

## Digital Technology Powers Radio 'Birds'

by Alan Haber

**WASHINGTON** Look up in the sky... it's a bird... it's a... satellite... it's a contingent of Ku- and C-band "birds" beaming hot programming down to radio stations across the country.

It's a new game out there, as much for radio stations looking to syndicate popular programs as for the myriad of networks across the United States offering a wide variety of up to 24 hours a day of programming. As more stations feel the pinch of today's economic grasp, scale down their operations and augment their locally-produced programs with satellite-delivered programming, delivery by bird could become even more prevalent than it is today.

### Turnkey

There is a wide variety of satellite equipment and space providers supplying products and services to programmers and radio stations across the country. The costs for these offerings varies according to a number of factors, such as the size of the dish and the amount of

bandwidth desired. And equipment can be purchased piece-by-piece or as part of turnkey packages.

National Supervisory Network (NSN) is one company that provides turnkey packages for about 70 networks of all sizes and more than 1,000 receive sites, utilizing both Ku- and C-band satellites. License preparation, uplink and downlink equipment, installation, training, 24-hour tech support, and space segments comprise NSN's bill of fare.

Since early 1992, the company has been operating MUSICAM digital Very Small Aperture Terminal (VSAT) radio networks. NSN's VSAT Intelligent Satellite Integrated Operations Network (VISION) promotes localism by centralizing each network's programming, production, traffic and billing operations. Production can be done at the program origination point by air staff and sent by satellite to any number of specific network affiliates; newscasts can even be produced for separate regions.

An emphasis on bandwidth and power efficiency powers ComStream, a manu-

facturer of satellite communications equipment. Bob Youngquist, regional sales manager, said that compression techniques such as the MUSICAM digital audio compression algorithm have made it possible for companies like ComStream to allow networks to broadcast more high-quality audio within less bandwidth than previously possible.

### Anywhere

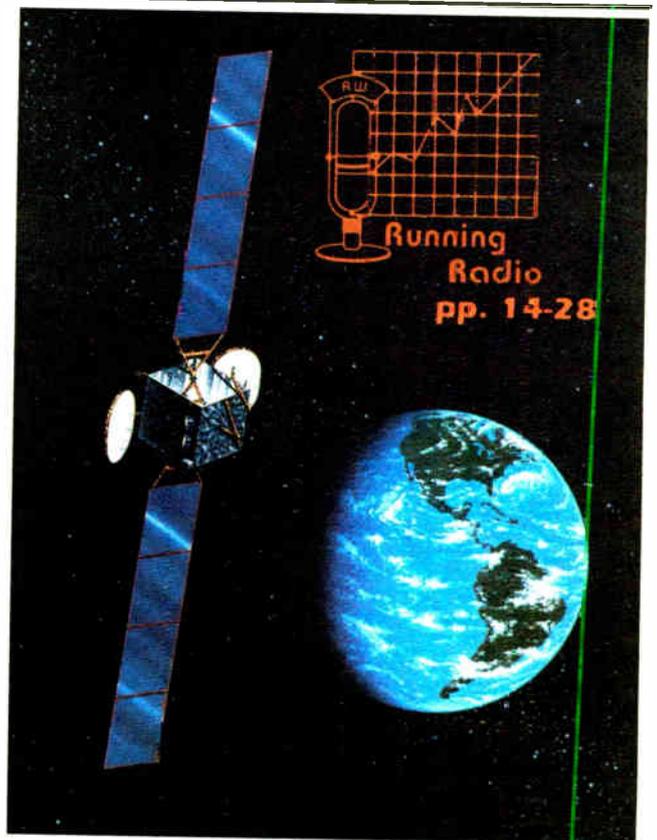
Audio signals can be delivered "anywhere in the U.S.," he noted, "completely insensitive to distance and the number of receive sites."

The company's digital audio systems, which operate in the Ku- and C-bands, are sold through a variety of distributors, including NSN and California Digital. ComStream's products include the ABR200 and ABR75 digital audio receivers for single channel per carrier (SCPC) digital audio transmission.

Dawn Satellite provides a variety of satellite equipment from major manufacturers—complete systems and separate components like satellite antennas and receivers—to radio stations affiliated with

networks such as ABC and National Public Radio (NPR). With digital-ready LNBs also available from the company, John A. Joslin, sales and marketing manager, has his eye on "the rapid conversion of satellite networks to digital transmission formats."

A manufacturer of satellite systems for  
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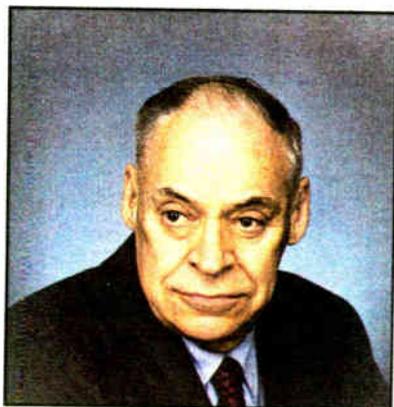
The Hughes Communications HS 601 satellite covers the Americas.

## Influential Engineer Mullaney Suffers Stroke, Dead at 73

by John Gatski

**SAITHERSBURG, Md.** Radio has lost one of its longtime AM engineers. John H. Mullaney, 73, who formed Multronics in the 1950s, and introduced the industry to the folded AM unipole system, died May 18.

According to his son, John J. Mullaney, his father fell ill a few days earlier during a business trip to Germany. He was brought back to the U.S. where he was hospitalized, but his condition worsened. Doctors diagnosed that Mullaney suf-



John H. Mullaney

fered a stroke. On May 16, he slipped into a coma and died two days later.

According to his family and associates who worked with him throughout his long career, Mullaney was very devoted to radio. He acquired his ham license when he was only 13. He later received

an electrical engineering degree from the University of Colorado's U.S. Armed Forces Institute.

After serving in World War II, Mullaney began working in broadcasting. He briefly joined a consulting firm in Washington, D.C., then rejoined the military during the Korean conflict. After the war, Mullaney formed his own consulting firm, John H. Mullaney & Associates. He then started Multronics Inc., initially manufacturing phasing equipment for AM radio stations.

Multronics was a cutting edge electronics company that made military antenna systems, geiger counters, wind recorders, submarine emergency buoys and burglar alarms. Mullaney also supervised design and construction of the U.S. military's first high power  
continued on page 8 ▶

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# NEWSWATCH

## Fidelipac Reorganizes; Signs New Lease

**MOORESTOWN, N.J.** Fidelipac, the manufacturer of the Dynamax DCR1000 digital cartridge recorder/player, was scheduled to move into a new building this month—partially as a result of a legal maneuver that led the company to file for protection from its creditors to get out of a dispute with its prior landlord.

In late May, with full cooperation from its bank, the company

filed "for protection under the provisions of Chapter 11 of the Bankruptcy Code," in order to reorganize its finances, according to a Fidelipac letter to creditors.

A 30-year old manufacturer of analog cart machines and tapes, as well as its current digital equipment, Fidelipac President Roger Thanhauser said that since the Chapter 11 filing, the company has continued with business as usual to the vendors and dealers, as well as service and warranty obligations.

"Virtually all of them have been very understanding and supportive," he added.

At press time, the company was scheduled to move into the new, down-sized building June 22-23, a planned action the company had sought with the old landlord prior to expiration of its previous lease.

"I would characterize our filing as an embarrassing, freak event," Thanhauser said. "It had to do with a misunderstanding over our old lease, which led to the dispute with the landlord.

This Chapter 11 filing was largely unrelated to any other (financial) events."

Thanhauser explained that the now-disputed lease stated that Fidelipac was required to notify the landlord six months in advance if the company intended to renew the lease or not. But, he said, a subsequent side letter contained contradictory language requiring six months prior notice for cancellation, or the lease automatically was renewed.

Thanhauser said he and his real estate agent "totally had forgotten about the side letter." Thanhauser said he tried to negotiate a new lease during

those few months before the Chapter 11 filing, and believed that the landlord would agree to a new lease for less space.

The company no longer needed the 30,000 square feet that it had leased before because the industry trend of reduced cart tape demand meant there was no need for an as-large inventory, he explained.

However, the landlord did not agree to another lease, Thanhauser said, and the company attorney advised filing Chapter 11 to avoid a litigation that could have resulted in Fidelipac owing at least \$400,000 for three years of rent and legal expenses. Filing Chapter 11 allows the company to still do business, but it is protected from creditors until the company's finances are reorganized. Chapter 11 also gets the filer out of existing contracts, such as leases.

According to Thanhauser, the implications of filing Chapter 11 outweighed having to pay the \$400,000 and probable legal

continued on next page ►

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► continued from previous page fees. The company also will reduce its annual overhead costs by 50 percent in the new, smaller building, he added.

Despite the problems with the landlord and the Chapter 11 filing, Fidelipac expects to emerge from the Chapter 11 reorganization within six months, according to Thanhauser.

Fidelipac does not expect there to be any impact on its introduction of the Dynamax DCR1000M/O Series, a digital cart machine that uses a 3.5-inch magneto-optical disc that can hold up to two hours of 15 kHz audio. Product is scheduled for shipping in July. The company also plans to enhance the capabilities of the Dynamax MXE Series console.

**New Commissioners Sworn in at FCC**

**WASHINGTON** Rachel B. Chong and Susan Ness, the newest FCC Commissioners, were sworn in late May. Chong, the first Asian American appointed to the FCC, fills the empty Republican seat on the five seat commission. Ness is filling the Democrat vacancy.

**NAB Calls for Relaxed SBA Rules**

**WASHINGTON** The National Association of Broadcasters (NAB) wants the federal government to relax regulations that hurt broadcasters eligibility for Small Business Administration (SBA) loan guarantees.

In comments filed in support of the SBA's proposal to repeal the so-called "opinion molder" rule, the NAB said a number of broadcasters have had difficulty securing loans because the stations have few "hard" assets.

According to the NAB, repeal of the opinion molder rule, along with a rule changes that raises the revenue-based standard for radio and TV stations' SBA loan eligibility, would "result in nearly 90 percent of radio stations... becoming eligible for SBA financial assistance."

# Museum to Sponsor Rock Djs

by Frank Beacham

**NEW YORK** In a year long series of special events starting this month, The Museum of Television & Radio is tracing the evolution of the 50-year relationship between rock 'n' roll music and the medium of radio.

Rock 'n' Roll and Radio, based at the

(KRLA, Los Angeles, 1967); Robert W. Morgan (KHJ, Los Angeles, 1968); Dewey Phillips (WMBQ, Memphis, 1951); Rosko (WNEW-FM, New York, 1970) and others.

The Museum has issued an open invitation to rock 'n' roll deejays and radio stations to broadcast live during the series from the radio studio at the

Oglevee, the museum's coordinator. "The only cost will be in getting their signal."

The Museum studio has many connection possibilities to the outside world, according to Oglevee. He said stations can use the studio's direct links with IDB or Keystone, or use Switched 56, microwave or Comrex line extenders for the remote.

"WNEW-FM is kicking it off with the first broadcast," Oglevee said. "Stevie Nicks is coming in and doing some live music here. The station is donating some programming from their amazing 30 year archives of rock into our permanent collection."

The series will trace the relationship of rock and radio from the period following World War II and examine how the music form empowered radio when its traditional role as America's primary entertainment medium was being threatened by television. The program will be presented in two six-month parts, offering a chance to hear airchecks that capture both the music and deejay in different eras over the five decade period.

Rock 'n' Roll and Radio has been underwritten by Norman J. Pattiz, founder and chairman of Westwood One Companies. Pattiz is also a trustee of the museum.

Stations interested in broadcasting from the museum should contact David Oglevee at 212-621-6600.



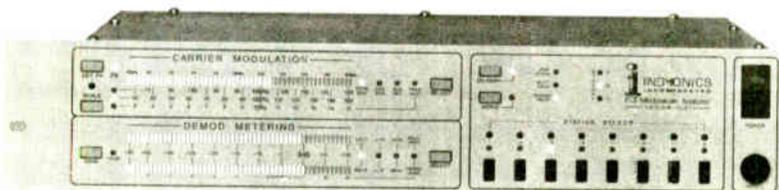
Norman J. Pattiz (l), chairman, Westwood One Inc. (and underwriter of the series) with Dave Herman, 92.3 FM K-ROCK in New York.

Museum's Manhattan headquarters, kicked off with a series of seminars that traced the rise of rock FM, narrowcasting, early top 40 and black radio. It featured appearances by wide range of radio industry veterans, including deejays, program directors and music industry executives.

Listening packages composed of radio airchecks spanning the last fifty years will be aired during the first half of the series, which ends Nov. 20. Featured deejays include: Dick "the Screamer" Biondi (WLS, Chicago, 1962); Elliott Field (KFWB, Los Angeles, 1959); Alan Freed (CBS, 1956); Murray the K (WINS, New York, 1964); Casey Kasem

Museum of Television and Radio in New York City. "We are offering the use of our studio free of charge," said David

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# The Alps Come Alive with Radio Show

**WASHINGTON** The astounding beauty of the Swiss Alps is legendary. A mere mention evokes bucolic scenes of picture-perfect towns nestled in lush green mountains and crystalline lakes. You can breathe the progress, the history, the civilization that emanates from everywhere.



To this picture add a train ride up to the quaint city of Montreux. It seems fitting, given radio's role in global communications, that radio broadcasters from around the world should converge there, to soak up news of new technologies and hold court, in a way, to discuss the future of their chosen business.

At press time, the 2nd Radio Montreux International Radio Symposium and Technical Exhibition is in full swing, and news from the show, via Radio World International Editor Alan Carter, is good.

U.S. participation in the show was worthy of note, although the bulk of registrants were not from the U.S. The gathering had the support of seven U.S. organizations, including the International Radio & Television Society (IRTS), National Public Radio (NPR), the Radio and Television News Directors Association (RTNDA) and the Radio Advertising Bureau (RAB).

RAB's Lynn Christian tells me the organization is witnessing greater interest from broadcasters worldwide in its Managing Sales Conferences and in becoming international members of the RAB. The organization has noted the need for sales resources and training overseas, and has now lent its support to both Radio Montreux meetings.

More than 20 speakers from the U.S. were scheduled to participate in the 25 sessions held during the June 9 - 11 meeting. Among the U.S. notables were Gary Fries, president/CEO of the RAB; Delano Lewis, president, NPR; Lowry Mays, chairman, Clear Channel Communications; Jeff Smulyan, chairman, Emmis Broadcasting; Ed McLaughlin, president, EFM Network; David Saperstein, president, Metro Traffic; and Tom Rounds, president, Radio Express.

Alan tells me that the Eastern Europeans, particularly from Poland and Russia, were the strongest market force attending the gathering. He mentioned they "were really scoping out the market." I gather capitalism is paying off in Poland, finally, although he noted that even though they had the money to make purchases, most of them were very careful shoppers—requiring follow-up calls and further negotiation before making a purchase.

It seems that European broadcasters are really into computer-driven technology.



Matt Siegel, KISS-108's "Matty in the Morning," hangs backstage with the girls of Fem 2 Fem at KISS Concert 15.

Interestingly enough, they want live-assist software and packages, not full automation. Give them a machine that can do audio, text, billing, etc., and leave the DJ stuff to a real personality. I like the sound of that—keeping the station alive.

The sound of that must be music to the ears of several U.S. companies that exhibited at Montreux, including: Ampex, Computer Concepts, Fidelipac, Marti Electronics, Metro Traffic Control, Radio Express, Smart Solutions, TM Century, Wegener and Valentino.

★ ★ ★

As you know by now, I love passing along international tidbits that I feel can be of use to you. But my favorite kind of information to pass along is the stuff that happens here in the U.S. at a station/community level.

Two-and-a-half years have passed since I exited the Big Apple, but I can vividly recall still the free concerts in the city during the summer sponsored by some of New York's greatest stations.

Case in point is WQXR-FM's Free Concert Series at Lincoln Center's Damrosch Park. The five-concert series is sponsored for live broadcast by the ITT Corp. in association with the City of New York, and produced and hosted by Tom

Bartunek, vice president of programming and operations for WQXR-FM.

Nothing endears a station to me more than having them provide me with a great setting, great music, and, in some cases, provide a worthwhile cause with much needed funds.

Boston's KISS 108 FM annual concert is just such an endeavor. The station recently held concert No. 15, during which it presented The Genesis Fund with a check for \$50,000. To date the concerts have raised more than \$400,000 for The Genesis Fund and helped establish the Jeffrey Osborne-KISS 108 Hearing and Language Disorder Clinic located at the National Birth Defects Center in Brighton, Mass.

And the concerts are a blast (as you can probably tell by the photo). Thirty-one performers participated in the 11-hour, non-stop music marathon at Great Woods. Nearly 20,000 fans soaked up sun and music from the likes of Meatloaf, ZZ Top, Tevin Campbell, Tony! Toni! Tone!, Robin S., Rosco Martinez, Ovis, Booker T & The MG's and Jon Secada.

Vintage disco sounds were provided by the Village People, rock 'n' roll from Peter Wolf, and soulful tunes from Luther Vandross. Other acts in the line-up included: Aaron Neville, Richard Marx, the Crash Test Dummies, Color Me Badd, Zhane and All-4-One.



J. Douglas Williams, owner and general manager, KWOX-FM in Woodward, Okla., was elected chairman of the radio board of the National Association of Broadcasters. Williams is president and CEO of Omni Communications Corp., licensee of KWOX-FM. Since 1985, he has been the "morning man" on the station weekdays. He also owns and operates co-located TV 101, channel 24, an LPTV station.

Williams is a member of the Oklahoma and Texas Broadcast Associations and is past president of the Oklahoma Association of Broadcasters. He is the local area chairman and state co-chairman for the Emergency Broadcast System.

Richard Ferguson, president and CEO, NewCity Communications of Bridgeport, Conn., was elected vice chairman of the radio board of the National Association of Broadcasters. Ferguson leads NewCity, which owns and operates 13 radio stations.

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### Not the bad guys

Dear RW,

The "RF Sickness" letter by Lawrence Tighe Jr. (RW, June 1) didn't tell the true story. As a member of the group of consulting engineers that Mr. Tighe's letter so broadly tarred, I believe that a response is in order.

Most consulting engineers I know, and certainly those of us at Hammett & Edison, don't go out drumming up radio frequency radiation (RFR) work. Rather, clients come to us, asking that we do the work. Consulting engineers would rather be doing useful work for their clients, but when the FCC interprets the National Environmental Policy Act (NEPA) as requiring an RFR showing, broadcasters, and we in the consulting field with the expertise to make the calculations and write the reports, have little choice.

The proper venting of Mr. Tighe's frustration should be toward Congress for adopting a NEPA written so vaguely that it can be interpreted by bureaucrats to require virtually anything, and, perhaps to a lesser extent, towards the FCC. But certainly the consulting engineering community didn't instigate this new regulatory complication.

Indeed, faced with a burden that makes our job much more complicated, in 1990 this firm was successful in getting the FCC to adopt a one-percent categorical exclusion that has probably allowed 90 percent of all LPTV and FM translator applications to not have to make detailed RFR calculations that include all other non-categorically exempted RFR sources at a site.

I submit that if the goal of broadcast industry consulting engineers was to greedily suck every last dollar out of broadcasters for "writing reports," we would not have gone to the trouble to petition the FCC for a declaratory order, and our proposal would not have been uniformly supported by the consulting engineering community.

(The sole objector to our percentage-based categorical exclusion was the EPA, and it is for that reason the categorical exemption level is at one percent of the ANSI limit rather than our proposed five percent exclusion.)

When Hammett & Edison first learned of the new ANSI standard in 1990, and fought the Institute of Electrical and Electronics Engineers (IEEE) bureaucracy to get a copy of what was then the ninth "final-final" draft, we entered into a three-year long battle with IEEE to get it to reconsider certain portions of that new standard that we felt were unjustified and would likely impose tremendous burdens on broadcasters, for no good reason. We lost.

We then carried our appeal to the ANSI Board of Standards Review and, in February 1993, traveled to New York City, on our own nickel, to testify against ANSI adoption of IEEE C95.1-1991 as an American national standard, on the grounds that due process was not applied in its development and that it was not a consensus standard.

We were joined in our appeal by Capital Cities/ABC, CBS Radio, Greater Media Inc., Group W, NAB, Smith & Powstenko consulting engineers, Susquehanna Radio Corp. and T.C.I. consulting engineers. We lost again.

For better or worse, the IEEE standard became an ANSI/IEEE standard, at which point the FCC felt obligated to begin a rulemaking (ET Docket 93-62) asking whether the new standard should become the new FCC bench mark.

There are portions of the new standard that can only be described as "brain dead," although, flawed as it is with its 100 MHz limit for induced body currents and contact currents, it is still preferable to even more outrageous "standards" that have started to be adopted by local governments. If Mr. Tighe thinks things are bad now, just wait and see what happens if the FCC does not now have the guts to finally preempt state, county and local government RFR standards that are more stringent than the new ANSI standard.

Hammett & Edison is now a member of Subcommittee 4 ("Safety Levels with Respect to Human Exposure," 3 kHz-300 GHz) of IEEE Standards Coordinating Committee 28 ("Non-Ionizing Radiation"). We have been attending these meetings, again on our own time and expense, since 1992, in order to insure that the broadcasting community is better represented.

RW readers should understand that broadcast consulting engineers are not the "bad guys," and we share much of Mr. Tighe's anger.

Dane E. Ericksen, P.E.  
Hammett & Edison Inc.  
San Francisco

### Audio history projects

Dear RW,

I am researching early American radio history in collaboration with a colleague from San Jose State University, Professor Mike Adams, in preparation for a book and television documentary on pioneer radio broadcaster Charles D. Herrold, who began what he claimed was America's first regularly scheduled broadcasting station in San Jose, Calif.,

## It Is Time for PC Madness

Futurists in government and industry have already spent years talking about the coming convergence of the home computer and television set.

Now a number of far-sighted broadcasters are beginning to ask: Why not radio/computer convergence?

This page recently praised the National Association of Broadcasters' Radio

Futures Committee initiative to seek new ways to inject radio broadcasting into the main stream of planning for the "information super-highway."

The plan was to canvass technology developers for ideas on how to integrate radio into the digital future. That search has already turned up at least one terrific idea.

Some software manufacturers market interfaces between computers and radio receivers. What if computer manufacturers were to simply install the AM and FM decoder chips directly into the computer?

One could compute and listen to the radio at the same time in the simplest application for such a device. If a radio broadcast data system (RBDS) decoding chip is thrown into the mix, software can be developed for even more interesting applications, such as an audio time shifting system—a VCR for radio.

A local area network of RBDS radio/computers could be developed for any number of business applications.

A real explosion of new applications could be triggered once high-speed FM data services come on line, followed by in-band, on-channel digital audio broadcasting.

"You can go on and on and on with all the things you can do that are pretty cool," says Futures Committee Chairman Dick Ferguson, president and CEO of NewCity Communications (and newly elected vice chairman of the NAB Radio Board). "The key to it is for computer manufacturers to see computers as having screens, keyboards and AM/FM receivers."

That sounds and reads like a wonderful union.

—RW

in 1909. His first call was "FN" (1910), then licenses 6XE and 6XF (1916) and finally KQW (1921).

Professor Adams' one-hour TV documentary, "Broadcasting's Forgotten Father," will premiere on public television later this year. My own research on Herrold, which was begun 40 years ago, was first published in the 1958-59 Winter issue of the "Journal of Broadcasting."

Would any of your readers have information of value? Whatever assistance you can render will be greatly appreciated.

Gordon B. Greg, professor emeritus  
San Jose State University  
One Washington Square  
San Jose, Calif. 95192

Dear RW,

Thanks for publishing Read Burgan's article about early stereo (RW, June 1). Those of use with one foot in tomorrow love looking back at where we've been, and it was nice to see Burgan striving to play his Cook binaural LP.

As for Read's belief that "few stations were doing stereo broadcasting before FM stereo was approved," in the 1950's, we paired mono stations in our little town for AM/AM stereo, AM/FM stereo and even FM/FM stereo.

Program material? Before the stereo LP, we used easily procured prerecorded tape in the quarter-inch, quarter-track format. You could choose "in-line" or "staggered-head" tracks. We even tried live stereo from a studio flanked by AM and FM control rooms.

We had a lot of fun promoting early stereo at drive-in theaters. A mono FM tuner in the projection booth fed left channel audio to the hanging window speaker, while the right channel was heard through the car radio, tuned to the AM station.

So who cared about phase coherency? Anyone who experienced the breakthrough of "audio with time perspective" recalls that "even poor stereo sounded

better than the best mono." Some of the audio was deliberately ping-ponged away from any adherence to spacial reality, all in the name of "stereo effect."

(Years later, promoters would kill quad much the same way.)

I need to enlist your readers for assistance. I'm gathering audio history for the Pavek Museum of the Wonderful Wireless in Minneapolis. We're looking for recorded interviews and memoirs of those folks who built our audio and radio industries.

If you have any such interview recordings, please share them with others. You'll be contributing to a master library that will be available to all. This is a wonderful opportunity for you to share your material and to hear what others have contributed. Duplicating and shipping costs are tax-deductible.

Please send me any audio you can contribute, and send it in any format, even Cook Binaural. (Yes, the Pavek has a binaural tone arm.) All contributions will be acknowledged and returned.

Be sure to visit the Pavek Museum when you're in the Twin Cities. You'll never forget the experience.

Mark Durenberger  
18147 Valley View Road  
Eden Prairie, Minn. 55346  
612-330-2433

### Corrections

In the June 1 RW, an article on page 23 misspelled the name of Tim Kregor, who is senior vice president of Digital Cable Radio.

Also in the June 1 issue, the page 1 article, {Spanish Radio in the U.S. Heats Up the Airwaves," incorrectly stated the CBS Americas network's total of weekly news broadcasts. The correct total is 235.

# Radio World

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# SPARS Hosts Workstation Seminar

## Annual Conference Showcases Latest Workstation Features and Techniques for Radio Production

by Mel Lambert

**LOS ANGELES** The recent two-day "Technical Conference on Audio Workstations," organized by the Society of Professional Audio Recording Services (SPARS), was considered a great success. Digital workstations are rapidly becoming staples in radio station production rooms and independent studios that contract radio work.

Held at the Beverly Garland's Holiday Inn, North Hollywood, on May 21-22, the SPARS Conference attracted nearly 150 individuals for formal presentations from 11 manufacturers of digital audio workstations (Spectral Synthesis withdrew just before the conference started).

On the first day, each company presented a necessarily brief, 20-minute product summary, with the rest of the day being devoted to hands-on demos. The second day began with an impressive session that analyzed the creative opportunities for recording and production—and maybe broadcast facilities—to take full advantage of the coming "Digital Superhighway." The remainder of the second day was given over to extended product demos, allowing attendees to compare and contrast technical features of a dozen DAWs.

### Data exchange

The primary topic of discussion turned out to be system networking and data exchange. As is rapidly becoming apparent, broadcast production studios often need to transport projects from one particular system to another. For example, we might have a four-track ProTools system in one production area that needs to send sound file, editing data and processing information to a Studer Dyaxis II. In such cases, a dedicated local-area network or removable optical media might prove essential to the speedy and efficient exchange of data.

As was explained by several companies showing systems at the SPARS Conference, Open Media Framework (OMF) allows EDLs, digitized audio, digitized video, digitized still frames and project data to be moved from one platform to another. Now supported by practically all manufacturers of top-end workstations, OMF enables the audio content and descriptions of edited material to be exchanged between disparate systems.

A series of APIs (Application Programming Interfaces) translate the file structures used by one proprietary data-storage format to one that can be read by other OMF-compatible systems. In OMF parlance, "Ingredients" are the digitized media files for a designated project, while "Recipes" comprise program descriptions that describe the way sound files are laid out and intermixed, edited and processed. OMF Ingredients

can range from animation frames to digitized audio, while Recipes list timecode-related information that describes edit points, cross-fade profiles, equalization and other data.

AMS-Neve offers cross-platform OMF compatibility between its proprietary CPU and Macintosh-based platforms, including Studer and Avid systems. The firm's AudioFile hard-disk editors now read OMF files directly from magneto-optical disks, without a translation process between file formats. Avid Technology also is extending its AudioVision AudioStation operating sys-



Studer Dyaxis II

tem to handle Native OMF formats. Currently, Avid systems can accept audio files from other systems; soon this function will be extended to OMF Compositions and allow complete projects to be imported and exported.

### Enhanced links

Avid also demonstrated a new SCSI switcher that allows up to 49 individual hard disks, magneto optical and other devices to be linked to AudioVision via balanced SCSI connections. As many as

four editing systems can be interlinked via 80-foot cables (increasing in the near future to six), to provide simultaneous access to data from any drives. Direct recording onto a single drive is also available.

Digidesign showed its enhanced V2.5 software for the ProTools editing system, which now offers full support for the Trans-system Digital Matrix Bus. TDM enables Macintosh-compatible plug-in boards and processing software to be controlled directly from ProTools, including a variety of mixing and signal-processing capabilities. V2.5 also extends OMF and external synchronization functions.

