

## FCC to Act on Expanded Band

by John Gatski

**WASHINGTON** An upcoming ruling concerning petitions for reconsideration filed last spring on the all-encompassing AM improvements docket (87-267) is expected at long last to allow migration onto the expanded AM band.

At press time, FCC Assistant Engineering Chief for the Mass Media Bureau William Hassinger said a decision on the petitions for reconsideration was nearing, and the staff already was preparing for expanded band applications.

"It's up for a vote on the eighth floor," Hassinger said. "Once the commission votes on the reconsideration, we're going to start moving to get the expanded band going."

The original docket was approved last year, but petitions for reconsideration and subsequent evaluation by the FCC staff delayed the go-ahead for its implementa-

tion. The sweeping improvements package includes migration to the expanded band (1605-1705 kHz), interference reduction and future services within the band.

### Worst Interfering stations

The original docket included a plan to move the worst interfering stations to the expanded band, as well as to give preference for AM stereo stations. The ruling also called for simulcasting on the existing frequency and the expanded band for up to five years.

The FCC received hundreds of letters of intent from stations in 1990-91 that expressed interest in moving to the expanded band.

Hassinger said that once the petitions for reconsideration issues are settled and the FCC gives the go-ahead, eligible stations will have to go through an application process.

Points that the FCC is considering in

the various petitions for reconsideration that pertain to the expanded band include: a recommendation of special preference for stations that would surrender their existing license immediately, special preference for minority-owned stations on the expanded and a request for nighttime performance improvement.

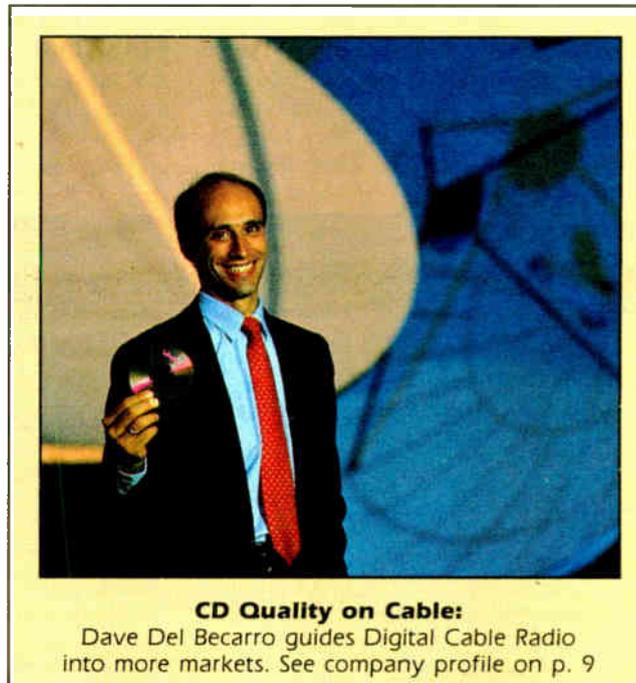
The FCC also is evaluating interference potential in the expanded band from fishing markers that also transmit on those frequencies.

### U.S. could lag

It is conceivable that Canada and Mexico could have stations operating in the expanded band before U.S. stations, according to the FCC's International Branch.

The U.S. signed an agreement with the Mexican government in mid August that cleared the way for broadcasting in the border region of the two countries. The U.S. and Canada have not approved a final agreement for the expanded band

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### CD Quality on Cable:

Dave Del Becarro guides Digital Cable Radio into more markets. See company profile on p. 9

### RUNNING RADIO

## Industry OKs New Limits

by Lucia Cobo

**WASHINGTON** Overall, most segments of the radio industry, including group owners, are happy with the FCC's decision to roll back ownership limits that it had increased sharply in March.

After months of internal and external debate, the FCC bowed to congressional and industry pressure and curbed the limits during its August meeting. The FCC reduced the 30 AM and 30 FM station national limits to 18 AMs and 18 FM. In two years, the national limits will increase to 20 per service.

Congressional leaders and other radio industry segments had reacted angrily to the FCC's initial ownership rules relaxation, describing the changes as dangerous to programming and ownership diversity. The Commission found itself in a position of having to back down or risk having the original 12 AM/12 FM ownership limit enacted into law by Congress.

### Between a rock and . . .

In comments related to the revision of the original increase in ownership limits, Commissioner Ervin S. Duggan said the FCC was under immense pressure.

"The Commission faced losing any chance to relax the ownership rules, despite its judgement that such a relaxation was justified," Duggan said.

In addition, Duggan added, the Commission also "found itself in the bizarre position of having advocated rules more generous than the radio industry itself seemed to want."

The recent decision, according to Duggan, is "an appropriate balance between prudent deregulation and fidelity to the

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World Radio History

## Course for DAB Set in Mexico

by Lucia Cobo

**MEXICO CITY** The Mexican broadcasters association, Camara Nacional de la Industria de Radio y Television (CIRT), is negotiating to join the Eureka 147 digital audio broadcasting (DAB) consortium and is moving forward with plans to begin testing and introducing digital radio to Mexico by 1998.

