engineer's time spent maintaining cart and CD machines is traded with maintaining computers. A part of this maintenance includes the system cables.

Laura Tyson of the Roland Corporation offers some suggestions on intercabling and selecting cables. First, remember that the SCSI bus is actually a form of transmission line, and just like with higher power RF, impedance matching is important. SCSI specifies a cable impedance of 100 ohms +10 percent. A majority of the SCSI cables sold today are closer to 50 ohms, resulting in reflections that can alter or corrupt data on the line.

Internal cable

SCSI specifications also call for the internal cable wiring to consist of 25 twisted pairs—each pair consisting of a signal and a ground. All too common is a cable consisting of 26 wires—25 signal wires and a common ground or shield. At low data speeds or for short runs of cable (less than a foot), this isn't usually a problem. Speed up the data, as a workstation does, and start lengthening the cable to three to six feet, and reflections and crosstalk become a problem.

How does this show up on the workstation? Primarily in the form of random data errors that cause noise in the audio

to a total shutdown of the equipment.

Laura Tyson has a sheet on selecting cables. The sheet contains an article by Steven Bobker of APS Technologies (800-846-9948). APS sells MAC hardware and the better grade computer cables. If your cables come from a variety of sources and are of different thicknesses, suspect problems. Thin cables that are 3/16-inch in diameter are the ones with the common shield. The premium SCSI cable will be thick, with 19 pairs of wires, and that bundle wrapped with another ground.

When you buy cables, select the shortest cable to fit your needs. This will help keep your total chain length under 19 feet—including connectors and ribbon cables inside the equipment.

In addition to cable problems, care must be taken that the physical ends of the SCSI chain are terminated. Termination can be performed internal to the drive by using an in-line resistor array, or external, by attaching to a Centronics 50-pin connector.

By the way, Laura warned not to change terminators on any SCSI device with the power on. Terminators require +5 VDC, and the equipment the terminator is connected to may not supply the voltage. To determine whether the voltage is present, turn on the drive, but with no connection to any other SCSI device and measure the voltage between pins 1 (GND) and 38 (TERMPWR) on a 50-pin Centronix connector, or for 25-pin D connectors measure between pins 14 (GND) and 25 (TERMPWR).

If you are not sure whether your drive is internally terminated, turn the drive on, but with no SCSI connections, and measure between pin 26 (DATA) and 1 (GND) on a 50-pin Centronix, or pin 6 (DATA) and 14 (GND) for the 25-pin D connector. If the drive is terminated internally, you'll measure approximately 3 VDC. If the drive is not internally terminated, this pin will "float" and you will see something closer to either 0 or 5 VDC, or even a fluctuation between 0 and 5 VDC.

If you are interested in receiving the entire cabling/SCSI termination information, circle **Reader Service 1**, or contact Laura Tyson at Roland Corporation.

★ ★ ★

WDNX(FM) is an educational station operating out of Harbert Hills Academy in Savannah, Tenn. Albert Nielsen is the station manager and engineer. He writes with an interesting dilemma. WDNX operates on 89.1 MHz. The second harmonic falls right on Channel 7, which is the most listened-to station in the area. WDNX operates its transmitter in the fringe area of Channel 7's coverage, so the TV signal is weak. The radio station, however, produces just enough interference to make the neighbors unhappy.

Second harmonic

Albert heard of a station that corrected a similar problem by radiating a small amount of second harmonic signal 180 degrees out of phase with the main signal. It would seem that a portion of the 89.1 transmission could be sampled, run through a doubler stage, and then inverted

and transmitted from a separate antenna, but what would the FCC say?

Another arrangement might be to install a second antenna, tuned to the second harmonic, that would be in parallel with the main antenna, but 180 degrees out of phase. This scheme is common among radio amateurs, who connect a set of quarter-wave dipoles together for 80, 40 and 20-meter operation. The transmitter frequency is radiated by the dipole tuned to that frequency, and the other dipoles reject the signal. The disadvantage to this arrangement is that harmonics are radiated, usually in phase.

Workbench readers are encouraged to share their knowledge by either faxing your thoughts to me (703-764-0751), or contacting Albert Nielsen directly at 901-925-9236.

★ ★ ★

We'll wrap up this issue with a few good lines from SBE Chapter 36 in San Diego, compliments of the Portland, Oregon field office. Here are some of the office's least favorite complaints and comments:

"What public file?"; "I just know I was the 7th caller!"; "You mean you have to have a license to do that?"; "Channel 12 ran the same episode of 'Hawaii Five-0' last month, and I want to know what you're going to do about it?";

And for Frank Lucia, down at the FCC in Washington, "I thought EBS was voluntary!"

□ □ □

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.

Tips for Effective Interviews

► continued from page 33

the résumé that the candidate included because he or she knew they would be glowing.

5. Why did you leave? If you are interviewing for a sales or management position, "a better opportunity," or "I was over-managed," are what you hope to hear. "My husband was transferred," or "my company went out of business and relocated" are appropriate answers from staff support candidates. "If the answer is "fired," probe carefully. Being "let go" because of failure to perform, personality clashes or misconduct is serious and requires an explanation from the candidate and other sources—most layoffs are performance based. Did the candidate learn from the failed experience? Or is she bitter?

6. And then where did you go? This is a critical question. Does the candidate know what is on his or her résumé? If the answer agrees with the résumé, re-ask questions 1-6 until you have covered each job on his résumé. Then ask: Are there any positions you have held which are not listed on your resume? You are looking for honesty. A candidate may mention an inconsequential part time or temporary job, neither of which is a problem, especially if he volunteers the information.

Other suggested questions:

- Tell me about yourself.
- How does your experience qualify you?
- What is your greatest accomplishment?

- What was your greatest disappointment?
- Did you pay for your own education?
- What are your personal goals? What are your career goals?
- What would be your ideal job or career?
- How do you like being managed? Who was your best boss and why?
- What was your best employment experience and why?
- What did you learn from your worst employment experience?
- What do you like and dislike about the position you are applying for?
- What are your strengths? What are your weaknesses?
- If you were offered the position, would there be any situations which would inhibit your ability to perform during the first 90 days?
- The hours are ___ to ___. Would you have a problem with these hours?

Interviewing carefully, along with other sound employee selection practices greatly increase the odds you'll catch candidates worth keeping.

□ □ □

The Omnia Group is an international management and personnel consulting firm that specializes in employee selection and management for 8,000 clients in 15 countries. The Omnia Group will provide a complimentary profile and interpretation to readers who call 1-800-525-7117 and request one.

The Wizard™ has gone STEREO!

The new DIGITAL FMSA-1 gives The Wizard System unmatched stereo monitoring capabilities. . .



Superlative stereo performance. Linear-phase filters that reveal the true performance of your audio processing. The stability of digital stereo demodulation. The sophisticated graphical presentation of The Wizard. And—with the RS-232 port—operation on site or off.

Contact Belar today for more details on what should be your next modulation monitor.

BELAR ELECTRONICS LABORATORY, INC.
119 LANCASTER AVENUE • P.O. BOX 76 • DEVON, PA 19333-0076 USA
(610) 687-5550 • FAX (610) 687-2686

Call, write or FAX for more information on Belar AM, FM, Stereo, SCA, and TV monitors.

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.

EBS EQUIPMENT



Model CEB Encoder-Decoder\$540
 Model CE Encoder\$375
 Model CE with Stereo Option\$405
 Model CD Decoder Only

(REQUIRED FOR LPTV)\$320
 Receiver can be supplied to drive Decoder.\$100

- Encoder FCC Type Accepted •
- Decoder FCC Certified •
- Exceeds FCC Specifications •

All interconnections to the EBS equipment are made through a barrier terminal block. No special connectors necessary. In stock—available for immediate delivery.

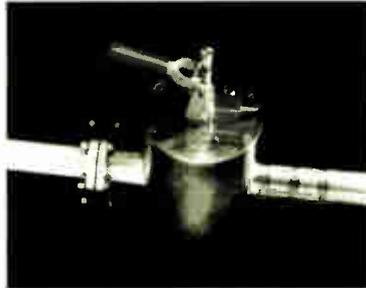
GORMAN REDLICH MFG. CO.
 257 W. Union St.
 Athens, Ohio 45701

Phone 614-593-3150 • FAX 614-592-3898

READER SERVICE NO. 109

ERI - ELECTRONICS RESEARCH 812-925-6000

You have heard the problems and read the OSHA fines. Now, here is the answer: ERI's antenna system Lock-out/Tag-out energy isolation device.



OSHA's recent enforcement of regulation 29 CFR-1919.147 in reference to transmitting antenna systems has illustrated the requirement to isolate the antenna system from the energy source. Protect your employees and your station. Call for more information.

READER SERVICE NO. 40



TELESCOPING MAST

for fast and easy deployment of lightweight antennas

- Manually deployed with quick lock/release collars in one minute or less
- 25' extended height
- 6' retracted height
- 20 lb. top load capacity
- Rigid azimuth locking
- Over 50 mph wind speed capacity
- Free standing
- Universal vehicle mounting stand included
- Portable - 20 lbs.
- High strength anodized aluminum construction
- Ideal for lightweight antennas
- Designed and built by the leading manufacturer of pneumatic telescoping masts



W3
 WILL BURT
 P.O. Box 900
 Orrville, Ohio 44667-0900
 Phone 216-682-7015
 FAX 216-684-1190

READER SERVICE NO. 63

ARE YOU LOOKING FOR A COST EFFECTIVE ALTERNATIVE TO MANUFACTURER SERVICE?

SERVICE, REPAIR & CALIBRATION

- STL's • RPU's • TSL's
- Exciters • AM/FM
- Broadcast Monitors •
- Remote Control Systems

SPECIALIZING IN EQUIPMENT BY

- Belar • Marti •
- Moseley • McMartin
- TFT • And others...

An authorized TFT service center <

IN CASE OF EMERGENCY

We can help get you back on the air with our STL Loaner Program. We have STL's available that will be set to your frequency prior to shipping. We also provide over-the-phone technical assistance.



2198 Hubbard Lane, Grants Pass, OR 97527

(503) 471-2262

READER SERVICE NO. 175

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.

UNIVERSAL ELECTRONICS, INC. 4555 Groves Road, Suite 12 Columbus, OH 43232
 Communications Specialists Phone: (614) 866-4605 Fax: (614) 866-1201

READER SERVICE NO. 86

How Good Can a Mixer This Size Be Anyway?



Actual Size

Try great specs to start with. Then add reliability that's backed by a THREE YEAR Warranty! It's just one of the 37 *STICK-ON*™ products from RDL™. Find out how RDL *STICK-ON* innovations can make your job easier. Call us today at 800 281-2683 or 805 684-5415 for your free catalog of these great value tools!



RDL Radio Design Labs

P.O. Box 1286 ■ Carpinteria, CA 93014
 In Europe call (31) 20-6238 983 Fax (31) 20-6225 287

© Radio Design Labs

READER SERVICE NO. 155

Attention Advertisers!

Reach **22,000+** broadcast professionals. **RADIO WORLD'S Running Radio Marketplace** provides a perfect medium for test marketing your products and services. It's an efficient, effective and affordable advertising option!

For more information, including rates and deadlines, Fax **Christopher** at **1-703-998-2966** or Call **1-800-336-3045**

FEEDLINE

Spring Cleaning Techniques for Tower Sites

*Checking Lights, Grounding, Wasp Nests;
All Part of the Joys of the Season*

by W.C. Alexander

DALLAS Winter time can be hard on antenna systems. Towers, foundations, antenna tuning units, sampling loops and just about every other piece of antenna hardware exposed to the elements will suffer some deterioration. Now that the cold weather is behind us, we should take a good look at these items and make repairs as needed.

The towers

Spring is an excellent time to have towers inspected. Employ a competent and bonded rigger to climb the towers. Be sure to remove the excitation from the tower being inspected.

On the way up, have the rigger inspect the following items: paint, welds, hardware, guy wire attach points and preforms, guy insulators and fiberglass rods, conduit and junction boxes, and transmission lines. Particular attention should be given to the welds across the flanges that join the tower sections together.

On the way down, the rigger should replace all bulbs and inspect the light fixtures, sockets and wiring, red lenses, and gaskets or O-rings. If there are any deficiencies, correct them right away. Little things tend to pile up or be forgotten.

Log this as one of your required quarterly tower light inspections; use the inspection report or service invoice as part of the log documenting the inspection.

At the tower base, you should personally inspect the base insulator, feedpoint connection, lighting chokes/transformers, photocells, spark gaps and isocouplers. Make sure that RF excitation has been removed from the tower, and beware of RF energy induced by nearby radiators. If the tower is not at DC ground potential, watch out for static electricity.

Check for chips

Check the base insulator for cracks or chips. Many base insulators are hollow and have drain holes inside. Be sure these are not clogged by pouring in a small quantity of water and watching for it to run out. If the drain holes are clogged, try using a shop-vac adapted to a short length (3-4 feet) of half-inch garden hose. Insert the garden hose into the hold in the tower base plate and manipulate it around to clear the blockage. You may have to use a coat hanger or other instrument to loosen the debris. Having drain holes clear is very important. If the insulator fills with water, it will present a low-impedance parallel path to ground for the RF.

Visually inspect the feedpoint connection for mechanical and electrical integrity. If the tower is galvanized, the galvanization should have been filed away at the point where the connection was made. Check this area carefully for corrosion and treat with a cold-galvanizing compound if necessary.

Look carefully at all lighting equipment at the tower base. Check for electrical connections, corrosion and foreign material (such as wasp nests). The bottom terminus of the lighting conduit will often have a screened vent facing downward. If this is blocked, any water that gets into

the conduit will remain there. Be sure this vent is clear.

Test the photocell and flasher, checking the beacon-on current with a clamp-on ammeter. Note the current on the inside the flasher box for future reference. With this data, you can tell if all bulbs are working even if you can't see the lights

Temperature changes will result in a good deal of expansion and contraction in ATU components.

during the daytime.

Austin-ring transformers should be checked for security, spacing and corrosion. Feel the rings to check for excessive resistive losses. Sometimes lightning will blow a hole in the rings and cause a short in several turns. The rings will still work but the turns ratio will be incorrect. Bulb voltages may consequently be low or high, and the windings may run hot.

Look at spark gaps for spacing and good connections. A high resistance in a spark gap renders it virtually useless for conducting static energy to ground. If you opened up your gaps during the winter to prevent them from icing over, close them back up to the proper spacing now. Remember that your spark gaps are your first (and best) line of defense against lightning.

If you have isocouplers, they should be removed from the tower and checked. If you don't remove them from the tower, there may be holes in them on the back side, where they abut the tower leg (and are most likely to arc). There also may be water within that you can't detect without removing them. Shake each isocoupler. If it rattles or sounds like there is water inside, replace the isocoupler.

All guy anchors should be visually inspected for integrity and security. The rigger should perform this service as part of the inspection process. However, there is no substitute for examining them yourself. Pay particular attention to preforms, insulators, turnbuckles and safety wires.

Tuning units

Unless they are located in insulated, sealed buildings equipped with heat/air conditioning, the antenna tuning units (ATU) are exposed to the elements all the time. Even in so-called "weatherproof" enclosures, the temperatures within will range from the lowest winter low to well above the highest summer high temperature.

Temperature changes will result in a good deal of expansion and contraction in ATU components, cracking insulators and loosening hardware. Carefully inspect every ATU component, checking for secure mounting and tight connections. Any cracked or broken insulators should be replaced.

Look for and remove any foreign materials such as wasp nests and the like. If the ATUs are housed in weatherproof enclosures, they probably have screened vents on the underside. Make sure these are clear and unobstructed with the screens in place. Check the hardware mounting for the entire ATU cabinet. If the ATUs are in doghouses, check for

deterioration of the wood, paint and roof material, fixing any leaks you find.

Bowl insulators should be secure and free of cracks and chipping. Look for evidence of water seepage around bowl insulators. If necessary, replace gaskets and cork washers.

Look at all mica capacitors, checking for leaks, seepage and dissipation. It is best to do this immediately after shutting down the RF excitation. Physically touch each component, noting whether or not it is hot.

works great and for a long time.

Out of sight, out of mind. That's the general rule when it comes to ground systems. Yet this hidden portion of the antenna system is absolutely critical to the efficient and proper operation of the station.

Generally speaking, a ground system will not "wear out" as such. Rather, something usually happens to damage or destroy it. Thieves steal radials and strap for the copper, erosion causes radials to be unearthed, underground utility construction causes radials to be cut. I have even seen wildlife tear up a ground system. If a ground system is kept in the ground and the exposed portions are maintained, it will continue to function indefinitely.

The thing to do is look for problems such as these I have mentioned. Has rain-water runoff caused erosion that has left radials exposed? Is there evidence of vandalism or theft? Be on the lookout for these things.

Warm is okay; hot is not. If the component is hot near a connection but cool elsewhere, a poor connection may be indicated.

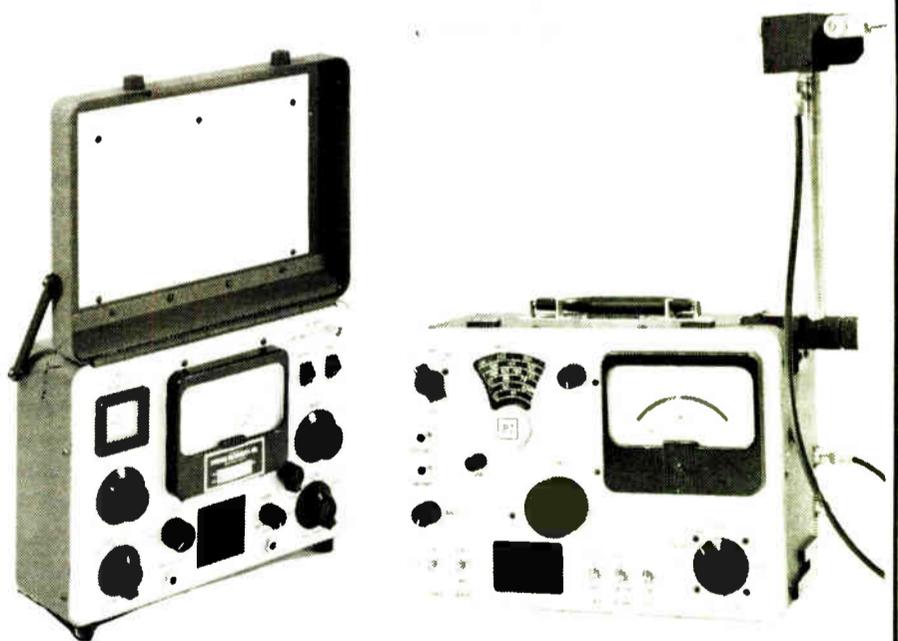
Insects

In many parts of the country (particularly the South), fire ants are a real problem. They are attracted to 60 Hz AC. Watch for evidence of fire ants and other insects. Ants are a particular problem because they can get in anywhere and they secrete an acid that will damage components. Treat the ground around the tower base and ATU with a good repellent/insecticide. The best I have found for fire ants is Orthene. It smells really bad, but it

If you see pronounced changes in the operation of your directional antenna (or in the base impedance of your non-directional antenna) when transitioning between wet and dry ground conditions, the trouble may be related to excessive close-in losses in the ground system. Look at the ground screen or interspersed radials at the tower base. Check to be sure the ATU is solidly connected to the

continued on page 39 ▶

MEASURE YOUR COVERAGE...



SATISFY YOUR SPONSORS AND PROVE COMPLIANCE WITH GOVERNMENT REGULATIONS.

For More Information About AM, FM, VHF-TV and UHF-TV Field Strength Meters Please Contact Us.

POTOMAC INSTRUMENTS

932 PHILADELPHIA AVE
SILVER SPRING, MD 20910
(301)589-2662
FAX: (301)589-2665

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.

The CircuitWerkes AC-12 Telephone Autocoupler Bay



Get up to 12 couplers in a neat, compact chassis

- Auto answer & disconnect.
- 2 audiobusses for mass feeds.
- Individually card selectable buss or auxilliary audio I/O.
- LED indicators for ring, clipping, power & online.
- Ring counter answers on user settable ring number.
- Momentary or latching dry contact outputs at pickup.
- Remove & install cards without affecting the rest.
- A special, non-bussed, balanced audio card for IFB feeds, etc., is available.

The AC-12 rack-mounted coupler bay is the best way to eliminate a wall or cabinet full of yesterday's couplers. Our unique dual audio busses eliminate the tedious and messy wiring associated with networks and other mass feeds. Each card can also individually either send or receive telco audio. Best of all, a fully loaded AC-12 lists for under \$185 per coupler.

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

READER SERVICE NO. 181

Shape Up!

Coverage. Saturation. DBk contours. In FM broadcasting, the "bottom line" is always based on your pattern.

More than any other manufacturer, Shively has the experience and reputation for providing crucial pattern **solutions** for critical propagation problems. On any tower. At any power level. Remember, **it pays to be heard.**

A good pattern. The shape you need. Talk to your consultant. And contact us.