On the subject of system networking, Avid Technology is now offering ATM (Asynchronous Transfer Mode) compatibility via AvidNet. ATM offers a theoretical data throughput of up to 1 Gbit/s, and should provide simultaneous transmission of multiple digital audio channels via a single fiber-optic interconnect.

Otari demonstrated a production version of RADAR, a stand-alone 8/16/24-track hard disk recorder/player, complete with remote control panel and autolocator functions. The firm's ProDisk 464 now offers integrated, non-linear video playback, LTC/VITC timecode sync, plus support for external MO drives.

### Fiber uses

Sonic Solutions demonstrated networking via its new MediaNet Server and Client cards for the Mac system controller. FDDI (Fiber Distributed Data Interface) and CDDI (Copper Distributed Data Interface, a twisted-pair version of FDDI) MediaNet formats provide data transfer rates of up to 12 Mbytes/s. Also being developed: an ATM-compatible version to extend the number of channels that can be accessed in real time from interconnected systems.

Now available with the new MultiDesk hardware controller, the Studer Editech Dyaxis II now offers direct compatibility with Sound Designer II, OMF, AIFF

(Audio Interchange File Format) and LightWorks files, in addition to the firm's proprietary MultiMix and MacMix file formats. Ethernet- and FDDI-based networks are also available, in addition to direct data storage/retrieval from magneto-optical drives—"Plug and Play"—using either non-compressed audio on 5.25-inch media, or data-reduced (modified Dolby AC-2) files for 3.5-inch drives.

Other significant presentations included: Fairlight ESP spotlighted new MFX 3 workstation features, including 24 channels of playback from a single hard disk, high-speed 40-bit DSP architecture (offering real-time EQ, pitch shift and other processing functions), and new digital I/O.

Micro Technology Unlimited showed the MicroStation system, a series of PC-compatible digitizing and playback cards, plus timecode sync cards that can replay multiple disk tracks.

Orban showed new V4.0 software features for the DSE-7000 Editing Station, including extended library search/sort, on-screen meter displays, storage/recall of various system functions, and a new Disk Cache that speeds up disk transfers from/to the system's RAM-based editor.

Roland Pro-Audio showed new V2.0 firmware software for the DM-80, which now includes waveform display via the remote panel, 40 edit markers, auto-trim mode, group faders, plus back-timing functions.

Timeline Vista showed its new Studioframe DAW-80 workstation, derived from the AudioFrame system that it purchased earlier this year. The new V6.0 Windows-based software offers improved editing functions, floating toolbars and other features; planned enhancements include 32 tracks of simultaneous track replay, plus extended machine control.

□□□

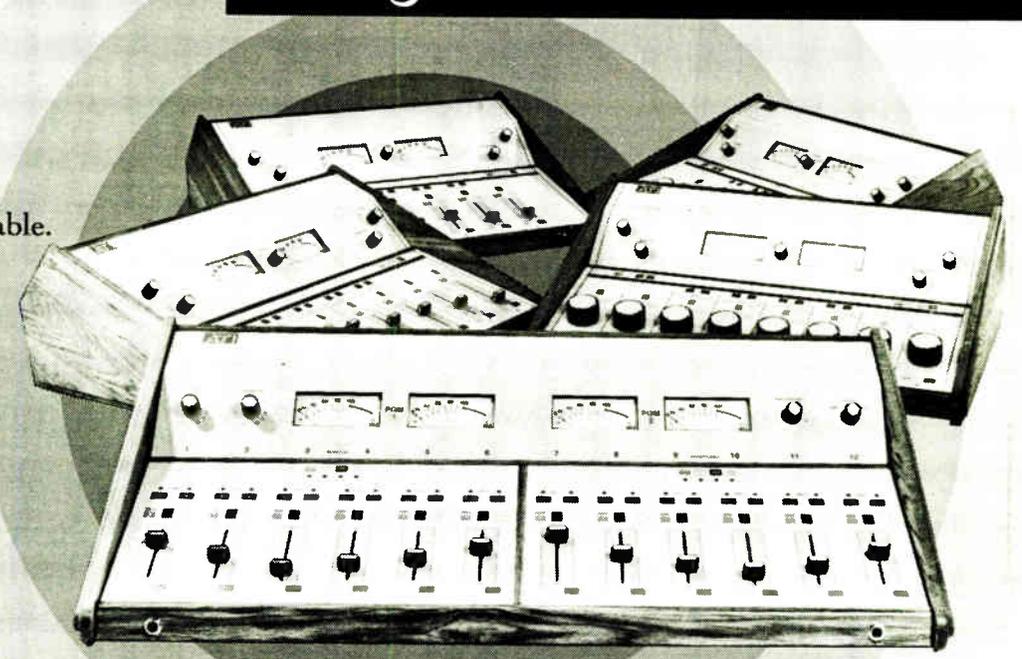
Mel Lambert has been intimately involved with the production and broadcast industries on both sides of the Atlantic for more than 15 years. Now principal of Media&Marketing, a Los Angeles-based consulting service for the professional audio industry, he can be reached at 818-753-9510.

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# Nautel Celebrates Its 25th Anniversary

by Alex Zavistovich

**HALIFAX, NOVA SCOTIA** Hackett's Cove doesn't sound like the kind of place you'd expect to find a high-technology transmitter manufacturer. It sounds more like a sleepy fishing village—which it is. But it is also the home of Nautel, the Canadian transmitter company which parlayed its early success at designing nautical radio beacons into a business that now spans the globe—with offices in Canada and the U.S.

In this, the twenty-fifth anniversary of Nautical Electronic Laboratories Limited, Nautel still produces the radio beacons that gave the company its start. The original product line, however, also has expanded to AM and FM solid state broadcast transmission products. The company recently entered the digital domain, with the debut of a digital FM exciter earlier this year. The company boasts 100 employees in Canada, 40 in the U.S., and sales representatives the world over.

Like many start-up operations, Nautel had humble origins. The company actually began in the basement of founder Dennis Covill in February 1969. Covill had planned to have his new firm bid on research and development contracts from nearby Bedford Institute of Oceanography. It wasn't until later that year, however, that Nautel got its first break: the Canadian Ministry of Transport invited the fledgling company to bid on a contract to develop a solid state 500 watt, non-directional radio beacon transmitter.

## Solid state

The technical requirements of creating a solid state transmitter operating at that power level were demanding. Earlier attempts to manufacture such a solid state device yielded products with no better reliability than a vacuum tube transmitter. Nautel's Covill, however, overcame the problem by inventing and patenting a linear power amplifier module. Combining several of these modules in a single transmitter in what came to be known as the "soft failure technique," Covill said he was able to create a transmitter with great operational reliability.

Covill's invention won the contract for Nautel from the Ministry of Transport; a prototype of the transmitter was so well received that Nautel won a second contract for production quantities of the

device. The success of the radio beacon transmitter led Nautel to extend its product line to power levels of 4000 watts. The company's customer base spread across the globe. Then came shore-to-ship telegraphic transmitters, HF transmitters and low power AM broadcast transmitters. Eventually, the company's steady growth required the company to expand from its 15,000 square foot building in Halifax to a 10,000 square foot subsidiary manufacturing plant in Bangor, Maine. In 1990, Nautel Maine grew into a 27,000 square foot facility.

## Using MOSFETS

By 1981, Nautel began to look into RF power MOSFET transistor technology as a way to bring soft-failure features and reliability to transmitters with considerably higher output power levels—up to 10,000 watts. FM transmitters were added to Nautel's product line in 1991 and 1992. A digital FM exciter, the NE50, was next to arrive on the scene, earlier this year.

In the coming months, Nautel will be supplying a 20,000 watt FM system to a CBC station in Halifax. The company facility will expand in size, up to 55,000 square feet. Nautel's steady growth is attributable to its niche

market strategy, which aims to capture a large share of relatively small markets. The company's products are all capital goods, typically sold directly to end users such as commercial or government AM and FM radio broadcasters. A network of independent agents promote sales around the world, supported by Nautel's sales and customer service departments.

Nautel said it has had great success in the international market: A single Indonesian order recently came to \$2.4 million. Nautel President David Grace attributes the company's successes to a commitment to staying on the leading edge of technology.

"As long as you aren't complacent, it is difficult for someone to knock you off. The international market is fair, but ruthless," Grace said.



Dennis Covill

As for the company's founder, Dennis Covill, the secret is to stay focused on success. "You have to have a reliable product that satisfies customers. But more than that, I think many businesses fail because they lack the deep, deep commitment to succeed."

## Engineer Mullaney Dead at 73

► continued from page 1

AM, FM, TV and LF transmitting airplane, which was used during the Vietnam War. Another accomplishment was construction supervision of the world's biggest satellite tracking station at Lake Kickapoo, Texas.

Multronics was sold in 1970, and Mullaney formed Mullaney Engineering along with his oldest son John. There were numerous accomplishments in AM antenna designs. The senior Mullaney held four patents on various antenna designs, including the folded unipole which is now used by more than 1,500 AM stations.

At the time of his death, Mullaney was involved in a promising new anti-sky-wave antenna design, according to John J. Mullaney. Up to now, no satisfactory anti-skywave antenna designs have been developed. In the late 1980s, the NAB devoted thousands of research dollars to a design that ultimately was considered not effective.

Mullaney was a 40-year member of the Association of Federal Communications Consulting Engineers, and a member of the Institute of Electrical and Electronic Engineers and the Society of Military Engineers. Although he never actually practiced law, Mullaney was a licensed attorney in the Washington, D.C., and a member of the Federal Communications Bar Association.

He is survived by his wife Nellie, a half-sister, six children, 16 grandchildren and 16 great-grandchildren.



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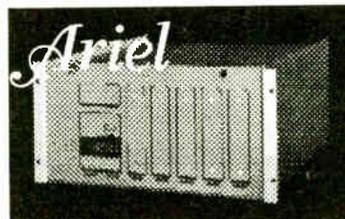


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# DSP Takes Hold in Radio Stations

by Ed Bukont

**LAS VEGAS** Digital signal processing is fast becoming a staple at radio facilities. A case in point of the technology's emerging prominence was the well-attended NAB session last spring.

Speakers covered exciter and STL design concerns, audio processing, digital coding and standards concerns when implementing digital signal processing.

Geoffrey Mendenhall, of Harris/Allied spoke about the Harris 100 percent digital "DIGIT" exciter and the AES/EBU standard in his treatment of "Maintaining a 100 percent Digital Path from the Studio to the 'On Air' RF Signal."

According to Mendenhall, until now, the weakest link in the audio chain has been the STL path. Harris has developed a digital modulator which will accept AES/EBU audio data and directly modulate the FM carrier with a synthesized "baseband like" signal. The digital exciter contains an internal stereo encoder and peak limiter that emulate an analog clipper. The final digital audio product undergoes a process of Direct Digital Synthesis (DDS) to create the RF waveform which is upconverted to the carrier frequency.

## The DIGIT

As a result, there are no tuned analog circuits within the audio modulator system. SCA signals are introduced as analog inputs to a summing circuit and A/D converter before being added to the audio bitstream where it enters the modulator. Because the AES/EBU standard maintains the amplitude and phase relationships of the input signal throughout the chain, there is no need for internal predistortion circuitry.

The AES/EBU Digital Audio Interface Serial Data Standard allows for the integration of various items within the audio chain. AES/EBU is a data transmission standard, not a processing standard or data reduction standard. The standard conveys two channels of audio over distances of up to 300 feet via a single, RS-422 compatible, polarity independent, shielded pair cable which terminates in a standard 3-pin audio XLR connector.

In point-to-point connections, the signal is self clocking at the destination. When mixing between sources, a master sync generator is required for system timing.

Several speakers noted that this topology will yield a system "very much like a TV studio."

The mixed signal can be distributed in much the same way as analog audio via DA or STL.

Of course, companded material, such as hard disc storage must first be expanded to a compatible data standard before introduction to the DSP mixing system.

## Using AES/EBU

The AES/EBU standard can already be found on many audio and broadcast devices.

One product of DSP research addressed by several speakers was "lossy data compression" which is processing "that seeks to reduce audio data by a ratio of at least 4:1 so that the resulting

data, when modulating an RF carrier, may fit within the channel allocation."

A consequence of this process is that lossy systems do cause a permanent loss of some of the input data, hence the name. In all cases, the lossy system takes advantage of psycho-acoustic effects to reduce the audio data without an apparent change to the listener.

No data reduction of the AES/EBU data should be necessary in T-1 links but may be necessary with RF STL systems.

Each speaker noted that because lossy data compression systems will change the dynamic nature of a signal, especially the peak signal level, there may be overshoots at the STL receiver output which can cause overmodulation of the transmitter if not properly processed before introduction to the transmitter. It is therefore recommended that if the STL path uses data compression, the audio processing system should be located at the transmitter site.

## Low bit rate

How the industry comes to define and develop a standard

was addressed by Greg Ubriel, Director of Operations for CBS Radio, Midwest. His presentation of "State of the Standard, Coding and Connectivity" in developing a standard for Low Bit Rate Audio Perceptual Coding traced the evolution of the ITU-R (International Telecommunications Union Radio Division) recommendation for perceptual coding.

Ubriel noted that despite the necessary caution and slowness of standards setting groups, their work and the results are "crucial to our process of technological change."

The result of this research was continued on page 10 ▶

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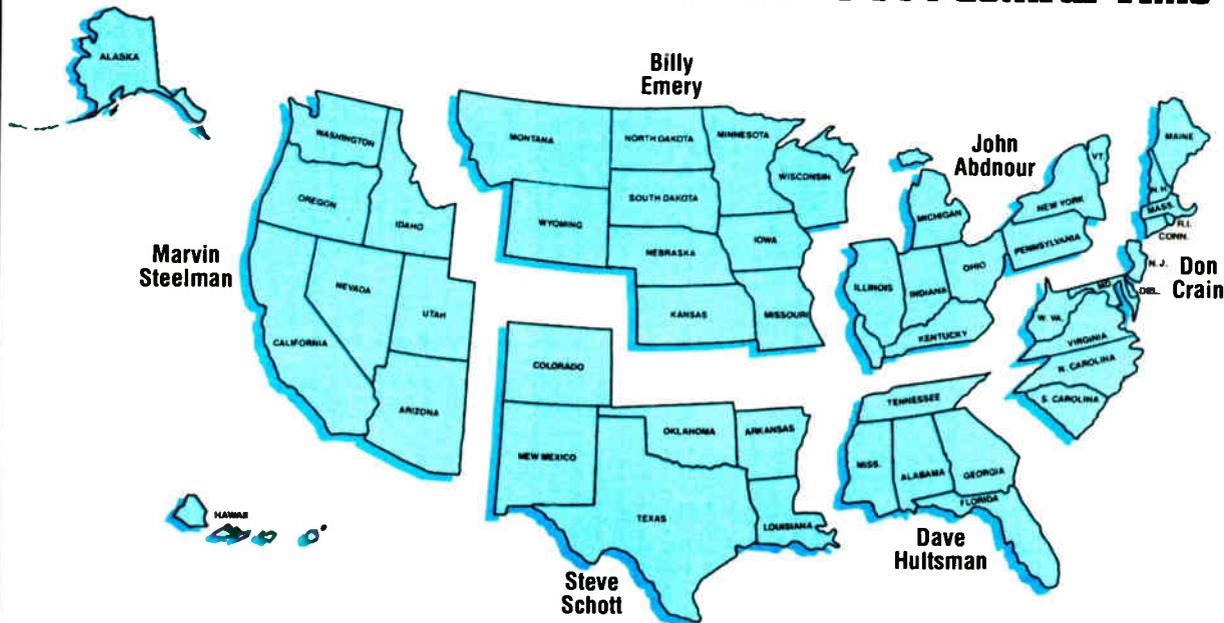
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# Utilizing Digital Signal Processing

► continued from page 9

to recommend applications of the ISO/MPEG designated standards, Layer I, Layer II and Layer III. ISO/MPEG refers to the Motion Pictures Expert Group of the International Standards Organization which, in cooperation with the IEC, drafted a standard for the digital storage of moving pictures and related audio data.

Two weeks before NAB, the following recommendations for use of ISO/MPEG standards were circulated: Layer III (highly complex algorithm at low bit rate) for commentary delivery and either Layer III or Layer II (MUSICAM—medium complex algorithm at medium bit rate) for distribution or emission delivery. MPEG and ITU-R will now focus their research on multi-channel compression systems operating with Layer II.

## Sample rate converters

Using the Orban 8200, Bob Orban reviewed the techniques required for "Utilizing Second Generation Transmission Processors for Audio." Of particular note is the use of an internal sample rate converter that allows the 8200 to accept an input sample rate from 30-50 kHz. The converter output is 32 kHz audio.

A benefit of the sample rate converter is that it cleans the incoming data of jitter or phase modulated components that might have been introduced outside the unit. The final output, with appropriate pre- or de-emphasis options as required, is a 32 kHz AES/EBU signal, locked to the input sample, for introduction to the digital

exciter. An output sample rate converter is also included.

The rate conversion scheme finds use in Europe where studios operate at 48 kHz but the STL and transmission systems are 32 kHz. The system does allow for actual audio to be input through secondary analog ports and A/D converter while accepting a clock input through the digital port.

The final speaker was Eric Benjamin of Dolby Labs. He addressed concerns in the "Interaction of Audio Processing and Low Bit Rate Coding in Broadcast Applications." The concern here is how much processing, especially that of an aggressive nature, can be tolerated in a low bit rate audio processor. Eric noted that most of the change in levels does not require very much processing and there is a point at which further small decreases in the dynamic range (increasing loudness) begin to realize a rapid decrease in audio quality.

Benjamin began his presentation with an overview of what one tries to accomplish with audio processing which is typically to maintain as small a peak to average ratio as is practical to achieve a constant loudness. This value should be measured as a running value within an audio selection. The ratio is the difference between the highest peak value and the overall RMS level of the selection. It is a relative, rather than an absolute measure.

Different readings will be attained using analog, digital and oscilloscope based systems. Typical values are 9-11 dB peak average ratio for popular music and 20-30 dB for other program sources.

Returning again to the STL overshoot

concern, the effects of phase distortion were described as they can effect wave-shape and cause changes in peak signal levels of several db.

## Phase distortion

This can be quite a factor when the system is presented with program material that contains a highly processed and sustained low frequency component where large shifts are common.

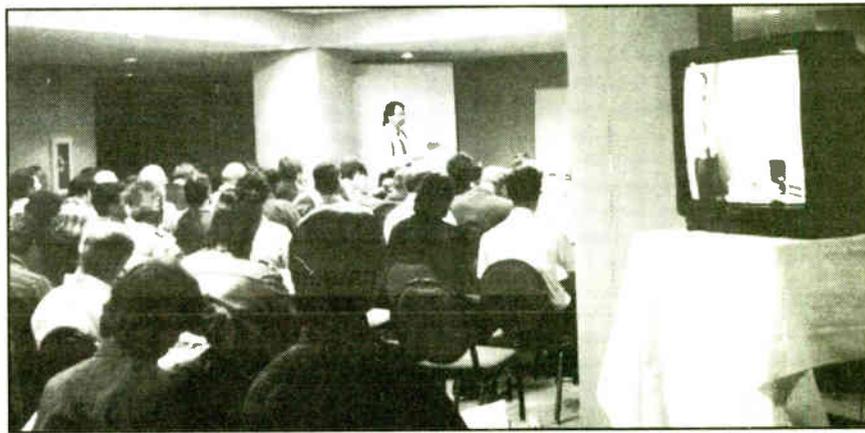
While modern systems do tend to have digital filters or phase compensation circuitry, processing systems must address

these problems and the overshoot considerations of the STL chain.

For proper coding, it is important to reduce the chances of under or overshoot and present an incoming signal that is essentially flat and free of pre-emphasis which will cause an incorrect calculation, especially at high frequencies and subsequent incorrect processing. The question becomes one of where to put the pre-emphasis.

Before the processing results in data coding errors; after results in large overshoots and overmodulation. Dolby has decided to apply de-emphasis to its products in the coding stage, then adds the pre-emphasis back after the coder, producing an essentially flat signal.

## EXPO '94 in Richmond



Harris Allied's Ron Oler (pictured above) discusses the best techniques for CD player maintenance at the company's EXPO '94 conference. The session drew a standing-room-only crowd that emptied the exhibit hall for one hour.

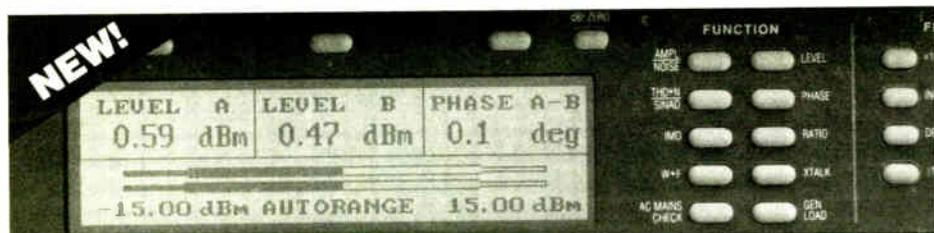
The session was one of three held that day at the Leland Hotel in Richmond. The other two were "Solving RFI & Shielding Problems," and "Future Trends in Radio." More than 200 registrants from as far away as West Virginia attended the show, with more than 30 of the vendors the company represents

present on the exhibit floor.

Vendors love the opportunity to spend time with the engineers, demonstrating the equipment and answering questions, according to several of those present. "It is the best way to find out what the customers want and what they are saying," said Genner's Elaine Jones.

The event is a good opportunity for vendors, said Telos' Neil Glassman. "Harris Allied took care of both the exhibitors and the registrants."

The event was organized for Harris Allied by Radio NetWorks principal, Dave Burns.



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# Old Time Radio Theater from KANU

by Bob Kirby

**LAWRENCE, Kans.** Public radio listeners nationwide are paying attention to live radio theater being produced in Lawrence, Kansas. Unlike the soap operas or spooky ghost stories—the typical dramatic fare offered by the webs during radio's Golden Era—tales spun on "The Imagination Workshop" are topical and highly satirical. The show features comedic skits, three to seven minutes duration, with musical bridges between. Recent shows included episodes of "Buck Naked—Frontier Scout," "Barbie and Ken at Home," and "The Legion of Stupid Heroes"—all of them raucous comedies.

"The Imagination Workshop" is produced six times a year by KANU (FM), an NPR affiliate licensed to The University of Kansas at Lawrence, 35 miles west of Kansas City.

"The Imagination Workshop" is the brainchild of Darrell Brogdon, KANU's program director. Brogdon, a student of radio's golden age and an advocate of radio theater, started "The Imagination Workshop" nearly 10 years ago.

## A live audience

As Producer and head writer, Brogdon started "The Imagination Workshop" in 1983, took the production before a live audience in 1985 and made the show available nationally in 1988. This year, NPR began the satellite distribution of the hour-long production, which is carried by about 90 stations.

"My initial interest was to do radio drama," Brogdon said. "We adapted science fiction stories and classic American literature, but comedy slowly took over. Four years ago we devoted the entire show to comedy. It was clear that's what the audience responded to."

"Workshop" is performed live before an audience of 450 at Liberty Hall, a theater in downtown Lawrence, and is broadcast live on KANU. The performance is taped for later uplink to NPR.

Brogdon exploits the use of stereo as an artistic tool to help create mental images. "Listening to the broadcast is very dramatic in that you get a real sense of where people are," Brogdon said. "You'll hear one person sort of over on the left and another on the right. You get a real spatial sense about this sound field you're creating."

The actors deliver their lines around a pair of Neumann KM-84 microphones in an "X-Y" stereo orientation, according to Sam Chapman, KANU's chief engineer.

"A primary benefit of that technique is that it lets us use cardioid mics and has very good mono compatibility," Chapman said.

## Realistic sounds

Sound effects, live and prerecorded, are a big draw for the live hall audience. Recorded stereo sound effects are played back from an ITC cart player or Tascam DA-30 DAT decks. But the hall audience enjoys watching the sound effects person working the mechanical effects devices behind the actors. A recent spoof of the winter Olympics included a bobsled whizzing by. "We did that with four actors holding a garbage can between them, shaking it, and there was a bucket inside the garbage can. As they ran by

the mics shaking this thing and screaming their heads off, you heard it pass from right to left," Brogdon said.

Brogdon has a large collection of sound effects devices, including a miniature door and frame, a glass breaking device and a wind machine. "Years ago, I ran across a book written by a sound effects man, and it contained blueprints for every sound effects device known to man. We were lucky because Bill Crahan, our show's music director, is also a wonderful woodworker. He built our door, the glass crusher and others," Brogdon said.

Two Neumann KM-84s capture live sound effects as mono sources panned

left or right as dictated by the needs of a skit. A small band provides musical bridges between sketches. A piano is miked in stereo, and a synthesizer provides direct stereo outs. Saxophone and bass are miked mono. Due to broadcast console input capacity, the band is sub-mixed on stage.

## Two mixes

Because the audio needs of radio listeners differ from those in the hall, the production is mixed separately for each, according to Chapman.

Audio sources feed a Sescom signal splitter. "One set of splitter outputs goes to the broadcast console and the other to

the PA," Chapman said. "The PA console generally is in the middle of the audience while the broadcast console, an ancient Yamaha PM-1000, is on the side of the stage."

The requirements of live radio theater provide a real stretch for KANU's engineers. Hollywood's Foley artists aside, how many broadcast engineers these days concern themselves with miking a machine that breaks glass?

The KANU engineering department essentially builds a production studio with analog and digital tape recorders, cart decks and signal processing equipment in Liberty Hall for each broadcast. Equipment is housed in three portable equipment racks interconnected with multipair cables terminated at Elco connectors.

continued on page 13 ▶

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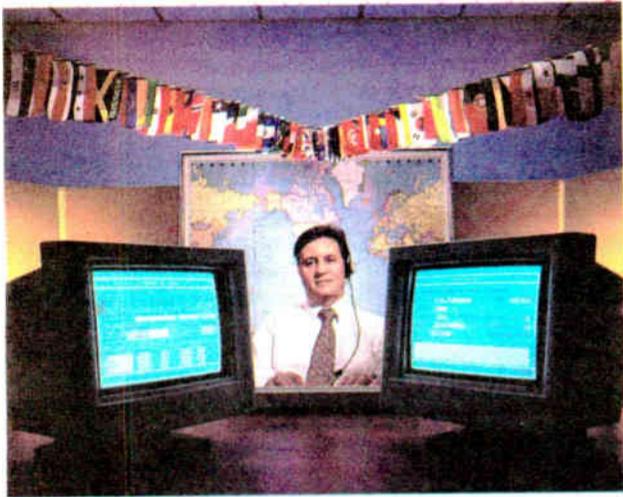
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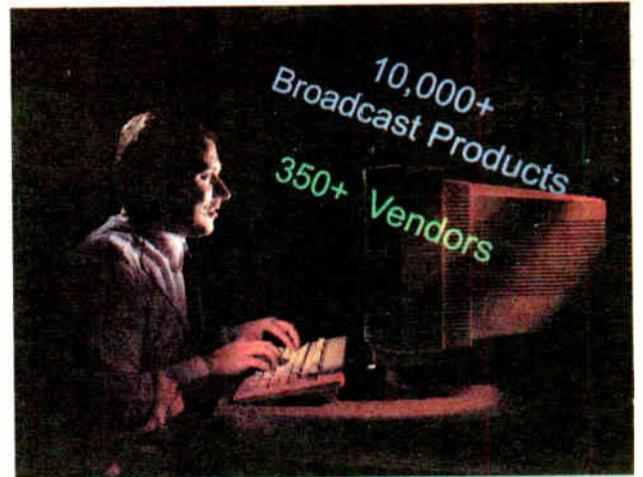
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## Zephyr Road Trip Gets Thumbs Up

Passengers include Vice President Gore



A couple of Telos Zephyrs recently gave WAMU-FM the power to transform the two lane copper country road that crisscrosses the nation into a digital expressway. Hitching a ride for the successful test drive was Vice President Al Gore who addressed more than 650 public-interest telecommunications activists at a March 29 summit on shaping the National Information Infrastructure (NII) held in Washington, D.C.

In little more than four days and with limited resources, WAMU built the "access ramp" onto the artery that carried the event to a nationwide audience. Thousands more joined the conference live via the Internet, television, and radio call-in.



"Because they had the equipment (Zephyr) and the expertise to make it happen, we approached WAMU," notes the broadcast's initiator and co-producer Lynn Chadwick, National Federation of Community Broadcasters president. The Veep's tight schedule meant the meeting's date was nailed down with little time to spare before the event. "Without Zephyr we wouldn't have done it," confirms the station's Program Director Steve Palmier. Both agree that Zephyr's innovative technology and quick, economical set-up, combined with its full fidelity sound, made it an ideal solution.

Zephyr enabled WAMU to bypass the time-consuming and expensive process of ordering and installing dedicated analog lines for the remote. Thanks to Zephyr, setting up WAMU's first ISDN remote in a makeshift studio in the corner of a hotel ballroom was almost as easy as plugging in and sending a fax. "Getting

ISDN lines was not a problem," says WAMU Chief Engineer Mike Byrnes who worked through his local Bell Atlantic phone company rep. "Even for a one-shot, ISDN lines were only a fraction of what we'd pay for an 8kHz analog line," says Byrnes.