Classified as a "B partner" with Eureka, the research and cooperation pact will give the CIRT non-voting representation on the Eureka program board. According to CIRT New Technologies Commission Board President Carlos Aguirre, board representation will allow CIRT "decision-level participation" in discussions that pertain to technical design, timetables for rollout and the organization's lobbying efforts.

The agreement will include a provision for CIRT to recover money spent (both past and future) to promote the technology. According to CIRT, revenue for the repayment will come from royalties from the sale of Eureka 147 equipment world-wide. CIRT has asked for royalty profit sharing in the amount of 20 percent annually.

CIRT also will benefit from the

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# NEWSWATCH

## NAB Releases

### Radio Salary Survey

**WASHINGTON** Chief engineers earn an average base salary of \$28,748 per year, while general managers earn an average salary of \$56,458, according to the NAB's 1992 radio salary and benefit survey of U.S. radio stations.

Undertaken every two years, the information in the survey is grouped by revenue size, population size and station type.

Other average annual salaries listed in the survey include technician, \$24,314; production person, \$25,181; program director, \$32,953; operations manager, \$30,275; news director, \$22,352; news reporter,

\$19,449; and on-air personalities, \$22,471. In sales, salaries ranged from \$53,983 for general sales manager to \$70,394 for national sales managers.

The survey can be purchased from NAB for \$50 for members and \$100 for non-members. For more information, contact the NAB at 1-800-368-5644.

### Few Stations Eligible For New AM Policy

**WASHINGTON** Fewer than 10 U.S. AM radio stations are eligible to move from daytime to full-time status, based on an FCC policy that was authorized by Congress in late 1991.

The law amended the Communications Act to allow AM daytimers to go full-time in markets with more than 100,000 population that lack a full-time station. The station also must be located in a Class I service area to apply for full-time status.

The FCC invites written requests by qualified stations and will determine how best to accommodate these stations into existing allotment schemes. Options include:

- Upgrade to full-time on current channel;
- Upgrade to full-time on an adjacent channel; and
- Upgrade to full-time on any other AM channel including the expanded band.

Stations that meet one of these conditions will have the opportunity to file an application to modify their operations. The application will not be subject to competing or mutually exclusive applications, the FCC said.

### Mitchell Named to EBS Post

**WASHINGTON** Dr. Helena Mitchell has been named chief of the FCC's Emergency Broadcast System. She had been named acting chief in March.

Formerly director of telecommunications development at the National Telecommunications and Information Administration (NTIA), Mitchell replaces William Browning.

Mitchell also has served as director of Rutgers University's Office of Television and Radio, and had been a faculty professor at the university.

The new EBS chief arrives at the FCC during a period of transition for the alerting system. EBS has been criticized in recent years as ineffective and the FCC is considering adopting new technologies to improve it.

### NAB Considers Court Action To Repeal Fine Schedule

**WASHINGTON** The NAB has threatened to go to court to get the FCC to reverse its recent fine policy revision that substantially increased forfeiture limits.

The fine policy was enacted via a policy statement and was not subject to hearings as are rulemakings. Without the opportunity for hearing and comment, the new policy was unfair to broadcasters, according to the NAB.

The NAB challenged the original ruling, but the FCC upheld its decision in June.

continued on next page ►

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The telephone industry also objected to the fine increases.

In a statement released in August, the NAB said it is "considering joining the telephone industry in its appeal of the new regulatory rules."

**KMEL Nets Indecency Fine**

**SAN FRANCISCO** KMEL-FM was fined \$25,000 for broadcasting indecent material between Aug. 20 and Sept. 16, 1991.

According to the FCC, the indecent material was aired during the Rick Chase show, which broadcasts during hours prohibited for such material. KMEL is owned by San Francisco Century Broadcasting Limited Partnership.

**BE Receives Military Award For Support during Gulf Crisis**

**QUINCY, Ill.** Broadcast Electronics was recognized for its support of U.S. troops during Operation Desert Shield and Operation Desert Storm, in a ceremony at the company's headquarters in August.

BE provided transmitting equipment for over 50 sites in the desert, which provided information and entertainment to troops stationed in the Middle East. According to the Armed Forces Radio and Television Services (AFTRS), the transmitters worked without failure under adverse conditions; many of the sites are still in operation.

Colonel Errol Honaker is commander of the Television Audio Support Activity, the technical support group for AFTRS. According to him, "We asked our people who did the best job overall during the desert operation and (BE) was the one name that kept coming up."

**Harris Corporate Earnings Rebound from 1991**

**MELBOURNE, Fla.** The Harris Corporation had a pretty good year with earnings up \$68 million over fiscal 1991, according to the company.

The corporation's latest financial report shows that it earned \$87.5 million from continuing operations in fiscal 1992, compared with \$19.5 million in fiscal 1991. Net income was \$75.2 million in 1992 compared to \$72.9 million.

The sales figures from the international corporation exceeded \$3.04 billion, compared to 1991 figures of \$3.004 billion. According to Harris Chairman and CEO John Hartley, the electronics sector garnered \$1 billion in sales for the first time in the corporation's history.

**Gentner Posts Record Sales**  
**SALT LAKE CITY** Gentner Communications has posted the highest quarterly sales in its history, according to the company.

The company posted \$2.05 million in sales in the fourth quarter ending June 30. The latest quarter sales were 45 percent greater than the fourth quarter in 1991.