Shively Labs

A Division of Howell Laboratories, Inc.
19 Harrison Road, Bridgton, ME 04009
207-647-3327 FAX 207-647-8273

READER SERVICE NO. 158



Why gamble on a lower-priced rebuilt?

Have your Eimac tube **REMANUFACTURED** by the trusted original manufacturer.

- Original Specifications
- Original Warranty
- 30 Day Turnaround

Call us: **VARIAN - EIMAC**
301 Industrial Way,
San Carlos, CA 94070
(800) 414-8823 or
fax (415) 592-9988



varian[®]
power grid tube products

READER SERVICE NO. 198

TWO NEW ADDITIONS TO THE COAXIAL DYNAMICS WATTCHMAN® TRANSMITTER PROTECTION SYSTEMS

Models 81081 and 81082 with 15/30/60 kw Meter Scales



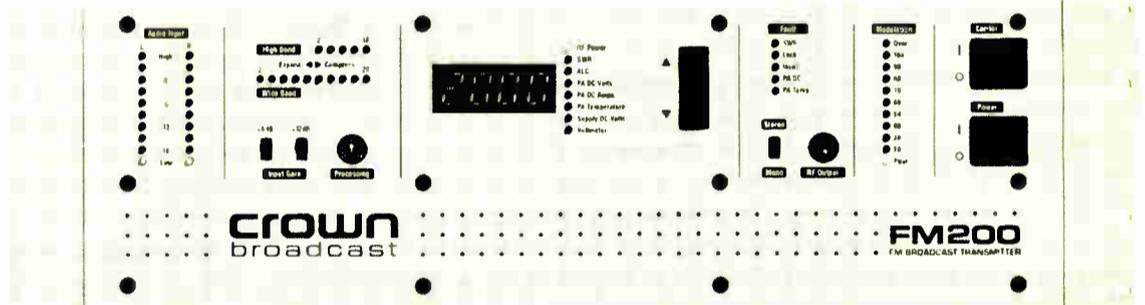
NEW!
4-1/16 and 6-1/8 series line sections and elements to add to our exciting line-up

WATTCHMAN—protects your transmitter and transmission line system. A permanent 19 inch rack installation used with any dual socket line section 7/8", 1-5/8", 3-1/8" and elements (additional) to monitor CW, TV, and FM power. Model 81070 features two easily read meters to monitor both forward and reflected power. The reflected meter provides a front panel adjustable set point which controls the trip level for fast transmitter shut down and alarm. Abnormal load conditions quickly cause transmitter shut down in less than 15 milliseconds including control relay. Both visual and audible alarms indicate system malfunction. Contacts provided for remote alarm and reset switching. Contact us for your nearest authorized Coaxial Dynamics Representative or Distributor in our World Wide Sales Network.

COAXIAL DYNAMICS, INC.
15210 Industrial Parkway • Cleveland, Ohio 44135
(216) 267-2233 or 1-800-COAXIAL • Fax: (216) 267-3142
Service and Dependability... A Part of Every Product

READER SERVICE NO. 204

Never Go Off the Air Again.



When the power fails, your signal won't. Crown's FM200 transmitter, with optional automatic back-up power, will keep your station on the air. Available in 30, 100 and 200 watt models.

Each FM200 includes:

- FM Exciter
- Audio Processor
- Stereo Generator
- RF Amplifier

All of which operates from your AC or DC power source.



A Division of Crown International, Inc.
1718 West Mishawaka Road
Elkhart, Indiana 46515-1000
Fax 219-294-8302
Broadcast Sales 219-294-8050

READER SERVICE NO. 132

AXS (Ax'-sess)... Jocks Love It!

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.

AXS is a modular design that begins as a simple cart replacement and grows to any combination of CD, hard disk, satellite or specialty programming with ease.

AXS has all the sophisticated feature options including device independent multi-channel background audio record and replay. Macro programming makes tough to run event sequences easy. Software drives a powerful programmable real time IOMAP.

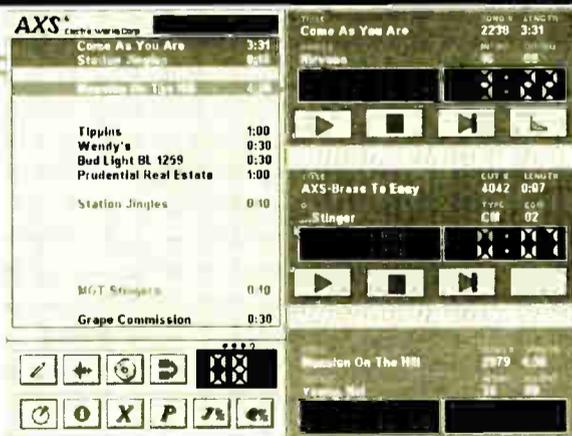
Jocks love AXS: A fast 99 page, 28 button Jock F/X panel that can be time linked and remote wired is standard.

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.

AXS Systems...

From \$6000.00 using your 486 computers and hard disks.

READER SERVICE NO. 178



AXS

The Management

800-334-7823 • 817-625-9761
FAX 817-624-9741
P.O. Box 1-36457 Fort Worth, TX 76136
1700+ Stations • Our 14th Year

Attention Advertisers

Reach **22,000+** broadcasting professionals!

Products & Services Showcase appears bi-weekly in the pages of **Radio World**.

For more information, contact **Skip Tash** - East Coast
Dale Tucker - Midwest and West Coast



Radio World

P.O. Box 1214
Falls Church, Va
22041

Phone:
800-336-3045

FAX:
703-998-2966

Spring Tower Cleaning

► continued from page 37

ground system with a strap. Watch for broken or torn straps and make repairs as necessary.

Unless you are using air-dielectric lines, which must be kept pressurized, there isn't much to check on the transmission and sample lines. Look at the security of the connections on both ends and watch for kinks or bends that may have occurred.

If a line does have a problem, the antenna system will usually show some symptoms. A wet line will typically have a mismatch at the place where the water is. This will cause a power loss in that leg and usually a phase shift as well, which will disrupt the parameters of the whole array. It is not always readily apparent which line is at fault in a directional array with such a problem.

Should a line problem be suspected, a bridge can be used to check the characteristic impedance and electrical length of the line. Problems, if they exist, will usually show up in such a test. The results of these measurements can be compared with the results obtained following the original installation to find out what changes have taken place. Once any uncovered problems have been repaired, run these measurements again and record the results for future reference. A time domain reflectometer

Spring is an excellent time to have towers inspected.

(TDR) may be necessary to locate faults in a transmission line. If you rent one with a strip chart recorder, take advantage of the opportunity to pull a print on all your transmission and sample lines for future reference.

Transmitter building

Varmints love warm transmitter buildings during the wintertime. Critters of all descriptions will utilize any opening, no matter how small, to gain entry. Once inside, they will find a warm, dry spot in which to hibernate, lay eggs or whatever critters do in the wintertime.

Every spring cleaning of the transmitter site should include a professional extermination, whether or not an insect or rodent problem is evident. Because of the remote location of most transmitter sites, insects will abound and eventually cause problems. The best insurance is to exterminate aggressively.

A thorough check of air conditioning units should top the list for building maintenance every spring. Have a service company check the unit completely, performing any needed maintenance. The time to fix an A/C problem is when it is relatively cool, not when it is 90°-plus outside. Change all the filters yourself. Pick up two or more complete sets while you are shopping for filters so you have a set or two on hand for next time.

Look for evidence of roof leaks, cracked door seals and other ways that water can get in. With gusty thunderstorms likely to occur all spring and summer, the building had better be high and dry.

Thunderstorm season is also the time when the generator is likely to be needed

the most. In addition to regular exercising of the unit, perform whatever regular preventive maintenance is recommended by the manufacturer. This probably includes changing the engine oil and filter, air filter, fuel filter, flushing the cooling system, etc.

Check the full-load voltage output and frequency, adjusting the governor as necessary. Some transmitters won't operate properly if the frequency of the AC power supply is much off the 60 Hz mark.

Review the exercise schedule to be sure it is adequate. Above all else, insure that when exercised, the generator runs long

enough to reach its normal operating temperature. If shut down while still warming up, moisture will collect in the crankcase and cause corrosion. It would be better not to exercise the unit at all than to have too short a run-time.

Be on the lookout for bird/wasp nests in the generator housing, radiator, intake, etc. In addition to the "pest factor," nests can impede the flow of induction or cooling air and result in generator damage or shutdown under load.

Insurance

While you're looking everything over, note all the equipment model and serial numbers and other identifying marks on an inventory list. Then, use this list to determine whether the insurance policy covering the site and equipment is ade-

quate. The time to find out you're underinsured is not while filing a major claim! On the other hand, if you are overinsured, you're wasting money. An annual check of replacement costs is a good way to keep a handle on insurance coverage.

Most everyone does some sort of spring cleaning. I think it's in our genes or something. Engineers should channel whatever cleaning energies that "spring forth" into their transmitter sites. Maintenance problems can often be nipped in the bud, and you can rest assured that everything at the transmitter plant is shipshape for the summer and fall.

□ □ □

Cris Alexander is director of engineering for Crawford Broadcasting in Dallas. Reach him care of RW.



Clean it up with the easy-to-use TS612.

Every day radio and television stations are airing more and more talk shows. Unfortunately, they aren't upgrading their studio telephone equipment. The result is a virtual waste dump of operational errors and bad caller audio.

The solution is the TS612 from Gentner. Designed specifically for talk show formats, the TS612 features six phone lines (expandable to 12), Gentner's newest Superhybrids with internal mix minus generation, automatic caller level control, and digital audio enhancement for consistently clear caller audio.

Your talent will love the TS612's unique talk show features like VIP caller, four-line conferencing, and call screening. Plus, its built-in handset and key pad will make your talk show run as smoothly as your callers' mouths.

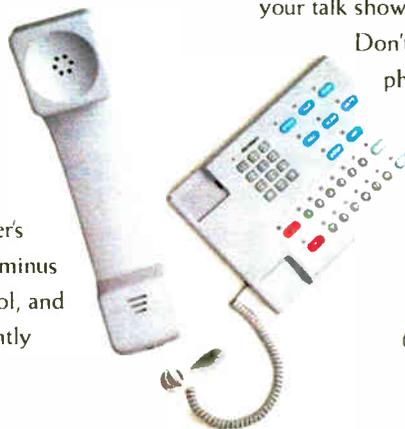
Don't wait a day longer to clean up your "talk sick" phone system with the affordable TS612.

Contact your Gentner dealer today and order your TS612, before your studio is designated as a Superfund site.

 **Gentner**

1-800-945-7730 · 1-801-975-7200

Call Gentner for all of your telephone interface solutions, including conference calling services.



Circle (156) On Reader Service Card

"Radio means the world to us" at Computer Concepts

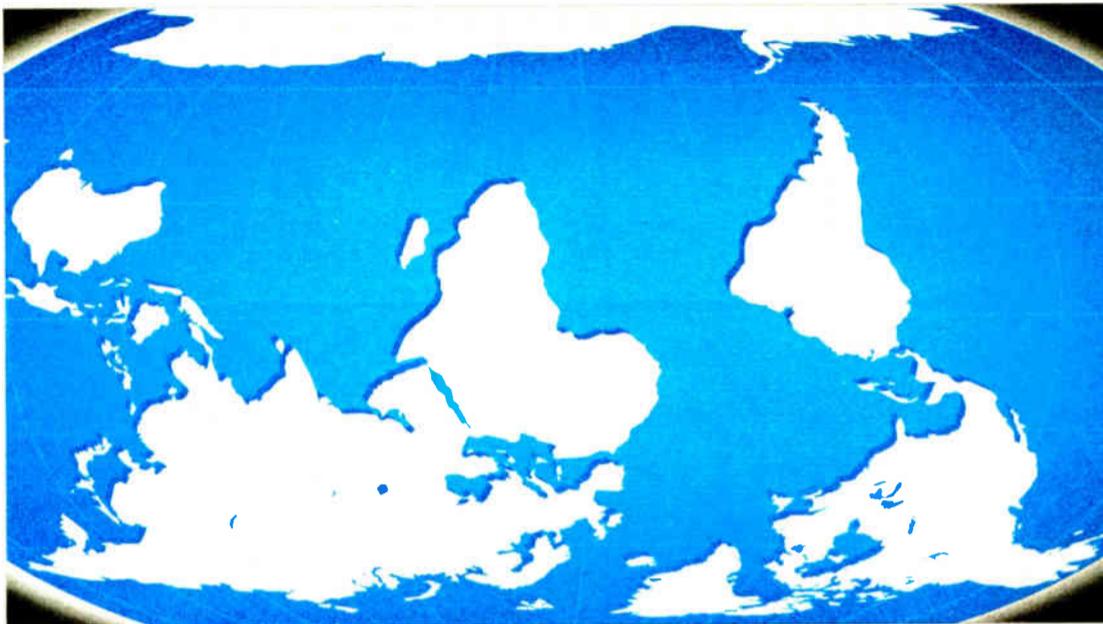
THE NEW RADIO TIMES

Computer Concepts, serving broadcasters for over 20 years



STUDIOFRAME PRODUCTION IS FAST, EASY.

In the production studio, time equals money. For the fastest, easiest multi-track production for commercials and station promos, Computer Concepts introduces the StudioFrame™ the complete audio workstation, "studio in a box." Every production feature from true 8 track input and output (expandable to 24 tracks) to time compression, digital EQ and filters is built into StudioFrame. Best of all, with its direct integration with DCS, produced spots can be on the air seconds after completion.



COMPUTER CONCEPTS IS TURNING THE WORLD OF RADIO UPSIDE DOWN

LAS VEGAS- Visitors to the 1995 NAB convention were amazed to see no fewer than six new products for radio from Computer Concepts, makers of DCS™, the world's leading hard disk system. For the first time, one company offers proven products for stations of every size — from 100% live major market powerhouses to fully automated local stations — all working together through the DCS architecture. Some of these new products, while new to the US, have been in use for years in international markets... another advantage of Computer Concepts' world-wide scope. With so many products to choose from, Computer Concepts can now custom-tailor a profit-making system for every radio operation.

COMPUTER CONCEPTS - THE POWER BEHIND THE RADIO REVOLUTION.

What makes Computer Concepts stand out of the pack of companies now offering hard disk products for radio? We're customer-driven, and we have been since we started over 20 years ago. We maintain direct contact with our customers before, during and after the sale. We're so proud of our customer relationships that unlike most other vendors, we'll be happy to supply our entire customer list to any prospective purchaser.

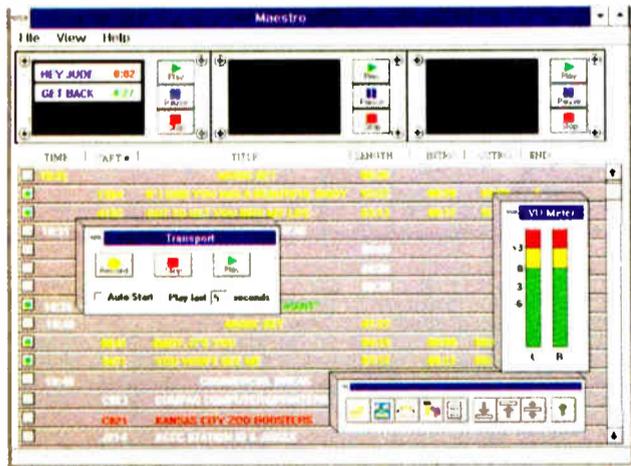
DCS from Computer Concepts has long been the leader in automating commercials and spot insertion for stations of all sizes. But the big news this year is an unprecedented array of new products for every facet of on-air operations, and every kind of radio facility. All are field-proven and backed with the kind of customer service that has been instrumental in the success of Computer Concepts.

As your needs change, so can your DCS-based system. For example, DCS systems can be configured to store music, commercials, jingles and other audio cuts either centrally on an audio server or distributed on individual DCS workstations. A new option, Audio Central+ distributed audio, offers both capabilities plus complete fail-safe redundancy.

Another new DCS option developed in response to customer requests allows the system to start playing back material while it is still being recorded. Perfect for delaying network news-on-the-hour for a few seconds or minutes while giving local headlines first.

All the new and exciting Computer Concepts products integrate seamlessly to DCS. It's your assurance that — whichever components you choose to make up your DCS system today — your system can be expanded tomorrow.

Large stations or small, simple system or very complex, today more than ever, there's one place to call for total expertise and total customer responsiveness in hard disk systems. Call Computer Concepts at 1-800-255-6350 and profit from our experience.



MAESTRO BRINGS MUSIC AND SPOTS TOGETHER.

DCS has always managed commercials and spots flawlessly. Maestro™ now does the same for music, integrating all music and commercial information and control with a Windows™-based on-screen interface. Maestro is the key to accessing music directly from hard disk. It interfaces directly with music scheduling database systems and gives on-air talent total flexibility to execute perfect song-over-jingle-over-song crossfades. Music search by type, artist, etc., intro and outro countdown display and instant access to news and weather info are just a few of the many features which make Maestro the perfect DCS interface for creative on-air control.

Newsroom keeps you up-to-the-minute.

Radio news can be a profit center with Newsroom™, the complete electronic news operation from Computer Concepts. The key word with Newsroom is *efficiency*. The system automatically takes both text and actualities from wire services, networks and other sources. A news person writes and edits copy on screen, linking sound bites to the copy — playing the wrong "cart" is a thing of the past. Editing of audio actualities is fast and precise. On-screen prompting lets talents read final copy right off the screen. Newsroom is fully integrated with DCS and Maestro and can be added to an installed system at anytime.

CARTRACK TAKES THE HASSLES OUT OF LIVE RADIO.

CartRack™ is a field-proven "front-end" to DCS which puts right on the screen all the carts your morning (or other) talent could ever want, for instant, no-hassle access. Individual "racks" of carts can be programmed for each show — there's no limit. Talent uses a touchscreen, trackball or mouse to "point and play" carts to three on-screen graphic "cart machines." Events played from DCS can be controlled by CartRack. It's the easiest way to handle live shows offered by any hard disk system. Let CartRack bring order into your hectic, live, money-maker drivetime shows, and then let DCS automation take over to handle other dayparts.



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

ROOTS OF RADIO

Birds at Root of Antenna Trouble

by Ralph R. Townsley

WEST LAFAYETTE, Ind. The following is a story from the 1940s that may be of some interest because of its rather freakish nature. I think it exemplifies just another one of the many trials and tribulations a broadcast engineer endured in the early days of broadcasting.

This incident occurred at Purdue University's WBAA(AM). At the time, the station was still located in the Electrical Engineering Building. The antenna was suspended between two towers that were part of the steelwork of the building.

The building was designed to accommodate these towers when it was originally built. (The station signed on in 1922.) The towers extended 88 feet above the roof of the building and supported a cage-type antenna between the tops of the towers. This was essentially a "T" type antenna except that instead of a single conductor in the form of a "T" this antenna was made up of six parallel conductors.

Cage-like device

They consisted of quarter-inch, phosphor bronze cable spaced around metal hoops about 15 inches in diameter. This formed a cage-like device with the conductors spaced about seven inches apart. The 15-inch rings were spaced about every 10 feet along the antenna to keep the wires in proper relative position. The vertical lead to the center of the span was of similar construction. The antenna was of excellent mechanical construction. The six cables were brought together at the ends and an insulator was inserted between the antenna and each tower.

Late one summer afternoon, around 4:00, I noticed a gradual change in the antenna current. The plate input power also gradually changed at this time. Over the next half hour, these readings kept deviating further from normal. There seemed to be nothing wrong with the transmitter. All symptoms pointed to something detuning the antenna. However, I was certain that the antenna was of such extremely solid construction that nothing imaginable could change it in any way.

By the end of 30 minutes, the readings were rather seriously low. Obviously this could not go on indefinitely. I was the only operator at the time so I was not able to leave the control room to inspect the antenna even though I was quite certain that there could be nothing wrong with it.

Return to normal

Just when things were approaching a rather critical point, the meter readings began to return very slowly toward normal. In another half hour they were completely back to normal. Everything acted just as if nothing had ever happened. There was not the slightest clue as to what could have caused the temporary deviations. Strangely enough, about the same time the next day the same thing happened again. Once more everything returned to normal by the end of an hour. This went on for several days, always at about the same time of day.

The station had almost no test equipment of any kind in those days so no very sophisticated tests or trouble isolation was possible. A dummy antenna was a luxury that was completely out of the question. The night after the first time the trouble

was observed was spent very carefully checking for loose or high resistance connections and all other reasonable faults which could cause the symptoms. None were found. The problem was becoming rather exasperating.

At the time, WBAA was not on the air Sundays. It so happened that I was driving down Northwestern Avenue on Sunday at about the time when the problem was at its peak. Glancing up at the antenna, I noticed that it was completely covered from end to end with blackbirds. There were thousands of them sitting side by side with others hovering about waiting for one to move. I

assume that they were holding a conference regarding what fields to attack the next day.