Using Zephyr's ISO/MPEG Layer III audio coding scheme to compress the program audio for transmission, the encoded digital signal was sent via an ISDN BRI (2B+D) line to a second Zephyr at National Public Radio headquarters. There it was decoded for satellite uplinking to noncommercial radio stations nationwide. Simultaneously, that Zephyr picked up a downlink feed from a guest site located at KQED-FM's studios in San Francisco and handed it off to the remote site.

The heart of the program was a three-hour, live, national call-in show aired by more than 30 noncommercial radio stations across the country. Hosted by WAMU's Derek McGinty, the program permitted as many as three guests in Washington and another at KQED to field calls from four 800-number telephone lines. Two Telos 10s and four Telos ONE digital hybrids provided seamless integration of all sites into the broadcast, allowing talk-show guests, including the Veep and Mitch Kapor, Lotus founder and head of the Electronic Frontier Foundation, to carry on smooth, natural, two-way conversations with callers without upcutting or distortion.

Before being pressed into service for this remote, WAMU was using Zephyr to link its studios with the public radio satellite system's (PRSS) Washington uplink. Byrnes notes that one-time installation and ISDN usage fees are considerably less than the cost of dedicated broadcast-quality phone lines. As a result, Byrnes expects Zephyr to pay for itself in no time.

Other benefits he praises are enhanced sound quality and reliability, plus bidirectionality. Byrnes's verdict on Zephyr's performance: "It does the job we bought it for. It works. Sounds good. We had zero problems. What more can you ask for?!"

*continued on back page Direct Connection*

### Inside this issue...

- Save on the new ONE-x-Six Power Bundle
- Help us celebrate the 10th anniversary of the Telos 10

Direct Connection is provided by Telos Systems to keep our customers up-to-date on using the dial-up telephone network in broadcast and recording applications. Copyright © 1994, TIS Corporation.

# Telos User Success Stories: The ONE-x-Six

The Telos ONE-x-Six is helping 1230 WBVP-AM stay the "Talk of Beaver County." To feed its thriving news-talk-sports format, the suburban Pittsburgh station couldn't afford to keep using a homemade, jerry-built talk show system that consisted of a modified answering machine and an outdated analog hybrid. So operations manager and morning show host John Nuzzo says WBVP chose the Telos ONE-x-Six. He likes its clarity and conferencing capabilities. Nuzzo also appreciates the fact that ONE-x-Six was designed with smaller installations in mind. "It's got everything you need and it's simple to install, almost doesn't take an engineer," he quips. In fact, the device's six phone lines are connected using standard RJ11C plugs and the program-on-hold uses an XLR. The hybrid audio input is selectable for microphone or line level and there are two caller audio outputs.

Next, Nuzzo, who has spent more than a quarter century behind the microphone, is looking forward to tapping into another Telos product guaranteed to make his job easier, Call Screen Manager.



## **1230 WBVP** *The Talk of Beaver County*

Talk-show gear is not just for radio stations anymore. Ask CVI West Valley Studios'

### **WEST VALLEY STUDIOS**



senior engineer for technical services and operations, Dave Weiland. Located not far from Hollywood, this high-tech facility accommodates everything from shooting to post production for corporate films, infomercials, and music videos, not to mention public access TV.

A key part of the two-year old facility's marketing strategy was offering clients the capacity to conduct live call-in shows. When Weiland went shopping for a talk show system, only the ONE-x-Six met all the criteria on his list: It sounds good, is affordable, simple to use, easy to install, and flexible enough to move between either of two studio control rooms at a moment's notice. Especially important for television production is the ability to monitor callers through open speakers without feedback.

## ONE-x-Six Power Bundle \$2960 — Great Phones at a Great Price



Since its introduction last year, the Telos ONE-x-Six has rapidly become a "first choice" for high quality talk programming and teleconferencing. To make the ONE-x-Six even more appealing, we are offering a more complete system that costs \$219 less than purchasing the components separately.

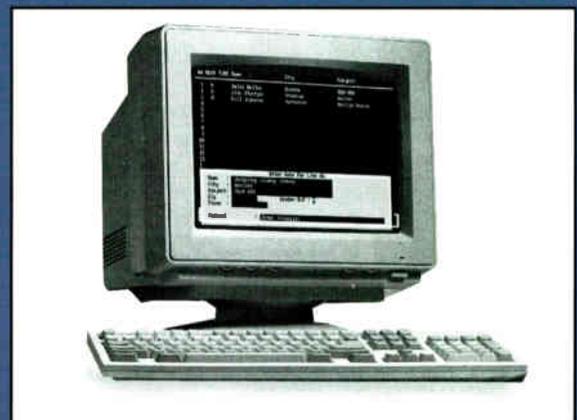
Our ONE-x-Six Power Bundle includes the ONE-x-Six with two Switch Console control surfaces and Call Screen Manager™, the world's most popular call screening software. (Sorry, computer not included.)

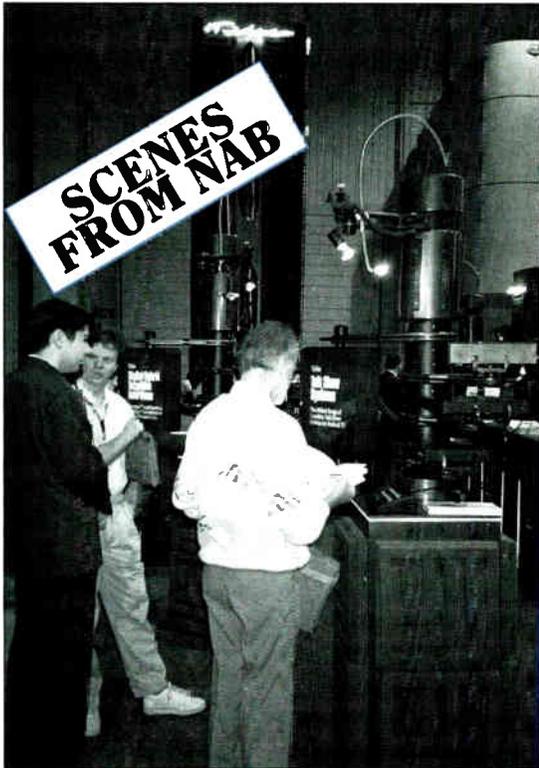
The ONE-x-Six has the famous Telos ONE digital hybrid and six line broadcast phone system in a single unit. The Telos ONE has earned its reputation for exceptional performance. In addition to superior trans-hybrid loss for full-duplex audio, it achieves consistent output level and the ability to monitor callers through open speakers without feedback. The ONE-x-Six offers caller conferencing, program-on-hold, and features that allow automatic selection of the next caller, control of external audio recorders, and more.

Call Screen Manager complements your ONE-x-Six by allowing the screener/director to provide the talent with information on each caller, send additional messages to the talent, and control the status of telephone lines. Telephone line and caller status are updated in real time to indicate callers who are ON-AIR, part of a conference, and on HOLD. Each line has a call timer and program-mable duration alarm.

Call Screen Manager includes a caller information database module, Database Tools, to store and manipulate caller data. Built-in and custom reports can be used to analyze your caller information.

For those requiring a more basic system, the ONE-x-Six, packaged with a single Switch Console has a list price of only \$2180. The best sound, the best value.





*Kevin explains our Talk Show Systems to an interested NAB attendee, while another peruses the new "Telos Systems Guide To The Broadcast-To-Telephone Interface".*



*When they came, they came in droves. Despite the location in the rear corner of the hall, Telos logged record attendance in the booth.*



*Tony gives a guided tour of the Zephyr at the NAB in Las Vegas. Tickets for this particular attraction were typically sold out.*

## Telos 10 Celebrates Ten Years And we have a gift for Telos 10 owners!

At the NAB in 1984, the first professional CD players were being previewed and the term "multimedia" had yet to be coined. In a small booth at the back of the audio exhibits, Steve Church was demonstrating the Telos 10, the first broadcast product to use digital signal processing (DSP).



This year, Telos celebrates the 10th anniversary of the introduction of the Telos 10 digital hybrid telephone interface. Since then, Telos has maintained its leadership position in technology for the broadcast-to-telephone interface. We are now on our fourth generation of digital hybrid telephone interfaces.

While the Telos 10 was discontinued years ago, we continue to provide parts and repair services. (Telos has never charged for a software upgrade!) In our early ads, we promoted the Telos 10 as "the one that works!" This rings just as true today. As far as we know, most of the original Telos 10s are still in service.

Telos has always been grateful to our customers, especially those who came on-board early. To celebrate our anniversary, we have a special "thank you" for those still using Telos 10s.

Fax your Telos 10 serial number to Telos at (216) 241-4103 and we will send you a coveted Telos T-shirt. Send us a recent photo of your Telos 10 in action and we will also send

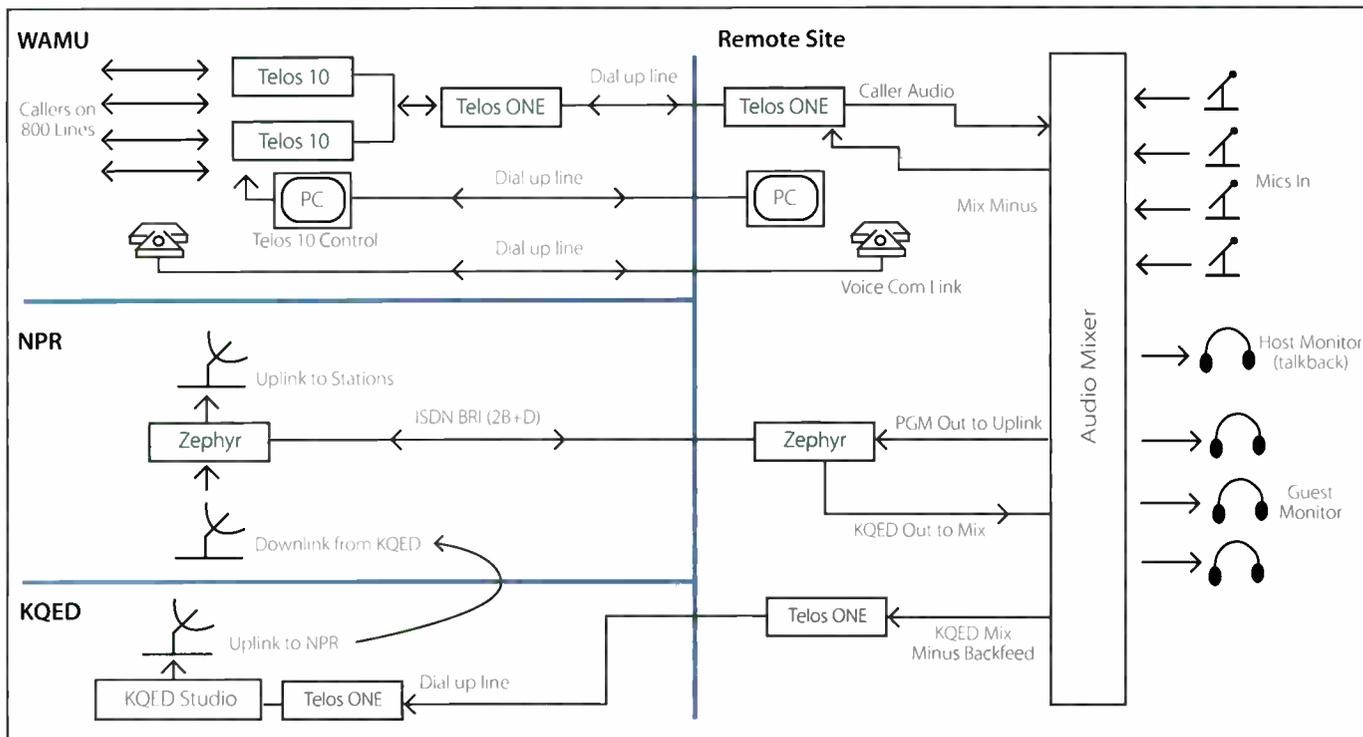


you a certificate valid for a \$200

rebate on the purchase of any Telos product between June 1, 1994 through December 31, 1995. (Details are on the rebate certificate.)

## Telos Tidbits

- We hate to be the first to remind you, but it's time to plan fall sports coverage. This year your remotes can sound better, be easier to set up, and cost you less. With ISDN and the Telos **Zephyr**, you can have full-duplex, 15kHz stereo audio for about the cost of a standard phone call. Now is the time to talk to your phone company about ISDN line installation and to place your order for Zephyrs.
- Curious about **Call Screen Manager**? Demonstration disks are available. Just call or fax and we will send you a disk at no charge.
- An increasing number of audio and video facilities are using ISDN. New York's DIGIFÖN now offers **The Digital Dial-up List**, a directory that lists users all over the world. DIGIFÖN's Dave Immer tells us that inclusion in the directory is free for those connected with the audio and/or video production industry, have ISDN, and want to be known to others with similar interests and capabilities. The Digital Dial-up List is available at a nominal charge. Contact DIGIFÖN at +1 (212) 242-2534.
- Sometimes you need a Zephyr or a Telos hybrid for a one-time event. There are several companies that maintain **rental stock of Telos equipment**. Contact Telos Customer Support and we will send you a current list. If you are a company that offers Telos rental equipment, let us know so we can spread the word.



Information highway remote signal path

## Zephyr Road Trip

continued from front page...

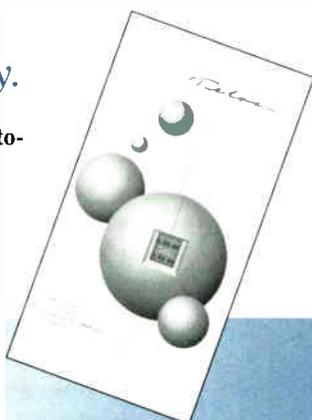


After proving itself, the station's PD is hatching new plans for Zephyr. The station's format is an innovative mix of NPR news and information, local public affairs, talk programming, and traditional American music. Says Palmer, "I want it (Zephyr) to change the way we think about remotes. The more accessible and inexpensive the gear gets, the more creative we'll get in using it. It's like building a highway out into the country—suddenly there are new destinations you never thought possible." Palmer hopes to use Zephyr for a variety of remotes including town meetings, increased coverage of upcoming elections, and live concert broadcasts.

The Public Interest Summit aimed to educate grass-roots groups about the information superhighway and its implications for everybody. The conference was sponsored by the Administration's Information Infrastructure Task Force and organized by the Benton Foundation with support from eight other grant makers.

## Call or fax for your free copy.

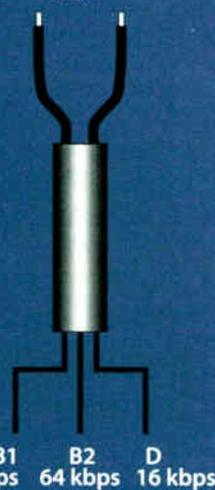
The new **Telos Systems Guide to the Broadcast-to-Telephone Interface** has technical references on analog phone lines, mix-minus, ISDN, and other topics. It also has information on the complete line of Telos equipment.



## Alphabet Soup: What is ISDN BRI?

For its recent remote, WAMU used ISDN Basic Rate Interface (BRI), the form of ISDN of most interest to broadcasters and audio professionals. On a single pair of ordinary phone wires, BRI offers two "bearer" channels at a 64kbps transmission rate and one "data" channel at 16kbps. (This service is sometimes called 2B+D.) Zephyr uses the two "B" channels for program and backhaul audio and RS-232 data, while the "D" channel is used for inter-unit signalling.

Standard Telephone Pair



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# Digital Technology Powers 'Birds'

► continued from page 1

audio transmission, Wegener Communications has applied MUSICAM digital audio compression technology to its line of products, which includes the DR series of digital audio subcarrier L-band receivers, available in addressable and non-addressable versions.

These receivers allow radio stations to convert the RF signal to an audio or data channel, or a cue and control function that allows interfacing directly with cart machines and other station equipment. The company works with programmers to determine the hardware and software necessary for transmission, and works directly with a variety of distributors to outfit stations on networks with the equipment they need to receive programming.

## Space providers

After programmers and stations secure the equipment necessary to come online, the next step is to secure uplinking services and space segments.

ABC Satellite Services, for example, provides these and other elements, including automation and data services, to programmers like Infinity Broadcasting. Uplinking to SATCOM C-5 allows access to 57 audio channels operating at 128 kilobits per second (Kbps), and 11 cue and data channels; ABC also uplinks to SATCOM K-2.

Serving more than 3,000 stations, ABC uses SEDAT digital audio compression technology for high-quality digital audio satellite transmission.

Program distribution, utilizing digital audio transmission service (DATS), is offered to networks and other programmers by GE American Communications Inc. on C-band on SATCOM C-5. SCPC is also offered both on Ku- and C-bands, in both analog and digital form. Major networks utilizing GE's services include ABC Radio and Gannet Broadcasting.

Hughes Communications provides satellite capacity to radio programmers on its own Galaxy IV (Ku- and C-band) and Galaxy VI (C-band) satellites (programmers utilizing Hughes's Galaxy VI satellite were formerly on the now-defunct Galaxy II satellite).

IDB Communications, through its audio distribution broadcast unit, mainly provides uplink and space segments for programmers, although downlink services are sometimes offered. IDB works in both the Ku- and C-bands, although primarily in the C-band on Satcom C-5.

The company's offerings include complete transmission packages for multiple station remotes, as well as

International Digital Audio Transmission between the U.S. and Moscow, London, Tokyo and Paris, from 3.5 kHz to 15 kHz stereo.

## Proprietary compression

Providing point-to-multipoint service between programmers and over 200 radio stations nationwide, the International Satellite Communications Corporation (InterSat) employs a proprietary compression scheme to pack maximum audio and data on a narrower band at low cost. InterSat's SatWare proprietary software allows programmers to transmit as many as seven services (four data, two audio, and one printer port) to unlimited receive sites.

NPR Distribution manages and operates the public radio satellite system, "the primary mechanism used by public radio program providers to distribute their programming to public radio stations," according to Pete Loewenstein, vice president for distribution. The company serves about 250 programmers and some 360 interconnected downlink stations (of which about 300 are NPR member stations).

Uniquely, excess space capacity is brokered out to non-public radio programmers, who are identified at trade shows, through limited trade magazine advertising, and word of mouth.

## A solid foundation

Equipment and space segment providers are working together to build a solid foundation for growth along the satellite delivery highway—and digital looks to continue to be a key component of that growth.

According to Dawn Satellite's Joslin, "satellite radio networks have found that converting from an analog transmission scheme to a digital transmission scheme can reduce their space segment costs and allow them to put more programming on the satellite," which benefits affiliates.

On the station side, NPR's Loewenstein is keeping his eye on interconnectivity. "The more stations have in terms of interconnectivity to various technologies and program sources, the more choices they have available to serve their audience," he said. And, NSN's Muffy Montemayor sees more and more stations committing to automation.

For those programmers concerned about new technology rendering today's equipment obsolete, GE American's director of broadcast and business services, Frederick Cain, said that "people are going to get the

things that really aren't done very much any more. Radio is the perfect story-telling medium, whether telling funny or serious stories."

□ □ □

*Bob Kirby is a freelance technical writer and public radio news producer in Kansas City, MO. He can be reached at 816-941-4356.*

dollar value out of their equipment," but allows that those same people are "going to be more willing to change in the future because of the improvements in technology."

And, as ABC Satellite's Vice President of Engineering, Bob Donnelly, said "The progression of technology is benefitting everybody."

# Users of Satellites

Riding down the satellite highway is beneficial to programmers like Arkansas-based Music Channel One, delivering the hot sounds of CHR to stations in Arizona, Arkansas, New York, Louisiana, South Dakota, Virginia, and Washington State.

George Hochman, managing partner, thinks that "satellite programming allows broadcasters to keep the door open. I think many radio stations could not operate if they had to maintain 24-hour live staffs."

In today's "tough economic times," he said, "satellite programming offers an opportunity for broadcasters to remain viable. After all, radio is a business, too."

★ ★ ★

Contemporary Christian satellite broadcaster Clean Air Radio originates its programming from KCGN-FM in Ortonville, Minn/Millbank, S.D., and sends it over Ku-band to KCGN(AM), about 140 miles away (the original signal from KCGN-FM is picked up by 14 translator stations in the area).

Verlyn Menning, president of parent company Communicating Good News (CGN) Corporation, said that satellite delivery to CGN's AM station made sense.

"Satellite saves us so much on programming costs," he noted. "We wouldn't have been able to acquire the station without it. It made (the transaction) economically feasible."

★ ★ ★

Radio One originates locally-customized programming (using the Audisk automation system) over the Ku-band for parent-company Gardiner Broadcast Partner's owned and affiliate stations, primarily located in ski resort areas in Colorado, Idaho and New Mexico.

According to Marty Hijmans, group engineer, Gardiner had purchased a number of stations in Colorado ski resort areas with an eye toward networking. All of the stations were losing money, he said; the goal was to consolidate, cut operating costs and work toward turning a profit.

"It has not become feasible for some stations to have their own local staffs," Hijmans said. "In a day and age when there is so much competition for the advertising dollar, (the satellite) alternative allows stations to serve the public locally (if they take advantage of automation), and allows broadcasters to have a chance of making a profit."

# Radio Theater

► continued from page 11

"The racks feed into a patch panel so that you have a consistent user interface from one production to the next, and you can do all the usual things, and some unusual ones, without having to rewire equipment at the back of the racks," Chapman said.

"One of the things we try to do for Darrell and the actors is give them a studio in which to be creative," Chapman said.

## The talent

The "Imagination Workshop" actors are working broadcast and voice-over professionals, with one exception. David Greusel is a St. Louis, Mo. architect, and commutes across Missouri to do the show. John Jessup and Margi Posten are voice-over talents in Kansas City. Jim Moore co-hosts the morning show on KFKF (FM), Kansas City and is public address announcer for the Kansas City Royals. Roberta Solomon coaxes listeners out of bed during the morning show on KLTH (FM), Kansas City, while Rick Tamblyn is doing likewise on KCFX (FM). Paul Meier, a former member of the BBC Radio Drama Repertory Company, teaches Theatre and Film at Kansas University.

People actively involved in broadcasting stage "The Imagination Workshop," yet so much of it has so little to do with regular, daily radio. "I think that's why the actors who work on the show love it as much as they do," Brogdon said. "It gives them a chance to step outside the kinds of things they do day-to-day and do some

## Radio Equity Acquires NewMarket Media

Radio Equity Partners acquired the eleven-station NewMarket Media radio group, in a transaction valued at roughly \$100 million. The deal is radio's largest to date in 1994, and closed in New York last month.

The NewMarket stations consist of WNOE-AM-FM New Orleans, La.; WREC(AM)-WEGR(FM) and WRXQ(FM) Memphis, Tenn.; WSJS(AM)-WTQR(FM) Greensboro, N.C., and KXXY-AM-FM Oklahoma City, Okla. The transaction also includes two radio stations under contract to NewMarket: KGTR(FM) New Orleans and KOQL(FM) Oklahoma City, Okla.

Radio Equity Partners also owns WWBB(FM) Providence, R.I., WHYN-AM-FM Springfield, Mass., and WCKT(FM) LeHigh Acres, Fla. (Fort Myers market).

Richard Foreman was the exclusive broker for the transaction.

Pictured above (l to r) are Stephen Robertson, chairman NewMarket Media; broker Dick Foreman of Richard Foreman Associates; George Sosson, president, Radio Equity Partners and Peter Schulte, president, NewMarket Media.



# Running Radio

What Kind of  
Manager Are You?  
See page 21.

Your Resource for Business, Programming & Sales

## TECH TALK

### WDRE Takes on Manhattan... and Wins

by Judith Gross

**NEW YORK**...It's big, it's tough, it's in your face and it's a place where the faint of heart don't get very far. The New York City radio market, No. 1, spawned the infamous loudness wars, where too many stations tread on each others' playlists and where, if a station wants to succeed, it has to punch through a lot of hype and adopt a take-no-prisoners attitude.

Yet, it's also an over-radioed market where, to get the largest number of listeners and advertiser dollars, the "Big Guys" tend to play it safe. You can scan the dial and hear the same currents and recurrences—even the same spots—at the exact same instant.

So a Big Apple observer might rightly wonder how WDRE(FM), a feisty, short-spaced Class A FM broadcasting at only 1000 W in the fringe of the city,

can possibly buck local trends and thrive in this radio market from hell. The answer lies in an interesting blend of cultivating listener loyalty, in precision and pioneering programming, in a nurturing management style and ultimately, in solid engineering techniques open to new ideas. In short, a case study in radio success.

Recently, as part of a move to new studios, WDRE got an extra bonus in stronger, cleaner signal coverage, allowing further inroads into the lucrative boroughs of Manhattan, Brooklyn and Queens and the moneyed conclaves of Long Island, simply by putting in a new processing chain. Why play safe?

WDRE has a long history of being on the cutting edge of music with an alternative rock format, originally as WLIR. Listeners tuned in in the '80s to get relief from the new FM-talk craze of Howard Stern and his clones, and from

the middle-of-the-road crossover of rock, rap, country and other narrowcast formats. They also sought escape from the plethora of over-processed CHR stations playing nearly identical lists of Madonna, Phil Collins or Prince.

ing male-female, 18-to-35 demo."

Calderone concedes that former CHRs have begun playing artists who were exclusively on WDRE's playlist, but notes that the station will dig for deeper selections from a CD and play deeper cuts by artists like the B-52s and Depeche Mode. The station's "alternative" tone carries over into its humorous spots and promos, designed to support the subtle—and sometimes not so sub-



Walkway of CDs into WDRE's brand new studios in Garden City, New York

"They tuned into us through the '80s because they wanted an alternative, and they stayed with us," notes Operations Manager Tom Calderone, who is considered one of the gurus of the Modern Rock format. "Now that alternative has moved mainstream, we'll gain newer listeners while we tend to keep our exist-

tle—non-conformity of listeners tired of the same old radio hype. That attitude spells listener loyalty as well.

In fact, that loyalty is so strong, that Ron Morey, President of WDRE owner Jarad Broadcasting, points out that list-

continued on page 16 ▶

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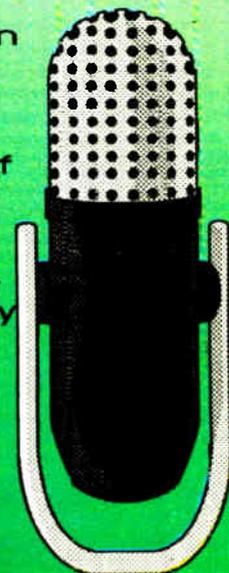
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World Radio History

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USAirplay

# Listen in on Four Years of Radio Airplay

by Charles Taylor

**WASHINGTON** With this, my 50th and final USAirplay, reflection is at the top of the playlist.

A lot has happened in the radio business in the four years since I began collecting ideas and opinions on the things that gratify and dishearten me about programming in the U.S.

We've watched trends rise and fall, including top 40's fragmentation, country radio's proliferation and rap's obstinate persistence. We've explored radio's continual search for lucrative niches through all-sports, religious and children's radio, Spanish programming, Generation X, disco and yes, even polka.

We've mourned the loss of Freddie Mercury and celebrated the perseverance of Tina Turner, while examining the artists that make radio a good place to be—Celine Dion, Toni Braxton and R.E.M., for instance—and those who demonstrate its shallow side—SWV, Rod Stewart and Hammer.

In essence, I've tried to offer a glimpse of just how quickly this industry reinvents what it deems profitable and inventive. Indeed, radio is at all times dynamic and ever-conscientious of changing parameters, both in terms of business and programming.

It has been a fun ride.

Beginning in July, I have been drafted to lend a hand as editor of IMAS Publishing's launch of *The Radio World Magazine*, which makes its debut in September.

Before I go, I thought I would make a last attempt to hammer out some of the ideas I hold most passionately, using a few of those 49 other columns as footnotes.

In **June 1990**, we explored how programmers deliver music over the airwaves. While carts remained a standard, CD was rapidly working its way into staple status. Said one programmer sold on digital in Bozeman, Minn., "If someone requests a song we do not have on CD, we just cannot play it."

While carts still have a place in most radio stations, in 1994 CDs are as common as pushbutton phones. But technology has gone further. The question now is: How much programming is delivered by CD versus automated digital workstations and other high-capacity mediums?

I defended freedom of the airwaves in three columns. First, in **August 1990**, stations were reacting to government paranoia over concerns that lyrics from 2 Live Crew's "Me So Horny" were too racy for the airwaves.

The fear was making some programmers so anxious, I wrote, that "songs perfectly acceptable three months ago now must be edited or worse, banned."

The matter seems mild compared with the issues of racism, guns, violence, societal rebellion and sexism common in today's "gansta" rap, popular among America's youth. But I stand by the belief that radio knows where to responsibly draw the line without the government playing referee.

It comes down to the point I drove home in **January 1994**: parents must take control of their children's values

and not expect the government to do their job for them: "Passing sweeping legislation that blocks the exchange of varying viewpoints is wrong. It protects listeners from the fears of others, making radio an outlet only for the lowest common denominator," I said.