Gentner President William Towbridge credited the increase to an upswing in teleconferencing equipment sales and international market buying.

The downside of the equation, however, is that domestic broadcasting sales remained sluggish due to the recession. Towbridge said the company expects broadcast equipment sales to increase as the U.S. economy recovers.

**Former DJ Charged with Vandalizing Rival Station**

**BRYAN, Texas** A former morning DJ for KKYS-FM has been charged with felony criminal mischief in connection with vandalism at competitor KTSR-FM/WTAW-AM.

According to the Bryan City Police Department, Robert George Clarke (aka Rex DeShannon), 23, was accused of vandalizing equipment including cutting an STL line, satellite lines and nearly severing the main FM transmission line. Police said the vandalism occurred during late evening hours in July.

Only one charge actually was filed, totaling \$1,500 in damages. Police said, however, that the damage amount was

higher. At press time, Clarke was out on bail. He faces two to 10 years in jail and a maximum \$10,000 fine.

A Bryan Police Department spokesman said that KKYS suspected Clarke was involved in the vandalism and helped police with its investigation.

**VOA Builds New Relay Station**

**WASHINGTON** The Voice of America (VOA) has begun construction of a new relay station on Sao Tome Island, slated for 1993 service, to enhance the service coverage in central Africa.

Sao Tome is about 200 miles south of Nigeria in Africa. The new 100 kW medium-wave relay station and associated projects will replace four 100 kW stations located in Botswana. VOA plans also include four 100 kW shortwave transmitters and a 600 kW medium-wave transmitter for the island by 1995.

**CCS Gets DCS Patent**

**LENEXA, Kan.** Computer Concepts Systems has been issued a patent for its Digital Commercial System (DCS).

The technology allows simultaneous playing of two audio files while recording a third. The PC-based product combines a digital audio board and software to make possible the digital recording and playback of jingles and commercials.

**BBC Utilizes Wegener Systems**

**DULUTH, Ga.** The BBC World Service Radio Network is utilizing a Wegener Communications-designed digital trans-

mission subcarrier system for rebroadcast of programming such as arts, drama, and music.

The system uses the ISO MPEG digital compression scheme and was manufactured specifically for the BBC. The systems also uses Wegener's ANCS system for automation of the satellite receivers and associated equipment.

**Audio Broadcast Adds To Sales Staff**

**GRAND RAPIDS, Mich.** Audio Broadcast Group has added two new members to its staff and promoted Dave Howland to sales and marketing manager.

Cindy Edwards, formerly with Broadcast Electronics, joins ABS as a salesperson for the southeast (800-369-7623). Jack Connors, formerly with Harrison, is the company's new transmitter and RF sales engineer.

Howland has been with the company for 20 years, serving in various sales capacities.

**AP Awards WHBC, WWJ**

**WASHINGTON** The Associated Press has given its APB awards for outstanding journalism to two radio stations in the midwest.

Best Radio Spot News award went to WWJ(AM) in Detroit for coverage of the post office shooting in November 1991. WHBC-AM-FM in Canton, Ohio was honored with the Best Radio Enterprise award for a documentary on drunk driving and its impact on fatality survivors.

AP also honored stations for their single story and weekend contributions to AP.

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# Marconi, Stubblefield and Elvis

by Alex Zavistovich

**WASHINGTON** Well, it's upon us again. The NAB's annual fall radio show is underway, this time in New Orleans. And while our last issue was, technically-speaking, our preview for the show, a few things have happened since we last got together that bear some mention here in *Pilot Tone*.

This is one of the few times of the year that I can actually sympathize with the people at the NAB. Having planned some events and promotions in my time, I can imagine that putting together something the size of the fall convention is as much fun as a barrel of monkey wrenches.

Take the Marconi Awards, for example. Deborah Norville and Tom Snyder had been tapped to host the awards show. That, of course, was before the recent spate of layoffs at ABC, where both had been air personalities.



I suppose you could have read the handwriting on the wall when Ron Nessen was given his walking papers about a month and a half ago. Then it was the "consolidation" of newscasts, then Norville got the pink slip, then Snyder ... by some reports, more than 50 jobs may be eliminated before ABC stops swinging the ax.

That's a story in itself, of course. But an unintended victim of the layoffs was the NAB, which suddenly found itself without hosts for its annual end-of-

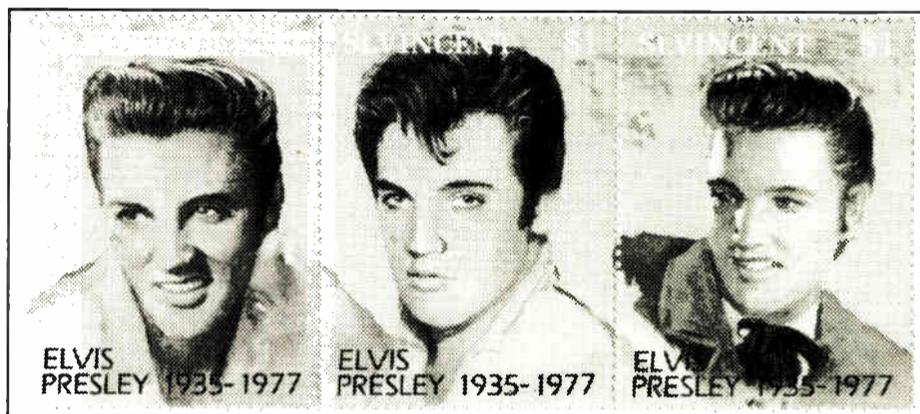
convention blowout.