Significant sag

I stopped and watched this phenomenon for quite a while. In spite of the extra

Glancing at the antenna, I noticed it was completely covered from end to end with blackbirds.

heavy construction of the antenna it was sagging very significantly. The sag was probably enough to change the capacity to ground appreciably. However, the added

effective diameter of each conductor could certainly explain the significant change in antenna impedance. So, after all, the problem was just as the symptoms indicated.

As night approached, the blackbirds gradually all took off for somewhere else.

The very frustrating mystery was solved. It could not get appreciably worse because there simply was not room for more birds to sit on the antenna. There was a real consideration that they could cause breakage of the antenna. There was very little to do to drive them away. They were too far from the ground to be frightened by noise originating from the ground or even from the roof of the building.

This is a true bird story—so no jokes about it being "for the birds." It may well be the original bird cage antenna made of real live birds.

□□□

Ralph Townsley is a former broadcast engineer. He currently resides in West Lafayette, Indiana.



Systems with Style

When KABC/KLOS decided to rebuild from the ground up, they called Pacific Recorders & Engineering to provide its expertise in studio systems planning and execution. After all, when you're dedicated to winning, you don't gamble with success. PR&E has a proven track record of building the world's leading broadcast facilities for over twenty years. This record translates into the uncommon depth and breadth of experience which we bring to each new project. From news to rock, talk, or full-service, we're comfortable and conversant with all formats.

When you see the attention to detail, the design elegance, and the fanatical commitment to quality, you quickly realize why PR&E consoles and studio systems are found in nearly every leading broadcast facility in the nation.

But what may really surprise you is how much money you can save by working with us. That's right, save money. You see, we design and build so many world-class studio systems, we avoid the "surprises" by having the details down to a science. Why don't you give us the opportunity to work with you on your next studio project? We think you'll be pleasantly surprised at how easy it is to realize the operational efficiency and benefits of a genuine PR&E system.



Pacific Recorders & Engineering Corporation
2070 Las Palmas Drive, Carlsbad, CA 92009
Tel: 619-438-3911 Fax: 619-438-9277 GSA: GS-03F-2057A

DESIGNS THAT MAKE THE DIFFERENCE

Circle (177) On Reader Service Card

World Radio History



LINE-OUT

Digital Editing in the Real World

by Bruce Bartlett
with Jenny Bartlett

ELKHART, Ind. A good way to learn how to digitally edit a program is to see how it is done in the real world. Here's the story of one such event.

Elkhart station WVPE(FM), not recorded a concert by Joan Collaso, a marvelous jazz/blues singer from Chicago. The station asked me to digitally edit this recording into a two-hour program for later broadcast.

The station supplied me with three DAT tapes of the concert, plus a studio recording of an announcer. The

announcer read an intro, outro, and other comments. My job was to combine these elements into a smoothly flowing program, and have it time out to exactly one hour, 59 minutes.

Great mix

Jim Biddle, producer of the broadcast, had recorded the concert live to DAT by taking a split off the same mics used for PA. He monitored the mix with headphones and mixed during the concert. In spite of this adverse monitoring situation, he came up with a great mix.

Jim wanted to divide the two-hour pro-

gram into four half-hour segments with space between for station IDs. He had timed the concert recording, so we knew where to divide the music into four roughly equal parts.

Because my hard disk can hold up to 52 minutes of digital audio, we planned to record and edit one 30-minute segment at a time. We would dump each segment to the master DAT, one after the other. This was the plan:

1. Record and edit the first 30 minutes of program.
2. Dump the edited segment to the master DAT.
3. Erase the hard disk.

4. Record the next 30 minutes of program, edit it, dump it to the master DAT with an assemble-edit, and so on.

Let's look at this procedure in more detail. First, we copied onto disk the spoken intro that was recorded in the studio. Then we copied about 28 minutes of the concert, then the phrase, "You are listening to a concert by Joan Collaso recorded July 16 at the downtown plaza." As we copied from DAT to disk, I noted the hard disk start and stop times for each of these segments.

The spoken intro needed editing to remove mistakes. Using the digital editor's mouse and on-screen waveform display, I defined the start and stop points of the correctly read parts, then put them into a playlist in order. This effectively removed the mistakes.

I also defined the start and stop times of the music, and the phrase "You are listening..." So there were three elements: edited intro, music and phrase. I put them into a playlist so they would play in sequence.

When the computer played the playlist, the music started abruptly with applause after the spoken intro. To smooth the transition, I added a two-second crossfade between the intro and applause. It sounded like a studio engineer fading up the applause just after the spoken intro. Then I added a crossfade between the end of the music and the "You are listening" phrase.

To smooth the transition, I added a two-second crossfade between the intro and applause.

I played the playlist (with crossfades) and copied the program onto DAT. Then I recorded 10 seconds of silence onto DAT—a space for a station ID to be read live during the broadcast.

Now we were ready to edit the second half hour of the program. I erased the hard disk, and copied part two of the music onto disk, plus a few minutes of the announcer listing the concert sponsors. After editing these elements and making a playlist, I copied the program to the master DAT just after the first part of the program. One minute of silence followed. It was a space for the person who would play the tape to read the station ID and some promos.

Next we recorded and edited parts 3 and 4 of the music and commentary.

Mixing/timing the outro

Spoken credits came after the end of the concert recording. Jim Biddle wanted some outro music to play under the credits. He chose the first song from the concert, an instrumental that was not included before. This was the plan:

1. Edit spoken credits to remove mistakes.
2. Play edited credits with music.
3. Fade up music after credits.
4. Play music, then fade it out so program ends at 1:59:00.

I could have mixed the speech and music with the digital workstation,

continued on page 45 ►



RE digital audio encoder and decoder



RE audio codecs — full compliance with the industry standard

Buy an audio codec from just about anybody other than RE and you may get more than you bargained for—hopeless operational procedures, non-standard compression protocols and limited connectivity.

Then again, you may get less. Less bandwidth. Fewer compression options. No service.

Let's face it. There are a lot of products out there that promise you the world, yet corrupt your signal and complicate your life. You simply cannot afford non-standard audio codecs. That's why when the time comes to look at your audio transmission needs, you'll want to take a closer look at RE.

RE offers ISO/MPEG Layer II audio compression, which is the most widely used high-fidelity audio compression algorithm in the industry. We're the only company in the world that can offer you half sampling frequencies for a choice of six different sampling rates, and bandwidths up to a full 20kHz. We're also the company to provide CRC scale factors to protect your

audio from transmission errors. And when it comes to compression and compatibility, our implementation of ISO/MPEG Layer II has been thoroughly checked and tested by the IRT in Munich—part of the very team that invented the standard in the first place.

With several outstanding RE *Easy ISDN* packages to choose from, why not give us a call? For further information, contact RE at (216) 871-7617

- Full 20 kHz bandwidth
- Choice of six sampling frequencies
- Outstanding audio quality even at low bit rates
- Simple encoder operation
- Auto-configuring decoder for easy set-up
- IRT-tested ISO/MPEG Layer II compression
- G.722 for full bi-directional communication and cue channels
- Optional AES/EBU digital audio

re

RE AMERICA, INC. • Telephone: (216) 871-7617 • Telex: (216) 871-149 • RE JAPAN CO. LTD. • Telephone: (81) 91-320-0100 • Telex: (81) 03-320-0097 • RE DEUTSCHLAND GMBH • Telephone: (49) 02161-680330 • Telex: (49) 02161-56831 • RE UK LTD. • Telephone: (44) 01753-731119 • Telex: (44) 01753-731190 • RE INTERNATIONAL AS • Telephone: (45) 017-00100 • Telex: (45) 3017-0010 • Plus 30 authorized distributors worldwide.

Circle (105) On Reader Service Card

World Radio History

TECHNOLOGY UPDATE

New device turns any electrical outlet into a phone jack

Engineering breakthrough gives you unlimited phone extensions without wires or expensive installation fees



You don't have to have a teenager to appreciate having extra phone jacks. Almost everyone wishes they had more phone jacks around the house.

When I decided to put an office in my home, I called the phone company to find out how much it would cost to add extra phone jacks. Would you believe it was \$158?

No more excuses.

Today, there are a thousand reasons to get an extra phone jack and a thousand excuses not to get one. Now an engineering breakthrough allows you to add a jack anywhere you have an electrical outlet. Without the hassle. Without the expense. And without the miles of wires.

Like plugging in an appliance.

Now you can add extensions with a remarkable new device called the Wireless Phone Jack. It allows you to convert your phone signal into an FM signal and then broadcast it over your home's existing electrical wiring.

Just plug the transmitter into a phone jack and an electrical outlet. You can then insert a receiver into any outlet anywhere in your house. You'll be

able to move your phone to rooms or areas that have never had jacks before.

Clear reception at any distance. The Wireless Phone Jack uses your home's existing electrical wiring to transmit signals. This gives you sound quality that far exceeds cordless phones. It even exceeds the quality of previous devices. In fact, the Wireless Phone Jack has ten times the power of its predecessor.

Your range extends as far as you have electrical outlets: five feet or five hundred feet. If you have an outlet, you can turn it into a phone jack—no matter how far away it is. The Wireless Phone Jack's advanced companding noise reduction features guarantee you crystal-clear reception throughout even the largest home.

Privacy guarantee.

You can use The Wireless Phone Jack in any electrical outlet in or around your home, even if it's on a different circuit than the transmitter. Each Wireless Phone Jack uses one of 65,000 different security codes. You can be assured that only your receiver will be able to pick up transmissions from your transmitter.

Is the Wireless Phone Jack right for you?

The Wireless Phone Jack works with any single-line phone device. Almost anyone could use it, especially if...

Few jacks. You want more phone extensions without the hassle and expense of calling the phone company.

Bad location. You have jacks, but not where you need them most, like in the kitchen, garage, home office or outside on the deck.

Renting. You want to add extensions, but you don't want to pay each time you move.

Other phone devices. You have an answering machine, modem or fax machine you want to move to a more convenient place.

The Wireless Phone Jack System

consists of a transmitter (right) and a receiver (left). One transmitter will operate an unlimited number of receivers.



Unlimited extensions—no monthly charge. Most phone lines can only handle up to five extensions with regular phone jacks. Not with the Wireless Phone Jack. All you need is one transmitter, and you can add as many receivers as you want. Six, ten, there's no limit. And with the Wireless Phone Jack, you'll never get a monthly charge for the extra receivers.

Works with any phone device.

This breakthrough technology will fulfill all of your single-line phone needs. It has a special digital interface for use with your fax machine or modem. You can even use it with your answering machine just by plugging it into the Wireless Phone Jack receiver.

Special factory-direct offer.

To introduce this new technology, we are offering a special factory-direct package. For a limited time, the transmitter is only \$49. One transmitter works an unlimited number of receivers priced at \$49 for the first one and \$39 for each additional receiver. Plus, with any Wireless Phone Jack purchase, we'll throw in a phone card with 30 minutes of long distance (a \$30 value) for only \$9.95!

Try it risk-free. The Wireless Phone Jack is backed by Comtrad's exclusive 30-day risk-free home trial. If you're not completely satisfied, return it for a full "No Questions Asked" refund. It is also backed by a one-year manufacturer's limited warranty. Most orders are processed within 72 hours and shipped UPS.

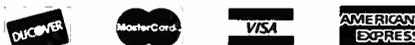
Wireless Phone Jack transmitter ...\$49 \$4 S&H
Wireless Phone Jack receiver\$49 \$4 S&H
save \$10 on each additional receiver—\$39

30-minute long distance phone card.....\$30
\$9.95 with Wireless Phone Jack purchase

Please mention promotional code 017-RW8604.

For fastest service, call toll-free 24 hours day

800-992-2966



To order by mail, send check or money order for the total amount including S&H (VA residents add 4.5% sales tax). Or charge it to your credit card by enclosing your account number and expiration date.

COMTRAD INDUSTRIES

2820 Waterford Lake Drive, Suite 106
 Midlothian, Virginia 23113



The Wireless Phone Jack lets you add a phone, modem, fax machine or answering machine almost anywhere.

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.

WIRELESS IFB SYSTEM

Used by hundreds of TV stations for van-to-field cueing in ENG & SNG applications. Transmitter provides mix of program and instructions to rugged, pocket receivers.

- 100% duty cycle
- Wideband audio
- Excellent operating range



COMREX[®]

Comrex Corp., 65 Nonset Path, Acton, MA 01720
Tel: 1-800-237-1776 Fax: 508 635-0401

READER SERVICE NO. 200

ERI - ELECTRONICS RESEARCH

812-925-6000

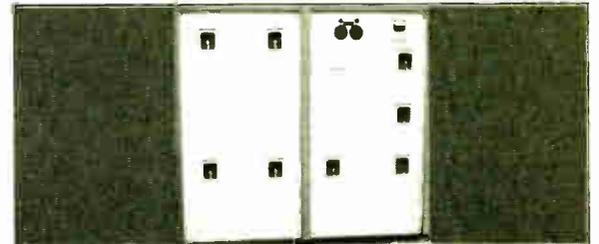
S.K.I.P. - Site Keeper Integrated Pager

Monitors, Reports and Controls antenna system and transmission site conditions including tower lights, VSWR, line pressure, antenna icing, tower or building security.



ARS-1003 - Automatic Transmitter Recycler
Engages the transmitter interlock when VSWR exceeds user set limits, breaks supply of RF to antenna system, re-sets transmitter, logs and reports sequence of events.

READER SERVICE NO. 133



- CUSTOM ANTENNA PHASING SYSTEMS
- ANTENNA CONTROL SYSTEMS
- AM/MF ANTENNA TUNING UNITS
- DIPLEXERS & MULTIPLEXERS
- TRANSMITTER COMBINERS
- DUMMYLOADS (WITH MATCHING NETWORK)
- ASSOCIATED RF COMPONENTS
- CALL OR FAX FOR MORE INFORMATION

PHASETEK INC.

550 CALIFORNIA RD. UNIT 11
QUAKERTOWN, PA 18951

PHONE: 215-536-6648

FAX: 215-536-7180

READER SERVICE NO. 56

REMEMBER THE **CORTANA**
FOLDED **UNIPOLE ANTENNA?**
WE STILL MAKE IT WITH THE
SAME HIGH QUALITY MATERIALS
AND WORKMANSHIP.
IT FEATURES...

- BROAD BANDWIDTH for better sound
- GROUNDED ANTENNA for lightning and static electricity
- ELIMINATES ISOCOUPLES for VHF and UHF antenna lines
- BEST ANTENNA FOR DIRECTIONAL ARRAYS.

Also

DESIGN YOUR OWN ANTENNA THAT WORKS WITH ANY
ANTENNA PATTERN. TOWER, POWER LINE, TOWER TO TOWER,
WIND TOWER.

www.nottltd.com

nott ltd.

4001 LINDSEY DRIVE
CAMDEN, NJ 07710
Phone: 800-521-1111 Fax: 800-521-1111

READER SERVICE NO. 43

EBS-EAS SHORT-TONE CONVERSION REQUIRED BY JULY 1.

3.5 SECOND ADJUSTABLE KITS

Install in an hour: \$85 or less!

NO GUESSWORK - NO CRATING
NO LOGGING - NO WAITING

1-800-669-3993

MC • Visa • American Express

READER SERVICE NO. 20

Quality* Power Tubes

3CX15,000A7	4CX1600U	4X350A/8321
3CX15,000A3	4CX1600B	4CX250R/7580W
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
4CX10,000D/8171		811A
4CX5000A/8170		833A
4CX3500A		833C



- Watch this list grow.
- Manufactured in Russia's largest power tube factory.
- Shipment from USA stock.
- Generous* warranty based on high quality.
- Honest prices based on quality at low cost.

Broadcasters

Phone: 205-882-1344
FAX: 205-880-8077
800-239-6900

OEMs, Distributors

Phone US: 800-578-3852
Int'l & US: 415-233-0429
FAX: 415-233-0439

READER SERVICE NO. 201

The best compact way
to squeeze a great sound
through a telephone line...

You don't have to settle
for less than the best!



The 'Max-ZII' 2 channel remote console

P.O. Box 84, Zercom Drive
Merrifield, Minnesota 56465-0084
218/765-3151-Fax 218/765-3900

Available through all major dealers

READER SERVICE NO. 21

Attention Advertisers!

Reach 22,000+ broadcasting professionals! RADIO WORLD's Product Showcase provides a perfect medium for test marketing your products and services. It's an efficient, effective and affordable advertising option! For more information, including rates and deadlines, fax your sales representative at

1-703-998-2966

or call

1-800-336-3045

'Cookbook Approach' to Circuitry

► continued from page 34

DC. The + and - power busses are generally referred to as the "rails" of the supply. Maximum peak-to-peak output voltage from an op-amp will generally be about 85 percent of the sum of the rails, i.e. 25V p-p for 15V rails.

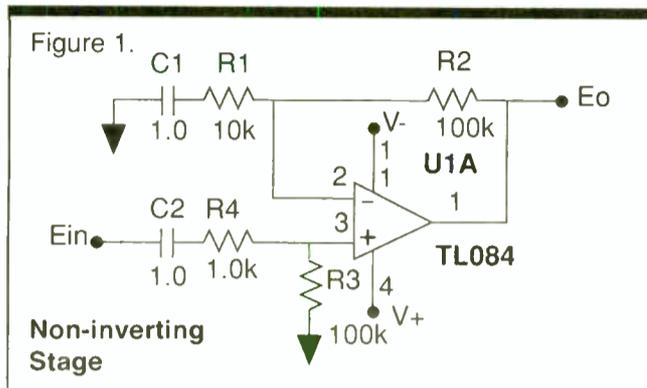
Bypassing is very important, especially with high performance op-amps. For example, 0.1 µF ceramic caps to ground are usually sufficient if connected very close to the power terminals of the device. A more sophisticated bypassing approach for very wide bandwidth op-amps would add 1.5 µF tantalum caps in parallel with the ceramics. This will provide maximum circuit stability. If your circuit breaks into oscillation you can usually trace it back to poor bypassing and/or grounding.

The most common op-amp stage does not invert the input signal. The input impedance of the (+) non-inverting op-amp terminal is very high—almost an open circuit, so the value chosen for R3 will determine the input impedance of the stage. Amplifier voltage gain is determined by the formula: $E_{gain} = R1 + R2/R1$. In the example, the amplifier will have an input impedance of 100k ohms and a voltage gain of 11 (20.8 dB)

$dB = 20 \log_{10} 11$. Try to keep stage gain around 20-25 dB and you won't run into trouble. High performance op-amps can be configured for more gain. More about this later.

All operational amplifiers have a very low output impedance (on the order of a few ohms), but most are designed to drive impedances of 2,000 ohms or

low (close to the ground). Therefore, the input impedance of an inverting stage is, essentially, the value of R1 (10k ohms in the example). Amplifier voltage gain is determined by the formula $E_{gain} = R2/R1$. In our example this would be 10 (20 dB). R3 is equal to the parallel value of R1/R2 and minimizes DC offset at the output of the stage.



greater for best performance. Specialized op-amps are designed to drive lower impedance loads; or you can use a transistor output stage. If you are driving long lines, it is wise to place a series resistor in the output of the stage to isolate line capacitance from the feedback loop. This will ensure stable operation, but will also reduce the output slightly—usually, 30-50 ohms is sufficient. This resistor can be placed inside or outside the feedback loop.

The amplifier can be made more stable by placing a small capacitor in parallel with R2 (10 pF or so). This will gently roll off the high frequency response outside the audio range.

Non-inverting stage

The non-inverting stage shown is AC-coupled for audio use and contains two low-frequency roll-offs: R1/C1 and R3/C2. These roll-offs can be calculated by the formula: $F = 1 / (2\pi RC)$ where R is in ohms and C is in farads. In this non-inverting stage, it is standard practice to make the R1/C1 roll-off dominant. The values shown cut off at approximately 16 Hz. The secondary roll-off can be about 1/10 of the primary roll-off—1.6 Hz in the example. These roll-offs in an AC stage minimize the low-frequency noise gain of the op-amp.

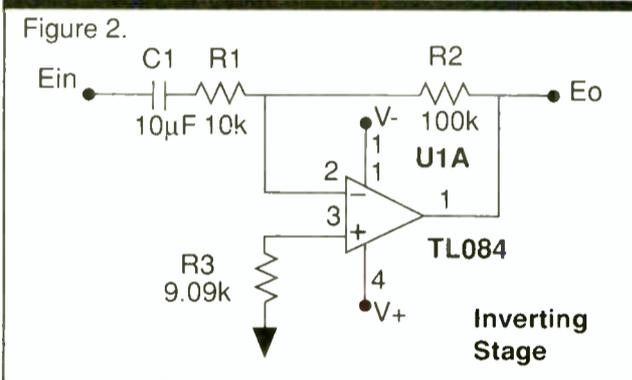
Now, take a look at the same op-amp configured for inverting operation: the output signal will be the input signal inverted. The input impedance of the inverting terminal of the op-amp is very

The same stability rules listed for non-inverting stages apply equally to inverting stages. Practice good bypassing techniques.