In **July 1991**, I discussed adults who express discomfort about the airwaves being "indecent"—a term that government has struggled to efficiently define for decades. My view then and now: We are granted an option that remedies such an offense—the ability to change the dial.

In **November 1990**, the movie soundtrack to "Pretty Woman" was at the top of the album charts, prompting me to comment that "hearing the memories of a meaningful movie over the airwaves adds a distinctive depth to radio."

The trend is nothing if not more intense today. Soundtracks are a rewarding vehicle for many artists to gain radio exposure and broaden their reach. As this is being written, "The Crow" soundtrack is No. 1 in the U.S. Close behind are the musical backdrops from "Above the Rim" and "Reality Bites."

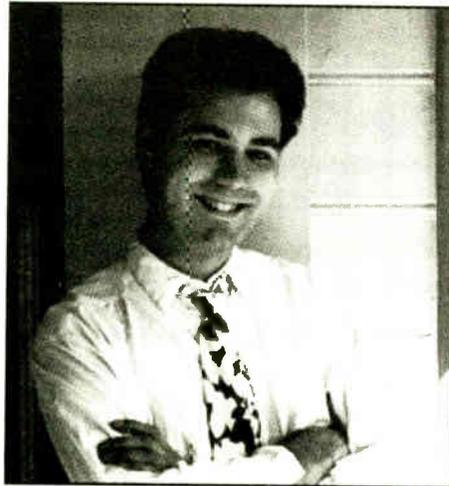
Movie songs also have shown muscle at the Grammys for the past two years, with "The Bodyguard," "Beauty and the Beast" and "Aladdin" picking up awards. You can bet Bruce Springsteen's "Streets of Philadelphia" is next in line.

"Technical circles buzzed all year about the sudden imminence of digital audio broadcasting," I wrote in **December 1990**. "Right now, especially in the U.S., there remain more questions than answers, but regardless, it looks promising that by the time I'm writing a wrap-up column on the 1990s, we'll be able to hear radio in color."

Not so fast, there. In **June 1993**, I described my flirtations with an inviting

new service in "Move Over FM, Cable Radio Is Here." The column was intended as a warning for traditional broadcasters, some of whom wonder why anyone would pay for music service when they can get radio for free.

Easy: Consider the lure of no commercials, no rambling DJs and format choices



Charles Taylor, Editor  
The Radio World Magazine

that outdo the narrow playlists of many stations. Music Choice and Digital Music Express, the dominant services, are making themselves heard around the world.

I complained about artistic exploitation in **February 1991**. Referring to New Kids on the Block, I wrote, their "carefully orchestrated image has been stamped on everything from bath towels and dolls to pencils and even a Saturday morning cartoon show. Call me odd, but I always thought performers were out there to make music, not to help me dry my thighs."

Three years later, the bygone NKOTB would be lucky to sell pencils, much less albums. But you know, I'd take them any day over today's exploitation of

sappy sound-alike soul ensembles on the airwaves: Shai, H-Town, All-4-One, Silk, Mint Condition and Jodeci... who can tell the difference? This redundancy is among my biggest gripes with U.S. radio programming.

In **November 1992**, I acknowledged that top 40 had splintered into more hybrids than a handful of fingers will hold: CHR, top 40, Hot AC, adult contemporary, CHUrban and Adult CHR.

Less than two years later, the scenario has changed. Three types of "top 40" playlists predominate in 1994: Urban CHR, mixing rap and traditional R&B; "Sleeper 40," a land where predictable "adult" artists like Michael Bolton, Mariah Carey, Bonnie Raitt and Billy Joel reign; and the latest, most promising movement—a liberal sampling of traditionally modern rock artists—for those weary of the alternatives.

But many top 40 listeners simply lost patience waiting for the CHR shake out, and tuned their radio dials elsewhere. Country was the victor. **June 1991**: "Country's ability to lasso a larger, fiercely loyal listenership can be attributed to a dedicated effort to just be itself."

And finally, one must never underestimate the value of a good quote. My favorite comes from the **August 1993** column that drew some of the best response from any I wrote: polka's popularity in the Midwest.

Cletus Bellin, program director at WAUN(FM) in Kewaunee, Wisconsin, told me, "It's a proven fact that cows give more milk to polkas than they do rock."

It's the kind of statement that merits no follow up question or explanation—just a nod and the subsequent clicking of my keyboard.

Cheers.

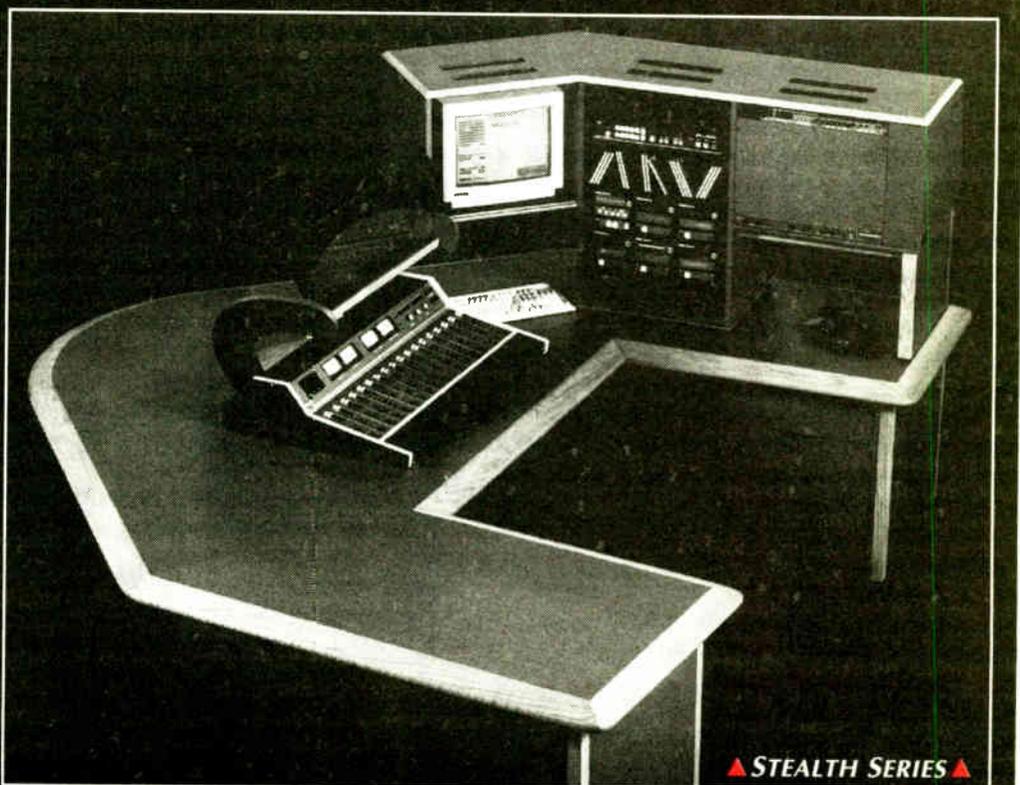
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# Taking on Manhattan

► continued from page 14

teners have relocated within the listening area using reception of WDRE as a major criterion. And VP of Engineering John Caracciolo adds that listeners are tuned into every nuance in the station's signal. "We get several letters a week, and phone calls, from listeners who want help picking us up better, and they notice when we do something different with our signal," Caracciolo says.

One of the biggest complaints over the years has been interference from other stations and signal fading. For a time, WDRE participated in a joint promotion with a radio receiver antenna manufacturer, that dubbed its product the "WDRE Maximizer" precisely because so many of the station's listeners were ordering it.

## More recently

More recently, Jarad has begun concentrated efforts to improve its reach and bring its modern rock format to an expanded audience.

"Historically, we haven't done so well in New York," says Morey. WDRE is a grandfathered short-spaced Class A whose 1 mV contour is completely subsumed by two Class Bs, one transmitting from the Empire State Building and another from the World Trade Tower. WDRE's antenna is on an apartment building no taller than 450 feet, at the

edge of Queens.

Attempts to get a power boost under the Class A upgrade allowed by the FCC have so far been thwarted by the station's second adjacencies. "Ironically, we were one of the initiators of the Class A upgrade lobbying effort, and we have



Jarad Broadcasting President and WDRE Owner Ron Morey; Operations Manager Tom Calderone (guru of Modern Rock); and VP Engineering John Caracciolo discuss the station's success and future.

yet to benefit from it ourselves," Morey notes.

"We feel we've been short-changed in this," agrees Caracciolo, who adds that two petitions for the increase are still before the commission. Limited to its 1

kW power, WDRE has had to become creative at maximizing its coverage. Not surprisingly, in this age of duopolies and LMAs, one way has been station acquisition.

## Simulcast success

Jarad began with a Philadelphia signal, which now simulcasts its Garden City signal. At 3 kW in Philly, the company has ratings and revenue success.

sound of the music we play is an important reason why they identify with our station. That's one more way we cultivate listener loyalty, by doing what we do better," Calderone says.

"Doing it well" is too elusive a quality to be on the list of high-priced radio consultants; it's as undefinable as the sense of "alternative" programming that has made WDRE a success. What's ahead for WDRE and Jarad are more acquisitions and even a plan to syndicate the format through agreements with affiliates to develop a network of simulcasts.

## Winning combo

And then there's that unbeatable combination of ingredients that spell a textbook success for radio in the '90s; that blend of visionary management, unique, risk-taking programming, creative engineering and fastidious concern with long-term listening, all working together as a team. The Big Apple had better watch out.

□ □ □

Judith Gross is VP/Head Copywriter for Media/Scan, a public relations and advertising agency specializing in broadcast and pro audio, and can be reached at 212-929-6108.

# 63 Years Ago

Reprinted from Radio World June 20, 1931. Editor's note: The RW of old, printed for a time in the 1920s and 1930s and today's RW are unrelated except in name.

## SUN AND MOON EFFECT ON SW TO BE TESTED

Influence of the sun and moon on shortwave reception is to be studied by scientists. The Perkins Observatory of Ohio Wesleyan University, which has made extensive studies on broadcast reception, will have the co-operation in the new work of the Warner and Swasey Observatory of the Case School of Applied Science in Cleveland.

Prof. Harlan T. Stetson, director of the Perkins Observatory, in a communication to the Shortwave and Television Corporation, said:

"In regard to our present research on radio reception as affecting high frequency signals, we are preparing apparatus this Summer for an extensive study. In this case the broadcasting as well as the receiving will be under our control.

"We shall send signals at different hours of the day and night on 20, 40 and 80 meter bands.

"These will be automatically recorded here at the Perkins Observatory and should furnish valuable information in the course of time on the influence of the sun and moon on short-wave reception.

"All that has been published so far has been pertinent to the broadcasting band. As there are unquestionably critical heights in the Heaviside layer for various distances in reception, it is a little difficult to predict short-wave transmission on the basis of broadcast data.



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"We're sold out until summer in Philadelphia," says Morey. "If we could have that signal in New York, we could make a serious showing. "More recently, Jarad purchased a station in Westhampton (Riverhead) Long Island, also simulcasting the Garden City signal, but at 6 kW.

Morey expects this eastern island coverage to win new listeners as millions of New Yorkers flock to the beach resorts this summer. But help for multipath problems and other interference in WDRE's main coverage contour recently got help in an unexpected and dramatic way.

## New home and new gear

This spring, WDRE moved into brand new headquarters about a block from its old digs. There was new furniture, gorgeous new surroundings, a new analog STL, and plenty of room to grow, but no changes to the transmitter or tower. The move was set for the third week in March, and Caracciolo was looking for a backup processing chain until the existing one could be physically moved.

He accepted a suggestion to put in the Aphex Air Chain to make the switchover (see *Buyer's Guide*, RW June 15). Morey says, "I noticed it personally; after we installed it it's like the station has really spread its wings. I drive to Philadelphia quite a bit, and now, from Kennedy Airport (western Nassau) I can go clear to the Verrazano Bridge (Staten Island), even beyond, with virtually no problem.

"People are not getting as much multipath, so they're listening to us longer. Where we were weak, we're now strong. Where we weren't received, we can now be picked up. It's like we have more presence on the dial," Caracciolo says. Morey believes that in addition to the possibility of gaining new listeners, the improved coverage deepens the sense among listeners that "we are committed to providing a quality product."

He has already ordered the Aphex chain for the Philadelphia station. "Our listeners tune in for the music, and the

# 'Cousin Brucie' Finds a Niche in New

by Alan Haber

Part II of II

**NEW YORK** The WCBS-FM studio lines ring with abandon throughout the weekly "Cousin Brucie's Saturday Night Oldies Party." It's a double-play weekend at the station, which is celebrating the opening of the baseball season by giving away tickets to Mets and Yankees home games.

The giveaways will come later this evening. Now, it seems just about every resident of the tri-state area of New York, New Jersey and Connecticut is trying to get through on the request line, to speak to their Cousin Brucie.

"Let me take another phone call here," the Cuz says. "Hello, you're on the radio," he sings to a caller.

**You are on the air**

"Hello, this is Joanne from Forest Hills," the caller says. "I'd like to dedicate this to all the Yankee fans. Morse Code of Love, by the Capris." Joanne must have about 150 friends with her—they all yell gleefully around the receiver, and their jubilation from being on the air resounds through the airwaves in every home connected to Cousin Brucie.

"What was that?" the Cuz asks, laughing. "You have your own dugout?"

Bruce "Cousin Brucie" Morrow missed his New York microphone. So he and his wife made the decision to move back to New York City, to the hustle and bustle of the life that was pulsating through his veins even when he wasn't physically there.

When WCBS-FM program director Joe McCoy and then-general manager Rod Calarco made the trip to see Cousin Brucie at WRAN, the Sillerman-Morrow station in Dover, N.J., they knew that coming back to the Big Apple was something Morrow wanted very much to do. It didn't take much for him to agree, at first to one night a month on the oldies station; this soon became one night a week, and then two nights a week (his Saturday Night party is augmented by the Wednesday night "Cousin Brucie's Yearbook" show).

Morrow was so excited about his new radio berth that he also entered into what became a six-year ride as admiral aboard the nationally syndicated weekly show "Cruisin' America," and even broadcast for a while on Capital Gold radio in London, England.

**Multi-Market Radio**

About a year ago, Morrow, Sillerman and Sillerman's partner Howard Tytel, got together at a New York restaurant for some Italian food to talk over new possibilities in radio. Multi-Market Radio was borne out of that meal.

Morrow says that, thanks to the relaxation of station ownership rules by the FCC, he is able to purchase stations in contiguous markets. "Without duopoly, and without being able to buy contiguous markets," he says, "we would not be able to survive the way we want, the way we want to build radio stations. (We) want to keep the local feel, want to keep...a community feel, (and) not rip (the community) up by its roots."

As an owner, Morrow is attracted to small and medium market radio stations, as he was in the Sillerman-Morrow era. He believes that success is a by-product of the predictability of these types of stations. He feels "you can control (them), you can mold (them) to the particular environment. Large market, you can't. Too much competition, and it's too unstable. With talent, with care, with patience, you can mold and you can predict what's going to happen."

More than 30 years of pumping excitement through the airwaves to his fans affords Morrow a unique outlook on the methods that work best in a radio station. Take, for example, the optimum length of an airshift: for Morrow, it's three hours. "That's what God put down in the Bible," he said, laughing. "That's in the old testament. I think two hours is too short, except for a very specialized thing. I think the three-hour air shift for a strip program is perfect."

Morrow's five-hour Saturday Night Oldies Party is an exception—for his fans, nothing less would do (but more would probably suffice). But for most

other cases? "When you get the five-hour strip air shift," he cautions, "that's because somebody cannot afford to bring in another person. So what (they) do is buy these kids and shove them on for five hours and feed (them) down the public's throat. And I think that's wrong."

**Work week**

What about the number of days in a week a disk jockey should work? How about six days a week? "In Sillerman-

scenario ideal, but assume very rarely.

Should a personality work on his own board, or have an engineer? "I'm me, an engineer drives a train, or develops an airplane or a bridge," he proclaims. "By my handling my own equipment today, which I love, I know my brain tells me, here, this is what I want to do. I do it, I don't have to explain it to anybody else, or (tell somebody what I want to do) if I make a last-minute decision." Working his own board makes him work quickly.



Bruce attracted adoring fans at New Jersey's late, lamented Palisades Park.

Morrow broadcasting, everybody worked six days, and I'll tell you, if we'd get the seventh, we would. Because, economically, we were fighting to survive."

**Ideal situation**

The ultimate work week for a disk jockey? "I think every personality should work a five-day shift, three hours a day," he says, adding that he has no problem with personalities also doing production work. Morrow calls the five-day, three-hours-a-day air shift

he said: "I think it sounds better, I think it's more fun for the audience, because anything can happen."

Jingles are an important part of a station's sound—the station's calling card, if you will, for when listeners hear a station's sound, all wrapped up in a neat, short, concise, catchy package.

"I love jingles," Morrow says, smiling. "A radio station could be a jukebox, if you didn't have some kind of an ID. That

continued on page 20 ▶

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For information, contact Richie Suraci in New York state at 914-561-5866; fax: 914-561-5866; or circle **Reader Service 143**.

## Custom Promotion Packages

**FEDERAL WAY, Wash.** GMI Media Group is a creative production firm specializing in radio production services.

GMI recently created a new custom jingle and voice image package for the Seattle station KJR-FM's new format "the greatest hits of the '70s."

For information, contact Leslie Erak in Washington state at 206-839-9414; fax: 206-839-5112; or circle **Reader Service 206**.

## National Issues Debate Show

**WASHINGTON** "The O'Leary/Kamber Report," a weekly one-hour national issues debate show hosted by Democratic political consultant Victor Kamber and Republican political consultant Brad O'Leary, has been signed to a

two-year contract by the NBC Radio Network. The "Report" also picked up its 100th station just six months after being launched on NBC Radio.

Each show focuses on a single topic and feature expert guests. Recently discussed topics include health care reform to crime to term limits to gun control.

For information, contact Peggy Solomon in Virginia at 703-685-2000; fax: 703-685-2145; or circle **Reader Service 7**.

## Digital Production by Standard Phone Line

**MILWAUKIE, Ore.** Production On Demand is the newest offering from the Coreson Company. It enables a station to send via fax a radio spot to Coreson and its staff of voice talent and producers. Coreson loads the appropriate information into its digital production computers, and once the production is completed, sends the recorded spot via telephone line to its destination.

Coreson works with DG Systems of San Francisco, a supplier of "receive" boxes. Coreson markets to the current list of DGS stations so they can receive production via DGS and has recently developed an agreement with DGS to make these boxes available to any station

that would like to sign up for Production On Demand.

For information, contact Corky Coreson at 1-503-659-7815; or circle **Reader Service 61**.

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For information, contact Jim Magidson at 312-642-0996; or circle **Reader Service 79**.

## Euro Hits Come States-Side

**ALBUQUERQUE, N.M.** KBE "Broadcasting By Design" is consulting on the North American release of The European Hit Survey radio program, which originates from Amsterdam, Netherlands.

The two-hour, weekly show, hosted by Euro-DJ Bobby Sicilia, features pan-European hits, artist interviews and European lifestyle and entertainment news. It is to be available in the U.S. on a barter basis.

For information, contact Karl Baehr in New Mexico at 508-828-0488; or circle **Reader Service 82**.

## Research and Syndication

**LOS ANGELES** Premiere Radio Networks Inc. acquired 100 percent interest in Mediabase Research Service in late April. The acquisition complements Premiere Radio Network's expansion strategy.

Mediabase Research Service is a comprehensive electronic database providing competitive music research and analysis on radio stations in the top 50 markets.

Premiere Radio Network produces and delivers 18 syndicated comedy, entertainment and music-related radio programs and services.

For information, contact Anne Doremus at Catalyst Communications in California at 510-838-7121; fax: 510-820-0551; or circle **Reader Service 127**.

## Big Band Jump Celebrates 10 Years

**ATLANTA** The two-hour weekly program, Big Band Jump, will celebrate 10 years of syndication in September. Hosted and produced by Don Kennedy, the program is now heard on roughly 200 radio stations in the U.S. and Canada.

The program began locally as a one-time presentation on a college FM in

Atlanta, but drew such a response that a listener suggested syndication.

Big Band Jump features Big Bands and vocalists, along with background information.

For information, contact Don Kennedy at 1-404-231-7990; or circle **Reader Service 199**.

## Elvis on the USA Country Network

**NASHVILLE, Tenn.** The USA Country Network, a division of American Freedom DJ's Inc., established a Nashville mailing address and phone number: 9 Music Square South, Suite 343, Nashville, TN 37203; phone: 615-742-1177.

USA Country Network is making available a three-hour radio special, Elvis: The Legend of a King, for a mid-August Elvis tribute broadcast.

For information, contact Tony Garcia at 203-288-0644; or circle **Reader Service 148**.

## Customized Country

**SAVANNAH, Ga.** DC Productions offers one of the largest country music libraries available—nearly 4,000 top country singles from the 1950s to current. Stations choose songs they need from a master catalog. Selections are then digitally recorded onto CDs. Excellent quality and perfect for stations needing traditional country oldies.

Stations can add music monthly as their budget allows.

For information, contact David Cunningham at 912-872-3221; or circle **Reader Service 153**.

## Humor Tests Well

**SAN LUIS OBISPO, Calif.** Humor tests extremely well on the radio, and it has certainly been successful in morning drive. Syndicom distributes one-minute comedy editorials by Red Neckerson (since 1979). Red becomes a character, he always has an opinion and can become a valuable team member.

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The Red Neckerson minute is a cash feature (one-minute editorial with customized teaser and intro for each show).

For information contact Mike Hesser at 805-543-9214; or circle **Reader Service 102**.

## Hits with Hooks from BP

**SEATTLE** Broadcast Programming began shipping CHARTBREAKERS WEEKLY Hit CDs. In addition to the hottest new songs for CHR, AC, Country and AOR, each CD contains pre-produced musical hooks for each hit on the disc, for use by subscribing radio stations in on-air promos and music research.

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For information, contact Keith Chambers at 800-426-9082; or circle **Reader Service 217**.

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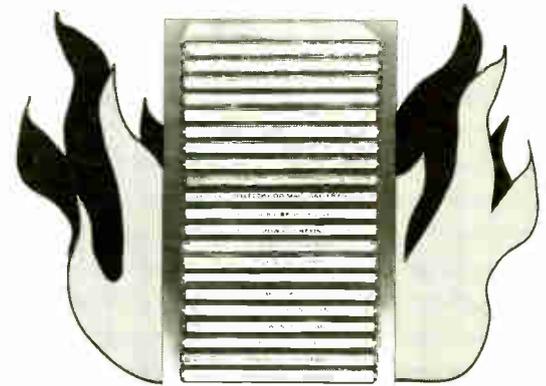
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Reader Service No. 6

# Sales Meetings Can Miss the Point

by Bob Harris

**DALLAS** There is nothing more hated by most radio salespeople than the sales meeting.

And there is very good reason. Most radio sales meetings are a sheer waste of time. They are boring, they are repetitious, they are counter-productive and they normally do not increase sales.

I think America's radio sales managers should dramatically improve the quality of their sales meetings or do away with them entirely. That's right, no sales meetings. I bet at most radio stations, business would improve.

## It's broken, fix it

Here are some of the things I see wrong with most sales meetings. First and foremost, sales meetings take people off the street and off the phones. Nothing is ever sold at a sales meeting (except salespeople selling the boss), while everything is sold on the phone or on the street.

Some stations I know have daily one-hour sales meetings. I cannot imagine any management missives or other words of wisdom from on-high that should take salespeople away from selling for 12.5 percent of their weekly sales time.

Why do sales managers persist in having so many meetings and, in my opinion, wasting precious sales time? Probably to satisfy their egos, they have a captive audience they can "lecture" to, or as happens all too often in sales meetings, sales managers show their power by "beating up" the salespeople for not doing something right.

I have no problem with sales meetings that truly teach or train. As I stated in an earlier column, I believe the radio industry as a whole does a very poor job of sales training. Meetings that bring knowledge and relevant information to help a person sell are wonderful. But I just don't think those type meetings happen often enough.

## Tactics, tactics, tactics

Do not use a sales meeting to berate one or more members of the staff for not having sold this or that, for not having a prospect list for some new package, or

for not collecting some money.

Remember the old maxim, praise in public, criticize in private. Do your critiques one on one with the salespeople who need help.

Do not waste everyone's time being critical of a few, and most importantly don't put every salesperson in a bad mood for the rest of the day by yelling and screaming at them. (Yes, I have been a salesperson in sales meetings at major market stations where the sales manager made everyone feel like the lowest form of life.)

Another major problem with sales meetings, that most sales managers never seem to solve, is that of the varying experience levels of their salespeople. The veteran salespeople are bored with information that rookie salespeople must have. The newcomers don't understand some of the more sophisticated techniques or types of business that the pros do need to help them sell.

Why not separate your sales staff for meeting purposes into two groups, newcomers and old pros? Don't make the experienced salespeople sit through hours of information they already know. Don't take your top producers off the

street to tell them something they learned years ago.

Try to turn sales meetings into short, positive experiences. A sales meeting doesn't have to last an hour, but most seem to. If there is nothing new to talk about, why not have a short meeting or, better yet, no meeting at all?

Good sales meetings can be fun, positive, educational and motivational. It's an old idea, but do you bring in outside experts or knowledgeable clients to talk about their industry?

## Map a strategy

Just recently, I was asked to speak to the sales staff of Bonneville's KZPS(FM) here in Dallas. My presentation on how radio can generate new revenue from food manufacturers included slides plus specific examples of local grocery marketing campaigns that had produced over \$500,000 in "found money" for Dallas radio stations over the past few years.

I knew by the numerous questions that the salespeople and sales managers had on the topic that it was a good sales meeting. Everyone, beginner or pro,

could take something out of the meeting.

Maybe this guest speaker concept is done once a month, and one meeting a month is devoted to sales training. Then maybe you need only one or two other sales meetings during the month to update, praise and motivate.

I think you owe it to your sales staff to evaluate your sales meetings. How many meetings do you have, how long are the meetings, what are the topics, do you ever brainstorm for new sales ideas, do you have guest speakers, do you yell and scream, do you browbeat, do you really train or inform?

If you honestly study the situation and ask your salespeople how they really feel about your sales meetings, I bet you will have fewer, shorter, and more productive sales meetings. Plus, you'll increase your business. If I'm wrong, please let me know.

□ □ □

*Bob Harris is a sales and marketing consultant to the food manufacturer, food broker and radio industries. His 30-year career includes radio sales, promotion and management, radio syndication sales, newspaper sales, TV promotion and advertising and sales promotion agency ownership. He can be reached at Harris Marketing Corp., 3422 Flair Drive, Dallas, TX 75229; telephone: 214-902-8552; fax: 214-956-9885.*

# 'Brucie' Draws Crowds

► continued from page 17

means, A-number one, the human element, and what I call the whipped cream or the icing on the cake. Icing on the cake is a sound. A sound is jingles, or IDs. Jingles are very important. (They're) the graphics of radio broadcasting."

## An informal, personal medium

Top 40 radio—the medium that Morrow helped to create and nurtured through the '60s, the '70s, and keeps alive today—started, he says, as "a very informal format. We didn't know what the hell we were doing, none of us. We were there experimenting, and fortunately, the 'suits' let us experiment, because they didn't know what they were doing. We didn't know what they were doing." Things changed, he laments, when money came into the

radio picture.

Ah, the '70s. "We lost that personal touch in the '70s," he says, "because we started getting involved with programming people and consultants that were more attuned to what the suits wanted than what the people wanted. We lost the people. We lost that cohesion between

Birthday, Sweet Sixteen" hit the airwaves as he continues. "This goes out to Susie and Billy. They've been engaged for about three weeks. I wonder what they're engaged in..."

There are many things in life that are certainties. For example, there will be four seasons (more or less), Christmas will come every December 25th, and Bruce Morrow will always be Cousin Brucie.



An accomplished photographer (see framed photo at left), and a collector of vintage radios and television, Bruce "Cousin Brucie" Morrow poses with one of his possessions, a mint Wurlitzer 78 rpm jukebox.

(the audience) and radio now," he adds happily, it's back.

Today, "(people) are listening in to their friends," he says, meaning their favorite personalities. "Radio is not just a box. It's people. It's human. It's still that extension of the body."

The WCBS-FM weather bed is set into motion. Cousin Brucie looks at the forecast in front of him, and turns on his microphone. "Right now, in New York City," he says, as if the Big Apple encompasses every single home tuned in, "it's 43 degrees and kind of nice." The opening notes of Neil Sedaka's "Happy

"That's my epitaph," he said, with a smile. "It's good. I like it. People always like to go to their cousins' houses. Cousins always had the best food and good toys." With a laugh, he said, "You never wanted to go over to Grandma's, maybe, or your aunts and uncles, but your cousins you wanted to see."

And hear. All over the tri-state area, people want to hear to Cousin Brucie. And Cousin Brucie is ready for them. "I'm young, I feel energetic," he says. "I will continue doing this as long as I can. I'll never stop."