Fortunately, help was waiting in the wings in the form of Mark & Brian of KLOS-FM in Los Angeles, who last year won the Marconi Award in the Personality of the Year, Major Market category. Having won last year, they aren't eligible this year, which made the duo available to fill the void left by Norville and Snyder.

Still, knowing Mark & Brian's fond-

No, it's not Marconi. Or de Forest. Or even Fessenden. It's the redoubtable Nathan B. Stubblefield of Murray, Kentucky. (With all due respect to these men and the medium in general, though, I think the *mother* of radio must have gotten around some in her salad days. I mean, it's getting so you can hardly swing a cat without hitting yet another father of radio.)

Anyway, if you want to judge for your-



Long live The King ...

ness for racy material, I wonder how they'll go over with the audience at the Marconis, which doesn't usually go in for that kind of humor.

★★★

Anyone with any interest in digital audio broadcasting will want to stop by the USA Digital booth at the New Orleans show for a demonstration of the Project Acorn system for FM and AM—it's definitely a glimpse of radio's future.

But for those of you who are equally interested in a glimpse of the past, you might want to track down a demonstration conducted by the Murray State University College of Fine Arts and Communication. Larry Albert, an engineer at Murray State, will be exhibiting replicas of a system developed by a man some people think is the true "father of radio."

self whether Stubblefield's 1892 wireless system is in fact "radio," this may be the last chance you get. After they wrap things up at the NAB's radio show, the equipment will be transferred to the Wrather West Kentucky Museum on the Murray State campus.

Incidentally, Albert and the others from Murray State haven't applied for any special authorizations from the FCC to conduct these demonstrations at the NAB show. You'll really know they were successful in convincing people that Stubblefield's invention was radio if the exhibitors get cited by the FCC for unlicensed operations.

★★★

When the U.S. Postal Service decided to feature Elvis Presley's face on a commemorative postage stamp, everybody got into the act. Even some oldies radio stations had contests and votes to decide whether we should go with "Young Elvis" or "Fat Elvis."

Well, while all the bickering was going on here, the tiny island nation of St. Vincent in the British West Indies went one better: The government has released a series of *nine* stamps of The King, from periods throughout his checkered reign.

Each of the stamps is about four times the size of the proposed U.S. stamp, and each has a face value of a dollar. A complete set of stamps can be purchased for a limited time from The International Collectors Society in Baltimore. Call Scott Tilson at the Society: 1-800-873-2003, for more information on how to pick up a set.

I know a lot of you will want to head for Heartbreak Hotel considering we were beaten to the punch on this whole Elvis stamp thing by a country that Rhode Island could take in an arm-wrestling match. But don't worry, our own stamp will be out soon enough. As Tilson says, "I don't see the Postal Service getting all shook up over this."

Ouch. That's it for now. Tune in next time.

*Alex*

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## A necessary evil?

Dear RW,

In the *Readers Forum* of July 22, a letter was included which was a response to the RW June 10 editorial indicating that efficiency in the management of radio stations should include the services of a full-time engineer. The letter writer seemed to feel that you are Chip-ing away at what he assumes to be his exclusive turf.

This writer began his radio career in the early 1930s and has seen many changes; most of them due to the opinion I heard voiced by a station manager in the '50s when he said that radio engineers are but a "necessary evil." Later I joined a station that employed a staff of twelve technicians, each of whom had a "First Class Ticket." This station was representative of many of the period in that the equipment was well cared for and an auxiliary transmitter was a rarity. If the equipment failed the man on duty restored it to service.

The '50s saw the elimination of transmitter engineers as the FCC authorized remote control. In time the studio engineers were also eliminated and the announcers were put in charge. They now had the welcome chance to wear headphones which made them feel like a doctor with a stethoscope.

They tried to make their voices sound like a professional announcer. They demanded more headphone volume and became deaf as they cranked it up. They blew out the console-mounted VU meters theorizing that pegging the needle would drown out the competition. It became necessary to install exotic limiters to thwart this excess so that the lone surviving engineer could be reasonably assured of proper modulation as the quality decreased.

During my years as a field service engineer with Collins Radio Company, it was frustrating to be assigned to call on stations with no technicians on staff.

In 1978 an experienced station manager invited me to maintain his AM/FM combination, and this proved to be very successful until his retirement 13 years later. The inexperienced young station owner then took over with the disastrous results you could easily have forecast. After my resignation he found a part-time person.

In many cases, outside maintenance firms recruit moonlighters from other stations to augment their "staffs" as a large corp of qualified engineers cannot be maintained on a full-time basis. When emergencies simultaneously arise at more than one client station, the lack of a caring, conscientious staff engineer becomes apparent. We all know that the industry has lost many good people to other fields. They are not returning and the scarcity has become very serious!