There is one low frequency roll-off in our inverting stage: R1/C1. By calculation, the roll-off is approximately 1.6 Hz. If you change C1 to 1.0 µF the roll-off becomes approximately 16 Hz. Again, use the roll-offs to minimize the low frequency noise gain of the op-amp.

The amplifier stage

My standard "recipes" for non-inverting and inverting op-amp gain stages are



shown in the Figures. Gain per stage is approximately 20 dB and roll-offs are approximately 16 Hz. It is very easy to change the "ingredients" to tailor the gain blocks to your particular needs. If your gain requirements are unity, be sure the op-amp you are using is compensated for unity gain or you will probably run into stability problems. At 10 or 20 dB, almost any op-amp will be stable.

The amount of gain available from op-amps is determined by the open loop gain of the device and the amount of feedback needed for the required performance. If you are designing amplifiers with gains of more than 30 dB you need to know something about the unity gain bandwidth of the op-amp you are using. In most cases, you can just take the basic circuit, juggle the values for stage gain and calculate the low frequency roll-off(s).

Most of your op-amp gain stages will be

Real World DAW Editing

► continued from page 42

but this is slow and cumbersome. It was easier to use an outboard mixer and three DAT machines.

One DAT played the edited credits, one played the music and the third recorded the mix of the credits and music.

First I recorded the credits onto hard disk, edited them, and dumped them back to a DAT. Then I determined how long the outro music should be so that the program would end at 1:59:00.

To do this, I noted the DAT counter time at the end of the program recorded so far. I subtracted this time from 1:59:00, and the remainder was the length of music needed. (The DAT counter time was absolute time. This was recorded with the signal on tape, so it was very accurate.)

I put the edited credits into one DAT recorder, the outro music into another, and mixed them through a mixer to a third DAT recorder. Then I copied the speech/music mix to hard disk, edited it to the proper length, and added a fade-out at the end.

Finally, I copied the edited outro music from hard disk to the master DAT, and the music ended on time. Whew!

□ □ □

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

AS-101 Audio Switcher

- Illuminated and legendable control buttons
- Instant or overlap switching
- Front panel accessible level controls
- Options include: RS-232 interface, remote control, relay-follow-switch outputs
- Network proven quality and reliability

P.O. Box 1342 Bellingham, WA 98227
1-800-645-1061 FAX (206) 676-4822

Conex Electro-Systems, Inc.

Circle (88) On Reader Service Card

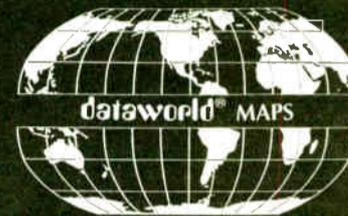
World Radio History

non-inverting, but occasionally you will find a need to invert polarity. Also, because of the low impedance to the inverting input of the op-amp, inverting stages make excellent high-isolation combiners.

Next time we will continue our cookbook design series by covering combiners, differential input and output stages, as well as power output stages. We will also touch on choosing the best op-amp for the job with a cookbook primer on open loop gain and unity gain bandwidth.

□ □ □

Jim Somich is the president of MicroCon Systems Ltd., a manufacturing and consulting firm. He can be reached 216-546-0967.



LMA/DUOPOLY CONTOUR MAPS

The DATAWORLD LMA/DUOPOLY Market Survey Contour maps present a precise electronic verification of overlapping and intersecting contours.

AM 5 mV/m and FM 3.16 mV/m City Grade contours are shown in full color, including transmitter site indicator. The map is supported with a printout showing all of the stations which appear on the map. Daily updating of DATAWORLD'S AM and FM databases protects against errors and omissions.

OTHER MAP OPTIONS

- SHADOWING (TERRAIN SHIELDING)
- CONTOUR COVERAGE
- POPULATION DENSITY
- ZIP CODE BOUNDARIES
- RECEIVED SIGNAL LEVEL
- SPECIAL REQUIREMENTS

1990 CENSUS

WHO ARE YOUR LISTENERS?

1990 BUREAU OF CENSUS POPULATION COUNTING

- Comprehensive Ethnic and Demographic Data
- Ethnic/Demographic Data Available for Each Zip Code Within Coverage Area
- Age Analysis Reflected in Ethnic Breakout
- Resolution Increased to Block Level
- Percent of County Coverage Shown

ETHNIC PIE-CHART DISPLAY

- Projects Ethnic Population in Multi-Color Pie Chart Form

dataworld®

800-368-5754 FAX: 301-656-5341

Circle (10) On Reader Service Card

COLE'S LAW

Springtime Means FCC Forms Are Due

by Harry Cole

WASHINGTON It is springtime here in Washington. Springtime, when a broadcaster turns his or her thoughts to... the filing of Annual Employment Reports.

Annual Employment Report? Ho-hum, wake me when it is over, right? As it turns out, while this may be fairly low on your list of priorities, this is a must-do job that can be very helpful. And if that isn't enough incentive, it is a job that, if done carelessly and inaccurately, can result in serious headaches, expense, and some possible jeopardy to your license.

First, the easy stuff. Each broadcast licensee is required to file, by May 31 of each year, a report on FCC Form 395-B reflecting the licensee's employment profile (broken out according to sex and certain FCC-defined racial and ethnic groupings) as of a pay period during the first three months of the year in which the report is filed. Normally, the pay period in question is selected by the licensee, and is constant from year to year—say, the last pay period in February each year, or the first pay period of the year, etc.

The annual report

The report must be completed, signed by an officer of the licensee, and submitted to the FCC in duplicate on or prior to May 31. A copy must also be placed in the station's local public inspection file immediately.

Even though those steps might seem to take care of everything, the prudent licensee should not stop there. It is good practice, after compiling and filing the form, for the licensee to sit down and undertake some relatively simple analysis of the numbers on the form.

The primary calculation to be made provides an idea of whether your

employment profile falls within a general zone of reasonableness for FCC purposes. First, take the number of all your full-time employees, male or female, who are non-white according to the FCC's racial/ethnic definitions. Divide that number by the total number of full-time employees. That will give you a percentage, which you should then compare against the percentage of minorities in your relevant labor workforce (e.g., county, urbanized area, etc.).

If your minority employment percentage is more than half of the minority percentage in the workforce, you satisfy the preliminary level of review.

To illustrate, if 10 percent of your full-time employees are minorities, and the relevant labor workforce has an overall minority population of 15 percent, your percentage (10 percent) is greater than

half of the workforce percentage (i.e., 15 percent divided by 2, or 7.5 percent), and your statistical profile is probably not going to raise any questions at the commission. If, on the other hand, your percentage is less than half of the workforce percentage, your profile could trigger FCC problems.

Reflecting the market

For example, if (as in our previous example) the labor workforce has an overall minority population of 15 percent, and your minority employment represents only 5 percent of your full-time staff, you fall below the FCC's informal guidelines.

Generally, the commission does not seem to focus on each licensee's annual reports as it is filed. Rather, the reports tend to get stuck away in the files. But at

renewal time, those reports are hauled out and considered, as they afford a look at the licensee's employment profile over an extended period of time.

If that review indicates a pattern of minority under-representation in the station's employment profile, the staff may ask questions (assuming a petitioner to deny has not already done so). Thus, if you spot-check your own employment profile each time you file a report, you have an easy opportunity to figure out, well in advance of renewal time, whether you might have a statistical problem. If you do, you have an obvious chance to take appropriate corrective measures before renewal time.

Such self-analysis and self-correction, on an ongoing basis through the license term, are especially useful at renewal time, when you have to provide more detailed information about hiring and promotion practices at the station during the immediately preceding year. Ideally, your self-correction efforts in connection

continued on next page ►

GUEST COMMENTARY

Steel Structures Disrupt AM Signals

by Ron Nott

FARMINGTON, N.M. The March 8 issue of *RW* contains a front-page article titled "Cellular Sites Must Protect AMs." With the rapid growth of the Public Mobile Service, this is very timely. Whether in metropolitan, medium or small markets, station owners and engineers can expect the possibility of having towers or steel poles suddenly sprout up in the vicinity of their transmitter sites.

Such towers can function as parasitic re-radiators, receiving the station signal and then re-radiating it with a time or phase lag in it. The spacing between the AM antenna and the cellular tower along with the time or phase lag can cause a distortion of the antenna pattern that can be difficult to predict and have very negative effects.

Back on Aug. 11, 1987, the FCC put out

a Public Notice concerning construction of towers near AM facilities. However, many people in both broadcasting and the cellular phone industry were unaware of it. At that time, the notice was concerned with tower construction within 0.5 mile of a non-directional station and two miles of a directional. This has been changed in the new rules (CFR para. 22.371) to one kilometer (0.62 miles) for non-DA stations and three kilometers (1.86 miles) for DA stations.

To follow the new rules, the Public Mobile Service licensee must notify the AM licensee in advance of the planned construction or modification. The rules also state that "measurements must be made to determine whether the construction or modification affected the AM station antenna pattern." Measurements should be made prior to construction and then again afterward. Many things can distort the pattern such as power lines, metal buildings, tanks, bridges, etc. If measurements are not made beforehand, it can be difficult or impossible to determine the effects of the new cellular tower.

If a cellular company notifies an AM broadcaster and builds a new structure, what can be done to restore the AM antenna pattern back to normal? The FCC has addressed this, so the rules further state that the cellular "licensee is responsible for the installation and continued maintenance of any detuning apparatus necessary to restore proper performance of the AM station tower or array."

Skirt-wire system

So what is detuning apparatus and where does it go? It is a system of skirt wires and one or more reactances that is installed on the new cellular tower or pole. It is tuned to make the new tower effectively disappear from the AM station signal. This is done by tuning the system to reduce the RF currents induced in the cellular tower by the radio station to zero or nearly so. When this is done, the tower no longer functions as a parasitic re-radiator.

This sounds simple and the cellular operator must pick-up the tab for the detuning apparatus and its engineering, but there can be headaches for an AM station. Some cellular operators don't know about the

new rules and possibly some don't believe that they should be bothered by their proximity to an AM station. You may find that they have erected a tower without first notifying your station. If this happens, the first thing to do is for the station manager or chief engineer to contact the cellular company citing the new FCC rules. If that doesn't work, then the station attorney or the FCC should be contacted.

Proving the effect

If the new tower has already been built, it may be difficult to prove that it is having an effect on the AM station. For a directional station, check the monitor points to see if they are out of tolerance. You might have to check points on a partial or skeleton proof to see if they are different from measurements done before the new tower was built. Keep careful field notes when you do this.

For non-directional stations, it could be more difficult as few of them have done field intensity measurements to determine pattern shape. In severe cases, transmitter tuning can be affected. Believe it or not, some cellular towers have been built within a few hundred feet of AM transmitter sites. If your transmitter has been detuned by a new tower, you can be assured that your pattern has also been affected.

You may feel the need to bring in an engineering consultant. This should be the responsibility of the cellular operator, but make sure that he agrees to it. The need for detuning is becoming known in the cellular industry, and the reputable companies recognize their responsibility and will work with you.

The technology is available to detune any structure that distorts your coverage pattern. The FCC recognizes this, and, in the case of new cellular towers, it has provided rules for resolving problems that may arise. Remember, if this is about to happen to your station, insist on field measurements prior to construction of the new tower. Afterward, make sure that the structure was properly detuned and your pattern is back to its original shape.

□□□

Ron Nott runs an engineering consultant firm, Nott Ltd., in Farmington, New Mexico.

Now Hiring!

Midwest Sales Manager

If You Love Radio...And You Love Publishing
And You Can Sell, Sell, Sell

We Want You!

The world's #1 radio industry publisher is looking for a dynamic individual to handle Midwest advertising sales for Radio World Newspaper, Radio World International and The Radio World Magazine.

This job requires five or more years of radio industry experience (station experience preferred), and a strong background in advertising, sales and marketing. You must be energetic, aggressive, creative, organized and (most important) LOVE RADIO. You must also live within the territory and be able to travel.

We offer a competitive salary/commission package, plus benefits. Send resume (in confidence) with salary history to:



Carmel King, Sales Director
Radio World
PO Box 1214, Falls Church VA 22041
FAX: 703-998-2966
* No Phone Calls Please

MARKETPLACE

Recently Introduced Products for the Radio Broadcast Professional

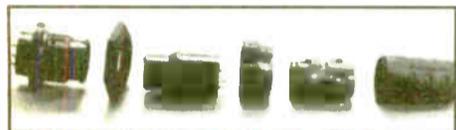
Audio Circuit Identifier

The Talking Duck by Broadcast Tools Inc. identifies any audio circuit. By connecting the wall transformer to the Talking Duck and pressing the Record button, an identifying message of up to 15 seconds may be recorded. On playback, a five-second 1 kHz tone, along with the recorded message, runs continually.

One common application is to connect the Talking Duck to a telco loop, with the user recording a message identifying a radio station, circuit number and location. The Talking Duck continually feeds the circuit until a T/R/S one-quarter-inch plug is inserted into the front panel jack. Once this connection is made, the Talking Duck's recording is disconnected and the source equipment is switched back to the loop. When the user is finished with the loop and removes the jack, the customized announcement feeds the loop.

For information, contact Don Winget in Washington state at 206-938-4089; or circle Reader Service 79.

Mini Weathertight Connector



Switchcraft's new EN3 mini weathertight connector provides superior leakage protection with a double seal to prevent moisture and chemicals from reaching the contacts.

The EN3 prevents leakage by using an integral O-ring molded onto the cord housing assembly. Additional protection is provided by a gasket molded onto the

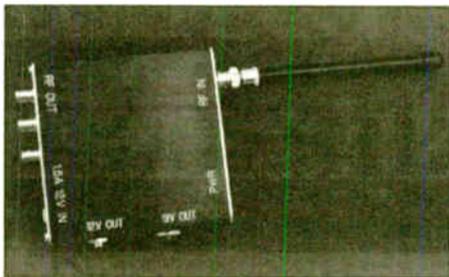
panel housing assembly.

The EN3 connector is available in two to eight pins/contacts, with cord plug or panel mount, crimp or solder termination.

For information, contact the company in Illinois at 312-792-2700; fax: 312-792-2129; or circle Reader Service 114.

Wireless Mic Antenna Splitter/DC Power Distributor

The RD-31 from Professional Wireless Systems is a combination wireless microphone antenna splitter and DC power distribution unit. The compact RD-31 is ideal for field production, fitting easily into any EFP audio bag and offering single-switch activation. One antenna input feeds up to four wireless microphone receivers, while one switch controls a 12-V DC source to feed any



number of devices, eliminating the need to change multiple batteries.

The DC outputs to wireless microphone receivers, transmitters and field audio mixers are ferromagnetically isolated.

The unit's dual-band UHF/VHF antenna input provides fast setup and greater range by reducing the antenna directivity effect caused by using multiple antennas in close proximity to each other.

For information, contact the company in Florida at 407-240-2880; fax: 407-240-5091; or circle Reader Service 160.

Rackmount Cases

Jensen Tools offers a new line of shock-absorbent rackmount cases for 19-inch and 26-inch-wide electronic equip-



ment. These cases provide outstanding protection for the transport and storage of sensitive audio, video and other broadcast and communications equipment.

These American-made cases are molded from ultra-high molecular weight polyethylene. They are 50 percent lighter than wooden cases and are impervious to most solvents, oils, fuels and acids. Other features include molded-in ribbing and bumpers for extra strength, and tongue and groove aluminum valance with O-ring seals.

For information, contact the company in Arizona at 800-426-1194; fax: 602-438-1690; or circle Reader Service 35.

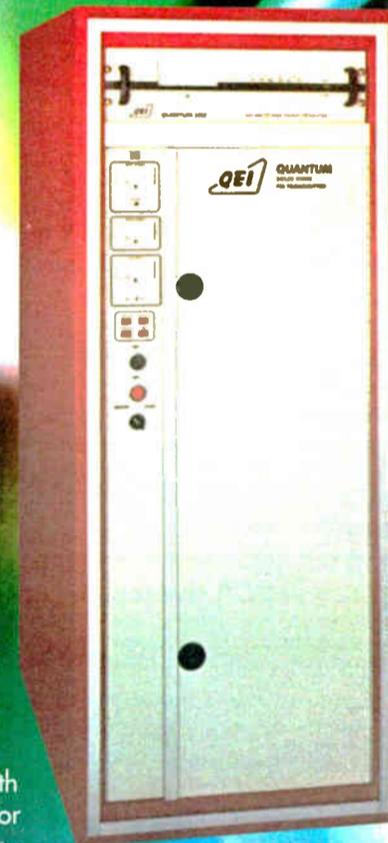
Quantum FM

Solid
State

Solid
Reliability

from

QEI



- Proven reliability
- Maintenance-free FET technology
- Self-contained modules with own power supply regulator
- Compact size reduces shipping costs, allows affordable air shipment
- Power levels between 300 Watts and 6 kW
- Modular design offers buy-only-what-you-need affordability and convenience

For the same price you pay for a tube transmitter, you can now have a superior solid state FM transmitter with high-power, advanced technology exciter and cableless combiner. The modular design of QEI's QUANTUM-Series FM transmitters offers the advantage of buying only the amount of power you need...and means that you can upgrade to higher power levels whenever you're ready.

QUANTUM from QEI-the people who have been designing and building solid state transmitters longer than anyone else in the industry.

You need to know more! Call Jeff Detweiler today toll free (800) 334-9154.

QEI Corporation
One Airport Drive • P.O. Box 805
Williamstown, NJ 08094

Tel (800) 334-9154
Fax (609) 629-1751

24-Hour Service Hotline
(609) 728-2020

FCC Workforce Reports

► continued from previous page
with each individual employment report will result in an acceptable profile at renewal time.

But even if your statistics for your renewal year happen to be low, your ongoing efforts at self-correction (assuming you have in fact made such efforts) in earlier years should prove very helpful in assuring the FCC that any shortfall is inadvertent and contrary to your best efforts.

Annual Employment Reports

How could your Annual Employment Reports get you in trouble? Well, obviously, if they repeatedly reflect serious shortfalls in minority employment, and you cannot demonstrate that you made equally serious efforts to remedy those shortfalls over the license term, you could be looking at a fine, or even a short-term renewal.

Also, at the risk of stating the obvious, if you try to get cute in what you put in your reports, it could easily come back to haunt you. For example, if you knowingly place employees in incorrect racial/ethnic categories to create an inaccurate minority employment profile, you are playing with fire.

And even if you simply try to shape that profile by, say, filling a full-time position with a minority person for the pay period covered by the report, and then terminating that person after that period, you risk serious problems if that practice comes to light with the help of a disgruntled former employee, a suspicious petitioner to deny, or just dumb luck.

Of course, any misconduct along these lines could result in loss of license, if the FCC concludes that it rises to the level of misrepresentation or the like.

So as you approach the preparation of your Annual Employment Report, you should recognize it not so much as a chore, but as a chance to increase your readiness for renewal time. The FCC is still committed to enforcing its EEO rules, and has in recent years upped the ante considerably for licensees who violate those rules. The opportunity to engage in annual self-assessment and self-correction should not be wasted.

□ □ □

Harry Cole is a principal in the Washington-based law firm of Bechtel & Cole, Chartered. He can be reached at 202-833-4190.

MARKETPLACE

Recently Introduced Products for the Radio Broadcast Professional

Panasonic Catalog

Panasonic Factory Automation Co. has cataloged a summary of features and specifications for products relating to its electronic measuring systems (EMS). This publication offers over 190 pages of product information and is designed to be a reference for decisions in instrumentation and system needs.

The manual indexes product categories and model numbers of automatic measuring systems, signal generators, low-frequency oscillators, modulators, audio analyzers/distortion meters, wow and flutter meters, analog/digital voltmeters and frequency counters.

For information, contact Kevin Dunoon at 708-288-4471; or circle **Reader Service 121**.

Telescoping Antenna Mast

The Fast Mast portable telescoping antenna mast from D&D Enterprises is constructed of 6061 T6 aircraft aluminum tubing that is machined to fit together. The mast is extended horizontally and held in place by locking pins with safety wires. These safety wires also help guide the coaxial cable down the mast after it's raised to help support the weight of the mast.

The base of the mast is also made of aluminum and comes in several styles: portable, hitch and bumper. The mechanics of the base are the same in all styles.

For information, contact the company in South Carolina at 803-546-5496; or circle **Reader Service 107**.

Stereo AGC/Leveler

The new 422 stereo AGC/leveler from Symetrix Inc. is an automatic gain controller designed to boost stereo signals that fall below the target output level and pull back those that rise above it.

Intended for use at any point where there is line-level audio, the Symetrix 422 features a parallel input/output meter to allow the user to see the input level and adjust it to the desired target output level.