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## MANAGER'S NOTEBOOK

# Be a Fair and Effective Manager

by Sue Jones

**BURKE, Va.** Ideally we learn good management techniques through formal study and working with seasoned managers who practice good management principles. Sometimes we learn how to manage by observing poor management and the staff's response to it.

Perhaps you remember your personal feelings at the time you observed the negative example. We can all empathize with the person receiving an angry blast, no matter how well deserved, from the boss. Each time I've observed such an event, as well as other negative management examples, I vow to myself to never respond that way in a management role.

## Top of mind

When I was promoted to my first management position, I tried to remember I was both a manager expected to perform tasks and provide leadership that would contribute to the company's bottom line success as well as a role model for the staff—some who would become managers in the future.

Whether you are in your first management position, or you are a seasoned manager, take a moment to ask yourself the following questions.

- **Investigation**—Does your staff know you as a manager who gathers all the facts before deciding on a course of action? Or do they know you for knee-jerk reactions to daily problems?
- **Measured Response**—When solving a problem, do you evaluate all the options before selecting the solution most beneficial to all? The other side is giving the appearance of being decisive and action driven by not taking the time to evaluate all possible solutions.
- **Balance**—Do you treat the on-air staff, engineer and sales staff with the same level of professional respect even though you may not seek them as close friends?
- **Fairness**—If a position were to become vacant at the office, would you consider any staff member who wanted to apply for it who met the position requirements? Are your pay scales the same for males and females for the same position with equivalent experience?
- **Double Standard**—Do you follow all the station's policies and procedures? Are you as punctual as you expect your staff to be? You cannot expect your staff to follow the rules if you ignore them or consider yourself above them.

## Explanation or directive?

• **Communication**—Do you have an open-door environment encouraging the staff to approach you about just about any topic? Can they ask questions without fear of retribution? Or is your communication approach formal, rigid and memo directed?

Do you openly communicate the reasons behind policy changes or simply convey the change via memo without explanations about why the changes were necessary and the supporting reasons for the changes?

Do you encourage staff idea exchange and suggestions for new sales approaches, promotions and daily operations? Do you direct the staff to concern themselves only with their responsibilities? Do you encourage every staff member to offer

ideas and suggestions or only a selected few?

Do you have regularly scheduled staff meetings where generalized information is disseminated and each manager gives feedback to management on their department?

Do you have a grievance procedure for staff who have a problem with a current situation?

• **Confidentiality**—If a staff member confides a personal or professional problem or concern with you, do you keep that information confidential?

• **Friend versus Manager**—Are you

attempting to be everyone's best friend? If so, that perspective will cause future problems. Think of it this way: You expect the president of the U.S. to do a good job and lead the country in all its various aspects. But you probably do not expect the president to be your best or even a good friend.

• **Consistency**—Are your explanations the same to every staff member? Or do you change the slant or meaning when talking with different employees? Do you take a position with one staff member and take the opposite position with another staffer?

Are your responses to problems the same daily or do they vary from day to day?

Unpredictable responses to similar problems can force your staff to withhold information from you fearing an angry or unknown response.

## Credit where it is due

• **Giving Credit**—Do you give your employees credit for original ideas and do you recognize their contributions publicly? Or do you take your staffs' ideas and promote them as yours?

• **Honesty**—Are your explanations to the staff the truth? Or do you tell them one thing and reverse the explanation at some time in the future?

• **Bait and Switch**—Do you honor the promises that you make to your staff members? Are you guilty of making a promise and when it comes time to

continued on page 22 ▶

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## GUEST COMMENTARY

# Copywriting Essential to Radio Spots

by Charles Fuller

**BOLINGBROOK, III.** "What can be done to breathe new life into your sales department? Is the problem the product? The people? The presentation? The price?" As I read Karl Baehr's words in the January 12 *Uplink*, I thought: "There's one area missing from Karl's inspiring article. He never asked: Is the problem the copy?"

Likewise, Bob Harris, writing excellent advice in the same issue, remarks upon all the sales opportunities available for the staff to present every week—but he too forgot to mention the value of copy that hits the mark and excites the client.

## Vanishing art form

Sales are up, but staffs are being downsized. Copywriters are becoming a vanishing breed in many radio operations around the country. But just read *RW* issue after issue to find stats and stories that emphasize the growth of advertising revenue in radio.

Despite recession woes, fantastically increased competition for the audience from TV, cable, videos, games and unidentified challenges, radio's ad revenue continues to expand.

The seeming explosion of radio advertising places stringent demands on the sales staffs of stations in all size markets. Special considerations (value-added proposals), remotes, contests, gimmicks and, most of all, commercials that work for the client have been contributory to radio's continuing success.

Not to slight the programmers and on-air talent, whether local, syndicated, packaged or any other variety of delivery, the entertainment value of radio from the

fragmented music formats to talk, discussion and specialty/ethnic programming has continued to excite and involve listeners, thus providing the kind of audience attention and response needed to support the claims that bring about the increased sales activity in most markets.

*RW* reported in January, in an article entitled "1993 Radio Ad Analysis Shows Growth," that "Overall, every region of the country posted increases for 1993." Quoting Gary Fries, RAB president, "This is an exciting time for the radio industry and its advertisers... and optimism is high for the coming year."

## It's how you say it

Hooray for sales. Hooray for the salespeople who are not out there on the front lines, suffering rejection and fierce competition and succeeding in ever-greater totals. But what are they selling: schedules, avails, packages? What?

And what about the commercials themselves? Apart from the dedicated radio advertisers who prepare their own commercials through their own ad depart-

even the craftsman in the production room has been sliced, leaving the battered salespeople on their own, trying to create selling prose that will deliver the results that their promises have promised to the advertisers.

Enter a detour that solves the problem, one that many sales managers and their staffs have begun to take so that they may concentrate on their greatest talent, selling, rather than having to spend valuable street or phone time grappling and struggling to write flowing, convincing, selling copy.

Harken to the detour. More and more, as staffs become increasingly sales-oriented, stations and sales personnel have inclined toward calling upon a small but growing niche service to broadcaster, cable operations and TV: an independent copywriting service.

## Who you gonna call?

An independent copywriting service can relieve a salesperson of the often taxing and very time-consuming task of creating professional, high-quality commercial copy for both local and regional accounts, campaigns on demand for special blue-chip local advertisers, assistance in finding talent, and a variety of other services. Those things

that many stations once tried to provide in-house are now successfully offered through these independent copywriting services in a cost-effective and time-saving fashion.

Minneapolis' Ghostwriters, Chicago's Copy on the Spot and a variety of other such services have begun to receive a warm welcome from beleaguered sales crews. With a variety of rate schedules, most such services deliver right-on-tar-

**Despite recession woes, fantastically increased competition for audience from TV, cable, videos, games and unidentified challenges, radio's ad revenue continues to expand.**

ments or through advertising agencies or independent producers, what about the radio station copywriter, if such a creature still exists?

Salespeople sell, copywriters write. But in many operations across the United States where staffs have been shaved to the bone and the lean, mean operation is the battle cry of the day, copywriters have often become a thing of the past. In some smaller markets,

commercial copy for both local and regional accounts, campaigns on demand for special blue-chip local advertisers, assistance in finding talent, and a variety of other services. Those things

get copy within 24 hours of the order which, as any experienced salesperson will admit, is often much faster than it used to be with a copywriter on staff.

Sales will continue to increase, according to Bob Coen, presenter of the annual McCann-Erickson Worldwide Media Outlook Conference. At the end of 1993, he said the outlook for U.S. advertising is "clearly brighter" than it has been.

As Karl Baehr wrote in *RW*'s January 12 issue, "Radio is, dollar for dollar, the fastest way to get a business or product into the minds of customers," and those of us in the profession of writing the copy that gets into those minds are ready, willing and able to support that sales activity.

□□□

*Charles Fuller has more than 25 years experience in the broadcast and advertising business. Currently at Copy on the Spot in Chicago he works in narration, training and product infomercials. He is an instructor of broadcast management and voiceover at Columbia College. Reach him at 708-739-0044.*

# Bad Habits To Avoid

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deliver change the commitment?

• Anger—When you discover that a task is not done, do you have a bellicose response aimed at the responsible employee or do you attempt to get good information from him or her about why the task was not completed? If corrective or disciplinary action is warranted, do you conduct those discussions in privacy instead of in front of the rest of the staff?

• Corrective Action—When a problem exists, do you focus on the person instead of the situation, issue or behavior? Is your objective to resolve problems or issues immediately punishing those involved; or do you attempt to maintain the self-confidence and self-esteem of others when dealing with problems?

• Leadership Example—Do you lead by example or is your philosophy: "Do as I say, Not as I do."

## Mirror, Mirror

If you recognized any of the above negative management traits as part of your management style, chances are good that you are alienating several, if not all, of your staff. Some of these negative management techniques seriously erode your integrity and credibility. If integrity and credibility are lost, your staff will complete the minimum amount of work to satisfy their jobs' requirements. They will be easily lured to other stations because they will have no loyalty to you or your station.

Keep in mind that you can have a well organized station with all the appropriate management tools such as position descriptions, written policies and procedures. However, if the management style does not conform to the standards and provide leadership by example demonstrating fair and balanced management, your actions will speak louder than your written words.

□□□

*Sue Jones is a Senior Manager at Computer Data Systems Inc. in Rockville, Md. She can be reached at 703-323-0491.*

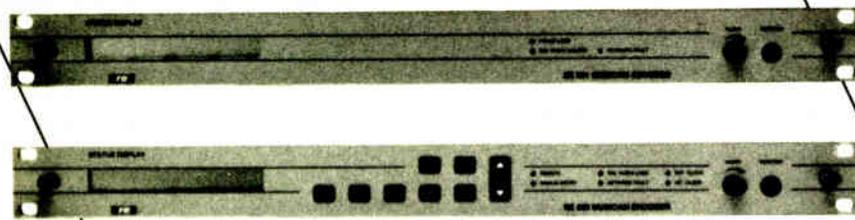
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# Staring Down Those Computer Demons

by Richard Bednar

**CHAMPAIGN, III.** It is not easy being computer illiterate in this day and age. For years I blissfully watched the computer revolution pass me by. I was raised on IBM Selectrics, not word processors.

With over 30 years of broadcast production experience, I was far more comfortable with the trusty feel of an Ampex reel-to-reel recorder than a mouse and a computer screen.

Recently, however, I convinced myself it was time to try the new technology. I bought a digital audio workstation and, surprisingly, a very computer-like one at that. My attitude has changed dramatically.

If you are like I was—unmotivated to enter the computer age—I can tell you it is possible to operate a DAW, even if you know nothing about computers.

## Shopping

I was introduced to the digital world a couple of years ago when a local radio station purchased a Studer DAW. As the owner of a recording studio specializing in radio and TV soundtrack production, I was interested in at least seeing the new gadget. I was impressed by the quick demonstration by the station's production director.

I began a serious investigation of DAWs about a year ago by reading the reviews of various models in the trade press. My first impulse was to choose a particular model that claimed to be "broadcast-like" in appearance and operation. It included a small mixer board that seemed an easy jump from the gear I had been using for years.

Alan Thacker, resident DAW expert at GAND Audio in Chicago, invited me in for a demonstration of the model I liked. I came away disappointed. It could do amazing things, but the visual display did not seem quite right. Somehow, the system did not seem like something I would enjoy using.

After the demo, Alan turned to a table with a computer and a mouse and said, "Now over here is another system." I was wary.

He went into a dazzling demonstration of the Spectral Synthesis system that left my head swimming. The visual display was far superior to the other model's, and the system could be hooked up to an eight-pot mixing board that made it more broadcast-like.

I went home determined to forget about buying a four-track reel-to-reel unit, and to jump into the computer world. Initially, I worked with my daughter's home computer, trying out the basic operational lessons with Windows software.

This still did not exactly turn me on, but I was determined to learn so that I could graduate to a DAW. I didn't care about all the computer jargon; I just wanted to know how to make it work for my broadcast production needs. I saw another simple "broadcast-like" system demonstrated at the University of Illinois, and like the first one, it did not seem to fit.

Alan gave me some hands-on training on the Spectral system during a return trip to Chicago, and I was more convinced than ever that Spectral was the

system for me. He spent two days with me, and I took careful notes. I also read the Spectral instruction book, but I

(Several other Spectral buyers have since call me to ask for copies of these notes, which have gladly provided.)

no mistake. With any DAW you buy, once you get it home, you're pretty much on your own."

**Those of you who are shying away from DAWs because they seem too computerlike, take heart. I dragged myself into the 1990s, and I still don't know a megawatt from a megabyte.**

found the notes more helpful. They are a handy reference guide that I still use from time to time.

For me, one of the most helpful passages in my notes was a comment by the audio operator at the university: "Make

## Setting up

A local computer store helped me select the proper machine to go with the Spectral system, an IBM tower-style computer. I also bought a large color monitor that makes the Spectral graphics display even more impressive.

I love the fact that you can name the tracks instead of just staring at a bunch of blocks or waveforms moving across the screen. (You can waveform edit with

continued on page 28 ►

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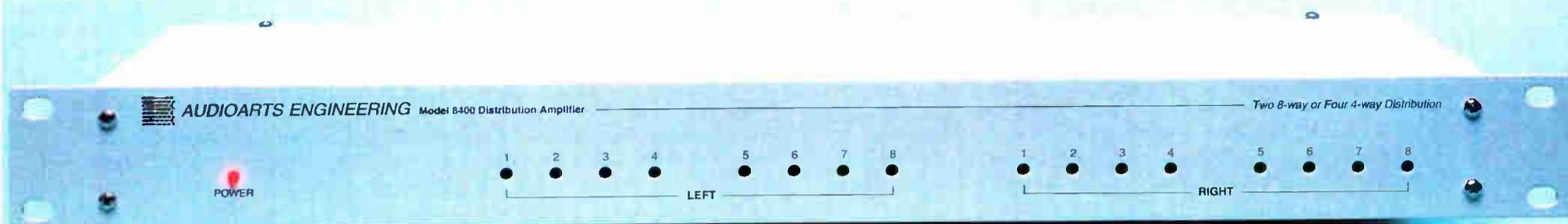
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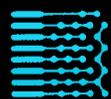
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# Granville Klink: A Passion for Radio

by Whitney Pinion

**WASHINGTON** There is a flurry surrounding new technology and its implementation—it narrows the focus of radio to the future. And in spite of its recent appearance in the history of the world, radio counts among its pioneers many men who not only shaped the medium, but continue to contribute to its longevity.

The stories of early radio can be told well by one such pioneer, Granville Klink. Klink has spent 57 of his 84 years as a radio engineer, now working for WTOP NewsRadio 1500 in Washington. For 27 years, Klink served as chief engi-

wheelchair-bound president to use during public broadcasts.

Klink claims that FDR was a master at using radio to stay connected to the American people. "He used radio to the greatest advantage of any president that we've ever had."

### Variety of tasks

FDR's broadcasts weren't Klink's only jobs when he joined WJSV. He was assigned to field operations and did remotes for the big radio shows that came to town. He did "Amos and Andy" and "Report to the Nation," a show now broadcast on television as "Face the

was one of the great pleasures of his job.

Klink also worked with Arthur Godfrey and Ed Murrow through the years. "For 39 weeks I did nothing but work for Godfrey," he says. "I was assigned to play his records for him in the morning." Klink remembers that at one time Godfrey was "Singin' Sam the Barbisol Man" as part of an advertising campaign. That memory makes him chuckle. Klink also helped wire Godfrey's farm for radio broadcasts.

Ed Murrow used to visit Washington often, Klink recalls. The two of them would haul equipment to the Capitol to record the opening session of Congress, with accompanying commentary from Murrow. "We had a special setup in one of the libraries. Then we'd run his microphone out onto the floor. We had seven other microphones on the floor which could pick up almost anything. Seven microphones was quite a large setup in those days."

### Change of focus

So how does radio today compare to radio of yesteryear? In the early days, Klink says, a radio station was run by the engineering department, a team of technical people who could work well together. "Now the so-called 'bottom-line men' are running things," he says. "Without us they couldn't do it, but sometimes we feel that they don't realize that."

Klink has seen radio grow and transform in a number of ways through the past five decades. "In the early days we didn't have formats," he says. "A radio station was something for everybody."

Of course when Klink first came to Washington, there were only four stations. Now there are ten times as many stations in the metro market, each searching for its own niche.

Klink witnessed the onset of the age of television and its effect on radio. "In the late '50s the programming started to

continued on page 28 ▶



Granville Klink (center), WTOP consulting engineer who has been with the station since 1937, is flanked by CBS commentator Charles Osgood (r) and Jack Gandy (l) WTOP production technician.

neer for WTOP-AM-FM-TV. When asked to retire in 1978, he said, "No, I'd like not to retire." And, as he puts it, "So here I am."

Radio has been a lifelong source of pleasure for Granville "Granny" Klink, and he wants to stay involved in the business as long as he is able.

### Early tube sets

"When I was 12 years old I was building tube sets," says Klink, explaining his early interest in radio as a kid in Pennsylvania. As a young man he worked as an amateur radio operator and passed the Federal Radio Commission exam for a radio/telephone license in 1932. "In those days, you couldn't get a job in a radio station without a license. I've made my living on that license ever since 1937."

1937 was the year Klink landed a job at WJSV(AM) Washington, a move that literally put him next to President Franklin Roosevelt. Klink was one of the engineers assigned to broadcast FDR's famous Fireside Chats from the Oval Office. "We did general coverage of the president in those days," he says. "I did his Fireside Chats and a lot of his election hearing broadcasts, and I followed him around during the war."

One of the most memorable moments of his career happened Christmas Eve 1943, when Klink and his colleagues traveled to Hyde Park, New York, on the president's train and broadcast that evening's Fireside Chat from the study in Roosevelt's home there.

According to Klink, the radio industry was very close to "Mr. Roosevelt." "He depended on us and we depended on him for his broadcast." In fact, Klink and a few other engineers designed a special knock-down microphone stand for the

Nation."

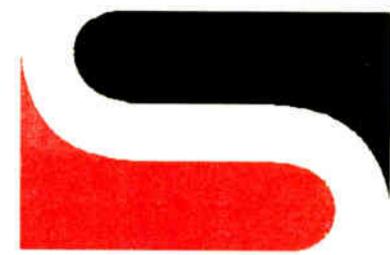
During the war, various dance bands played at the Roosevelt Hotel, and Klink was responsible for setting up remotes there. "I worked with a lot of the performers before they were even heard of," Klink says, mentioning the Clooney Sisters, Milton Berle, Benny Goodman, Abe Lyman, and Fred Waring. Working with these talented performers, he says,

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# Taming the Computer Demons

► continued from page 23  
this system, if desired.)

Spectral has all the goodies, including easy editing and top-quality digital sound. I still have not scratched the surface of all it can do.

The only disappointment is the sound of the time compression, which I have not found satisfactory. Spectral says it has improved this feature in a software upgrade, which was recently sent to system users.

You can use a mouse to move the

pots up and down on the on-screen mixer display, but I found that cumbersome. Instead, I have the system hooked up to a Cooper CS-10 eight-pot mixing board and it works very well. Again, it feels much more broadcast-like.

I have had to call the factory for information on various details on several occasions, and the answers have always been helpful. The system also seemed reasonably priced.

All in all, I am still dazzled when I sit down to produce a spot

on the Spectral.

Those of you who are shying away from DAWs because they seem too computer-like, take heart. I dragged myself into the 1990s, and I still don't know a megawatt from a megabyte.

□□□

*Richard Bednar is owner of Richard Bednar Creative Broadcast Production, Champaign, Ill., and a writer/producer at WCIA(TV) Champaign. He can be reached at 217-359-5369.*

# A Passion For Radio

► continued from page 27

change. Soap operas were gradually disappearing from radio and coming up on television."

But radio itself isn't the only thing that's changed. What listeners find entertaining has changed as well. Klink laughs when Howard Stern's name is mentioned. "I think he shouldn't be on the air, but of course I'm not the manager of the station that puts him on." He says audiences a few decades ago wouldn't have tolerated Stern and his type of humor, which Klink considers obscene.

Klink prefers listening to the news format that WTOP embraced in 1969, including all the sports coverage. He and Arch McDonald used to broadcast the Washington Senators' baseball games from Griffin Stadium, and nowadays he likes to keep up with the Orioles. Klink says he likes to fall asleep each night with his radio tuned to a station that plays "the old-time dance band music."

When asked about all the technical options facing radio, Klink can only describe them as "mind-boggling." "There's hardly any way of telling what's going to happen with satellite communications," he says. Although he predicts drastic changes in the communications business as a whole, he says that modern technology isn't going to have as many in-roads into radio as it will in television. His frustration with this technology is that, with satellite, cable, and DBS, there are so many different ways of getting a program to an audience now that radio is becoming "muddled."

Klink regrets that solid state has made the vacuum tubes he was so accustomed to nearly obsolete, although he's pleased with the improved quality of transmitters and audio and studio equipment. He's still waiting, though, for a high-power transmitter that doesn't use tubes.

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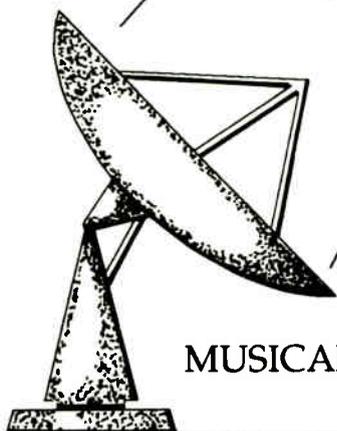
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# WORKBENCH

## Routing Ideas Improve Operations

by John Bisset

**SPRINGFIELD, Va.** I recently had the pleasure of attending the Charleston, W.Va., chapter meeting of the Society of Broadcast Engineers, and got a chance to tour West Virginia Radio Corp.'s recent station acquisitions. The group now has two AMs and two FM's in the Charleston area, and is in the process of building a coordinated studio facility.

Jim Murphy, director of engineering, showed me a novel way to record feeds without tying up the console. Each of the inputs to the studio tape machines are tied to PR/E LS-10 line selectors. The idea is that any feed, whether it be from another studio, the hybrid, a remote loop or the satellite, can be punched into the input of any recorder.

It is a simple idea that vastly improves the efficiency of the air talent. Signals are not routed through the audition channel, so there is no chance of accidental airing of what is supposed to be going through audition.

Jim also has his own method for routing wires into the studio. He runs a four-inch PVC from the ceiling to about counter height and connects a sweep. The sweep

By the way, Jim is looking for a chief for the new plant. If you're interested, contact him in Morganstown, W.Va., 304-296-0029.

★ ★ ★

System hum during frequency measurements is often noticeable, often due to

### Bigger is not necessarily better in the evolving world of digital workstations.

simple ground loops or bad power supply capacitors. Hum can also be caused by different pieces of equipment in the chain on different power company phases.

Ed Burkhardt of Burkhardt Monitoring Service says his clients sometimes dispute his hum readings, saying the value is not as bad as their station monitors indicate. Aged coupling caps affect the bass response on these monitors.

Ed suggests checking with a sweep of an oscillator from 1 kHz to 20 Hz fed directly into the exciter to find any loss of metered bass points to bad monitor coupling caps.

design uses magnetic latching relays that interface to the Broadcast Audio console. A momentary open collector pulse from the machine start logic on the console operates the appropriate crystal relay and resets the previously selected relay.

Bill mounted the entire circuit on a two-

by-two piece of perfboard, mounted to the top edge of his S.A. manual crystal selector switch board. This keeps the leads extremely short.

A separate 12 VDC supply powers the control circuits, but since current drain is negligible and is not continuous, the receiver power source can also be used.

★ ★ ★

Bigger is not necessarily better in the evolving world of digital workstations. It was easy to miss PHONE BYTE state-of-the-art digital recorder, which was tucked away at The Blue Group's booth in a corner at the National Association of Broadcasters.

PHONE BYTE is designed to record and play back phone calls, replacing your reel-to-reel recorder. It automatically logs the time and date you start a new recording.

A scratch pad feature allows you to type a short note about any or all of the

recordings, useful during request shows. Enter the name of the song requested, then later in the show, search for the needed audio by simply entering the song title.

PHONE BYTE can be started from the console, and has relay outputs to drive lamps or start other equipment. The screen also includes both elapsed time and remaining time displays.

Just like a tape recorder, you can cut and splice phone bits. Unlike the recorder, if you make a mistake, you can restore the original.

The Blue Group also produces the DigiStation hard drive automation system. If you would like a copy of the company's data sheet, circle Reader Service 179.

★ ★ ★

MECI, which bills itself as "your electronics value company," has released a summer catalog complete with everything from capacitors to fans to cables and connectors, also featuring several off-beat items an engineer needs: Touchtone keypads for under \$2; an assortment of relays for under \$1 each; difficult-to-find electrolytic can caps, and a variety of project boxes and cases.

If it's time to replenish your stock of project parts, and you have not received the summer MECI catalog, be sure to circle Reader Service 113.

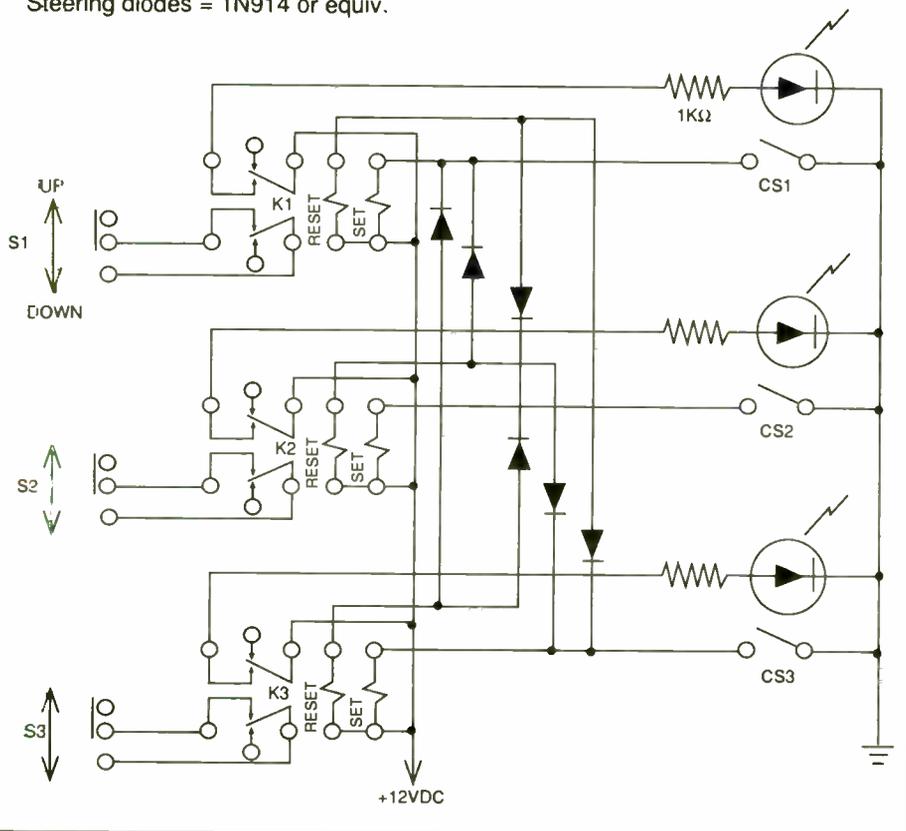
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John Bisset is a principal in Multiphase Consulting, a contract engineering and projects company. He can be reached at 703-323-7180. Faxed submissions can be sent to 703-998-2966, and qualify for SBE recertification credit, when published.

Figure 1.

#### Remote Transponder Switcher for Scientific Atlanta DAT-32

S 1, 2, 3 = Xtal selector switches in downconverter.  
CS 1, 2, 3, = Momentary SPST or pulsed open collector in console.  
K 1, 2, 3, = P & B T83S11D132-12 dual coil latching relay.  
Steering diodes = 1N914 or equiv.



is designed to protrude from the wall at the point where the wiring trough is located on the back of the console. It is an inexpensive, but effective way of keeping wires in order.

Jim is pleased with the performance of his Audiometrics CD players. The only problem has been a misadjusted microswitch, which rejected CDs when they were inserted. The problem was easily fixed by properly realigning the microswitch.

You can reach Ed Burkhardt at 804-261-1800. Burkhardt Monitoring recently distributed a client memo, full of good maintenance tips. If you'd like a copy, circle Reader Service 33.

★ ★ ★

Bill Draper at WKIP(AM) Poughkeepsie, N.Y., sent me his version of a transponder switcher, which he has been using for several years on his Scientific Atlanta DAT-32 (See Figure 1). Bill's

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**READER SERVICE NO. 204**

## OFFBEAT RADIO

# Radio Is Powerful Political Force

by Dee McVicker

**BRATTLEBORO, Vt.** While in the process of enmeshing himself into the health care reform debate in the state of Vermont, broadcaster Mark Hutchins was reminded of radio's magnetic pull, the same force that originally attracted him to the business back in the 1960s.

"The thing that got me into radio in the first place was that, all of a sudden, this one radio station everybody was listening to started playing music for us teenagers," said Hutchins, part owner of WKVT(AM) Brattleboro, Vt., and a longtime broadcast consulting engineer. "You could walk up and down the beach and everybody had the radio on. I remember thinking, 'Wow, this is powerful.'"