To quote your profound observation: "... station managers must be reminded that a full-time engineer is not a frivolous expense and can be at least as useful and valuable to them as a full-time sales manager or a full-time promotion manager."

Ken Blake, CE  
KBEE-FM/KOOK-AM  
Modesto, Calif.

## Wrapping up the news

Dear RW,

I would like to make some comments on recent developments in the recording, audio, and broadcasting industry. The first thing I would like to address is the recent FCC Report and Order concerning the new multiple

## NAB Radio Show Addenda

*The following information supplements the NAB Exhibitors Directory published in RW's August 19 edition.*

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Contact: Michael Krafcin  
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#### Cutting Edge Technologies 514, 134

Cutting Edge will be showing the Unity 2000 audio processor at the Harris and Broadcasters General Store booths. The Unity is an all-in-one box with compression, limiting, equalization and a digitally-controlled stereo generator.

Contact: Margot Daly  
2501 West 3rd St.  
Cleveland, OH 44113  
216-241-3343

#### Enco Systems 653

Enco will show its DAD486x digital audio distribution system for radio and TV applications. Stereo audio recording and reproduction, graphic waveform editing and playlist manipulation are standard features.

Contact: Eugene Novacek or Larry Lamoray  
1866 Craigshire Dr.  
St. Louis, MO 63146-4006  
314-453-0060

#### Telos Systems 134, 262

Telos will be featured at the booths of Broadcasters General Store and Broadcast Supply West. The company will show the Telos One digital phone hybrid, the Telos One Plus One and the Telos 100 Delta series, as well as interface modules and control keypads.

Contact: Steve Church  
1729 Superior Ave.  
Cleveland, OH 44114  
216-241-7225

## DAB: Stay The Course

Despite indications that Mexico and Canada may try to enlist the NAB's aid in reversing the U.S. position on L-band DAB, the domestic radio industry should stay its course and continue development of an in-band solution.

A developmental DAB plan from the CIRT (Mexico's counterpart of the NAB) shows that Canada and Mexico are working to become "B partners" in the Eureka consortium.

The plan describes how the two nations expect to divide royalties from the implementation of the technology in North America and Central and South America.

The plan also details future efforts to have the U.S. implement Eureka technology in the L-band, as well. These efforts include "insisting" on the NAB's help in lobbying for L-band DAB. (At present the L-band is reserved in the U.S. for telemetry research.)

The U.S. broadcasting industry should not be overly concerned about such potential pressure, especially since progress on in-band technology is being made. The USA Digital Radio project seems poised for a breakthrough demonstration of its Project Acorn in-band AM and FM DAB scheme. Other in-band systems are also progressing toward demonstrations.

As for "insisting" on the NAB's influence in helping reverse the U.S. position, the CIRT should be reminded that the NAB has formally endorsed in-band development, in response to broadcasters' marked preference for such a system in the U.S. As long as the NAB stands behind that endorsement, Canadian and Mexican insistence will come to nothing. What's more, some insiders maintain that such a decision is not up to individual nations; it must be brought up at the next World Administrative Radio Conference.

While there may be some measure of gratification attached to being the leader in DAB implementation in this hemisphere, the reality is that the U.S. is the prime consumer of radios. DAB will wait until the U.S. broadcasting industry has made a reasoned evaluation of the most appropriate system for use inside its borders.

If that decision ultimately is in favor of L-band DAB, so be it. But in the meantime, the U.S. broadcasting industry should proceed as planned, and not succumb to pressure from our neighbors to make such an important decision in haste.

—RW

ownership rules. I think John Dingle, the U.S. House of Representatives' chairman of the Committee on Energy and Commerce, has the right idea and FCC Chairman Al Sikes did not consider these suggestions before legislation.

Thirty AM, 30 FM, and 30 TV stations per owner is quite outrageous. Did anybody question the Seventh Section of the Clayton Act or the First Section of the Sherman Act, concerning anti-trust laws as mandated by the Department of Justice? What is going to happen to our minority owners?

Secondly, I am glad to see General Docket 87-267 become a reality. Thanks to members of Senate and House Committees, we now have the AM Improvement Act of 1991. NRSC (National Radio Systems Committee) RF Mask I and II is now being performed at transmitter sites. What about this AM stereo issue? Leonard Kahn and Motorola are still fighting over systems manufactured nine years ago and *there still is not a standard*. Look how many countries are now broadcasting with the Motorola C-QUAM system.

The NAB AMAX campaign is great. But is Congress listening to you all? I would love to see narrow and wide IF bandwidth selectivity switches on AM radios. How many radio listeners want multipath distortion and IM products dispersed out of their Jensen car speakers? I think the AM expanded band (1605 kHz-1705 kHz) is great.

Finally, I would like to comment on the recent garbage concerning "anti-SCMS black-box devices," written two weeks ago (RW, Aug. 5, 1992). Most of my clients are songwriters and affiliates with ASCAP, BMI, SESAC, NMPA, Church Music Publishers Association, and Songwriters Guild Association. They are upset about these black boxes and the Honorable Ralph Oman, chairman of the Office of Register of Copyrights would not like this either because it is against the Digital Audio Recording Act of 1990.

In reality, who is watching over all these recent developments? Do audio, recording, and broadcasting professionals really care

about what is mandated through the U.S. government and Congress?