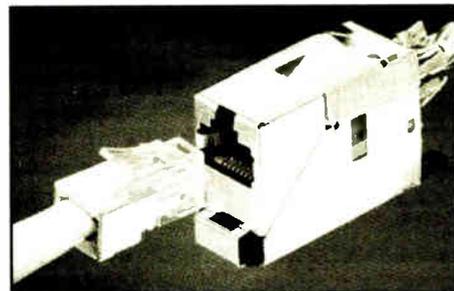
Other features include a threshold control for adjusting sensitivity, a response control for regulating speed and a peak limiter control for creating an absolute ceiling level.

For information, contact Jon Bosaw in Washington state at 206-787-3222; fax: 206-787-3211; or circle **Reader Service 95**.

Shielded Modular Jacks

The new shielded PAN-JACK Category 5 modular jacks from Panduit Corp. terminate 22- or 24-gauge 100-ohm screened twisted pair to a modular jack to protect a communication system from the harmful effects of electromagnetic interference.

The jacks exceed EN 55022 EMC/EMI requirements and proposed TIA/EIA transmission requirements.



These jacks feature a patented design cap that makes it easy to maintain cable twists to within one-half inch (a Category 5 installation requirement) and insulation displacement contacts.

For information, contact Product Manager, Network Systems Division, in Illinois at 800-777-3300, ext. 8314; fax: 708-532-1811; or circle **Reader Service 148**.

Improved Digital Audio Processing Suite

NVision's enhanced version of its Digital Audio Processing Suite now includes two layers of eight-by-eight digital audio routing.

DAPS II is a system designed to provide solutions to interface and synchronization problems within audio, video, broadcast and post production facilities.

DAPS II consists of two NV1308A AES/EBU-format digital audio routers, an NV9301 X/Y router control panel, an NV1055 four-channel digital audio mix/minus and routing module, an NV9055 remote controller, an NV1050 four-channel sample rate converter, and an NV1060 four-channel digital audio delay compensator.

For information, contact the company in California at 916-265-1000; fax: 916-265-1010; or circle **Reader Service 143**.

Audio Codec

The Comrex DX200 MusicLine audio codec, which uses ISO/MPEG Layer II, is designed to incorporate maximum function and utility into a minimum of hardware, thereby reducing cost without sacrificing audio quality.

The DX200 incorporates both an encoder and decoder in the same compact, 1U rack chassis. It is capable of 15 or 20 kHz stereo operation on a single ISDN line or two Switched 56 channels. It is also capable of wide band mono (11 kHz) on a single 56 or 64 kbps digital channel.

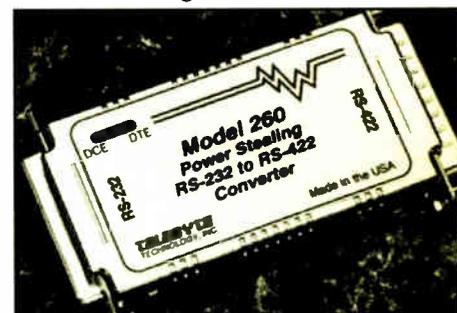
The DX200 features a built-in inverse multiplexer that combines two independent 56 or 64 kbps channels. The IMUX also offers the ability to aggregate two 112 or 128 kbps channels, allowing for inexpensive 256 kbps links when using BONDING-compatible terminal adaptors.

For information, contact the company in Massachusetts at 508-263-1800; fax: 508-635-0401; or circle **Reader Service 36**.

Interface Converter

RS-232 to RS-422 interface conversion has always consumed excessive power due to maximum line terminating loads and bipolar integrated circuits. Telebyte's Model 260 RS-232 to RS-422 interface converter derives its operating power from the transmit data signal presented to the RS-232 interface.

The Model 260 interface connectors accommodate full duplex signals at data rates up to 19.2 kbps, without requiring any AC or DC power. Unique power conversion circuits create the necessary operating voltages from the RS-232 transmit data signal.



With only TD, RD and ground, the Model 260 provides operation on the RS-422 side over 8,000 feet of twisted pair into a load of 120 ohms.

For information, contact the company in New York at 800-Teleby (835-3298); fax: 516-385-8184; or circle **Reader Service 19**.

Mic Positioning Device

The Positioner from Studio Techniques is a device that allows the up-down and left-right orientation of any microphone to be remotely controlled from 300 feet away.

The Positioner consists of a motorized unit that attaches easily to a conventional microphone stand or boom. The mic connects to the other end of the unit via



a threaded mount. A small, battery-powered remote controller links the Positioner via a conventional XLR cable. Using the controller, any microphone can be rotated through 350 degrees and tilted 180 degrees, providing full control of the capsule's orientation.

For information, contact the company in Connecticut at 203-791-3919; fax: 203-791-3918; or circle **Reader Service 77**.

AXS (Ax'-sess)... Jocks Love It!

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.

AXS is a modular design that begins as a simple cart replacement and grows to any combination of CD, hard disk, satellite or specialty programming with ease.

AXS has all the sophisticated feature options including device independent multi-channel background audio record and replay. Macro programming makes tough to run event sequences easy. Software drives a powerful programmable real time IOMAP.

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. *AXS systems...*

From \$6000.00 using your 486 computers and hard disks.



AXS™

The Management

800-334-7823 817-625-9761

FAX 817-624-9741

P.O. Box 1-36457 Fort Worth, TX 76136

1700+ Stations • Our 14th Year

Broadcast Equipment Exchange

"Broadcast Equipment Exchange" accepts no responsibility for the condition of the equipment listed or for the specifics of transactions made between buyers and sellers.

ACOUSTICS

Want To Sell

Tired Of Bad Sound? Let Us Give You A Few Pointers.

STUDIOFOAM SOUND ABSORBENT WEDGES

The industry's most absorbent foam line! Features a uniform cut for clean & easy installation- no "innies & outies" like that other brand. How's it work? Up to 60% better than foams that can cost 5 times as much! NRCs from .50 to 1.30. Passes the stringent California firecode & tests 48% more flame retardant than Sonex. Available in 1", 2", 4" & 12" (bass trap) sizes in 2'x4' sheets. Super long-lasting, doesn't crumble like other brands can. Available in a wide range of colors from neutral to wild to match any decor. What Value!!! Min. 1 box. 1"-\$8.99 ea (20/box), 2"-\$11.99 ea. (12/box), 4"-\$22.99 ea. (6/box)

FROM JUST \$8.99 A SHEET!

Clients: Ford Motor Co. • Kodak • Warner Bros. • Hitachi • Dennis DeYoung (Slyx) • Baldwin Piano • Editel • Mike Wanchic (J. Mellencamp) • Rockwell Int'l • US Gov't • Opryland USA • Bell Telephone Research Labs • MPI Home Video (ABC News, Apple Records) • Carvin • Penn State Univ. • WhisperRoom • MTX • Martin Marietta • Manley Labs • NJJ (NFL on Fox, Coke)

USAfoam • Box 20384, Indianapolis IN 46220 • (800) 95-WEDGE • Fax (317) 257-2USA

Circle (24) On Reader Service Card

AMPLIFIERS

Want To Sell

Altec 361-A amp, \$50; McIntosh MC 250 stereo pwr amp, \$250; South-west Tech 215-A stereo pwr amp, \$95. D Lundy, 606-546-6650.

Dynaco stereo 120A pwr amp w/PAT-4 stereo preamp; Macintosh MC-2505 solid state pwr amp w/VU meters, nice wooden case; Kenwood KR-4600 stereo rcvr, all BO. D Jackson, WQQQ, 19 Boas Ln, Wilton CT 06897-1301. 203-762-9425.

Marantz 2130 quartz locked tuner w/scope; Marantz 3250 B cntrl pre-amp; Marantz 140 amp w/VU meters, \$595. J Price, Price's Rec, 2651 Globe Ave, Dallax TX 75228. 214-321-6580.

RTS-405 stereo TT preamps (2), used 6 mos then stored, \$140/ea+ shpg. B Lord, Lord Bdcg, 3824 SW Myrtle St, Seattle WA 98126. 206-932-4839.

Want To Buy

WANTED:

Pultec EQ's; Fairchild, Teletronix, dbx, UREI, Sontec Limiters. Neumann, Telefunken, AKG and RCA mics. MacIntosh or Marantz Gear; Lang, Neve and API gear. Misc old tubes and guitars.

DAN ALEXANDER AUDIO

1340 Mission Street
San Francisco, CA 94103
(415) 252-7102
FAX: (415) 252-7524

ANTENNAS/TOWERS/CABLES

Want To Sell

2 150' towers, one or both, BO. B Locklear, WO7CN LPTV, Rt 10 Box 190, Lumberton NC 28358. 910-521-3101.

Rohn 45 G tower sections, \$125/BO. Rick, KBZO, Lubbock TX, 806-763-6051.

Jampro 2 bay 10 kW FM antenna, 102.3 tuning, BO; approx 100' or more unshielded solid wire B-conductor cable, BO. G Price, WCVR, POB 249, Randolph VT 05061.

Rohn BX40 40' tower, brand new, \$350. Clark, 704-982-6141.

FM ANTENNAS CIRCULAR POLARIZED HIGH & LOW POWER STACKED ARRAYS- UP TO 16 BAYS

We also repair FM xmtrs, equipment & upgrade old FM crystal controlled xmtrs w/a new Phase lock loop board. House calls available -NY, NJ, CT, PA. Call now & save 10% on first order or repair

> QUALITY BAYS <
516-226-5979

Shively 5 bay HF FM on 98.7, 3 1/8" EIA end fed, deice-s on ground, in Utica NY, BO. M Ring, Black River Bdcg, 134 Mullin St, Watertown NY 13601. 315-788-0790.

350' 1 5/8 Andrew line w/EIA connectors & gas barrier, BO. D Charles, WLOQ, POB 2085, Winter Park FL 32790. 407-647-5557.

AUDIO PRODUCTION

Want To Sell

Eventide H910 w/blown output section, \$275; DEX1000 digital delay, rack mount w/tone cntrls, slight noise problem, \$175; JT patch cables (39), Monster Prolink, \$250; EV 666 mic, \$200; EV velocity mics, one pair, BO. P Santo, 617-293-5671.

Orban 111B reverb, \$200/BO. D Charles, WLOQ, POB 2085, Winter Park FL 32790. 407-647-5557.

Furman PQ-4 parametric EQ, 1 yo, exc cond, \$199. Ron, 206-839-9414.

dbx 180 stereo NR, \$225; dbx 208 NR system, \$595. J Price, Price's Rec, 2651 Globe Ave, Dallax TX 75228. 214-321-6580.

Roland E-660 digital parametric EQ, new in box, with specs, \$1000; AKAI X7000 sampling keyboard with memory, like new, still in box, \$700, \$850 with stand; Scotchcart IIs, new in boxes, 10 4.5 min units, \$60, 20 5.5 min units, \$130, \$180/all; Otari SX70 8-track 1" R-R recorder in like new condition, including new remote control unit with 25' cable interface, 6 1" tapes with reels & maintenance tape, all books & specs included, \$4000. B Giordano, WODS-FM, 20 Winter St, Boston MA 02108. 617-728-1957.

CRL Dynaflex DX2 NR unit; Aphex Compeller; Moseley PLC303 STL set; Eventide Harmonizer 949; Technics SL-P101 #610 expander/compressor; Orban 111B dual band reverb; CBS Audimax AGC; CBS Volumax 400; Gates Solid Statesman (2). M Ring, Black River Bdcg, 134 Mullin St, Watertown NY 13601. 315-788-0790.

CASSETTES • CARTS • REELS

J & I AUDIO/VIDEO

A wholesaler in the Radio and Television market. Now running SPECIALS on audio and video:

BASF CASSETTES-AMPEX R-Rs
AUDIOPAK, FIDELIPAC & ITC CARTS
DAT & THE NEW R-CD

For more information call Kris Elliot at 1-800-942-1711

or write to: J&I Audio/Video
20899 Kelvin Pl.
Woodland Hills, CA 91367

Circle (47) On Reader Service Card

ADC 1/4" patchbays and cords, NEW, UNDER HALF PRICE, ADC TT patchbays, \$129 up, NEW cords, \$9.95. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

dbx 165 "over easy" compressor, \$150. J Laprad, 508-755-0732.

Altec 1567A tube-type mic mixer w/meter, vintage; Yamaha RM-804 rcdg mixers (2), 8 faders, 4 chnls, +L&R; Teac Model Two audio mixer, 6 faders to 4 chnls w/HF & LF selectable rolloff, w/Teac MB-20 meter bridge; Shure SE-30 mixer/gated compressor; Shure M-68P mic sub-mixer, all BO. D Jackson, WQQQ, 19 Boas Ln, Wilton CT 06897-1301. 203-762-9425.

Good used studio tape 1/2" \$15, 1" \$30, 2" \$55. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

UREI LA4 mint pr, \$1095; Lexicon Alex, \$295; bulk eraser, \$49; Stewart direct boxes mono, \$50, 4 Ch, \$95; Cue command decoder, \$125; ABC Network decoder, \$125; NEW Tascam midiizer MTS1000, \$750; Dyna stereo 120 rack mt amp, \$229; Sherwood FM tuner, new tubes, \$49; Ionics 7" reel copier 3 copies, \$125 ea; Crown & Furman elec crossovers, \$95. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

Want To Buy

Symetrix 511A or equivalent, single-ended 2-chnl NR. J Laprad, 508-755-0732.

Ampex tube mixers, plug-in mic preamp modules for PR10's. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

AUTOMATION EQUIPMENT

Want To Sell

Cetec/Schafer 902 1/2 automation, used as Sat music cart plyr, includes 902 sequential thumbwheel unit, 2000 event RASMOS controller, Audiofile IIA multi-cart units (2), VEL Decoder w/Extel AFIR printer, BO, sell unit or as pieces. B Spitzer, 605-343-6161.

Cetec 7000 automation syst w/48-tray Instacart, BO. J Walker, KWHT, POB 640, Pendleton OR 97801. 503-278-2500.

IGM stereo Instacart, \$500; ESE Model 790 1,000 event programmable clock, \$200. M Ripley, KOZE, Box 936, Lewiston ID 83501-0936. 208-743-2502.

IGM Comm event cntrls (2), BO. G Price, WCVR, POB 249, Randolph VT 05061.

Want To Buy

Audisk basic system, K Tuckerman, WCVO. 614-855-9171.

CART MACHINES

Want To Sell

Dynamax CTRID stereo R/P cart machine, \$1200/BO; BE 5300 stereo R/P triple stack w/rcd amp, \$2500/BO; BE 3000 mono R/P cart machine, \$895/BO. J Walker, KWHT, POB 640, Pendleton OR 97801. 503-278-2500.

Otari CTM-10.5K rcd/plybk stereo cart, \$1750; Otari CTM-5 plybk only stereo, \$1000. B Hannie, 407-649-6444.

Great Prices on original equipment tape heads for ITC, BE, Fidelipac, Otari, Tascam & others!

(804) 984-4255

HALL Electronics

IGM 48 tray Go Carts (3) model 4216, \$300/ea; IGM 12 tray Insta Cart model 12 STK, \$300; SMC 250 Carousel, \$150; Master carts, various lengths, 70 cents/ea; cart racks, hold 24 carts, table top, \$10; Harris Criterion 90 ply mono cart machine, \$300; BE 2000 cart machine parts, \$25; BE cart rdwr, \$200. T Wortmann, 402-371-0780.

Ramko Primus R/P stereo cart machine, like new w/manuals, \$1200. 800-397-4146.

Harris Criterion 90-2 (2), mono PB, gd cond, \$200/ea. M Anthony, WENG, POB 2908, Englewood FL 34295. 813-474-3231.

HALL Electronics

706 Rose Hill Drive Charlottesville VA 22901



DYNAMAX
BROADCAST PRODUCTS BY FIDELIPAC

- True modular design
- Excellent RF immunity
- Prices start at under \$3,000.00 for the MX6R

The RFC-1/BHV3 provides transmitter power control, has alarm dial out for 6 numbers, and provides up to 64 channels of control and metering.



The DAI-1 easily handles EBS requirements for "walk away" operations. It also allows direct access to the air chain in addition to providing remote broadcasts. The best & lowest cost 'dial-up' remote control available.

SINE SYSTEMS

Call us for the Best Digital, New & Completely Rebuilt Equipment! (804) 984-HALL (4255) (804) 984-FAXX (3299)

APHEX SYSTEMS - Air Chain



Compellor 320

The Compellor is the world's most acclaimed audio level processor. Its completely transparent audio path is comprised of servo-balanced transformerless inputs and outputs.

Dominator II



The Dominator II is a stereo (dual channel linked) multi-band peak limiter with zero overshoot. In addition to providing peak protection, the Dominator II may be used to gain greater loudness.



Digicoder Stereo Generator

The use of the Digicoder will allow a broadcaster to turn down the amount of processing and still maintain the same level of loudness.

Check out these great deals on rebuilt equipment. Many more available - Call Us!

Orban 8000A FM Stereo 'Optimod' - 2 In Stock	REBUILT	\$ 1,495
Eventide BD-942 3 Second Stereo Delay	REBUILT	\$ 1,095
CRL SMP-800 FM Stereo Limiter	REBUILT	\$ 495
CRL SPF-300 AM NRSC Filter/Pre-Emp. Adapter	REBUILT	\$ 249
Audiotronics 110A 18 Pot Stereo Console w/ Eq.	REBUILT	\$ 1,695
Otari MX-5050 BQ-II 4 Track Reel	REBUILT	\$ 1,595
Orban 622B Stereo Parametric Equalizer	REBUILT	\$ 295
Orban 111/B Dual Spring Reverb	REBUILT	\$ 175
Moseley TRC-15AW 15 Ch. Remote Control	REBUILT	\$ 595
Hallikainen TEI 171 Digital Metering for TRC-15	NEW	\$ 295
Mari MW-500 Microwave Booster System	REBUILT	\$ 1,295
Valley 'Dynamic' Dual Mic Preamp/EQ/Clipper	REBUILT	\$ 145
Valley 400 Mic Processor	REBUILT	\$ 349
Yamaha SPX 990 Effects Generator	REBUILT	\$ 395
Broadcast Tools 6X1 Routing Switch	REBUILT	\$ 249
Technics SL-P1200 CD Player - Production Model	REBUILT	\$ 595
Teac X1000R 1/4 Track St. 10.5" Reel w/Auto Reverse	REBUILT	\$ 595
JBL 7510A 24 Input Automatic Mic Mixer	REBUILT	\$ 395
Tepeco J-318 10 Watt FM Booster System	NEW	\$ 1,895
Potomac Instruments FM-71 FM Field Strength Meter	REBUILT	\$ 3,995
Radio Systems TI-101 Telephone Hybrid	REBUILT	\$ 329
Gentner SPH-3 Telephone Hybrid	REBUILT	\$ 399
CBS/Audiomax 4450A Stereo AGC	REBUILT	\$ 195
McMartin EBS-2/TG-2 EBS EBS System	REBUILT	\$ 349

CART MACHINES...WTS

Tapemaster X-701 mono plybks (2), exc cond, very clean, w/manuals, \$295/ea; UMC Beaucart 12-123, stereo rcd/plybk, exc cond, very clean, w/manual, \$295. K Lamson, 510-447-7405.

BE 5 stack 5 stereo cart plybk unit, incl xtra unit for parts, \$250+shpg. G Dunn, NoCA News, 5383 Willow Lake Ct, Byron CA 94514. 510-516-0299.

ITC Delta (3) plybk only cart machines, like new, \$600/ea. R Statham, WSTW/WHLG, 1000 Alice Ave, Stuart FL 34994. 407-692-1000.

Tapemaster 700-P & 700-RP (2) ply & rcd/ply cart machines, BO; ITC PD-II rcd/ply cart machine, BO; Audi-Cord E11 & (2) E-31s ply only cart machines, BO; Sono-Mag Corp cart carousels, (7) 350s & (2) 452s, BO. G Price, WCVR, POB 249, Randolph VT 05061.

BE 5300C tripledeck, stereo, PB, mint less than 50 hrs, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

ITC System 99B stereo record/play: tones, ELSA, auto head: \$1200/firm. C Scott, WKYU-FM, (502) 745-5489.

Want To Buy

ITC, BE, Fidelipac cart machines: single, triple, mono, stereo, play & record/play. Call M O'Drobinak @ 619-758-0888.

CASSETTE & REEL-TO-REEL RECORDERS

STUDER SERVICE SPECIALIST

Thousands Served • Unbeatable Rates
Precision Capstan Resurfacing
Audio Advantage
Tel (615) 742-3834
PRICE-QUALITY-SERVICE
Let Us Prove It

Want To Sell

AKAI 1730D.SS 4-chnl stereo surround sound R-R tape deck, \$100+shpg. M Hardy, WMSJ, POB 432, Freeport ME 04032-0032. 207-865-3448.

Ampex 440-C 1/2" 4-trk DC servo, \$800; Ampex 440-C 1/4" 2-trk DC servo, \$400; Scully 280 7 1/2" & 15 very good, \$200; MCI JH 110 8-trk, \$1500; Ampex 440-C electronics, \$100/ea; Ampex 440-C deck DC servo, \$300. D Lundy, 606-546-6650.