## Taking to the air

That feeling returned to him in February and March 1994, as Hutchins used radio to help beat back a health care bill before the Vermont House. The bill called for mandatory employer health insurance premiums, which Hutchins felt would be a devastating blow for the state's radio stations and other small business.

Health care reform is an especially important issue to Hutchins, not only as a small business operator, but as a diabetic who survived a kidney transplant after paying for years of costly dialysis treatments.

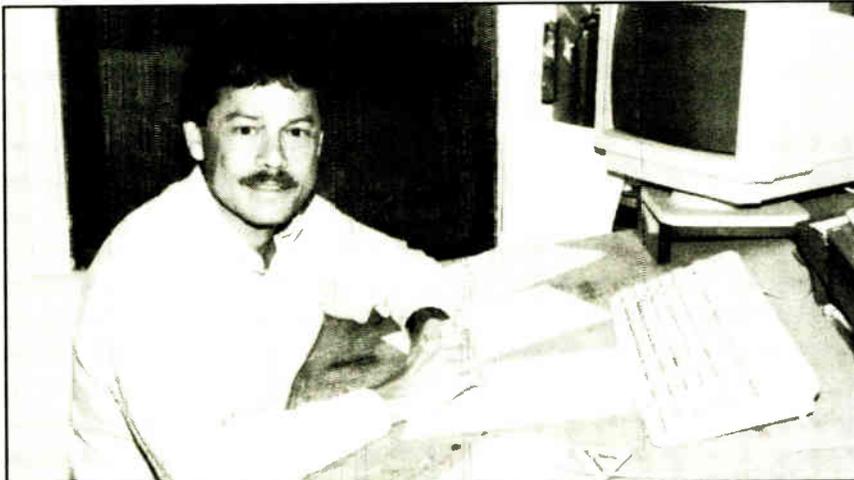
Hutchins registered as a citizen lobbyist, and began airing spots attacking the original version of the Vermont health care reform bill on WKVT in February. He realized almost immediately that radio would be the most powerful and economical medium to carry the campaign forward.

The radio spots were able to reach blue-collar, hard-working citizens more cost-effectively than TV or newspapers could deliver. "We have about five or six newspapers around this state and most of them are about a thousand dollars for a full page," Hutchins said. "I know that a thousand dollars in this state will buy an incredible amount of radio time if you place it carefully."

Besides, he said, "It wasn't happening in the newspapers.

People don't read the newspapers the way they used to, so editorials don't get the kind of impact that one of my station sales managers calls 'carpet bombing.'"

The radio spots prompted a flurry of calls to state legislators. "When they start calling the legislators, the legislators start going bananas in Vermont. If a legislator gets 25 phone calls on a particular issue, they realize



WKVT's Mark Hutchins used carefully placed radio spots to help block health care reform bill in Vermont.

that the public is hot and they better be careful to not do something that might cost them votes," he said.

Hutchins decided to expand his campaigning when a revised version of the health care bill was introduced. He began running the ads on 13 radio stations strategically located throughout the state. "I had to really swallow hard to buy my competition," he said.

Many of the spots aired on stations carrying the "Rush Limbaugh Show." "The one thing I knew about the Rush listeners is they couldn't disagree with me more philosophically, but they would find enough to hate in the (Vermont) bill—which is, by the way, the Bill Clinton bill really," said Hutchins, who favors a single-payer health care system.

## Powerful response

The spots, produced and paid for by Hutchins himself, were all real-life stories told by people who had experienced medical problems with the current system,

sometimes involving life-threatening mishaps. He interviewed clerks, shoppers and others in public places, and often brought them into WKVT's studio to record the spots.

Spots were put together late in the evening on digital equipment. "I put it all together on the Audiovault at 10 o'clock at night. I think in the old days I would never have tried to do anything like this, and I would have had much duller spots," he said. "It's been a long time since I did radio sales."

Throughout February and March, the radio campaign became familiar to many in the state. At the height of the campaign, Hutchins bought radio time where and when House leaders were most likely to be listening to radio. At one point, he leveled his hard-hitting testimonial spots at the state's governor, the bill's chief advocate.

"We knew which stations the governor was probably going to be listening to on his way into (the state capital), so I bought three and four stations deep in the capital area," Hutchins said.

He knew the strategy was a success when even more phones started ringing. "The Vermont House was livid when (the spots) first started running. People were calling the radio stations and legislators," he said.

Even the Speaker of the House received calls at his home, many of them from senior citizens "threatening to hit him with their canes," Hutchins said.

By the time Hutchins' campaign had played out, Hutchins had gained some notoriety in the community newspapers and attracted several interest groups.

He had also reacquainted himself with an appreciation for radio that harkened back some 30 years when, as a young diabetic, his mother called the station Hutchins hung out at to remind him to take his insulin.

Hutchins, who was cruising around town at the time, remembers clearly the power of radio when the station jock broadcast on the air to be on the lookout for Hutchins' red sports car. For a long time afterward, he said, "everyone would say 'Hey you're the one' everywhere I went."

Radio may not be exactly the same medium it was in those days, but even now, "we still have this really powerful thing," he said.

□ □ □

Dee McVicker is a freelance writer and a regular contributor for RW. She can be reached at 602-545-7363.

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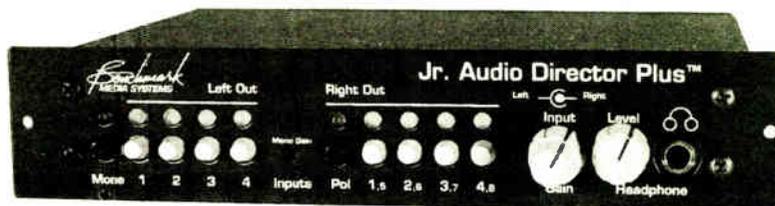
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FEEDLINE

# Combined AM Transmission Likely to Increase

by W.C. Alexander

**DALLAS** We are in an age when it makes sense for many AM stations to combine transmitter sites.

LMA and duopoly consolidations, the coming expanded AM band, and the overall cutback in AM station operating expenses will prompt many stations to consider combined sites.

Others are forced to combine sites when their leases are yanked from under them because the land has become too valuable to use as a transmitter site. Sometimes the governmental pressures of RF radiation and RFI regulation or eminent domain force stations from their established facilities.

Once a site is lost, it may be impossible to find another one. Urban sprawl, FAA conflicts and environmental regulations make it enormously difficult to pin down a piece of land for a tower. Many problems are solved if a suitable site on an existing tower can be arranged.

### The parts

For non-directional operation, unless the stations sharing the site are too close together in frequency (approximately 120 kHz or less) the considerations for diplexing are fairly straightforward. The licensee must first determine whether the site meets all FCC protection requirements for all modes of operation. (Such a study is not necessary if the move is less than two miles.)

## Diplexed DA systems can be done in some situations.

The requirement that the signal reach the 5 millivolt contour within the city of license must also be met, as well as tower height requirements. The tower will operate at low efficiency if it is too short or too tall.

Directional systems can be diplexed. In this company (Crawford Broadcasting) we have a three-tower directional diplexed with another station. The considerations for diplexed DA operation include all those that apply to non-directional operation plus many more. A description of all these requirements is well beyond the scope of this article. Still, keep in mind that diplexed DA systems can be done in some situations.

Combining two or more stations into a single radiator requires a set of RF networks to block RF from each transmitter from feeding through to the transmitter output ports of the others. These networks also prevent intermodulation and other spurious emissions.

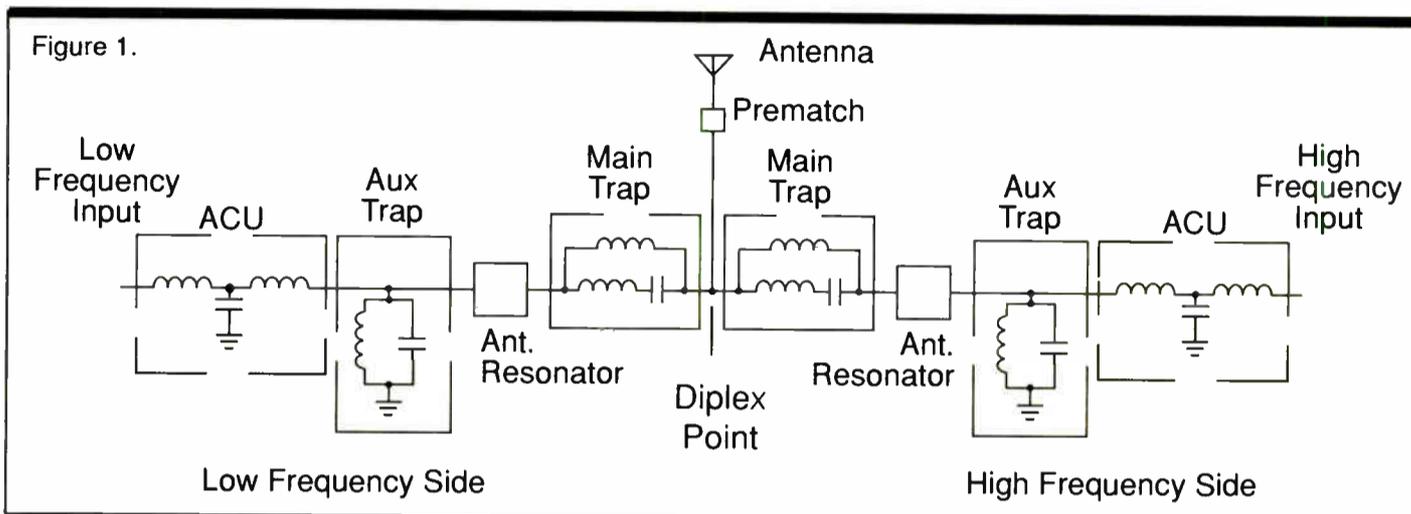
There are basically four parts to a diplexer, with each part duplicated on both the high and low frequency sides of the diplexer (see Figure 1):

- A coupling system, sometimes called the ACU (antenna coupling unit), is needed to match the impedance of the antenna through the filter circuits to the transmission line from the transmitter. The ACU is usually a simple T-network of conventional design.
- An auxiliary trap is used to reduce the

remaining energy on the reject frequency at the pass frequency input. It is configured so that it is parallel-resonant on the

insert a prematching network between the antenna and the diplex point. The network consists of a combination of

series/parallel resonance formulas you learned (and probably memorized) in tech school.



pass frequency, thereby providing a high parallel impedance (about 10 k $\Omega$ ) to pass frequency energy and series-resonant on the reject frequency, thus providing a very low impedance path (about 1 $\Omega$ ) to ground to reject frequency energy.

- An antenna resonator, a reactive component, is used to bring the impedance at the input of the auxiliary trap close to resonance. If the impedance at the input side of the main trap has an inductive reactance, a capacitor is used. If it has a capacitive reactance, an inductor is used. Some diplexer designs do not use this component.
- There is a main trap on each side of the diplexer. This network presents a high series impedance to reject frequency energy (about 10 k $\Omega$ ) and a low series impedance (about 1  $\Omega$ ) to pass frequency energy.

Both the main and auxiliary traps are made up of carefully selected components whose values are chosen so that the residual reactance of the parallel tuned circuit is series resonated with another component on the other frequency.

It is often possible to reduce the number of components by integrating the main trap and auxiliary trap into the ACU T-network. The main trap becomes the output arm of the T-network and auxiliary trap is the shunt arm. Reactance values of each arm are carefully chosen to provide both trapping and matching functions.

### Design considerations

Think of the diplex point as being similar to the common point in a directional system. It is the point where energy from both frequencies first comes together. The impedance at this point determines the stresses and Qs for the trap circuits on both sides of the diplexer.

Ideally, the branch point impedance at each frequency is as close to resonance as possible, with parallel resistance somewhere between 50 and 200 $\Omega$ . Remember that each main trap stores energy both at the pass and reject frequency; keeping the design close to these ideal values will yield enough series resonance so that the main traps' Qs will not be too high at the pass frequency.

If the parallel resistance remains in the 50-200  $\Omega$  range, it will keep the main traps' Qs reasonably low at the reject frequency.

Sometimes, depending on the impedance of the antenna itself, it is helpful to

inductors and capacitors that yield improved impedance at both frequencies.

For example, if the antenna impedance has a high inductive reactance at both frequencies, inserting a capacitor in series will reduce the inductive component of the antenna's impedance on both frequencies and will lower the parallel impedance. This tends to improve bandwidth.

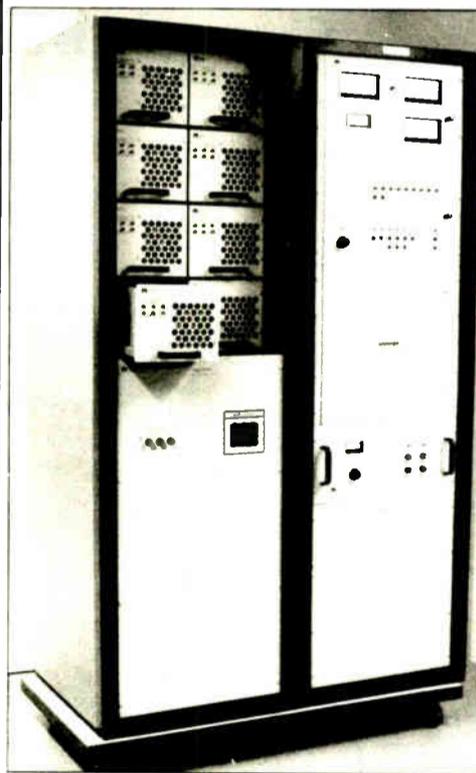
There are many formulas for computing the component values for the trap circuits in a diplexer, but they are fairly simple and are rooted in the basic

Despite the straight-forward nature of the component value calculation, it is best to find an experienced designer to build the diplexer. It is entirely possible to design a diplexer that looks great on paper but is so narrowband that the stations using it sound terrible on the air.

Bandwidth in a diplexer is determined by many factors, the most influential of which is the loaded Q of the individually tuned circuits. The lower the Q the less the isolation between frequencies. There

continued on page 34 ▶

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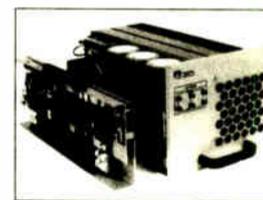
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# Tower Upkeep Must Be a Concern

by John Bisset

**LAS VEGAS** As one of the presenters at the "Towers and Other Transmission Support Equipment" spring NAB session said: "Towers and the transmission system are the most neglected of all broadcast station systems."

Next to an engineer's salary, this is probably true. For three hours, a number of recognized industry specialists spoke of the care and feeding of towers.

The session began with Craig Snyder of Sioux Falls Tower Specialists. He related how his firm got interested in guyed tower anchor shaft corrosion.

Snyder explained: It was by accident—literally. Two of his crewmen were critically injured four years ago when a tower they were climbing fell. The external visual inspection indicated the tower was safe to climb. What his men did not know was that one of the guy anchor shafts was badly corroded five feet below the surface of the soil.

## Safety hazard

This accident sent the company on a mission to develop Anchor Guard, a new product that minimizes corrosion on tower anchors. As the product was being developed, extensive research disclosed some pretty scary problems.

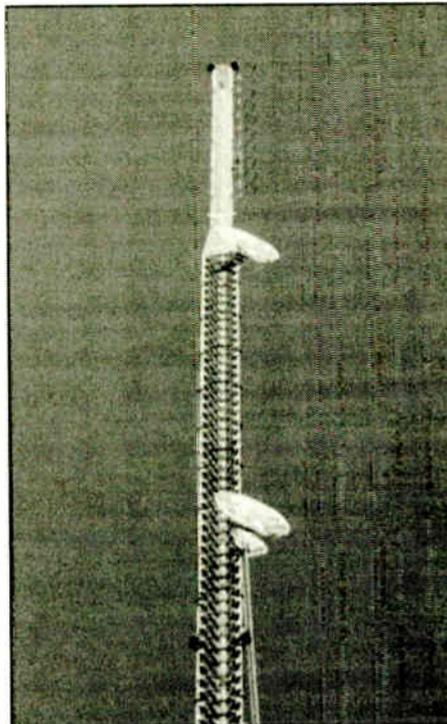
The first was how easy it was to find corrosion cells among buried guy anchors. Something as harmless as

backfilling the anchor hole with a different type of soil, such as clean fill dirt from another location, can set up corrosion cells that will eat away at the buried anchor.

Corrosion can be curtailed by using hot-dipped galvanizing. But in some buried conditions, the galvanizing will eventually wear out, and the anchor will begin to corrode and pit.

## Coat the tower

Another solution is to coat the galvanized anchor using a tar or black epoxy coating. As with galvanizing, however, the coating can also wear away. A third solution to anchor corrosion is encasing the entire anchor in a block of concrete. The concrete limits the electrical current flow. However, concrete anchors can crack, permitting soil and water to attack the anchor shaft in concentrated corrosion cells.



Towers, like the Jampro (pictured above) need a certain amount of care.

Mr. Snyder outlined a procedure for inspecting anchors. It consists of digging down about a foot, to expose the anchor shaft. If you see pitted, rusty steel, then a more thorough excavation and inspection is warranted, he said.

Snyder's presentation was a natural lead-in to J. Cabot Goudy's talk on controlling corrosion on broadcast towers. Goudy is with Structural Systems Technology in McLean, Va.

Surprisingly, he said, most older towers were simply painted, and are not galvanized. This is why it is particularly important for older AM arrays to be properly primed and painted.

Goudy explained how galvanizing controls corrosion by providing a protective coating over the steel. The galvanizing process is also self-healing. If a galvanized tower is scratched, the galvanizing process will actually heal itself. Paint over steel, on the other hand, will simply rust if scratched.

## Using galvanization

Galvanizing was chosen because it is a superior system. Although the coating is typically three to four millimeters thick, it will typically give 30 to 40 years of life—unless exposed to unusual conditions.

The galvanizing process can occur by spraying the molten zinc onto the metal, or the steel structure is dipped into a molten zinc bath at 850 degrees Fahrenheit. Galvanizing is a chemical process where the zinc chemically bonds to the steel. This bonding forms a series of layers. The outer layer is pure zinc. Each inner layer contains an increasing proportion of steel until the bare steel is reached.

Goudy pointed out that not all orange-coloring is rust. A picture was shown of a 15-year old tower with an orange-colored section. This was actually alloy layer staining. In this condition, the outer layer of galvanizing (pure zinc) is depleted, and the intermediate layers (which contain iron) are exposed to the atmosphere. The coloring appears to be rust, but is not.

## Tower nightmares

As a testament to the structural engineers of 30 years ago, a number of pictures were shown of "tower nightmares."

"That these towers were still standing was amazing. Ladders with holes completely through the metal, and other examples of severe corrosion were shown. Unfortunately, when the problem gets this far, the options for repair are limited.

## Combined AM Transmission

► continued from page 33

is a tradeoff between a system bandwidth and the level of isolation between ports.

## Band expanders

There are techniques available for improving the bandwidth of a diplexer. One may decide to bring the point where the main and auxiliary traps connect to resonance. By pre-matching the antenna and carefully choosing the components in the traps, this will often yield a workable design with acceptable bandwidth and isolation.

Another technique, described in a 1989 technical paper written by engineer Jerry M. Westberg, is the "Q-matching technique," which is a method for choosing the value of each component to provide a diplexed system with optimal bandwidth. It also minimizes the effect the traps have on station bandwidth while increasing isolation between stations.

I have used moment-method circuit analysis in conjunction with the Q-matching technique to design a diplexer with good theoretical results. This method deserves a second look by those who hold to traditional methods.

There are several unconventional methods. Mullaney Engineering developed a method that uses bifilar coils rather than conventional traps, which allows transmitters to decouple with virtually no leakage. Losses are reduced because of the absence of large circulating currents, and the task of impedance-matching is taken care of by the coils themselves. The simplicity of this method may be its most appealing aspect.

Another method uses a combination of a folded unipole antenna and conventional traps. With one wire per tower face per frequency, the stub position and tap point are selected to give the best impedance at each frequency, eliminating the need for pre-matching and cutting down on the RF voltages present in the traps. Some of the isolation is handled by the antenna itself, so the requirements put on the traps are reduced.

Should you find yourself in the hot seat to locate and secure another site for your AM station, consider diplexing. Not only does this get you around all the FAA and zoning issues, but it will provide the host station with some income that it probably needs.

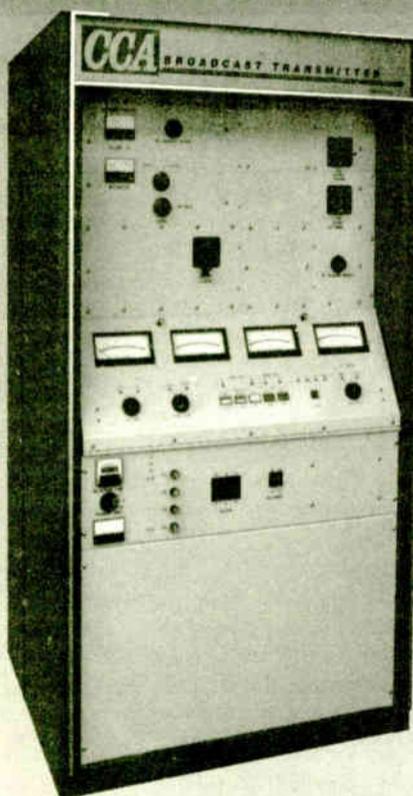
Even if you do not believe diplexing is possible, ask your consulting engineer to check out the possibilities. Creative engineers often find resourceful solutions, and there may be an innovative answer to your problem.

□□□

Cris Alexander is director of engineering for Crawford Broadcasting. He can be reached at Box 561307, Dallas, Texas 75356.

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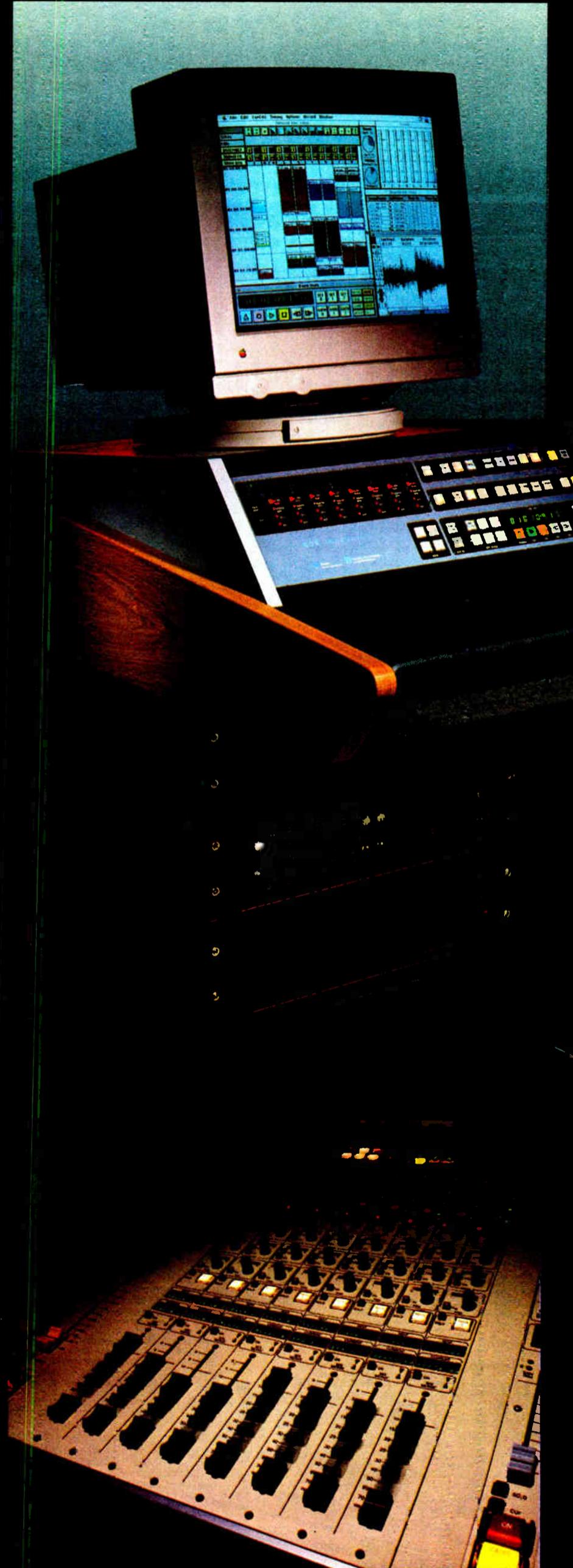
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continued on page 38 ►

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World Radio History

## INSIGHT-ON-RULES

# Rules Draw Multiple Interpretations

by Harold Hallikainen

**SAN LUIS OBISPO, Calif.** As we await the decision on the new Emergency Broadcast System, the FCC continues to enforce its existing EBS rules. In a recent Freedom of Information Act (FOIA) request at the commission, I found that nearly every station was cited for some EBS violation. One of the more interesting violations was a station not having a current EBS checklist. The current checklist is dated March 1, 1992. If you do not have it, call the FCC's EBS Office at 202-632-3906.

Most stations were cited for not consistently logging the transmission and reception of EBS tests in the station log. As part of the required chief operator log review, a weekly log entry of EBS test transmission and reception should be verified.

## Log review

I suggest a "log review form" where various items are checked off. The date and time of that week's EBS test transmission and reception should be recorded, verifying that they were indeed

all the violations is available.

For those with access to Internet, several resources are now available that can help you determine FCC policy. A short list is shown in Table 1.

## Old business

I received a call on an article where I discussed the FCC requirement that participants in telephone conversations be advised of the station's intention to broadcast a conversation prior to the start of the broadcast or recording for broadcast (Rule No. 73.1206). I used the example of a prank call I heard a station place.

According to the caller, these prank calls are available "canned" from programming services. As such, it appears that those calls would not violate 73.1206, assuming the participants in the call are actors and know they are to be broadcast. I wonder, though, if this could be a violation of Rule No. 73.1208(a) which states, "Any taped, filmed or recorded program material in which time is of special significance, or by which an affirmative attempt is made to create the impression that it is occurring simultane-

This is indeed what the FCC had in mind when this section was written, but the section was written before occupied bandwidth measurements were required. Harmonic measurements on DA stations are indeed to use the nondirectional carrier level as the reference level. The reason is that a directional antenna has a different pattern for the harmonics than it does for the fundamental while the pattern for the modulation sidebands is similar to that for the carrier. Use of the nondirectional field strength was a reasonable compromise.

At this point, I would suggest that

stations doing equipment performance measurements (EPMs) use the actual measured field of the carrier as a reference for in-band measurements (occupied bandwidth and intermod products) and use the calculated nondirectional field strength of the carrier for harmonic measurements. Further, though not specified in the rules, it makes sense to take the measurements in the center of the major lobe of the directional pattern.

□ □ □

*Harold Hallikainen is president of Hallikainen and Friends, a manufacturer of transmitter control and telemetry systems. He also teaches electronics at Cuesta College, San Luis Obispo. He can be reached at 805-541-0200. He can also be reached on internet at ap621@cleveland.freenet.edu.*

Table 1.

finger jrk@telcomlaw.com  
Returns a daily digest of FCC activity.

ftp ftp.fcc.gov  
login: anonymous  
password: your email address  
FTP access to FCC public notices, reports, etc.

ftp lcs.mit.edu  
login: anonymous  
password: your email address  
FTP access to Telecom Digest archives

ftp radio.aiss.uiuc.edu  
login: anonymous  
password: your email address  
FTP access to rec.radio.broadcasting archives

ftp ftp.clark.net  
login: anonymous  
password: your email address  
cd pub/rjk  
FTP access to various FCC documents

gopher radio.aiss.uiuc.edu 7070  
Gopher access to rec.radio.broadcasting archives

Usenet group rec.radio.broadcasting  
Discussion of radio broadcast topics.

Usenet group comp.dcom.telecom  
Discussion of telecom topics.

Email tech-request@airwaves.chi.il.us  
Subject: Subscribe  
This is a mailing list discussion on broadcast technology.

performed and that they were between 8:30 a.m and local sunset.

If an EBS test is missed, there should be a log entry explaining why and what is being done to ensure no more tests are missed. In many cases, the first clue the station had that tests were not being logged was the FCC inspector pointing out the problem. The chief operator should note this problem immediately.

Because of my FOIA request, the FCC is sending me a copy of all violation notices (and related correspondence) issued to broadcast stations in 1993. I have been sorting through the notices and keying them into a database. To date I have processed 200 rule violations. I will let you know when the report summarizing

ously with the broadcast, shall be announced at the beginning as taped, filmed or recorded."

I also received a call from John Riser at the FCC (202-254-3394) regarding interpretation of 73.44(d), which specifies equipment performance measurements on stations with a directional antenna are to use the nondirectional field as a carrier reference.

My interpretation of this rule, as written, would be that a station that is running a DA with 10 dB gain over nondirectional would have to have radiation at 15 kHz from carrier 35 dB below measured carrier level (the 25 dB specified in 73.44(b) plus 10 dB to make up for the DA gain).