David S. Pulwers  
Dave's Price Audio Productions  
Alexandria, Va.

## Sony JH-110 Series clarification

Dear RW,

While appreciative of Mr. Bisset's suggestions in providing solutions to certain technical problems of the MCI JH-110 Series machines, the lack of information in Mr. Bisset's August 5 *Workbench* article will be confusing to persons attempting to obtain MCI JH Series parts and technical information from Sony.

Since Sony's acquisition of MCI Inc. in 1982, the source for technical information for the MCI JH Series products is maintained solely at Sony Professional Products Company (SPPC) in Boca Raton, Fla. Mr. Bisset makes reference to the "modification manual for JH110 machines." To our knowledge this reference is incorrect as no such manual was ever published. More correctly, JH110 update information is available in the complete set of MCI JH Series Service Bulletins. This publication, available for a nominal charge, provides updates for MCI JH Series products manufactured between 1976 and 1984. Contact the SPPC Service Engineering Department and request the MCI Service Bulletin publication.

With the integration of the MCI JH Series parts into the worldwide Sony parts distribution channels, all MCI part numbers were changed to conform to the Sony part numbering system. A part number cross reference publication can be obtained by writing to Sony Professional Products Company, Service Engineering Department, 6500 Congress Avenue, Boca Raton, FL 33487. Please ask for the MCI-to-Sony Part Number Cross Reference publication.

Bob McGraw  
Service Engineering Dept.  
Sony Professional Products Company  
Boca Raton, Fla.

# Radio World

Vol 16, No 17 September 9, 1992

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# FCC to Issue New EBS Rulemaking

by Alex Zavistovich

**HERNDON, Va.** Judging by FCC Chairman Al Sikes' recent comments, a notice of proposed rulemaking (NRPM) regarding the emergency broadcast system (EBS) could be released within 30 days.

Sikes alluded to that timetable in a question-and-answer session following his address to attendees of the Seventh FCC EBS Workshop on August 13 at the Ramada Renaissance Hotel near Washington's Dulles Airport.

Pressed to provide a schedule for FCC action on the EBS notices of inquiry cur-

rently being evaluated at the FCC, Sikes said the commission may issue proposed rules within 60 days of the mid-August meeting—which meant the NPRM would be out no later than mid-October.

An FCC EBS official later said the NPRM is likely to be released by mid-September, barring any last-minute problems.

Sikes estimated that a Report and Order on the EBS issue may come "at the latest, by summer of next year."

The FCC has two EBS dockets pending. One is an examination of whether the current EBS system can be refined, to include shortening of the two-tone test

signal from its current 20-second duration and provide for remote control capabilities. The other docket requested comments on whether the current EBS (formally known as CONELRAD) should be kept or replaced by some other system.

## Several options

Among the potential successors to EBS suggested in the latter inquiry are the Improved Colorado EBS (ICEBS), California's Emergency Digital Information System (EDIS), the National Weather Service's WRSAME system, and Sage Alerting's SAGE I, a radio data system (RDS)-based technology.

Sikes pointed out that EBS "was last critically evaluated and updated in 1976... By harnessing the potential which is inherent in cable, satellite, digital and computer technology—and drawing new industries and participants into the 'safety net'—we can improve on today's EBS, and produce a much better system which is also in our economic reach."

The FCC is committed to creating a "truly 21st-century emergency alerting capability" through a grass roots effort,



FCC Chairman Al Sikes

Sikes said. Acknowledging that such capability may be expensive, Sikes added the FCC is talking with the Federal Emergency Management Agency (FEMA), in the hope that "significant dollars" be allocated by that group. How much money and what kind of transitional period would be required remains unclear, Sikes said.

In a press conference following his address, Sikes noted that the goal of the FCC EBS inquiry is "not to fix, but to improve" the system, in terms of speed, thoroughness and cable participation. He stressed, however, that the FCC is not looking to "eliminate the news and weather functions of radio and TV."

## An override preference?

Providing what may have been a glimpse of personal preference for one type of system over another, Sikes commented that technology exists for an alerting system to "override" other programming in the event of an emergency. At present, that feature is available only in the SAGE I RDS-based system.

With regard to remote control of EBS technology, Sikes said it "has gotten to a point where the human factor can be overridden." When or under what circumstances such override should take place remains to be seen, he added.

NAB Staff Engineer Kelly Williams said the FCC inquiry into EBS actually was initiated by a petition from the trade association. He added, however, that he is "happy the FCC is taking it to the extent they are."

Williams called the RDS technology's potential for an improved national emergency alerting system "good and effective." He said, however, that at the time the FCC launched its inquiry, a domestic RDS standard was not yet in place. The NAB "didn't want to see (an RDS-based system) mandated by the FCC."

Williams also noted that "some technologies are cheaper to implement" than RDS. He said the National Weather Service's WRSAME system could do many of the same things an RDS system can do, such as providing for remote control with the addition of DTMF tones.

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World Radio History

# Australia Evaluates Future DAB Service

by Max Thrower

**SYDNEY, Australia** Key players in the Australian broadcasting industry believe that Australian radio ultimately will convert to digital audio broadcasting (DAB).