SCULLY TAPE RECORDERS PARTS AND SERVICE

SEQUOIA ELECTRONICS
(408) 363-1646
FAX (408) 363-0957

Cypher Digital Shadow 4700 sync, CDI 4835 remote, cables for MTR10, MX5050 & MX70, \$1995. G Kornbluth, A&J Rcdg Studios, 212-247-4860.

Otari MX70 1" 16/8-track, mint condition, 8&16-track 1" heads, 16 channels rack mounted dbx 180A NR & CB117 remote, \$10,900; Otari MX5050 1/2" 8-track, mint condition, 8 channels rack mounted dbx 911, CB116 remote, \$3900. G Kornbluth, A&J Recording Studios, 212-247-4860.

ITC 850 R-R 2-trk unmounted w/manual, exc cond, \$650/BO. D Charles, WLOQ, POB 2085, Winter Park FL 32790. 407-647-5557.

Otari MTR10-2C stereo rec, \$2995; MCI Sony JH1100B, exc cond, \$1250; Otari 5050 stereo in console, \$1500; Ampex 354-2 tube w/440 deck, \$1000; Ampex 440 stereo, exc cond, \$995; Ampex AG350-2 stereo, \$595; Ampex & Scully motors, parts, 8 and 16 track hds, Ampex DC servo capstan motor and amp, \$300. J Price, Price's Rec, 2651 Globe Ave, Dallax TX 75228. 214-321-6580.

Sony TC-152SD stereo cass deck, w/VU meters, 2 speeds; Casio DA-2 port DAT rcd/ply deck, ballt or AC, almost new, in box; Wollensak Model 2851 cass rcd/plybk, heavy duty; ITC Encore R/P mono cart rcd/ply, S/N 434; Dukane Model 28A18 rcd/pulsers (2), 50 Hz @ 0.45/2.0 sec, all BO. D Jackson, WQQQ, 19 Boas Ln, Wilton CT 06897-1301. 203-762-9425.

REVOX PARTS/SERVICE

Cassette-CD-Open reel
NOS PR99 repros. CALL
Capstan resurfacing, ALL BRANDS.
JM TECHNICAL ARTS
30 Music Sq. W. #156
Nashville, TN 37203 (615) 244-6892

Sony TC-7884 4-trk, needs plybk head, otherwise good cond, BO. J Walker, KWHT, POB 640, Pendleton OR 97801. 503-278-2500.

Teac A-3300-SX stereo R-R, 10 1/2" & 7" reels, 1/4-trk stereo, 1/4" tape, complete syst in exc cond, \$400/BO. S Lawson, 707-528-4055.

Teac Tascam 80-8 8-chnl 1/2" R-R; Ampex 351 R-R, vintage; Ampex 1091 stereo rcds (2); Wollensak 2770 cass duper, stereo unidirectional; Pentagon 1100 Series 4-chnl cass duper; Crown 800 Series stereo R-R 10", looks vintage; Nakamichi Model 1000 Type II 3-head cass console/wooden case; Teac 3340-S 4-chnl simul-sync stereo R-R, 1/4"x10"; all BO. D Jackson, WQQQ, 19 Boas Ln, Wilton CT 06897-1301. 203-762-9425.

CLEAN PATCH BAYS NO DOWN TIME



VERTIGO BURNISHERS AND INJECTORS RESTORE ORIGINAL PERFORMANCE TO YOUR PATCH BAYS
\$34.95 Ea.
VERTIGO RECORDING SERVICES
12115 Magnolia Blvd. #116 818-907-5161
North Hollywood, CA 91607 fax 818-784-3763

Teac A23405 4-chnl R/P, clean, \$300; Teac A33405 4-channel, like new, \$500; ITC 750 playback units, \$150; Anri GX77 7" 3 motors, clean, \$250; Inovonics 370-375 record electronics (4), \$140/ea. J Parsons, Parsons Sound Svc, 2781 Fayson Cir, Deltona FL 32738. 904-532-0192.

Ampex 300 R-R 12-trk rcd, no electronics, \$400. CJ Scheppers, 816-221-0231.

Revox B77, mint cond, 3 3/4 & 7 1/2 ips, 2 trk, \$600. B Meuse, Muse Audio Arts, 600 Rainbow Dr Ste 107, Mountain View CA 94041. 415-969-2433.

Otari 5050-SHD 8 track 1/2" newly rebuilt, heads have full, life left, \$1800. W Gunn 619-320-0728.

Otari Mark II-IV 1/2" 4-track, multi-track, mint, less than 50 hrs, BO. R Kaufman, Pams Productions, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

Scully '100' recorders, record/play amplifiers, 8, 16, 24 track heads. Sequoia Electronics, 4646 Hounds-haven Way, San Jose CA 95111. 408-363-1646.

Revox A77 good condition, \$350; Revox PR99 (3), reproduce only, good condition, with 1 manual, \$250/ea; Otari ARS 1000 (5), reproduce only, 3 with manuals, \$250/ea; Tascam 22-2, good condition, with manual, \$350. D Noe, KNID, 316 E Willow, Enid OK 73701. 405-237-1390.

ITC Reel-to-Reel Specialists. Complete stock of spare parts. Motor rebuilding and heads for both reel-to-reel and cart machines.

VIF INTERNATIONAL
PO Box 1555
Mtn View CA
94042 U.S.A.

Inside USA: 1-800-848-4428
Outside USA: 1-408-739-9740
FAX: 1-408-739-0809

Scully 270 R-R stereo tape machine, play, \$200; ITC 750 stereo R-R ply, \$500; Scully 280 R-R play/record stereo, \$400; Ampex 440 R-R stereo play model 4020293-01, \$200. T Wortmann, 402-371-0780.

Uher CR134 cassette, \$195; DAT decks with new heads \$550, Tascam ATR 60 8 track with stand, remote, \$3250; Otari 5050-8 no hours on heads, \$1595, Ampex 440B-8, \$2450; Tascam 25-2, \$695; Ampex ATR700, \$695; Scully 16 track 2", \$3450; Tascam 52 top of line, \$950; M79-24 fully rebuilt, \$11,500; Tascam locator for 85-16, \$495; Fostex E22 1/2" timecode deck, \$1400; Fostex A80 8 track with 450 mixer, \$1350; Tascam 5, \$450; Nagra 10" reel adaptor, \$950. W Gunn, POB 2902, Palm Springs, CA 92263. 619-320-0728.

Want To Buy

Old 50s & 60s 3- & 4-track R-R recorders, mixers, etc needed for immediate use, not collection. M Limbert, Leppotone Electrical Recordings, POB 61, Kalamazoo MI 49005-0061. 616-383-3836.

Scully 280 record electronics, J Parsons, Parsons Sound Svc, 2781 Fayson Cir, Deltona FL 32738. 904-532-0192.

Sony TC-756-2 for parts, need used playback head for 2-track stereo or whole R-R for parts. R Lee, 304-624-6801.

Ampex ATR100 taperecorders for parts. Circuit cards, heads, motors, machine parts, or electronic parts. Call 818-907-5161.

Tascam 122MKII in good condition. Price negotiable. Fax info to (719) 531-3301.

CD PLAYERS

Want To Sell

Tascam CD-701 (6) CD players with RC-701 control unit & RC-7 control unit, \$2500. R Humphrey, WWVA, 1015 Main, Wheeling WV 26003. 304-234-0057.

COMPUTERS

Want To Sell

Okidata Microline 84 printers (2), BO. G Price, WCVR, POB 249, Randolph VT 05061.

TI 700 ASR data terminal, \$40; Harris Encoder 992-5118-001 for System 90, \$50; Anderson AJ1256 modem, \$20; TEC F10 daisy wheel printer, \$90; Extel AH11R printer, \$40; TI 810 printer, \$90; Quantum Q2040 32MB HD for Wang LVP2200 computer, \$25; 8" floppy drives for Wang LVP2200 computer, \$10; 8" Dysan computer disks, cheap. T Wortmann, 402-371-0780.

CONSOLES

Want To Sell

Wheatstone A-500A 32-chnl frame loaded w/4-mic, 16-SL, 2-L2, 1-SPN & tape cntrl modules, built-in clock & timer, copy bridge, 1 yo, BO. T Camp, WMXC-FM, 334-450-0100.

Pacific Recorders AMX-18 console with 11 stereo-, 9 stereo EQ-, & 2 mic-mods, Pacific Recorders custom deck with 28" equipment turret, 2-turntable return, overhead equip return (incl 1/4" patchbay), good condition, \$22,000/BO. Greg, 212-840-0220.

Yamaha MR-1242 12-chnl, 3 bus, 4 sub groups, cue, talk back, monitor cntrls, 3WAN individual EQ, \$400+shpg. M Hardy, WMSJ, POB 432, Freeport ME 04032-0032. 207-865-3448.

Ampex AM10 6x2 mixer \$495. J Price, Price's Rec, 2651 Globe Ave, Dallax TX 75228. 214-321-6580.

McMartin B-801 stereo 8-chnl audio console, \$800; Altec 352-A 5-chnl mixer amps (2), \$75. D Lundy, 606-546-6650.

McCurdy 18x4x2 console, side car, patch bay, P&G faders, manuals, \$1000. CJ Scheppers, 816-221-0231.

Soundcraft Delta 200 18 x8x2 sweep EQ opt, excellent condition, \$2200. M Schackow, 307 4th Ave E, Lemmon SD 57638. 605-374-3424.

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

Autogram consoles. V Baker, Positive Radio Group, 703-961-2377.

Neve consoles: any condition or parts
Also: UA, UREI, Teletronics, Fairchild, RCA, Pultec, API, any TUBE GEAR or COMPRESSORS
Call 201-798-2745 or fax 201-963-4764

Neve Melbourne 12 or 16 input, any Neve or API consoles, EQs or mic pres. B Ore, Clockwork, 606 Mamaroneck Ave, Mamaroneck NY 10543. 914-381-0661.

DISCO-PRO SOUND EQUIPMENT

Want To Sell

dbx 2-124 NR syst; dbx 188 dynamic range enhancer; Teac AN-180 NR unit; stereo jack field; Teac 3232 jack field; Tascam PB-32H patch bay; Bose Model 901 active EQ, all BO. D Jackson, WQQQ, 19 Boas Ln, Wilton CT 06897-1301. 203-762-9425.

UREI 530, 18 band stereo graphic EQ, \$150; UREI 535, 20 band stereo dual graphic EQ, \$200; DBX 222 type II NR syst, \$75; Dolby A-307 NR syst, \$175. D Lundy, 606-546-6650.

Yamaha SPX-90 Type II; Audiologic NT66 stereo compressor limiter; DOD R-830B graphic EQ; Spectro Acoustics 210 stereo graphic EQ, 10 bands/chnl; Furman LC-2 compressor/limiter w/de-ess, adjustable attack & release; Shure M-63 audio masters w/gain, bass & treble & hi & lo rolloff, hi end rolloff adj 13KHz-700Hz, low end rolloff adj 30-500Hz hi-lo imp mic, RCA or phone plugs in, 600 ohm balanced or Canon out, all BO. D Jackson, WQQQ, 19 Boas Ln, Wilton CT 06897-1301. 203-762-9425.

Want To Buy

Altec Lansing 844A monitor speaker system, only need one but will consider a pair. R Cramm, KZSN, 5610 E 29th St N, Wichita KS 67220. 316-683-4566.

Cooper Time Cube delay; Roland Dimension D & SDE-3000 delay; old tube guitar amp in need of repair & old guitar effects; Vanguard PK20 & SK150 mic. P Santo, 617-293-5671.

EBS EQUIPMENT

Want To Sell

NEW REQUIRED EBS SHORT-TONE Decoder Mod. Kits
Easy - Low Cost - FCC legal!
1-800-669-3993
MC - Visa - American Express

FINANCIAL SERVICES

EQUIPMENT LEASING

Excellent rates • Fast approval

Call for quote

Jon Fugler, Broadcast Innovations
(805) 594-1235

EQUIPMENT FINANCING

ON ALL RADIO EQUIPMENT

- Easy to qualify
- Fixed-rate, long-term leases
- Any new or used equipment
- 100% financing, no down payment
- No financials required under \$50,000
- Refinancing existing equipment

ENF EXCHANGE NATIONAL FUNDING

Call Mark Wilson
(800) 275-0185

DISTRIBUTOR DIRECTORY

The following distributors serving the broadcast industry would be glad to help you with any of your requirements.

CORNELL-DUBILIER MICA CAPACITORS

FROM STOCK

JENNINGS VACUUM CAPACITORS

FROM STOCK

JENNINGS VACUUM RELAYS

SURCOM ASSOCIATES

2215 Faraday Ave., Suite A
Carlsbad, California 92008
(619) 438-4420 Fax: (619) 438-4759

...country, top 40, news, urban, talk, jazz, the classics, mixed bag...

RADIO! The beat goes on!

CROUSE-KIMZEY OF ANNAPOLIS

tops in broadcast equipment

1-800-955-6800

ask for Kathleen

FINANCING

LOANS BY PHONE (800) 699-FLEX

- We finance all types of Broadcasting Equipment
- Flexible Credit Criteria
- Flexible Payment Plans
- No Down Payment, No Payments For 90-Days Available

To apply or request additional information call Jeff Wetter.

FLEX LEASE, Inc.

LIMITERS

Want To Sell

Aphex Compellor 320; Modulation Sciences Stereo Maxx; CRL peak modulation controller for AM and CRL Audio Gain Controller. V Baker, Positive Radio Group, 703-961-2377.

Orban Optimod 8000A (2); Discriminator/Audio Processor II (4); Gates M6659 AM modulation monitor; Delta ASM-1 (2), tri-band, stereo; CBS Labs Audimax (2). V Baker, Positive Radio Group, 703-961-2377.

Orban 8000 Optimod, recent factory check-out, also have 2 Texar Prisms, BO. A Williams, WQMZ, 501 E Main, Charlottesville VA 22902. 804-977-3030.

Symetrix 511 2-channel NR unit, rack mount, \$180; McMartin LX50C mixer/preamp for permanent installation, \$120; Orban 424A rack mount stereo limiter & de-esser with gating, \$240. D Horne, CCU, 74-923 Hovley Ln E #250, Palm Desert CA 92260. 619-773-4498.

CRL complete systems w/SPP-800, stereo prep processor, SEP-800 spectrum energy processor, SMP-850 stereo mod processor and SG-800A stereo generator, \$3500 + shipping. L Dupree, KQID, 1115 Texas Ave, Alexandria LA 71301. 318-445-1234.

LIMITERS...WTS

CBS 411 stereo Volumax & Audiomax, \$50/ea/Best Offer. Don Charles, WLOQ, POB 2085, Winter Park FL 32790. 407-647-5557.

Want To Buy

CBS Audiomax III Model 444 in working cond, also service manual to same & NuVistor tube type 8056 for Audiomax. G Brefini, 12 Bailey St, Foxboro MA 02035. 508-543-4213.

Gates M3529B tube type compressor-limiter. C Ordway, WNBZ-AM, POB 211, Saranac Lake NY 12983. 518-891-1544.

Fairchild 670 or 660 tube compressor/limiter, Teletronics LA-2A tube compressor/limiter or UREI LA-3A solid state compressor/limiter, call after 3PM CST. 214-271-7625.

CBS Dynamic Presence (2); CBS Audimax 4450A (2). V Baker, Positive Radio Group, 703-961-2377.

MICROPHONES

Want To Sell

HME-WM 252 wireless with SM58 mix transmitter, \$225; Telex transmitter & mic WT-200, \$300; Telex transmitter & mic WT-50, \$250. J Price, Price's Rec, 2651 Globe Ave, Dallas TX 75228. 214-321-6580.

RCA Baby 44 mic, vintage; EV 664 chrome mic, vintage; EV 630 salt-shaker-type mic, vintage; EV RE-15 mics (2); EV 660 mic; Shure 555W unidyn dynamic mic, vintage; AKG D-190E mics (2); Sennheiser MD-421 U5 mics (2), one has mount adaptor; set of lapel mics (5) "Condenser/PiezoElectret" in pouch, 3 with Canons, 2 phone plugs; Shure 571 dynamic lapel mic with tie clip, long cord, Canon out, red-velvet-type bag; Shure 444T controlled magnetic desk mic, grey with PTT bar & gain control grey; Astatic T-UG8-D104, chrome finish, stand with PTT bar, new in box, all Best Offer. D Jackson, WQQQ, 19 Boas Ln, Wilton CT 06897-1301. 203-762-9425.

EV RE20's, \$275-325; Sony ECM377 large dia. cond 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.

RFC M263 (2), new in box, \$140/both. J Parsons, Parsons Sound Service, 2781 Fayson Cir, Deltona FL 32738. 904-532-0192.

Neumann U-89 condenser mic with battery, 2-system phantom power supply, windscreens & shock-mount, \$1600. J Laprad, 508-755-0732.

Neumann U-89 with windscreens & phantom power supply, \$1600. J Lappard, Sunspots Productions, Box 403/Westside Sta, Worcester MA 01602. 508-755-0732.

Neumann-Gefell U57, mint, \$2200; Neumann U87i, very good condition, \$1200; (2) Varicoustics from RCA London, Smithsonian quality in ATA cases, \$1100/ea. Possible trades. Klay Anderson 801-272-1814.

Want To Buy

Any pro mics, any cond, for parts, etc. J Price, Price's Rec, 2651 Globe Ave, Dallas TX 75228. 214-321-6580.

AKG 414 EB or equivalent, also need shock-mount/windscreens. J Laprad, 508-755-0732.

77-DX's, 44-BX's, WE KU-3A's On-Air lights, recording lights & audition lights. Top price paid. Fast response. Bill Bryant Management, 2601 Hillsboro Rd, G12, Nashville TN 37212. 615-269-6131, FAX: 615-292-3434.

RCA 77DXs/44BXs ribbon, chrome/TV grey, good condition, Best Offer. R Kaufman, Pams Productions, 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.

MISCELLANEOUS

Want To Sell

Small Market Radio Stories from a woman's point of view. Hilarious booklet, \$5.00. Anne Long, 428 Hawthorne Lane, Charlotte NC 28204.

Onan 30kw 3-phase 240VAC generator, good condition, weather resistant housing, \$7500. J Schloss, KICD, 2600 N Hiway Blvd, Spencer IA 51301. 712-262-1240.

Paradyne 4951-03 equiprack, black, has blank covers, \$175; Soundolier equip rack, \$120, both +shpg. B Lord, Lord Bdctg, 3824 SW Myrtle St, Seattle WA 98126. 206-932-4839.

5 volt power supplies, \$2/ea. T Wortmann, 402-371-0780.

Columbia C6046 27 pair audio cable 2 line & shield, \$50/ft. D Lundy, 606-546-6650.

Johnson ST4-A SCA/multiplex tuner. V Baker, Positive Radio Group, 703-961-2377.

AUDIO TRANSFORMER MAGIC



9K-600-6

avisar

P.O. Box 1561, Bellevue, WA 98009
206-454-2040

Circle (93) On Reader Service Card

Panasonic Easa-phone KX-T61640 phone switching systems (2), BO; (2) equip rks, 5 1/2'. BOr. G Price, WCVR, POB 249, Randolph VT 05061.

Panasonic 920MA monitor, \$25; Panasonic 930 monitor, \$25; NEC FVM125A monitor, \$25; TEC 70x smart monitor, \$50; TEC 1440-003 screen & keyboard, \$50; Wang 2336 monitor & keyboard for LVP2200, \$20. T Wortmann, 402-371-0780.

Want To Buy

James Millen 90903 oscilloscope used for AM modulation monitor, need any service or instruction manual/info. R Cramm, KZSN, 5610 E 29th St N, Wichita KS 67220. 316-683-4566.

Jazz record collections, 10" LP/12" LP be-rec, swing, dixie, highest prices paid. B Rose, Program Recdgs, 228 East 10th, NNYN 10003. 212-674-3060.

MONITORS

Want To Sell

RCA FM stereo mon type BW85A, RCA FM SCA mon type BW95A, \$150/ea. CJ Scheppers, 816-221-0231.

Belar RFA-1 FM RF amp, \$250; Collins 900 C-3 FM mod mon, \$125. C Siegenthaler, KSIW, 612 S 14th Ave, Yakima WA 98902. 509-453-5492.

TFT 785/763 724A, 730A, FM monitoring system at 96.9, incl mod monitor w/preselector, stereo monitor and SCA monitor, \$900. D Noe, KNID, 316 E Willow, Enid OK 73701. 405-237-1390.

Want To Buy

AM and FM monitors wanted. V Baker, Positive Radio Group, 703-961-2377.