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# Tower Upkeep Must Be a Concern

► continued from page 34

A procedure for repainting a non-galvanized, painted structure was presented. The metal is scraped clean (bare metal showing, no rust), a zinc primer is then applied, followed by the top coat of paint.

Paint over galvanized metal is perhaps "the Cadillac" of protection. Tests show that such combinations extend the life by an additional 50 percent. The procedure is time consuming, however, to insure the painted surface doesn't peel off.

Goudy then presented a video tape of a recent job where his firm used a

Skycrane helicopter to replace a broadcast antenna mast. The structure was a self-supporting candelabra, home to two FMs and three television stations. The helicopter was selected for the job because conventional rigging would have kept the stations off the air for at least a week, and the television stations had no backup.

## Chopper delivered

The helicopter reduced the down time to four hours. A Sikorski F-64 helicopter was selected for the job. This model had a 25,000 pound load capacity, and though the new antenna mast weighed

half that amount, the additional capacity gave more hover time, Goudy said.

Although a low ceiling caused by inclement weather postponed the project on the scheduled day, the mast was changed out the following day with no problem.

Plummer and Bendov of Dielectric Communications provided a variety of useful maintenance tips for both radio and television engineers. Their paper stressed the importance of thorough structural inspections. The inspections were also necessary for checking the transmission line and antenna systems.

Among their recommendations were:

checking each flange joint for loose or broken hardware, on a still night, listen for air leaks, and as you climb, feel the flange joints for excessive heating. Keep in mind, however, that some increase in temperature at the flange joints is normal.

It's also important to check the tension on spring hangers. For a 2,000 foot tower, if all the spring hangers were mis-adjusted by plus or minus one inch, the top spring hanger will be subjected to an additional load of 1,200 pounds. While checking the spring hangers, check for missing or worn guides and broken springs.

The elbow complex is another potential for failure, especially if it is poorly supported. The exposure to additional stress guarantees line failure.

Even the lowly dehydrator should be suspected. Because it operates primarily with mechanical parts, it can fail in as few as three years. Watch for sticking pressure switches and moisture-laden desiccant.

## A new line

The last paper in this session was presented by Andrew Corporation. The paper outlined the performance of a new transmission line that had a solid, rigid outer conductor and a corrugated inner conductor. The presentation described Andrew's new HRLine™, which won a RW Cool Stuff Award for new product innovation.

For years, broadcasters could choose from either rigid line or continuously corrugated line, such as Andrew's Heliast™. The new line is a hybrid, using the corrugated inner conductor of Heliast™ and combining it with the rigid outer conductor of rigid line.

In normal operation, the inner conductor is hotter than the outer conductor. When thermal cycles are added to the picture, such as when the transmitter is turned off and then back on, or the weather changes temperature, the inner conductor will grow faster than the outer conductor. In standard rigid line, this movement translates into sliding contacts at the bullets of each section of line. The continuous friction eventually will lead to line failure.

Andrew engineers looked at the bellows-type inner conductor of Heliast™, which was more forgiving of these temperature variations, and a hybrid of the two technologies was born. To further increase reliability, rather than use bullets at each joint, the inner sections are bolted together placing a tension on the corrugated inner conductor. As temperature changes occur, the corrugation of the inner conductor accounts for thermal expansion. Because of the bolting assembly at each joint, a very low contact resistance occurs, further improving the line's efficiency.

Andrew engineers also did the unusual—they let economics play a big part in this product. Realizing that the outer conductor of standard rigid line remained the same whether the inner conductor was solid copper or the new bellows material, they also market this new coaxial line as Inners Only™.

For existing stations, you leave the outer conductor in place, and simply purchase the new inner conductor—at a substantial savings. For new installations, the complete line is available.

Although only high power 6.125-inch line is presently offered, smaller diameters are being tested and should be brought to market by NAB 1995.



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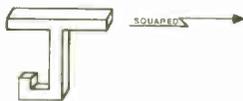
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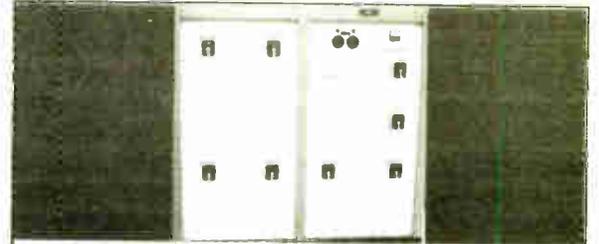
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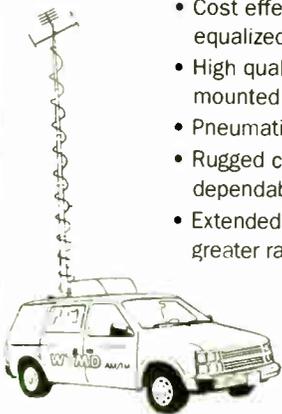
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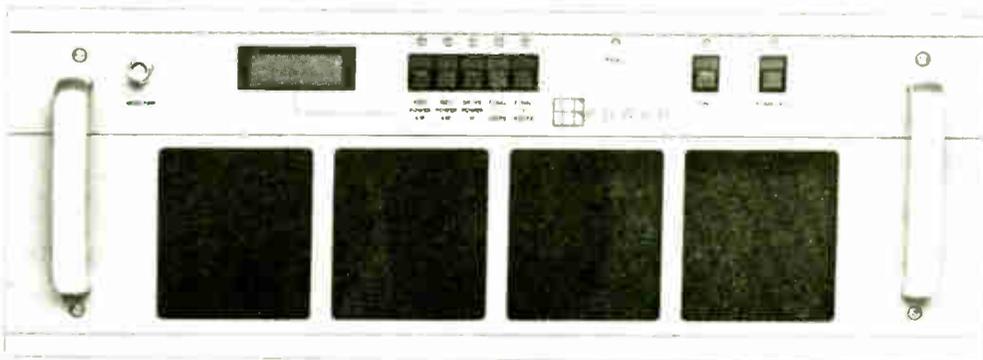
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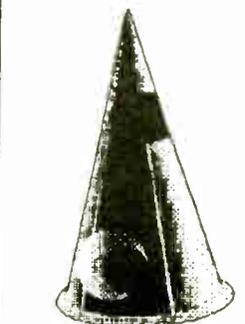
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# Caller ID Is an Ideal Tool for Talk Radio

by Richard Mertz

**FAIRFAX, Va.** As time goes on the marriage between radio and the telephone grows stronger and stronger. What with talk shows, on-air contests, and information lines, radio's ability to use the telephone as a vital link to its listeners improves.

There are times this link needs some help to get through the day. Take on-air contests. Many stations have a policy that permits callers to participate in contests only once a week or even once a month. How can you keep these folks and their speed dialers from spoiling the fun for the other listeners?

## Experience teaches

Back in my distant past, I worked for a news/talk station in Washington. Like all responsible news/talk stations, all calls were screened before they were turned over to the host and put on the air. The show producer would answer the phone and ask the caller what area of the city he or she lived in and for his phone number. This procedure worked great 99 percent of time.

The other 1 percent of the time, a person, known to the staff only as the "screamer" would call. What sounded to the producer as normal human would give a phony phone number and some area of the city. When the host would say, "Hello, you're on the air," this lunatic would scream at the top of his lungs.

It would be nice if these Neanderthals

could be screened before they can spoil the spontaneity of contests or the flow of talk shows. Well there is a way. That little device you have at home to screen your teenage daughter's phone calls. Yes, I'm talking about caller ID. That little burst of data between the first and second ring that tells the little box on the kitchen counter who's calling. Instantly, you know whether its a telemarketing caller or your mother-in-law.

How does it really work? And when will I get to a real application you can apply to your radio station operation? Hang on, here we go.

## What is it?

Ok, What is it? Caller ID is a service provided by most of the local phone companies that sends a bit stream shortly after the first ring. This bit stream is sent at 1200 baud, eight-bit, no parity and 1 stop-bit using Bell 202. Bell 202 uses FSK (tones shifting from 1200 to 2200) to transfer data. A good reference for more information on Bell 202 is the ARRL handbook.

The data sent from the central office is encoded as standard ASCII characters. The data is sent in one of two formats. The first is the "Single Data Message Format" (SDMF) and the other is "Multiple Data Message Format" (MDMF). Which format is used in your area depends on the service provided by your local phone company. Most areas

receive the SDMF format.

With the SDMF format, the caller's number and the date and time off the call is sent. The format is:

Byte 1	Message type (usually 04h for 04 in hexadecimal)
Byte 2	Length of the message
Bytes 3&4	Month
Bytes 5&6	Day
Bytes 7&8	Hour
Bytes 9&10	Minute
Bytes 11...N	Either the caller number or a reason for no phone number (An O is sent if the call is from outside the area. A P is sent if the caller has blocked his number)
Bytes N+1	Binary check sum of the bytes in the packet

With MDMF more information is transmitted, for example the caller's name. The format is slightly different than the SDMF format.

Byte 1	Message type (80h for 80 in hexadecimal)
Byte 2	Length of message
Byte 3	Parameter 1 type
Byte 4	Parameter 1 length
Byte 5..N	Parameter 1 data
Byte N+1	Parameter 2 type
Byte N+2	Parameter 2 length
Byte N...M	Parameter 2 data
	(additional parameters)
Final byte	check sum as in the SDMF format

The parameter types sent to the Caller ID decoders starting at byte 3 are sent in hexadecimal codes as follows:

Code sent	Description
01h	Time
02h	Callers phone number
04h	Reason for absence of the callers number
07h	Name
08h	Reason for absence of Name

If the caller ID decoder is sent a 01h, telling the decoder that time data is to follow, the time data will sent in the following format:

Byte 1	01h (tells the decoder time is following)
Byte 2	08h
Byte 3,4	month
Byte 5,6	day
Byte 7,8	hour
Byte 9,10	minute

The caller's telephone number field is setup as follows:

Byte 1	02h (tells the decoder that the caller telephone number is to follow)
Byte 2	Length of the following message
Byte 3..N	Caller's telephone number

If the caller's number is not sent then the absence of the caller's number:

Byte 1	04h (tells the decoder that a reason for the caller's number not being sent is to follow)
Byte 2	01h
Byte 3	Either an O or a P is sent

If the caller's name is sent, it comes in the following format:

Byte 1	07h (tells the decoder that an name will follow)
Byte 2	Length of the name (usually within 01h to 0fh)
Byte 3..N	Up to 15 ASCII

If the caller's name is not sent then the absence of the caller's name:

Byte 1	08h (tells the decoder that a reason for the caller's name not being sent is to follow)
Byte 2	01h
Byte 3	Either an O or a P is sent

Now that you know how the data is sent, how can you use it to prevent the "screamer" or the contest pest from getting through? It would be nice if those over the counter caller ID boxes could be hooked to the serial port of a computer, wouldn't it. AT&T used to make such a device. I recently tried to locate this device when I was preparing for this article. After many phone calls through the many AT&T divisions, I came up dry.

Several months ago, John Bisset wrote in a *Workbench* article about a company called Pewee Valley Innovations Inc. from Crestwood, Ky. These folks make a special card that is PC-compatible called "The PC Receptionist."

This card plugs into your PC much like installing a modem. Your phone line is plugged into the PC Receptionist card's line input. The phone jack on the card is then connected to a phone or phone system. Once connected to the phone line, and with the TSR PC Receptionist software loaded, you're ready.

When a call comes in, the first ring is sensed by the PC Receptionist and the data is received. The first ring's voltage is prevented from reaching the phone. Once the data is received, the second ring's voltage is connected to the phone. At the same time you hear the ring, the computer screen has displayed the caller's number. If this number matches a number in the PC Receptionist's data base, the name of the caller is also displayed. When the "screamer" calls in, his name shows up and the talk show producer can ignore the call. The same can be done for those who constantly tie up contest phone lines.

Pewee Valley can provide special programming assistance allowing the PC Receptionist card to work with other software packages. That's it for this month. Excuse me, there's the phone.

□□□

Richard Mertz is a partner at the consulting engineering firm of Suffa and Cavell, Fairfax, Va. He can be reached at 703-591-0110 or through Compu-serve, 73020,3026.

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BGW Systems 750C pro pwr amp. R Williams, WIOV, 44 Bethany Rd, Ephrata PA 17522. 717-738-1191.

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Crown power amp, silver face, \$275. B Wilson, 4400 Old Lebanon Rd, Campbellsville KY 42718. 502-789-1505.

Radix TP500 preamp; Microtrak 6405 preamp, BO. M Comfort, WQNN, 3405 Frontage Rd, Columbus MS 39705. 601-328-7124.

RTS-405 stereo preamp (2), used 6 mos, \$140 ea + shipping. B Lord, Lord Bldg Co, 13313 SE 208th, Kent WA 98042. 206-631-2374.

Dynaco stereo 120 solid state, rack mount \$229, Dynaco stereo 70 tube amp all new tubes! Dynaco PAT 4 pre-amps \$59. W Gunn 619-320-0728.

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Radiation Systems P9A120G (3), grid 940-960 MHz STL xmit/rec, \$3300; Radiation Systems P9A72G (2), grid 940-960 MHz STL xmit/rec, \$1950. J Stanley, Colfax Communications, 60 S 6th St, Minneapolis MN 55402. 612-373-0104.

Andrews 3" line (56'), new; Cablewave 1 5/8" (20'), new; Cablewave 1/2", used, 50', 100', 250'. F Nienow, WYTE, POB 1030, Stevens Point, WI 54481. 715-341-8838.

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Harris FMXL 3 bay CP FM, on 99.3, \$1500. KLBQ, 1904 W Hillsboro, El Dorado AR 71730. 501-863-5121.

Jampro 2 bay, on 99.3, 300' Andrew coax w/ 1 5/8" connectors; Rohn 55, 300' tower, still erected. D Denver, KUTT, 414 4th St, Fairbury NE 68352. 402-734-5521.

Pirod tower light control, needs work. F Nienow, WYTE, POB 1030, Stevens Point, WI 54481. 715-341-8838.

Scala CA series, low power, 4 bay TV antenna for chan 2, incl cable harness & pwr divider. P Delaney, RR2 Box 106A, Lacrescent MN 55947. 507-875-2065.

Andrew H59-50, 5" coax, 500' on spool in Brooklyn IA, BO. R Henry, WPIO, Box 6501, Titusville FL 32782. 407-267-3000.

### FM - ANTENNAS

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ERI G5CPS 12 bay center fed, exc cond w/300', 3 1/8" coax. G Hofer, KJLT, POB 709, N Platte IN 69103. 308-632-5515.

Pirod 160' Self-Supporting tower, new in 1987 w/original prints, \$18,000. Andrew 7Ghz waveguide, 295' & 13' w/24" flex section, \$1900. Stephen Buzzy, WKJG-TV, Fort Wayne IN 219-422-7474.

Want To Buy

6 bay CP med power, or 4 Bay horiz/low power on 100.1. D Crepps, Big Tree Comm, 29673 Silver St, Val Verde CA 91384. 805-294-9441.

Low power stand-by FM antenna, tuned to 94.3. B Campbell, KRIG, 918-333-7943.

### AUDIO PRODUCTION

Want To Sell

AKAI S1000 16 bit digital stereo sampler, 2 meg RAM expandable to 32 meg, \$1994; AKAI S950 12 bit digital sampler, 750k RAM expandable to 8 meg, \$985. Dave, 317-846-7768.

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Bloomington, IL 61704

Orban 536A, sibilance controller, \$550. J Stanley, Colfax Communications, 60 S 6th St, Minneapolis MN 55402. 612-373-0104.

Demeter 4 ch rack mount tube direct box NEW \$795. W Gunn 619-320-0728.

Burwen TNE 7000A transient noise eliminator for records, 2 sp rack mount, excellent condition, some corrosion on RCA jacks; works perfectly, manual, \$195 + shipping. S Hoffman, Sounds Impossible, 7109 NW Birch Pl, Lawton OK 73505. 405-536-0559.

360 Systems AM 16/E audio routing switcher 16x16 expansion unit, \$495; Studer Dyaxis, 2-channel digital audio processor unit, condition unknown, \$495. G Wachter, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-258-6161.

### CASSETTES • CARTS • REELS

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Orban 111B reverb unit, \$480; Orban 224F stereo synthesizer, \$250; Orban 222A, stereo spatial enhancer, \$550; Orban 290RX, \$1000. J Stanley, Colfax Communications, 60 S 6th St, Minneapolis MN 55402. 612-373-0104.

Valley 400, mic processor, \$340. J Stanley, Colfax Communications, 60 S 6th St, Minneapolis MN 55402. 612-373-0104.

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Accessit signal processing rack (4), mono compressor, reverb & bal/unbal DA with ps in 2 sp, rack mount, with some manuals, VGC, \$155. S Hoffman, Sounds Impossible, 7109 NW Birch Pl, Lawton OK 73505. 405-536-0559.

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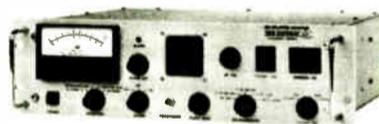
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ITC 3D Mono Cart Player -	Rebuilt	\$ 1,295
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Revox PR-99 Reel Player w/ 25Hz Sensor -	AS NEW	\$ 495
ATI Stereo BC8SR 8 Pot Console - (List \$ 3,595)	Rebuilt	\$ 995
Ramko DC-5RA 5 Pot Rack Mount Mono Mixer -	Rebuilt	\$ 195
Teles 10 Digital Hybrid -	Rebuilt	\$ 695
TRC-15-AW 15 Ch. Remote Control -	Rebuilt	\$ 695
Belar SCM-1 SCA Monitor -	Rebuilt	\$ 695
Dielectric 4 Pot 15/8" EIA Motorized Coax Switch -	Unused	\$ 1,295
Marti SCR-8H 67KHz SCA Demodulator -	Rebuilt	\$ 245
CBS Radio NETALERT III -	Tested	\$ 145
Samson SAWS-22GTR Guitar Pack Wireless Mic -	NEW	\$ 298
Tektronix 7704A 4-trace 200MHz Scope /modules -	Tested	\$ 795
Tektronix 1225 Digital Logic Analyzer (less probes) -	AS NEW	\$ 195
Microtrak 303 12" Tone Arms -	NEW	\$ 99

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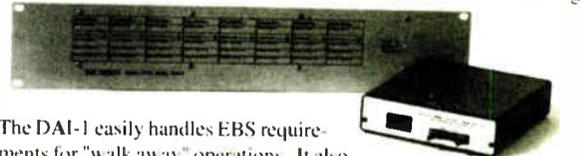
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Complete system under \$ 1300

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## AUDIO PRODUCTION...WTS

KLH DNF 1201A dynamic noise filter, stereo, \$50. G Haltman, Haltman Media Svcs, 300 Limp Creek Rd, Grants Pass OR 97527. 503-474-6466.

Orban 674A stereo EQ, graphic & pan, \$300. G Haltman, Haltman Media Svcs, 300 Limp Creek Rd, Grants Pass OR 97527. 503-474-6466.

ADC 96 & 144 Pr TT patchbays, excel cond, 1 rack space, 3 rows of 48, top 2 rows normalled, \$149, 96 is 2 row normalled, \$129 (you remove old wiring) or we totally refurbish w/new front panel, ready to install, \$199-229. TT cords up to 10 per bay at \$9 ea, reg \$13.95, also 1/4" bays. Audio Village, 619-320-0728, or Fax 619-320-2454.

AKAI MG1212 multitrack. 12 track/console. Lots of tapes, \$1500. Yamaha 1204 console w/Anvil case, \$500. 817-481-4453.

## AUTOMATION EQUIPMENT

## Want To Sell

BE Control 16 brains w/audio switchers (2); Otari ARS 1000 R-R in exc cond (5); working SMC Sonomag Carousels (2); SMC Sonomag Carousels good for parts (3); ITC triple stacker cart machine w/R/PB; ITC triple stacker w/PB only, cabinets included. M Jones, WZKB, POB 520, Wallace NC 28466. 910-285-4900.

Cetec 7000 Level 2, 5046 event memory, terminal, source cards, 4 350 series Carousels, 3 250 series Carousels, 1 Audiophile, 2 ITC 760 R-R play decks, all \$2500 or will sell parts. E Moody, KJEM/KESE, 216 N Main, Bentonville AR 72712. 501-273-9039.

IGM RAM stereo automation controller w/4096 events of memory, clock, silence sense, 9 audio inputs, 4 random access Carousel cards, manuals; stereo 350 (4), random access. F Nienow, WYTE, POB 1030, Stevens Point, WI 54481. 715-341-8838.

## CART MACHINES

## Want To Sell

ITC Delta R/P stereo, exc cond, \$1500. C Scherer, WZAK, 216-621-9300.

BE 2100, stereo R/P; ITC Delta 3 deck, stereo, R/P, w/ secondary & tertiary tones. F Nienow, WYTE, POB 1030, Stevens Point, WI 54481. 715-341-8838.

ITC 706 PB decks (2), \$250 ea or \$400/both. E Moody, KJEM/KESE, 216 N Main, Bentonville AR 72712. 501-273-9039.

Gates Cartritape II, R/P deck, \$300, PB deck, \$200. E Moody, KJEM/KESE, 216 N Main, Bentonville AR 72712. 501-273-9039.

BE 5300C tripledeck, stereo, PB, mint less than 50 hrs, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.



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Ramko RP-1M mono cart recorder/player, good condition, no power supply, \$250, with power supply, \$500. Klay, 801-272-1814.

Tapecaster X700 RP & P, good condition, \$495 & \$295. Call 804-752-6942.

## Want To Buy

Broadcast Electronics 3200 original cover. D Green, KTCU, POB 30793, Ft Worth TX 76129. 817-921-7630.

ITC, BE, Fidelipac cart machines: single, triple, mono, stereo, play & record/play. Call M O'Drobinak @ 619-758-0888.

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## Want To Sell

Studer C2702 2 trk analog mastering, \$2950/BO; Studer/Revox HS77 Mk IV FT mono, 10 hrs use, \$750/BO/trade; portable case for A77 w/m on spkrs & pwr amps, exc cond, \$375. R Katz, Allegro Sound, 15004 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

Otari 5050 MK III-8 trk, heads excellent, \$2450. Wayne Gunn 619-320-0728.

Ampex ATR-800 4 trk, 1/2" R-R, needs repair or use for parts, BO. T Rusk, KSSN, Little Rock AR. 501-227-9696.

Otari 5050B MK III-2, 1/2 track, professional broadcasting tape deck, console model, brand new, less than 30 hrs use, must sell, \$2500/BO. P Accardi, 717-586-4469.

Sony PCM-F1 digital recording system modified w/Apogee input filters and external sync input, system capable of locking to external video house sync, incl 2 SL-2000 protable Beta recorders, AC power supplies, NiCad batteries, tuner-timer module, cables, road case, complete system \$1500; F1 processor only \$1000. R Streicher, Pacific Audio-Visual Enterprises, 545 Cloverleaf Way, Monrovia, CA 91016. 818-359-8012.

Tascam ES-51 controller, ES-50 synchronizers (2), reads 1/20-100 x play speed, 29.97, 30, 24 & 25 fps, autounch, 20 scratchpad memories, sub-frame accurate (1/100) offset trimming, allow multitrack analog sync to video for editing, cables, manual, \$2100/BO + shipping. D Crepps, Big Tree Comm, 29673 Silver St, Val Verde CA 91384. 805-294-9441.

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Rebuilt A77s, \$850.<sup>00</sup>  
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Nashville, TN 37203 (615) 244-6892

MCI solid state w/sync designed to replace tube type electronics on Ampex, etc (8), \$150 ea. T Boddie, 12202 Union Ave, Cleveland OH 44105. 216-752-3440.

Nagra 4.2L, mono rec w/crystal sync, \$4200. P Koch, Koch/Marschall, 4310 N Mozart, Chicago IL 62618. 312-463-4010.

Otari DP 4050-OCF duplicator with MCI 1/4" 1/4 track recorder, Dolby B encoder, 6 units in one pass, 80/hr. C Hertzberg, Kinura Records, Box 660236, Miami Springs FL 33166. 305-887-5329.

Sony DAT DTC 75ES low hours, \$500; Teac test tape 15 ips, 1/2", \$45; MRL test tape, 15 ips, 1/4", \$25. D Kocher, Digital Sound Makers, 1901 Hanover Ave, Allentown PA 18103. 610-776-1455.

Tascam 38, 8 trk, 1/2" open reel, \$1100. P Cibley, Cibley Music, 138 E 38th St, New York NY 10016. 212-986-2219.

Ampex ATR-800 4-track 1/2" R-R, needs repair or use for parts, BO; Symetrix 108 telephone system. T Rusk, KSSN-KMVK, POB 96, Little Rock AR 72203. 501-227-9696.

NAGRA 4 SL, sync recorder, exc cond, \$5000. D Scates, 3142 Market Place, Bloomington IN 47403. 812-339-4446.

Otari MTR-12, 4 trk, 1/2", exc cond, tape inc, BO. B Webster, WLIT, 150 N Michigan Ave, Chicago IL 60601. 312-329-9002.

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16 track 2" \$3450, MCI JH110C-8 \$2800, 110C-8 play only \$500, ATR800 mono or Tascam 7300 or 2502 \$600 ea, MCI Locator III \$1195, Tascam 52 2 trk \$1200, Ampex AG350 electr \$50/ch. W Gunn 619-320-0728.

Otari Mark II-IV 1/2" 4-trk, multi-trk, mint, less than 50 hrs, BO. R Kaufman, Pams Pros, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

Recordex 6 cassell rewriter \$100; Tascam 40-4 4 trk 10" in flight case w/free dbx \$750; MRL new short test tapes \$39 for 1/4" to \$199 for 2". W Gunn 619-320-0728.

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North Hollywood, CA 91607 fax 818-784-3763

Scully '100' recorders, record/play amps, 8, 16, 24 track heads. Sequoia Electronics, 4646 Hounds-haven Way, San Jose CA 95111. 408-363-1646.

## Want To Buy

Concertone 90-2, deck or capstan motor, need 2 speed, 7.5-15 ips, prefer complete deck in gd cond. T Boddie, 12202 Union Ave, Cleveland OH 44105. 216-752-3440.

Ampex ATR100 taperecorders for parts. Circuit cards, heads, motors, machine parts, or electronic parts. Call 818-907-5161.

Ampex tube recorders and mixers. W Gunn, 619-320-0728.

Otari MX5050BII (2) at DIRT CHEAP prices for P/T at NCE-FM station. Robert 214-226-2949.

Tascam 58 1/2" 8 trk wanted to buy or trade for Otari 5050 MK III-8 or...? Wayne Gunn 619-320-0728.

## ABOUT OUR EMPLOYMENT SECTION

**HELP WANTED:** Any company or station can run "Help Wanted" ads for \$1.50/word or buy a display box for \$60/column inch. Payment must accompany insert, use your MasterCard or VISA; there will be no invoicing. Blind box numbers will be provided at an extra charge of \$10. Responses will be forwarded to listee, unopened, upon receipt. Call 800-336-3045 for details.

**POSITIONS WANTED:** Any individual can run a "Position Wanted" ad, FREE of charge (25 words max), and it will appear in the following 2 issues of Radio World. Contact information will be provided, but if a blind box number is required, there is a \$10 fee which must be paid with the listing (there will be no invoicing). Responses will be forwarded to the listee, unopened.

Mail to: BROADCAST EQUIPMENT EXCHANGE  
PO Box 1214, Falls Church, VA 22041  
Attn: Simone Mullins

## CD PLAYERS

## Want To Sell

Denon 950F (2), \$300 ea. N Doshi, WQCD, 220 E 42 St, New York NY 10017. 212-210-2775.

## COMPUTERS

## Want To Sell

Exabyte 8205 2.5 gig DAT tape backup, full height internal, SCSI interface, \$595; external unit with power supply, \$650. G Wachter, KFYL, 631 N 1st Ave, Phoenix AZ 85003. 602-252-6161.

Creative Labs Sound Blaster 16 ASP, 16 bit sound card for IBM PC's, \$125. P Cibley, Cibley Music, 138 E 38th St, New York NY 10016. 212-986-2219.

Exabyte EXP-8200 2.5 gig DAT tape drive for backup, 5 1/4" SCSI-2 drive, \$495. G Wachter, KFYL, 631 N 1st Ave, Phoenix AZ 85003. 602-252-6161.

## Want To Buy

Tandy 6000HD w/at least 1 floppy drive. Mel Crosby, 408-363-1646, FAX 408-363-0957.

## CONSOLES

## Want To Sell

Audionics 110 Grandson, 8 mono, 10 stereo input modules, Penny & Giles faders, foldback mix, tone generator, slate w/manual & power sply, \$2200. D Small, KNDD, 1100 Olive Way #1550, Seattle WA 98101. 206-622-3251.

BE Omega 10, 10 chnl, 40 input stereo w/slide faders, removed from service 4/94, extra preamp cards, \$2000/BO. C Guglielmetti, Edgewater Co, 232 C St, San Francisco CA 94080. 415-589-3313.