Although many major decisions still are to be made in the transition to DAB, strong trends are surfacing.

The earliest starting time for DAB in Australia seems likely to be between 1995 and 1996 for experimental broadcasts, with simulcasts until 2010 and digital broadcast only by 2015. Those closely involved all seem to hope for a prompt and smooth move to DAB despite the decisions that are still to be made and the money that is still to be spent.

"The Europeans will go ahead (with DAB), at least terrestrially, and the Canadians are pressing ahead," said Eric War-

ren, manager of Australian Broadcasting Corp. (ABC) Corporate Engineering Projects and chairman of the DAB tech-

allocation of L-band for DAB worldwide. The broadcasters are still committed and view the development of international

to a DAB-only service.

Receiver costs will be key to the success of Australian implementation of DAB. When AM stereo was introduced, one of the reasons for its failure was the expense of receivers. Consumers were not willing to purchase a receiver to listen to a service they could already receive. With analog and digital simulcast, the same sentiment could apply unless receivers are affordable, DAB experts noted.

Although no decision has been made about a national digital transmission

continued on page 8 ▶

## Australian broadcast officials are interested in the possibilities that a hybrid system of terrestrial and satellite DAB broadcast would offer to Australia.

nical subcommittee. "I guess the question is are we there with the rest of the world? Or will we lag behind and do without it for some length of time, until the logic eventually sinks in?"

### On-going progress

Australian delegation members to WARC-92 were strong supporters of the

standards as crucial to the successful introduction of DAB in Australia.

Australian officials believe the single transmission standard would encourage the retail of receivers to consumers at the most affordable price. Many industry figures envision existing services simulcasting in AM or FM. This would allow a smoother and quicker transition

## Mexico Outlines L-Band Plan

▶ continued from page 1

sales of Eureka 147 equipment in North America. The agreement enables CIRT to share in the profit made on the sale of the equipment in the U.S., Canada and Mexico.

### L-band testing

CIRT is moving ahead with plans to begin transmission tests on L-band. Funding for the project is being negotiated through the government regulatory agency, Secretaria de Comunicaciones y Transportes (SCT) and the National Council on Science and Technology. Any funding they contribute will be matched by the CIRT. The goal for the project is roughly \$2 million.

The Mexicans are coordinating test scheduling with the Canadians, the most active proponents of the Eureka 147 DAB system at L-band outside of Europe. Canada has conducted demonstrations and tests since 1990.

The tests in Mexico will be complementary to the Canadian ones, according to the CIRT, allowing for testing under different climactic and terrain conditions.

The testing agreement positions Mexico as a digital radio broadcasting leader among nations that it is connected with culturally, such Central and South American countries. As part of the 1992 World Administrative Radio Conference (WARC), Mexico made commitments to various South American governments to help them develop digital radio.

### Providing DAB leadership

As the testing progresses and test sites are built, Mexico already has pledged to share any technical data collected with Argentina, Brazil, Venezuela, Ecuador, Uruguay and Guatemala. The test sites will be open to visitors from those countries as well.

The CIRT has outlined a detailed plan

for the rollout of digital radio. As soon as the tests results yield enough information, the government will establish a subcommittee for frequency planning to begin allocation studies. The group would like to begin simulcast transmissions of both AM and FM stations to encourage the development and distribution of digital radio receivers.

Lobbying the U.S. to support the Eureka system is another key aspect of the CIRT plan: "We will insist on our lobbying efforts with NAB (National Association of Broadcasters) to change its current position (support of S-band for satellite and possible implementation of in-band for terrestrial) and assist them in obtaining the spectrum and the assignment to the broadcasters in their country."

The NAB says it is lobbied by many groups on many different things. "CIRT is doing what it feels is best for its members," said Michael Rau, NAB senior vice president of science and technology. "We are not interested in becoming a B partner with Eureka."

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## Shortwave Cuts Urged By U.S. Advisory Group

by John Gatski

**WASHINGTON** A government advisory group has called for major changes in U.S.-sponsored international broadcasting, including the phasing out of shortwave service in areas where local AM/FM radio is emerging and diverting those resources to TV service.

The U.S. Advisory Commission on Public Diplomacy (USACPD), a bipartisan group, released its report in early August. Recommendations include:

- Shut down the TV Marti broadcasts to Cuba;
- Terminate construction of shortwave stations in Israel;
- Build cheaper AM and shortwave stations in Kuwait;
- Enhance the existing Voice of America (VOA) broadcasts to China rather than building an entirely new, expensive new service; and
- Phase out Radio Free Europe (RFE) and Radio Liberty (RL) in areas where shortwave listening is declining and private broadcast on AM and FM is increasing.

According to the report, half of the VOA's shortwave transmitters are RFE/RL transmitters aimed at Eastern Europe and portions of the Soviet Union. Some of the RFE/RL broadcasts even duplicate VOA broadcast content. "RFE/RL served the country well," USACPD Chairman Tom Korologos said. "But with political changes, their programs resemble those of the Voice of America."

The commission is optimistic that

the current trend of private AM and FM stations in these areas will fill the void of an eventual phase-out of the shortwave RFE/RL broadcasts.