RECEIVERS & TRANSCEIVERS

Want To Sell

GE Superadio III, custom modified w/noise free SCA w/improved selectivity & sensitivity, \$95. Other modifications avail. Performance guaranteed. **800-944-0630**

GE Phoenix UHF 25 watt, 2-chnl radio w/PL & accessories, crystal model, 2 units, \$50/ea; Yaesu FTS-6 tone squelch encode/decode board, fits FTC 1123, 1143, FT-209, FT-709, \$10/ea. P Russell, Boudoin College, Sills Hall, Brunswick ME 04011. 207-725-3066.

SCA RECEIVERS—ALL TYPES

Reading Service / Ethnic / Data Professional / Table Will work to meet your receiver needs

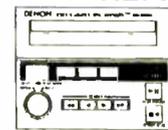
DAYTON INDUSTRIAL CORP. (Manufacturer) 2237 Industrial Boulevard Sarasota, FL 34234 Tel: 813 351 4454 FAX: 6081

Want To Buy

Bogen R765 AM/FM tuner, valve type tuners/old radios; Electro-Voice A30 amp; Mac MC-240, valve type amps. M Vincent, 2101 Camborne Rd, Richmond VA 23236. 804-276-3983 before 4 p.m.

REPAIR SERVICES

DENON CD CART PLAYER REPAIR



• Same Day Service
• Reasonable Rates
• We honor Denon Warranty
AUDIO VIDEO SERVICE LABS, INC.
800-765-4434
Quality Denon Service Since 1991
"The Best Kept Secret in Broadcasting"

REMOTE & MICROWAVE EQUIPMENT

Want To Sell

RENT IT HERE! Call Steve Kirsch for Details

COMREX
1, 2 & 3-Line Extenders
Switched 56/SDN Systems

TELOS
Zephyr
Digital Phone Hybrids

CCS "PRIMA"
CODECS

SHURE
FP-410 Automatic Mixers

REMOTE AUDIO
PACKAGES

SILVER LAKE AUDIO • 516-623-6114 • FAX: 516-377-4423

SATELLITE EQUIPMENT

Want To Sell

UNIVERSAL SPCX 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.

Phone: (614) 866-4605 Fax: (614) 866-1201

UNIVERSAL ELECTRONICS, INC. 4555 Groves Road, Suite 12 Columbus, OH 43232
Communications Specialists Phone: (614) 866-4605 Fax: (614) 866-1201

ACTION-GRAM

EQUIPMENT LISTINGS

Radio World's Broadcast Equipment Exchange provides a FREE listing service for radio stations and recording studios only. All other end users will be charged. Simply send your listings to us, following the example below. Please indicate in which category you would like your listing to appear. Mail your listings to the address below. Thank you.

Please print and include all information:

Contact Name _____
Title _____
Company/Station _____
Address _____
City/State _____
Zip Code _____
Telephone _____

I would like to receive or continue receiving Radio World FREE each month.
 Yes No

Signature _____ Date _____

Please Circle only one entry for each category:

I. Type of Firm

D. Combination AM/FM station F. Recording studio
A. Commercial AM station G. TV station/teleprod facility
B. Commercial FM station K. Radio Station Services
C. Educational FM station H. Consultant/ind engineer
E. Network/group owner I. Mfg. distributor or dealer
J. Other _____

II. Job Function

A. Ownership G. Sales Manager
B. General management E. News operations
C. Engineering F. Other (specify) _____
D. Programming/production

Brokers, dealers, manufacturers and other organizations who are not legitimate end users can participate in the Broadcast Equipment Exchange on a paid basis. Line ad listings & display advertising are available on a per word or per inch basis.

WTS WTB Category: _____
Make: _____ Model: _____
Brief Description: _____
Price: _____

*Closing for listings is every other Friday for the next month's issue. All listings are run for 2 issues unless pressed for space or otherwise notified by listee.

Broadcast Equipment Exchange

PO BOX 1214, Falls Church, VA 22041 • Tel: 800-336-3045 • Fax: 703-998-2966

PHONE: 703-998-7600 FAX: 703-998-2966



Call Simone Mullins, Classified Ad Manager, to reserve space in the next issue. Use your credit card to pay, we now accept VISA and MASTERCARD.

RadioWorld

5827 Columbia Pike, 3rd Floor, Falls Church, VA 22041

Select from these categories for best ad positioning:

- | | | |
|----------------------------|---------------------------|--------------------------|
| Acoustics | Consoles | Software Stations |
| Amplifiers | Disco-Pro Sound Equip. | Stereo Generators |
| Antennas & Towers & Cables | Financial Services | Tapes, Carts & Reels |
| Audio Production (Other) | Leasing | Tax Deductable Equipment |
| Brokers | Limiters | Test Equipment |
| Business Opportunities | Microphones | Transmitter/Exciters |
| Cart Machines | Miscellaneous | Tubes |
| Cassette & R-R Recorders | Monitors | Turntables |
| CD Players | Receivers & Transceivers | Positions Wanted |
| Computers | Remote & Microwave Equip. | Help Wanted |
| | Satellite Equipment | |

Classified Advertising Rates Effective January 1, 1994

	1x	3x	6x	12x
1-9 col inch (per inch)	\$60	58	54	49
10-19 col inch (per inch)	55	52	49	44
Distributor Directory	100	95	90	85
Professional Card	65	60	55	50
Classified Line Ad		\$1.50 per word		
Blind Box Ad		\$10 additional		

To compute ad costs: Multiply the number of ad inches (columns x inches) by the desired rate schedule for your per unit cost. Example: a 3" ad at the 1x rate is \$180, at the 3x rate \$174, at the 6x rate \$162, at the 12x rate \$147, etc.

REMOTE & MICRO EQUIP...WTS

TFT 7601 10-channel remote control, excellent condition, \$850. Ed or Scott, KMAV, Billings MT, 406-259-7000.

SATELLITE EQUIPMENT

Want To Sell

Equitorial 5100 receiver & dish, \$90. T Wortmann, 402-371-0780.

Scientific Atlanta SEDAT card, \$705. D Jackson, Radio South Burlington, Inc. 203-762-9425.

BUY

Satellite Systems pays cash for Westwood One Radio Networks satellite receivers!

REPAIR

Satellite Systems repairs all major brands of satellite equipment, including the Fairchild Dart 384 and Scientific Atlanta. Our turn-around time averages 24-hours. Plus, we provide pre-and post-service support along with a 90-day warranty.

SELL

Zephyrus SCPC 700 System Receiver, Jones Satellite Network and other available models. Just call and ask!

SATELLITE SYSTEMS

Satellite Equipment for Radio

615 East Brookside
Colorado Springs, CO 80906
(719)634-6319 Fax: (719)635-8151

Comstream ABR-200 KY band satellite rcvr, \$1595 +shpg. L Dupree, KQID, 1115 Texas Ave, Alexandria LA 71301. 318-445-1234.

Chaparral C Band LNB 20 degree p hemt LNB, 950 to 1450 MHz block, \$50+shpg. G Dunn, NoCA News, 5383 Willow Lake Ct, Byron CA 94514. 510-516-0299.

Full inventory of commercial, high-stability +/-100 kHz or PLL +/-15 kHz LNB's, C-Band, Ku-Band. A must for digital or SCPC reception. Low competitive prices. SCPC commercial frequency agile receiver. Other hard-to-find commercial broadcast satellite products. Call for prices. Universal Electronics, Inc. 614-866-4605, FAX: 614-866-1201.

Wegener Communications Model 1806-21 satellite rcvr for all ABC Satellite Network (Analog) Svcs. Need to trade for similar Jones Satellite Network or sell. Bill Cordell Spectrum Engineering Co., 800-966-8885.

Wegener 1601, can be re-tuned to any of the Jones Formats, \$800/Best Offer. G Perry, 915-550-0558.

SOFTWARE/DATABASES

Want To Sell

Data Broadcasting File Transfer Software

SATX™

Compatible with FM subcarriers, RBDS, DBS, TV (VBI) and more! Send database, digital audio files, software programs, and more! Consulting services available.

Milestone Technologies Inc.
Raleigh, NC
phone: 919-856-0700
fax: 919-856-8600

RADIO STATION DATABASE:
Obtain info & print mailing labels on 11,950+ U.S. stations. Gives phones/faxes. Numerous searches (calls, 24 formats, state/city/markets, etc.) Available MS-DOS or MAC only \$129.95 incl. quarterly updates! VISA/MC orders 1-800-626-2360 ext. 300

BBH Software, Inc.
Info 303 592-3780 Fax 303-363-8732

Circle (139) On Reader Service Card

STATIONS

Major mkt AM, expanded band, \$575,000; powerful FM, Midwest mkt of 120,000, tremendous potential for owner-operator, \$425,000/terms; serious inquiries only, financials submitted & confidentiality statement must be signed before any info is released, no phone calls. Send letter of interest & qualifications to: Hawkeye Radio Properties, 5546-3 Century Ave, Middleton WI 53562.

New FM Powerhouse. Midwest. Medium/Small market, \$495,000, terms. Great opportunity for growth. Serious inquiries only. Reply to: Radio World, POB 1214, Falls Church, VA 22041. Attn: #95-5-3-2RW.

LMA available for 5 kW full-time AM in Nashville TN, BO. Barry, 615-889-1960.

Suburban Corpus Christi Texas C-3 CP with tower and equipment for sale. Agents and minorities welcome. Mazal, 18032 C Lemon, Yorba Linda CA 92686.

Sunny Arizona. Top Rated AM/FM Combo. Small Market. Reply to: Radio World, PO Box-1214, Falls Church VA 22041. Attn: Box 95-5-3RW.

Want To Buy

AM stations, medium market, dark or unprofitable. Mr. Ford, 310-423-3899.

Small AM or FM in college mkt. Mr Ford, 310-423-3899.

Small AM & FM combo, dark or troubled OK. 718-893-4328.

We just sold our AM & are looking for another project station, especially interested in Western states, but all facilities & areas considered. P Hunn, 315-598-8952.

AM stations medium market, dark or unprofitable. Mr Ford, 310-423-3899.

AM or FM in small market in western mountains. 502-267-9213.

FM in SE US. S Clark, 305 Flannery Ct, Fountain Inn SC 29644.

STEREO GENERATORS

Want To Sell

Sparta 682 stereo generator. V Baker, Positive Radio Group, 703-961-2377.

TAPES/CARTS/REELS & CD'S

A&D
Cart Rebuilding
Do Bad Carts Have Your Temperature Rising?
Let A&D clean, load & pack your carts. They'll be serviced within 10 working days! Guaranteed!
3706 Vold Ct. 715-835-7347
Eau Claire WI 54701 Fax: 715-835-1151

Want To Sell

10 1/2" 1" percession aluminum reels, \$3/each; new 7" reels & boxes, 50 cents/each. D Lundy, 606-546-6650.

Drake-Chenault Great American Country 60+ 10 1/2" R-R tapes with 20+ songs per tape, great sound quality, excellent for start-up country gold station, most tapes without cue sheets, some with \$500/Best Offer. L Ballance, KFI-KOST-KACE, 610 S Ardmore Ave, Los Angeles CA 90005. 213-385-0101 xt 4150.

MARATHON PRODUCTS COMPANY

Audio Cartridge Rebuilding Division

Rebuilding/reloading, like new, all brands, any length up to & including 3.5 minutes, \$1.95 ea. FOB out plant, 48 hrs delivery. (New rate effective 9/1/93)

New NAB Marathon cartridges prices on request.

35 Years professional experience!
Lifetime member AES R.D. MYERS Sr.
Manufacturers of Audio Devices,
Continuous Tape Mag.

69 Sandersdale Rd. Charlton, MA 01507
1-508-248-3157 or 1-508-853-0988

Circle (116) On Reader Service Card

Oldies format recorded on black Scotchcarts IIs with over 3200 hit songs from 50s through 80s, \$8150; black Scotchcart IIs, 300 3.5 min, \$1.90/each. All carts used for 6 months, +shipping. B Lord, Lord Broadcasting, 3824 SW Myrtle St, Seattle WA 98126. 206-932-4839.

Audiopak A-2 carts (425), black, 25 cents/ea+shpg; Audiopak A-3 carts (5), blue, 50 cents ea/+shpg. D Morgan, KJYE-KNZZ, 1360 E Sherwood Dr, Grand Junction CO 81301. 303-241-9230.

Music libraries (2) on 10 1/2" reels, 1 big band/MOR & format #2 contemporary/MOR rock & roll. J Gelo, 813-642-6899.

CONSULTANTS

Consulting Communications Engineers

- Station improvement and modernization
- FCC Applications and Field Engineering
- Frequency Searches and Coordination
- AM-FM-CATV-ITFS-LPTV

OWL ENGINEERING, INC.
1-800-797-1338

1306 W. County Road, F, St. Paul, MN 55112 (612)631-1338 Member AFCCF

EVANS ASSOCIATES

Consulting Communications Engineers

TV • FM • AM • ITFS • Satellite
FCC Applications, Design
and Field Engineering

Video/Data/Voice • Light Fiber &
Microwave • Wide-Area Networks & STL's

210 S. Main Street
Thiensville, WI 53092
(414) 242-6000 • FAX (414) 242-6045
Member AFCCF

SERVICES

LOCATION SERVICES IN THE UNITED KINGDOM

Planning remotes from the U.K.?
we provide a comprehensive service
• we organize venues for your shows
• we provide temporary equipment
• live links via ISDN/Switched 56
• experienced radio engineers
• we help you line-up guests
Contact London (44) 81 442 8900
Good Morning from Great Britain
Wired for Sound Ltd., London N15

REMOTE EQUIPMENT RENTALS

COMREX and GENTNER
1, 2 & 3-Line Extender Systems
Now With The New TELOS ZEPHYR
MARTI VHF/UHF RPU Systems
ISDN & Switched-56 Systems
Call or FAX Dwight Weller
WELLER AUDIO-VISUAL ENGINEERING
Baltimore, Maryland
Phone: (410 or 800) 252-8351
FAX: (410) 252-4261

HARRIS ALLIED PARTS AND TECHNICAL SUPPORT

Now we can be reached online via e-mail.
TSUPPORT@HARRIS.COM
For your parts needs or with any technical problems you're having.

PC - SOFTWARE

AM FM TV Search Programs
Contour Mapping-STL Paths
RF HAZ-1990 POP Count
FAA Tower-Draw Tower

Doug Vernier
Broadcast Consultant
1600 Picturesque Dr
Cedar Falls, IA 50613

800-743-DOUG

North America RF & Audio Mirkwood Engineering Services

Broadcast and Telecommunications Consultants

Multidiscipline Engineering and Planning Firm including • Application & Allocation Services
• Project, Engineering & Construction Management • Site Acquisition
• Rural & Remote Site Installations
• Field Service • Studio Design & Installation
50 Park Ave. Claremont, NH 03743
(603) 542-6784

W. LEE SIMMONS & ASSOC., INC.

BROADCAST TELECOMMUNICATIONS CONSULTANTS

5 Gracefield Road
Hilton Head Is., SC 29928
1-800-277-5417
803-785-4445
FAX: 803-842-3371

Tower Sales & Erection

Turnkey Site Development
Installation & Maintenance
AM/FM Broadcast TV
Microwave Systems
Aerials & Towers

TOWERCOMM
Communications Specialists

Ben Wall
President
6017 Triangle Dr.
Raleigh, NC 27613
(919)781-3496
Gen Contractor #25841 Fax: (919)781-6854

When cost and quality count!

NORTH STAR TOWER
Tower Construction & Maintenance
Canton, NY
315-386-4932
FAX: 315-379-0951

- Propagation Services
- FM Studies
- Population Studies
- FCC/FAA Databases
- PC Software

Communications Data Services, Inc.

800-441-0034

703-534-0034
fax 703-534-7884
6105-E Arlington Blvd.
Falls Church, VA 22044

MLJ

Moffet, Larson & Johnson, Inc.
Consulting Telecommunications Engineers

Two Skyline Place, Suite 800
5203 Leesburg Pike
Falls Church VA 22041

(703) 824-5660
FAX: 703-824-5672

Member AFCCF

MULLANEY ENGINEERING, INC.

Consulting Engineers

• Design & Optimization of AM Directional Arrays
• Analysis for New Allocation, Site Relocation, and Upgrades
• AM-FM TV LPTV
• Wireless Cable (MDS/MMDS/ITFS/OFS)
• Environmental Radiation Analysis
• Field Work
• Expert Testimony

9049 Shady Grove Court
Gaithersburg, MD 20877
Phone: (301) 921-0115
Fax: (301) 590-9757

DON'T GAMBLE WITH YOUR ADVERTISING DOLLARS!

Advertise in Radio World and reach 22,000+ broadcast professionals.

Call Simone TODAY!
800-336-3045

PC SOFTWARE for Broadcasters.

Traffic, Billing, & Accounting. Powerful, inexpensive. Works with automated, satellite or live operations. INTERFACES with popular DIGITAL AUTOMATION SYSTEMS. Try it for 60 days, no obligation.

Absolute Broadcast Automation

Naples, Florida (813) 643-3689

Where In The World Are You?

Reach radio professionals worldwide by advertising in Radio World's international edition.

Call Simone for more information.
1-800-336-3045

TAPES/CARTS/REELS...WTS

Pams Jingles ref tapes, 1951-1976, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625.

Want To Buy

Fidelipac/Audiopak Mastercart II gold or AA-4 light blue in 2:30 through 4:00 lengths, must be in very good condition, call after 3PM CST. 214-271-7625.

TAX DEDUCTIBLE

Want To Sell

No cost mics, CD players, cart machines, TT, amps, cassette decks, consoles, all types of remote gear, limiters/compressors, mic mixers, speakers, more, for community/public station, will supply letter. B Scott, New Era Enterprises, POB 8197, Ann Arbor MI 48107. 313-990-4437.

Older AM broadcast equipment, donated preferably, will pay for shipping, all types of equipment, must be in working order, we are non-commercial, will take parts. J Gaulle, KLBN-AM, POB 1058, Lebanon OR 97355-0967. 503-258-2190.

TEST EQUIPMENT

Want To Sell

Eico 378 audio gen, to 110 kHz; Monarch FS1-3 VSWR meter; CSC Design Mate II function gen, 1Hz to 1MHz, square, triangle or sine wave; Micronta hand-held signal tracer, all BO. D Jackson, WQQQ, 19 Boas Ln, Wilton CT 06897-1301. 203-762-9425.

WANT ACCURATE AM BANDWIDTH MEASUREMENTS THIS YEAR?

The Shielded Loop Antenna

- ▶ SUPERIOR NOISE REJECTION
- ▶ CALIBRATED
- ▶ 20-40 DB NULL @ 90 deg

AM-FM FILTERS & LOOPS

CHRIS SCOTT & ASSOCIATES
BOWLING GREEN, KY
FAX: 502-781-1232
PH: 502-781-5301

Potomac Instruments AA-51 audio analyzer & AG 51 generator: \$1500/pair. C. Scott, 502-781-5301.

Tektronix Digital Multimeter DM502A auto range, \$295; Tektronix DM501A, \$295; Hewlett Packard distortion analyzer 333A, \$495; Hewlett Packard 353 patch panel 110 dB attenuator, \$75; Ilhaco 4302 dual 24 dB/octave hi-lo pass filter 1/10 to 1 MHz, \$295; Weston 666 multimeter, \$100; Eico Model 150, solid state signal tracer, \$100; Heath audio generator 1G-762, \$100; Sencore transistor tester, \$250; Tentelometer tape tension meter, \$200; Con strobrotuner, \$250; Ungar Hot Vac 2000 desolder station, \$150. J Price, Price's Rec, 2651 Globe Ave, Dallax TX 75228. 214-321-6580.

Nems-Clark 120E field strength meter; RCA WX2E field strength meter; Andrew Type 40004A-3 FM line pressure monitor and pump. V Baker, Positive Radio Group, 703-961-2377.

Want To Buy

Heath Kit HD-1250 Grid-Dip Meter/for other RF generator. D Paulson, KTAB, POB 691733, Stockton CA 95269. 209-478-0296.

TRANSMITTERS

Want To Sell

Collins 831-62 1979 models (2), with 3102-2 exciters, excellent condition, currently on-air, selling due to power upgrades, \$25,000/ea. C Lawson, Bristol Broadcasting, POB 1389, Bristol VA 24203. 703-669-8112.

DA HOOK
PERSONAL SAFETY
SHEPHERD HOOK \$79.95
INFO (708) 524-8588
WILK SCIENCE & TECHNOLOGY, INC.

Delta ASE-1 AM stereo exciter (2); Dielectric FM switch, 3 1/4" SW xmtrs. V Baker, Positive Radio Group, 703-961-2377.

Gates BC-1R & BC-5B 2 transmitter tubes & spare parts, sell or part out. W Osenga, WWIT, Box 1369, Canton NC 28716. 704-648-3588.

Harris 2.5H w/QEI 675 exciter & new spare tube, good operating cond, \$6500; Continental 315-F 5000 watt AM xmtr, fair to good cond, removed from svc Feb 95 on 1110 kHz, you pick up, \$5000. S King, KGFL/KHPQ, Box 33, Clinton AR 72031. 501-745-4474.