Fostex 2050 line mixer, 10 (8+2) line level inputs, stereo outputs, includes rack mount adaptors, \$100. R Streicher, Pacific Audio-Visual Enterprises, 545 Cloverleaf Way, Monrovia, CA 91016. 818-359-8012.

Pacific Recorders Radio Mixer 20, \$12,000. J Stanley, Colfax Communications, 60 S 6th St, Minneapolis MN 55402. 612-373-0104.

Soundcraft series 200, 8 chnl mixer, nice cond, \$700. M Berg, 612-870-0364.

Soundcraft Spirit 163 mixing console, 16 inputs, sep assignable stereo and mono outputs plus 4 aux busses, mods incl pre/post fader switches for Aux-2, tape return to monitor, line level monitor outputs, mono-sum to monitor, excellent cond, \$1550. R Streicher, Pacific Audio-Visual Enterprises, 545 Cloverleaf Way, Monrovia, CA 91016. 818-359-8012.

Collins IC-10A, gd cond, \$2000. Barry, KWMT, Box 578, Fort Dodge IA 50501. 515-576-7333.

Ramko DC5RA 5 chnl, mono, rack mount, comp w/all parts, non working, excel cond, \$50 + shpg; JBL 5600-2B, 6x1 mono rack mount, with 4 bal mic plug-in xfmres & bal out xfrmer, gd cond w/schem, \$75 + shpg. S Hoffman, Sounds Impossible, 7109 NW Birch Pl, Lawton OK 73505. 405-536-0559.

Ramsa WRTM20, 20x8-2, 8 buss out, 3 band EQ, 4 sends, pgm mis talkbacks, exc cond, \$2000/BO. E Sperry, 53 Ann St 2nd Flr, New York NY 10038. 212-732-9316.

TOA R5A-216 16 chnl with 4 mono amps avail for main & monitor mixing, exc cond, \$1200. B Wilson, 4400 Old Lebanon Rd, Campbellsville KY 42718. 502-789-1505.

Yamaha PM1000, 16 input, 12 echo send, 4 monitor, 4 buss output, good condition, with book & stand, \$1200/BO. Bernie, TV-50, 890 San Marcus Ln, Duarte CA 91010. 818-303-7161.

Ramko DC5AR 5 channel mixers, very good cond, \$175 each. 916-725-2434.

## Want To Buy

Sparks A-15-B manual. R Lee, POB 61, Clarksburg WV 26302. 304-624-6801.

Collins-Rockwell audio rock 10 cue monitors, or comp console for parts. T Hodgins, 14 E Main St, Walla Walla WA 99362. 509-529-6242.

## DISCO-PRO SOUND EQUIPMENT

## Want To Sell

AudioWorks DataLink, AES/EBU digital & analog cables; Studio Sound S305, vintage passive filter sets, Studio Sound S305 matched pair, consec #, rackmount, \$175 ea/trade. R Katz, Allegro Sound, 15004 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

Electrovoice EV100 monitor speakers (2), \$540. J Stanley, Colfax Communications, 60 S 6th St, Minneapolis MN 55402. 612-373-0104.

Solar Black speaker grill cloth, 50 yds by 72" wide, \$225/BO + shipping. F Stadler, 3912 Liberty Blvd, Westmont IL 60559. 708-852-6654.

Yamaha R1000 digital reverb, good condition, \$100/BO + shipping; Biamp SM23, crossover 3-way mono, 2-way stereo, good condition, \$99/BO + shipping. F Stadler, 3912 Liberty Blvd, Westmont IL 60559. 708-852-6654.

dbx 118 compressor-expander, excellent condition, \$125; SAE 5000 click-pop filter \$125; JBL 2426H compression driver, new in boxes, \$300/pair. R Glenn, WJGR, 1718 Shenandoah Dr, Wimauma FL 93598. 813-634-1940.

JBL 2204 (4), 2445 (2) drivers, 2380 (2) horns, 2404 drivers in cabinets, excellent condition, \$1400. D Kocher, Digital Sound Makers, 1901 Hanover Ave, Allentown PA 18103. 610-776-1455.

JBL ceiling speakers (2), inc housing, speaker, control knob, \$33 ea; Lil Miss Moffat 48 V phantom power supply (2), \$18 ea; 6" rack rails (2), \$18 ea; other pieces avail free w/purchase; all items + shipping. B Lord, Lord Bdcng Co, 13313 SE 208th, Kent WA 98042. 206-631-2374.

Speakers, self enclosed 7 x 4 1/2 x 4 1/2. R Williams, WIOV, 44 Bethany Rd, Ephrata PA 17522. 717-738-1191.

TOA 480SE speakers w/18" woofer, horn & slot tweeter, \$1000 pr. B Wilson, 4400 Old Lebanon Rd, Campbellsville KY 42718. 502-789-1505.

## Want To Buy

JBL 4343, studio monitors. R Glenn, WJGR, 1718 Shenandoah Dr, Wimauma FL 93598. 813-634-1940.

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## LIMITERS

## Want To Sell

CRL AM-4 mono, audio prep processor, spectral energy processor, peak mod controller with NRSC kit, excellent condition, \$1800/Best Offer. M McNeil, Guardian Communications, 800 Compton Rd, Cincinnati OH 45231. 513-931-8083.

## 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

Let's make millions together! Programming, sales & tech genius w/exclusive new talk/music fmt, looking for major mkt to kick it off. Bill, 413-442-1283.

Be Unorthodox! Call and hire Janet, FT announcing, programming aspirations, computer literate, in radio since 1980, PT announcing, marketing exp. Metros, bedroom communities preferred. Janet, 502-895-5888.

#1 Market Jock w/CHR, AC & PD exp, seeking new challenge. 201-728-3730.

Sportscaster, 8 yrs local level, ready for larger mkt, can paint the picture, Costas-like humor. JT, 417-673-1111.

CE w/big production voice & over 15 yrs hands-on exp, seeks CE position, strong troubleshooting, RF & computer networking skills. G Morgan, 704-563-8676.

Former CE, present 2 way radio tech seeking CE position. Strong PC digital and RF background. D Rupp, 1302 S Uplands Dr, Camano WA 98292.

Graduate w/3 yrs exp incl new director & asst promo dir for small mkt stn, hard working, looking for new challenges. Natalie, 814-827-1519.

Recent graduate w/on-air promo, PR, writing, prod & concert relations exp, looking for challenge. Chad, 412-225-9436.

Seeking GM/GSM position, recently GM/GSM w/eastern NC stn built from CP, can wear many hats to reduce your overhead. B Bolton, 919-249-1893.

Southern talk show host will relocate, North, West, Midwest, great pipes and gifted intellect. J Allan, 901-324-0859.

You don't have to call him Ted, Teddy or Theodore, you do have to call if you want radio's best entertainer. 405-361-1762.

Combo Manager, sales, PD, CE, Anncr, prod, Tampa Bay, coastal FL or pwrful sig in gd area, 30 yrs exp. Bill, 813-844-3823.

Seasoned Air Talent, 8 yrs exp in prod, promo, AOR/Oldies/Country, prefer West Coast, AZ. Robin, 602-461-8209.

Combine Information & entertainment w/this controversial SportsTalk host, 10 yrs exper, top rated in medium market for 4-1/2 yrs. PBP exper. Send replies to: Radio World, POB 1214, Falls Church VA 22041. Attn: Box 94-06-29-1RW.

## HELP WANTED

CHIEF ENGINEER: Georgia Class C FM & directional AM seeking experienced chief. Applicant should be comfortable with RF and studio maintenance including digital audio. Good pay & benefits. Send Replies to: Radio World, POB 1214, Falls Church VA 22041. Attn: Box #94-629-2 RW.

**LIMITERS...WTS**

**Aphex 104 Aural Exciter w/Big Bottom**, like new, \$200. K Thomas, Rebel Recording, 5555 Radio Lane, Jacksonville FL 32205. 904-388-7711.

**CRL SMP-850**, \$1175. J Stanley, Colfax Communications, 60 S 6th St, Minneapolis MN 55402. 612-373-0104.

**CRL SEC-800** multiband processor, \$1175; CRL SGC-800, multiband AGC, \$1125. J Stanley, Colfax Communications, 60 S 6th St, Minneapolis MN 55402. 612-373-0104.

**Modulation Sciences Stereo Maxx**, \$1400, Aphex Compellor, \$1000. J Stanley, Colfax Communications, 60 S 6th St, Minneapolis MN 55402. 612-373-0104.

**Texar Audio Prisms** multi band, pair w/manuals, \$1500. M Berg, 612-870-0364.

**Valley People Gain Brain II**, new modules (2), no boxes, \$90 ea/ or BO + shipping. M Shea, Precision, POB 723, New York NY 10276. 212-989-3684.

**CBS Audimax 444**, automatic level control. R Williams, WIOV, 44 Bethany Rd, Ephrata PA 17522. 717-738-1191.

**CRL PMC 300A & CRL APP-400**, Fairchild 658 B reverb, and Collins 21221, remote bcdt amp, BO. C Ratliff, 325A N 6th St, Albemarle NC 28001. 704-982-6141.

**Cutting Edge Vigilante** processor, approx 1 yr old, BO. J Michaels, WCOW/WKIJ, POB 539, Sparta WI 54656. 608-269-3100.

**Optimod 8000A**, \$1500. R Henry, WPIO, Box 6501, Titusville FL 32782. 407-267-3000.

**Symetrix 522** compressor, limiter gate, duck stereo, \$250. G Haltman, Haltman Media Svcs, 300 Limp Creek Rd, Grants Pass OR 97527. 503-474-6466.

**Want To Buy**

**903** (looking for 4) and **905** (looking for 2), just the modules, not the frame. R Streicher, Pacific Audio-Visual Enterprises, 545 Cloverleaf Way, Monrovia, CA 91016. 818-359-8012.

**Orban Optimod 8100**. S Garner, KCJH, 9019 West Lane, Stockton CA 95208. 209-477-3690.

**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.

**AKG C422EB** large diaphragm stereo mic, incl remote pattern selector, operates on phantom power, 20 meter cable, windscreen and shockmount, exc cond, \$1850; AKG D-140 dynamic cardioid mics, \$225/pair. R Streicher, Pacific Audio-Visual Enterprises, 545 Cloverleaf Way, Monrovia, CA 91016. 818-359-8012.

**AKG C-60** cable from mic to pwr sup; Bruel & Kjaer 2801 mic pwr sup. C Hertzburg, Kinura Records, Box 660236, Miami Springs FL 33166. 305-887-5329.

**77-DX's, 44-BX's, WE KU-3A's** On-Air lights, recording lights & audition lights. Top price paid. Fast response. Bill Bryant Mgmt, 2601 Hillsboro Rd, G12, Nashville TN 37212. 615-269-6131, FAX: 615-292-3434.

**RCA 77DXs/44BXs** ribbon, chrome/TV grey, gd cond, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

**MICROPHONES**

**Want To Sell**

**Telefunken/Schoeps CM61** tube mic, ext rare, uses std 6AU6 plug in tube, orig PS, new cable, mint cond, \$2950. R Katz, Allegro Sound, 15004 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

**Audiometrics** mic boom, 41" reach w/12 pro-base, new. R Williams, WIOV, 44 Bethany Rd, Ephrata PA 17522. 717-738-1191.

**EV 668** dynamic, ultra directional, shock mounted, variable impedance, BO. T Boddie, 12202 Union Ave, Cleveland OH 44105. 216-752-3440.

**Lectrosonics M185**, CR185 wireless mic system, like new, \$1100; Vega R33, 77D2, wireless mic system, VGC, \$600. D Scales, 3142 Market Place, Bloomington IN 47403. 812-339-4446.

**RCA 77DX (1), RCA 44BX (1)**, both in exc cond, BO over \$800 for either. R Burns, RF Studios, 1326 Highmeadow Drive, Garland TX 75040. 214-271-4386.

**RCA 44BX** ribbon mic, mint cond, \$700/BO; WE 639-A & 639-B, mint cond, BO; Altec 639B, BO T Boddie, 12202 Union Ave, Cleveland OH 44105. 216-752-3440.

**Sennheiser ZS100** mic shock mounts, \$75. C Scherer, WZAK, 612-621-9300.

**Shure SM80** LC microphone. R Williams, WIOV, 44 Bethany Rd, Ephrata PA 17522. 717-738-1191.

**Manley Labs CR3A**, new, \$795 w/shockmount, windscreen & case, no risk trial in your studio. Also have used mics & everything else. Get our catalog! Liberal trade policy too. Audio Village, 619-320-0728.

**Want To Buy**

**AKG C 414EB** condenser mic. P Cibley, Cibley Music, 138 E 38th St, New York NY 10016. 212-986-2219.

**Neumann U87s, KM84s, AKG 451s, EV RE20s, Sennheiser 421s**. W Gunn 619-320-0728.

**MISCELLANEOUS**

**Want To Sell**

**Snake**, 16 phantom-pwr'd inputs w/ext PS, 250' Belden 19 pr cable/MIL connectors/ss strain reliefs, 10' Neumann XLR snake mates w/box or Belden snake, top qual, exc cond, \$750/BO/trade. R Katz, Allegro Sound, 15004 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

**Bud equipment rack 70"** of 19" rack space, 16 gauge steel w/black finish, detachable back door w/vents on both sides of cabinet, 17" deep, mint cond, \$300. B Cuson, Tape-Tracks, 2275 Yargerville Rd, Lasalle MI 48145. 313-241-6695.

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**JVC HR-S10U** portable VHS recorder with companion tuner/timer unit, \$300 complete. R Streicher, Pacific Audio-Visual Enterprises, 545 Cloverleaf Way, Monrovia, CA 91016. 818-359-8012.

**Equipment racks**, like new (4), 74" high, 66" high, assorted rack panels (10). F Nienow, WYTE, POB 1030, Stevens Point, WI 54481. 715-341-8838.

**Switchcraft** switch panel containing 22 sets of 11 non-interlocking, lighted switch strips, 4 PDT, wired to AMphenol 50 pin connectors. M Muderick, Muderick Recording, 101 Earlington Rd, Havertown PA 19083. 610-449-6970.

**Rotron Blowers** for Elcom, Harris, CCA, CSI, McMartin, rebuilt & new. Goodrich Enterprises Inc. 11435 Manderson St, Omaha, NE 68164. 402-493-1886 FAX 402-493-6821

**Shure ST-3000** oak speakerphone/teleconference system, with mic/speaker wheel, control unit with in/out jacks & dial pad, \$495; original AT&T speaker phone & mic unit, \$50. G Wachter, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-252-6161.

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**Topaz 12000 W** true UPS w/batteries, 230V/3 phase in, 120V/220V single and 3 phase out, \$2995. G Wachter, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-258-6161.

**Want To Buy**

**Jazz record collections**, 10" LP/12" LP be-bop, swing, dixie, highest prices paid. B Rose, Program Recordings, 228 East 10th, NNY 10003. 212-674-3060.

**MONITORS**

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**Collins 900C-2**, FM stereo modulation monitor, solid state, rack mount with manual, condition unknown, \$150/Best Offer. A KZZZ, 2534 Hualapat Mtn Rd, Kingman AZ 86402. 602-753-2537.

**Want To Buy**

**McMartin (buy & sell)** any model. C Goodrich, 11435 Manderson, Omaha NE 68164. 402-493-1886 or fax 402-493-6821.

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**Hnat-Hindes SX-87** telephone hybrid and homebrew 1A2 type, 6 line switch w/keypad, working, great shape, \$550. M Vanhooser, KSKY, 4144 N Central Expy #266, Dallas TX. 214-827-5759.

**Moseley 303C** composite STL xmtr & rcvr w/manuals, \$400/BO or trade for low band FE Delta-S 2-way. D Small, KNDD, 1100 Olive Way #1550, Seattle WA 98101. 206-622-3251.

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**Symetrix 104** multiline phone hybrid, \$2000. J Stanley, Colfax Communications, 60 S 6th St, Minneapolis MN 55402. 612-373-0104.

**Tellabs**, STL phone EQS 4008 module, 4425 repeat coil, 248RF dual amp, 1012 housing, \$250/all. M Berg, 612-870-0364.

**Burk ARC-16** w/IP-8, relay panel & voice card, 1 yo, \$2200; Moseley MRC1600, exc cond, \$1200; Gates RDC 10, older, BO. B Spitzer, KKLS, Box 460, Rapid City SD 57709. 605-343-6161.

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**Integrated Network Corp 1056R**, 4 wire switched 56 DSU, \$495. G Wachter, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-258-6161.

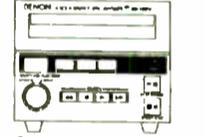
**Potomac RC-16** rem cntrl w/video interface, \$3000. N Doshi, WQCD, 220 E 42 St, New York NY 10017. 212-210-2775.

**TFT 7610-C** remote control link, control link is STL subcarrier, return link telco, \$850. M Comfort, WQNN, 3405 Frontage Rd S. Columbus MS 39701. 601-328-7124.

**Comrex 3XR** 3-line decoder, with remote control. Perfect cond. \$2950. S Kirsch, Silver Lake Audio, 2590 Hillside Ct., Baldwin NY 11510. 516-623-6114.

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Wegener audio processing card 1694; low power FM stereo xmtr card 1691-SW tuned to 101.5, use w/Wegener main frame for cable radio, exc cond, \$750, you pay shipping. T O'Brien, WTYS, POB 777, Mariana FL 32447. 904-482-2131.

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**Want To Buy**

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Technic SP-25 (2), with Micro-Trak arms, probase & isolators, \$275 each. M Comfort, WQNN, 3405 Frontage Rd, Columbus MS 39705. 601-328-7124.

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**Want To Buy**

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Inovonics 705, 1 yr old, BO. J Michaels, WCOW/WKIJ, POB 539, Sparta WI 54656. 608-269-3100.

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**Scotchcart II's**, 1000 between :40 & 7:00, most are between 2:30 & 5:00, all in excellent condition, \$1.89 ea. R Burns, RF Studios, 1326 Highmeadow Drive, Garland TX 75040. 214-271-4386.

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**Pams Jingles ref tapes, 1951-1976, BO.** R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625.

**Want To Buy**

**Pre-recorded open reel tapes, incl master dubs, 2 trk only, inline or stacked heads, all categories, labels and artists.** P Chance, Imperial Analog, 925 Clinton St, Philadelphia PA 19107. 215-574-8147.

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**Church media dept seeks studio equip, board, mics, tape decks, we pay shipping.** Christ Community Church, POB 97, Ridgeville Corners OH 43555. 419-267-3858.

**TEST EQUIPMENT**

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**Elcom Engineering 300 freq counter w/WWV rcvr, all manuals, 19" rack mount, exc cond, \$350.** G Heidenfeldt, WRGH, 2880 W Lake Rd, Wilson NY 14172. 716-751-6187.

**Anaconda 9300 sweep spectrum analyzer, \$1950/BO/trade; Philips PM6507 curve tracer, \$1450/BO/trade.** R Katz, Allegro Sound, 15004 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

**HP5006A digital signature analyzer w/probes, like new, \$300; Fluke 8012 true RMS digital multimeter w/low ohms & AC/battery option, \$125; Heath/Zenith 500 MHz freq counter, \$95.** G Wachter, KFYL, 631 N 1st Ave, Phoenix AZ 85003. 602-252-6161.

**Delta OIB-1, operating impedance bridge, \$750; Heath IM-4180, FM deviation meter with battery charger/eliminator, \$200; Leader LBO-514, dual trace, 10 MHz oscilloscope, \$180.** N Beatty, Broadcast Tech Svc, 2116 Osman Lane, Greenfield IN 46140. 317-326-3620.

**Fluke 8012A digital multimeter, true RMS, AC/Battery, 10 ohms opt, \$125; Shure M615AS equalization analyzer w/pink noise source & analyzer mic in travel case, \$295.** G Wachter, KFYL, 631 N 1st Ave, Phoenix AZ 85003. 602-258-6161.

**Heathkit 12 V, 15 W pwr sup; Conair 320, adjustable reg pwr sup; Conair 682, TV test pattern generator.** R Williams, WIOV, 44 Bethany Rd, Ephrata PA 17522. 717-738-1191.

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**Want To Sell**

**Harris MS-15, exciter, freq agile, manual & some spare parts, \$1500; CSI (QEI), FM-20-E, freq agile, 20 W exciter and opt meter panel, \$1500.** M Berg, 612-870-0364.

**RCA 10 kW FM BTF-10C, mint cond, re-worked IPA & PA w/ Harris MX-15 exciter, out of service 4-20-94, will sell xmtr w/out exciter.** E Stan'ord, WAFM, 521 Hwy 278, Amory MS 38821. 601-256-9726.

**BE MT-3 remote interface, \$1250.** N Doshi, WQCD, 220 E 42 St, New York NY 10017. 212-210-2775.

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**BEXT Inc. has a few demoed exciters, amplifiers and STI's for sale. All demoed systems are sold first come first served and have the same 2 year warranty as BEXT's new equipment. For information: 619-239-8462**

**CCA FM 10DS exciter; CCA rack mount, low volt pwr sup.** R Williams, WIOV, 44 Bethany Rd, Ephrata PA 17522. 717-738-1191.

**CCA 20k 18 yrs old, gd cond in Ogden UT, \$7500; Gates FM 3G, 20 yrs old, works great in Charlotte NC, \$3500; Best 3K Ferrups pouch back up power supply, exc cond, \$3500.** L Davey, Bible Bc'ing, Charlotte NC. 704-523-5252.

**Collins 831D, 2 FM generation 4, on air w/new tube.** D Royer, Denbar Communications, PO Drawer 192, Blackstone VA 23824. 804-292-4146.

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**CCA Electronics has the following trade-in equipment for sale:**

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**New McMartin 20 W, BLM-8000 1M exciters. New McMartin IBM10050 1M relay/rebroadcast rcvrs; also some used McMartin B910 exciters 15W.** Goodrich Inter., 11435 Manderson St., Omaha, NE 68164. 402-493-1886 fax 402-493-6821

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**Want To Buy**

**LPB 50C, AM broadcast transmitter, 50W, tubes unit, good condition.** F Fabre, WFLV, POB 201, Lajas PR, 00667. 809-899-4994.

**Harris MW1-A, PA modules, dead or alive; D Voy, KMAQ, 129 N Main, Maquoketa IA 52060. 319-652-2426.**

**FM 2.5 kW, 5 kW or 10 kW and AM 1 kW.** Barry, KWMT, Box 578, Fort Dodge IA 50501. 515-576-7333.

**Collins 310Z-2 exciter, RF amp module A5, dead or alive.** D Voy, KMAQ, 129 N Main, Maquoketa, IA 52060. 319-652-2426.

**VersaCount V-322 manual for FM exciter with stereo generator and sometimes SCA generator, will pay \$25 + shipping.** F McCoy, 312-891-0530.

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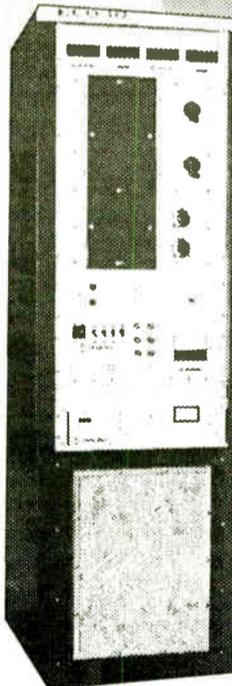
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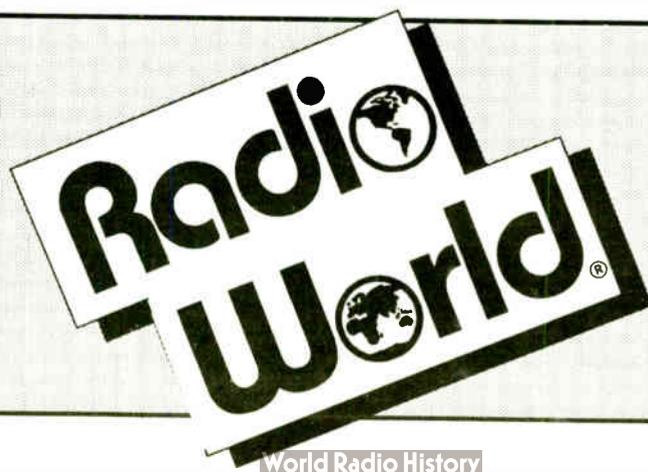
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Haeco SC-2 stereo cutterhead; Scully iathe. C Hertzburg, Kinura Records, Box 660236, Miami Springs FL 33166. 305-887-5329.

JVC 4-DD-5 quadraphonic disc demodulator, low hrs, \$50. D Pulwers, Dave's Price Audio, 310 N Howard St, Alexandria VA 22304. 703-751-9346.

Shure 3012R tone arm; VTC 6LS 3 audio transformer. J Hart, Hart Audio Archives, 2418 36th Ave W, Seattle WA 98299. 206-282-0720.

Technics SL-220 TT 2 speed, needs cartridge shell. M Muderick, Muderick Recording, 101 Earlington Rd, Havertown PA 19083. 610-449-6970.

**Want To Buy**

EMT 930. Y Chung, Sleeping Beauty, 1129 S. Robertson Blvd, Los Angeles CA 90035. 310-204-1921.

Technics SP10 MK III, in exc cond. J Hart, Hart Audio Archives, 2418 36th Ave W, Seattle WA 98299. 206-282-0720.

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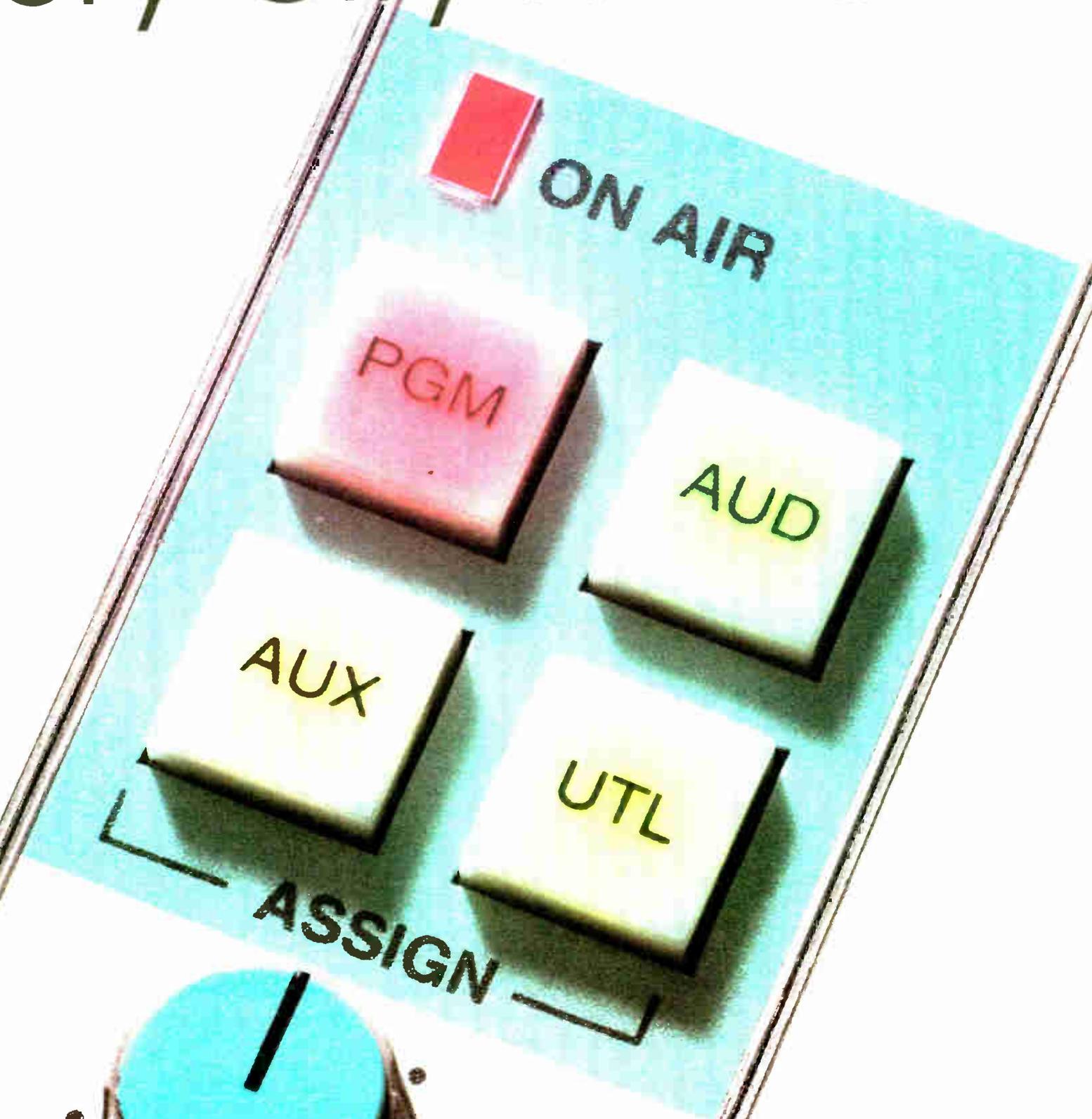
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