RCA BTA-5T 5 kW AM transmitter, mint condition, large supply of extra parts & tubes included, presently on 980 KHZ with easy conversion to other freqs, BO including loading. A Anderson, KBMR, Bismarck ND, 701-255-1234.

RCA BTA 104 10,000 watt AM transmitter with spare tubes, \$5000. R Martin, KQYD, POB 5668, CO Springs CO 80931. 719-392-4219.

BEXT
Great new or demoed FM transmitters, exciters, amps and STL's, some at discount prices
USA 619-239-8462
FAX: 619-239-8474

BE 959-0224 assembly driver from BE-30, 100 watt, recently checked out perfect, at BE now, will ship direct, \$1800. A Stanley, WFCC, 1 Village Dr, Brewster MA 02631. 508-896-9322.

Harris HT3.5FM 4 kW FM transmitter with THE-1 exciter on 107.7, new 9/89, \$18,200. L Collins, WJYY, POB 1923, Concord NH 03302-1923. 603-228-9036.

Harris FM 5 kW 1988 model, used only 18 months in 7 years, \$17,000. K Smith, Eclectic Enterprises, 111 Marquette Ave #100, Minneapolis MN 55401. 612-338-6022.

RAC BTA-5H AM transmitter, works well, Best Offer, you p/u. J Gomez, WGGH-1150 AM, POB 340, Marlon IL 62959. 618-993-8102.

Used equipment for sale: Belar SCM-1, Belar RFA-1, Belar FMS-1, Belar FMM-1, Moseley MRC 1600 syst, TFT EBS rcvr/gen, Gentner patch panel, and Harris racks. Call Transcom Corp 800-441-8454 or 215-884-0888.

Want To Buy

Modulation xformer for an RCA BTA-5F AM xmtr. Allan, 207-985-7547.

QEI 675 FM exciters; QEI 675T150 amplifiers; QEI 675T300 amplifiers. Call Bob Brown 609-232-1886.

1.5 to 2.5 kW FM power amp. D Jackson, WADQ, 203-762-9425.

American Electronic Labs AEL FM5KB, manual w/schematic or complete copy. Mack, 804-836-9217.

McMartin AM/FM transmitter, any model, exciter or stereo modules. Goodrich Enterprises, 11435 Manderson, Omaha NE 68164. 402-493-1886.

TUBES

Want To Sell

807, 811, 813, 8874, 8877, 4-400, 4-1000, 4CX250B, RCA, Amperex, EIMAC, etc. Westgate 800-213-

Svetlana
ELECTRON DEVICES

Quality* Power Tubes

3CX15,000A7	4CPX800A
3CX15,000A3	4CX400A
3CX10,000H3	4CX350AC
3CX10,000A7	4CX350A/8321
3CX3000F7/8162	4CX250R/7580W
3CX3000A7	4CX250BT
3CX2500H3	4CX250BC/8957
3CX2500F3/8251	4CX250B/7203
3CX2500A3/8161	4X150A/7034
4CX15,000A/8281	5CX1500B
4CX10,000D/8171	5CX1500A
4CX5000A/8170	YC130/9019
4CX3500A	8560AS
4CX1600U	811A
4CX1600B	833A
4CX1500A	833C
4CX800A	

- Watch this list grow.
- Shipment from USA stock.
- Manufactured in Russia's largest power tube factory.
- Generous* warranty based on high quality.
- Honest prices based on quality at low cost.

Broadcasters
Phone: 800-239-6900
205-882-1344
FAX: 205-880-8077
OEMs, Distributors
Phone US: 800-578-3852
Int'l & US: 415-233-0429
FAX: 415-233-0439

Circle (30) On Reader Service Card

ECONCO

Quality Rebuilt Tubes
Approximately 1/2 the Cost of New

Call for Our Price List

800-532-6626
916-662-7553

FAX 916-666-7760

Circle (185) On Reader Service Card

4563.

D and C Electronics Co.

Lowest Price on Tubes including:

4-1000A/3-1000Z/
8877/4CX250B/833A
4-500/5-500/4-400/
4CX 3500/5CX1500
and much more!
Factory Warranty!

1-800-881-2374
(904) 688-2374

Se habla Español
FAX: (904) 683-9595

REBUILT ELECTRON TUBES

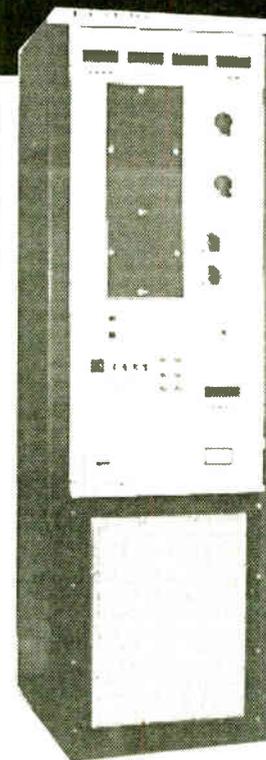
Partial List: 6623, 23791, TH150, 6425F, 5604, 6696, 6697, 5681, 5682, 5671, 7804, 3CX10,000H3, 3CX20,000H3, 4CX5000A, 4CX35,000C

Worn out power tubes purchased

Vacuum Tube Industries, Inc.

1-800-528-5014
508-584-4500 X75

You Need It... WE MAKE IT!



The ECO - 10

Your one call for Quality, Reliability and Economy in FM transmitters

- **SST Series** — Low Power Solid State FM from 30 to 500 watts.
- **Legend Series** — Medium Power Solid State FM 1 to 11KW
- **ECO Series** — Medium Power Grounded Grid Triode, Single Tube FM from 4 to 11 KW.
- **MK Series** — Medium and High Power Grounded Grid Triode, FM from 1.5 to 50 KW



"The Transmitter People"
Energy-Onix

518-828-1690
FAX: 518-828-8476

752 Warren Street, Hudson NY 12534

Circle (53) On Reader Service Card

TRANSCOM CORP.

Serving the Broadcast Industry Since 1978

Fine Used AM & FM Transmitters and Also New Equipment
For the best deals on Celwave products, Andrew cable and Shively antennas.

1 kW FM 1978 Collins 831C-2	1 kW AM 1980 Continental 314R-1
1 kW FM 1975 RCA BTF 1E2	5 kW AM 1977 RCA BTA 5L
2.5 kW FM 1983 Harris FM2.5K	10 kW AM 1974 CSI T-10-A
3 kW FM 1980 CSI 3000E	10 kW AM 1975 Continental 316-F
3 kW FM 1974 Harris FM3H	
5 kW FM 1974 Harris FM5H3	
5 kW FM 1967 Gates FM5B	
10 kW FM 1968 RCA BTF 10D	
20 kW FM 1976 Harris FM20H/K	
25 kW FM 1975 AEL 25,000KD	

1077 Rydal Road #101
Rydal PA 19046

800-441-8454 • 215-884-0888 • FAX No. 215-884-0738

Circle (76) On Reader Service Card

TURNABLES...WTS

WASHINGTON PROFESSIONAL SYSTEMS
 ph 301-942-6800
 fax 301-946-3241

OFFERING SPECIAL PRICING ON:
 Technics: SP-25 Variable Drive 33-1/3 +45 RPM turntable without Arm \$280
 SP-15 78 RPM without Arm \$395
 SP-10MKIII - Control Direct Drive \$595
 SH-15 B2 & B3 - Base for SP-25 & SP-15 \$150 each
 SL-M3 P-Mount Linear Tracking Turntable \$198.50

Technics SL1200 MKII turntable, \$150 or trade for cart machine. K Diebel, KTJC, 318-728-5852.

QRK Galaxy 15 to 90 rpm variable speed TT with electronic speed read-out, will do 16" transcriptions, less tonearm, including spare parts, \$250+shpg. G Dunn, NoCA News, 5383 Willow Lake Ct, Byron CA 94514. 510-516-0299.

Russco 3-speed rim drive TT (2), BO. G Price, WCVR, POB 249, Randolph VT 05061.

Want To Buy

Fairchild TT's, arms, cartridges, amps. D Bisbee, 685 S Roys Ave, Columbus OH 43204. 614-279-6163.

ADVERTISE
 in RADIO WORLD'S
BROADCAST EQUIPMENT EXCHANGE CALL 800-338-3045



EMPLOYMENT

To place ads in this section, use the ActionGram form. To respond to box numbers write Radio World, PO Box 1214, Falls Church, VA 22041. Attn: _____

POSITIONS WANTED

7 years on-air exper ready to relocate w/my huge collection of R&B classics, loves programming & prod, for tape, references & resume. John 910-545-8060.

8 years major mkt exp, heavy engineering background, on-air, production, copy writing, news, creative, funny, want to relocate, radio or recording studio. Todd, 216-267-6834.

AC communicator 15 yrs exp, prefer FL, VA or MD area, will go elsewhere for right opportunity. Pat 908-872-1132.

Classical music radio prod/ann, rcdg eng, 20 yrs major mkt, avail for perm or temp position in USA or worldwide. Fax 011-5283-784356.

Farm director and C/W dj, super ethics, used to long days, exper in prod, asst mgr & sales, prefer south. Kevin, 618-654-7521.

Freelance voice-over artist avail to do liners, IDs, sweepers, promos, etc. Matt, 201-839-1906.

Major market talent w/exper seeking position in News-Talk w/interest in AC, soft AC or classical formats, also prod work. Dan, 918-968-3014.

I want to work for you! 15 yrs in the business, programming, on-air, prod & eng. I do prod & rcd oldie shows for stations, major mkt exper. David, 800-288-4789 ext 6912.

Have team, will travel...super successful team for your sta, will bring competitor killer format, that was designed for Nashville 100 kW FM, prefer TN or SE metro-major. JD, 615-822-7999.

Hello Atlanta! I'm ready to settle in the country's best mkt, CHR/AC PD material, prod, air personality & the list goes on, N/T, AC, CHR, AOR. Brian, 1104 Park Cir, Conyers GA 30207.

New kid on block fresh out of college, seeks small or medium mkt, on-air, prod, sports, any format, willing to relocate. Brad, 904-575-4102.

R&B or hip-hop radio announcer, 3 1/2 yrs radio exper, FCC operators license, seeking full-time employment at urban contemporary FM sta in the Norfolk, Richmond, VA or Washington DC areas. Eric, 804-934-3039.

I build & maintain radio stations, AM, FM, shortwave, on land or at sea, what can I do for you? A Weiner, 207-985-7547.

Sports excitement! Dedicated, loves college/HS sports, novice but knowledgeable, color commentator/great side kick to play by play, relocation considered. Jay, 405-947-2742.

20+ yr pro seeking solid position in radio-all areas, 11 yrs w/Muzak, solid individual w/good attitude, Christian, Lite Hits, etc. E Pulaski, 909-881-3812.

7 yrs on-air exper ready to relocate w/my huge collection of R&B classics, love programming & prod, tape, resume & references. John, 910-545-8060.

Bdct grad seeking fast-paced, highly rewarding position, dynamic on-air, tight prod, creative copy, authoritative news, OK, MO, AR. Tim, 405-258-0403.

Decades of solid experience as PD, Op mgr and news, excellent production skills, yearning for FL. Bob, 210-724-1525.

JANET (502) 895-5888; versatile, intelligent, great for start ups or existing stns, want F/T airshift, first PD gig, never promoted, tired of unrated markets, uncompetitive pay.

ADVERTISER INDEX

This listing is provided for the convenience of our readers. Radio World assumes no liability for inaccuracy.

Page No.	Advertiser	Reader Service No.	Page No.	Advertiser	Reader Service No.
7	ATI	172	8	Harris Allied	124
26	ATI	11	32	Harris Allied	33
7	Altronic Research	48	31	Inovonics	188
28,29	Arrakis	122	36	J Squared Technical Service	175
16	Associated Press	38	49	J&I Audio/Video	47
6	Audio Broadcast Group	212	19	La Palma Broadcasting	—
26	Audio Broadcast Group	195	52	Marathon Products	116
2	Audioarts Engineering	13	27	Micro Technology Unlimited	111
51	Audisar	93	14	MicroCon Systems	202
12	Audio Precision	119	26	Myat Inc.	44
55	Audionics	193	25	National Public Radio	80
26	Autogram	103	44	Nott Ltd.	43
52	BBH Software, Inc.	139	10	Orban	92
35	Belar	115	33	Pacific Recorders	142
30	Benchmark Media Systems	106	41	Pacific Recorders	177
3	Bext	162	44	Phasetek	56
26	Broadcast Devices, Inc.	17	37	Potomac Instruments	96
4	Burk Technology	84	30	Pristine Systems	152
40	Computer Concepts Corporation	18	11	Prophet Systems	208
38	Circuit Werkes	181	47	OEI	45
38	Coaxial Dynamics	204	42	RE America	105
30	Comet North America	83	36	Radio Design Labs	155
3	Comrex	51	20	Radio Spirits	130
44	Comrex	200	15	Radio Systems	126
45	Conex Electro-Systems	88	26	S.C.M.S.	89
13	Continental Electronics Corp.	135	24	Scott Studios	191
38	Crown Broadcast	132	38	Shively Laboratories	158
9	Cutting Edge	145	30	Silicon Valley Power	14
12	Dataworld	75	16	Sine Systems	159
45	Dataworld	10	44	Svetlana Electron Devices	201
22	Don Giovanni Productions	180	53	Svetlana Electron Devices	30
53	Econco	185	34	TM Century	61
30	Econco	37	21	Tascam/Teac	149
36	Electronic Research Inc.	40	23	Telos Systems	165
44	Electronic Research Inc.	133	38	The Management	178
53	Energy-Onix	53	48	The Management	174
30	Excalibur	60	53	Transcom	76
18	Fidelipac	94	49	USAfoam	24
39	Gentner	156	36	Universal Electronics	86
19	Ghostwriters	50	53	Varian	7
36	Gorman Redlich	109	38	Varian Eimac	198
22	Group W Satellite	157	56	Wheatstone	168
49	Hall Electronics	70	36	Will-Burt	63
22	Halland Broadcast Services	134	44	Wind River Broadcast Center	20
30	Hallikainen & Friends	112	44	Zercom	21
1	Harris Allied	100			

Publisher	Stevan B. Dana	Ad Traffic Coordinator	Kathy Jackson
Associate Publisher	Carmel King	Ad Production Coordinator	Lisa Lyons
Marketing Consultant	Al Leon	Production Assistant	Cristina Strigel, Laurie Anne Tarkington
Marketing Assistant	Annette Deutscher	Ad Coordination Manager	Simone Mullins
Production Director	Lisa Stafford	Circulation Director	Eleya Finch
Publication/Desktop Sys. Mgr	Julianne Shannon Stone	Circulation Manager	Steven Bowman
Classified/Showcase Production Coordinator	Vicky Baron	Accounts Receivable	Steve Berto

Advertising Sales Representatives

U.S. East: Skip Tash	703-998-7600	Fax: 703-998-2966
U.S. West: Dale Tucker	916-721-3410	Fax: 916-729-0810
International: Stevan B. Dana	+1-703-998-7600	Fax: +1-998-2966
Europe: Dario Calabrese	+39-2-753-0274	Fax: +39-2-753-2697
Japan: Eiji Yoshikawa	+81-3-3327-2688	Fax: +81-3-3327-3010

Free Subscriptions are available upon request to professional broadcasting and audiovisual equipment users. For address changes, send current and new address to RW a month in advance at P O Box 1214, Falls Church, VA 22041. Unsolicited manuscripts are welcomed for review, send to the attention of the appropriate editor.

HELP WANTED

ENGINEER
 FLORIDA: Major FM/FM/AM DA2 Combo, with new showcase 22nd floor studios seeks motivated assistant engineer. 2 years min experience in AM directional, High Power FM Transmitter, and Digital Equipment preferred. SBE Cert a plus. No phone calls or faxes please. Send resume and salary requirements to: Steve Fluiker C.E.
 WMMO/WHTQ/WHOO
 200 South Orange Ave, Ste 2240
 Orlando, FL 32801

BROADCAST EQUIPMENT SALES PERSON
 Well established, full line, broadcast equipment supplier seeks additional sales personnel to operate out of Northeast Office. Engineering experience, ability to configure complete station facilities correctly, familiarity with modern digital equipment and good communications skills a must. Requires a strong desire to SELL with self motivation to seek out prospects, promote high tech equipment, and close sales. Compensation directly proportional to sales generated. Send resume to Radio World, POB 1214, Falls Church, VA 22041. Attn Box #95-531RW.

ELECTRONICS ENGINEER
 Minimum 3 years broadcasting experience, customer service experience, and electronic assembly/repair experience. Will need to provide technical support of products including application, specification, theory of operation, troubleshooting, etc. Send resume to:
 J. Murray
 ORBAN
 A Harman International Company
 1525 Alvarado St.
 San Leandro, CA 94577
 EOE

WANTED: TECHNICAL EDITOR FOR RADIO WORLD

- Writing/editing experience required
- Strong background in radio production
- General knowledge of broadcast equipment and industry trends
- Must be willing to relocate to Washington, DC metro area

Send resume, clips, salary requirements (a must) to:
Radio World
 Personnel Dept., P O Box 1214
 Falls Church, VA 22041
 No phone calls, please

NOW HIRING! MIDWEST SALES MANAGER
 If You Love Radio...And You Love Publishing, And You Can Sell, Sell, Sell WE WANT YOU!

The world's #1 radio industry publisher is looking for a dynamic individual to handle Midwest advertising sales for Radio World Newspaper, Radio World International and The Radio World Magazine.

This job requires five or more years of radio industry experience (station experience preferred), and a strong background in advertising, sales and marketing. You must be energetic, aggressive, creative, organized and (most important) LOVE RADIO. You must also live within the territory and be able to travel.

We offer a competitive salary/commission package, plus benefits. Send resume (in confidence) with salary history to:

Carmel King, Sales Director
 Radio World
 PO Box 1214, Falls Church VA 22041
 FAX: 703-998-2966
 * No Phone Calls Please



SUBSCRIPTION/READER SERVICE FORM

Radio World
 FREE Subscription/Renewal Card
 I would like to receive or continue receiving Radio World FREE each month. Yes No

Signature _____ Date _____

Please print and include all information:
 Name _____ Title _____
 Company/Station _____
 Address _____
 City _____ State _____ ZIP _____
 Business Telephone () _____

Please circle only one entry for each category:

I. Type of Firm
 D. Combination AM/FM station F. Recording Studio
 A. Commercial AM station K. Radio Station Services
 B. Commercial FM station G. TV station/teleprod facility
 C. Educational FM station H. Consultant/ind engineer
 E. Network/group owner I. Mfg, distributor or dealer
 J. Other _____

II. Job Function
 A. Ownership G. Sales manager
 B. General management E. News operations
 C. Engineering F. Other (specify) _____
 D. Programming/production

Reader Service
 May 3, 1995 Use until August 3, 1995
 Please first fill out contact information at left. Then check each advertisement for corresponding number and circle below.

Purchasing Authority
 1. Recommend 2. Specify 3. Approve

001 023 045 067 089 111 133 155 177 199
 002 024 046 068 090 112 134 156 178 200
 003 025 047 069 091 113 135 157 179 201
 004 026 048 070 092 114 136 158 180 202
 005 027 049 071 093 115 137 159 181 203
 006 028 050 072 094 116 138 160 182 204
 007 029 051 073 095 117 139 161 183 205
 008 030 052 074 096 118 140 162 184 206
 009 031 053 075 097 119 141 163 185 207
 010 032 054 076 098 120 142 164 186 208
 011 033 055 077 099 121 143 165 187 209
 012 034 056 078 100 122 144 166 188 210
 013 035 057 079 101 123 145 167 189 211
 014 036 058 080 102 124 146 168 190 212
 015 037 059 081 103 125 147 169 191 213
 016 038 060 082 104 126 148 170 192 214
 017 039 061 083 105 127 149 171 193 215
 018 040 062 084 106 128 150 172 194 216
 019 041 063 085 107 129 151 173 195 217
 020 042 064 086 108 130 152 174 196 218
 021 043 065 087 109 131 153 175 197 219
 022 044 066 088 110 132 154 176 198 220

Copy & Mail to: Radio World, PO Box 1214, Falls Church, VA 22041, or FAX to: 703-998-2966

Why Auditronics' 210 console remains radio's virtual standard

The contemporary 210 console contains exactly those features and qualities your on-air people tell us they need to do their best work. Nothing more, nothing less.

The Auditronics 210 has the best record for up-time of any radio console. It just plain works, elegantly, all day, every day, all year, every year.

And, most important in this age of cost concern, we've made our production more efficient, so we can deliver today's 210 console at a price less than that of over a decade ago.

It's no wonder the 210 console continues to be the on-air mixer of choice among quality-conscious broadcasters. Choose the Auditronics 210 for your next console replacement or upgrade. Call 901-362-1350 today for complete information.

This Auditronics 210-18 in KPFA-Berkeley's on-air studio is one of four 210s in use at the Pacifica Foundation station.