Money also can be saved by terminating the Israel-based Radio Free Europe/Radio Liberty project and building a "less costly site" in Kuwait, and not building a "Radio Free China." Instead of a separate service for China, VOA service in eastern Asia could be enhanced, the commission suggested.

The commission also echoed a recent Congressional report that called for termination of the nearly three-year old TV Marti broadcast to Cuba. The pre-dawn broadcasts of entertainment and news to Havana is jammed by the Cuban government, and its effectiveness has been questioned in light of the service's \$25 million annual operating cost.

Opponents have complained that TV Marti has resulted in retaliatory interference to U.S. broadcasters on AM frequencies and jamming of Radio Marti, an AM broadcast to Cuba considered much more effective.

"Unlike Radio Marti . . . TV Marti is not cost effective and its resources should be directed to more productive broadcasting facilities," the report said.

Combined with extra funding for international broadcasting, the group believes the money saved from cutting unnecessary services for international broadcasting could be devoted to effective television services such as WorldNet.

## Australia Studies DAB Service

► continued from page 7

system, the advanced development of the European developed Eureka 147 puts it high on the agenda for evaluation. The Australian Department of Transport and Communication hopes to buy third generation Eureka 147 hardware early in 1993 for test broadcasting and demonstrations.

### Working with Canada

Australia is communicating with the Canadians about Eureka-147 in L-band. Warren said "their (the Canadians') problems and their interests are very similar to ours and we are exchanging information."

Warren is interested in the possibilities that a hybrid system of terrestrial and satellite DAB broadcast would offer to Australia. Large areas of Australia are sparsely populated and radio reception is limited to those who have a receiving dish in such areas.

Satellite transmission of DAB would allow reception to anyone in a remote area with a DAB receiver, he added.

The option to broadcast DAB via satellite in Australia is further away than terrestrial transmission due to

the B-series AUSSAT satellites not having transponders with enough power to enable normal DAB direct-to-receiver transmission.

Although there is tremendous enthusiasm for DAB among members of FARB (Federation of Australian Radio Broadcasters), FARB representative Joe Oost said there is some uncertainty because of economic conditions.

### History lesson

Many radio stations are operating at a loss and an economic recession still has a firm hold on the nation. The prospect of investing heavily to keep pace with technological change is not attractive for all players. While Oost said that this is not a prevalent attitude, it is one that he sees a need to guard against to avoid a repetition of the Australian experience with FM.

"There was a general feeling after the Second World War among Australian broadcasters that FM wasn't needed here," he said. "Subsequently the first commercial FM stations didn't open until 1980. Existing broadcasters weren't allowed into FM and many AM stations were left standing."

# Digital Cable Radio Attracts Listeners

*Editor's note: This is the last in a series of articles updating major players in the fledgling digital cable audio industry.*

by Frank Beacham

**NEW YORK** In 1988, when Jerrold Communications began to test the new concept of transmitting digital audio over cable television systems, they knew they had a hit.

Listeners at test sites in three cities reported that the digital audio tuner had quickly become the most used appliance in their home.

Researchers found that the average listener tuned in the CD-quality audio programming 21 hours each week. When offered the choice of music with or without disc jockeys, the test consumers gave Jerrold a loud and clear answer.

"They absolutely, positively do not want disc jockeys," said Dave Del Beccaro, president of Digital Cable Radio (DCR), located in Hatboro, Pa. The DCR service was born from the Jerrold technology.

Feedback from those early listeners helped shape the programming line-up available today to 35,000-plus DCR subscribers on more than 60 U.S. cable systems, according to the company. DJs and commercials are absent from the service's 19 CD-quality music channels.

**Premium audio**

In addition to music, DCR offers digital stereo simulcast feeds of HBO, Cinemax, Showtime, MTV and VH-1 on its national service. The movie channels are often in surround sound. Competitor Digital Music Express (DMX) allows local operators the choice of whether or not to offer video simulcast feeds.

## Action Due On AM Rules

► continued from page 1 but have been operating under a "working" agreement.

The U.S./Mexican agreement will affect stations within 450 kilometers of the border, according to Henry Straube, negotiator for the FCC's International Branch.

"With Mexico, we are going to have allotments—21 on each side of the border, 21 for the U.S and 21 for Mexico. They (the allotments) are spread across all 10 frequencies."

The Canadian/U.S. working agreement is somewhat different from the Mexican structure. "With Canada we have one unlimited frequency for each side and the other eight frequencies go along with the Rio '88 allotment system, so you have to coordinate everything based on adjacencies," Straube said.

Straube noted that no stations have begun broadcasting on the expanded band in Canada or Mexico. He also noted that those countries consider the new frequencies as additional allotments for more stations—not part of a plan to reduce interference.

DCR also provides a channel called "Spectrum," which is used to provide specialty programs and for testing of new formats. Audiophile Audition, a show aimed at audio buffs, and the David Sanborn Show, a jazz program, appear on this channel. Another channel, "For Kids Only," offers children's music and storybook readings.

Last year DCR experimented in a

with an LCD display that provides information about the music.

"DCR's addition of new channels is just the first of many steps in the expansion of our service," Del Beccaro said. "Within the next 10 years, DCR will offer a diverse line-up of 250 audio channels, including sports, news, education, foreign languages, local programming—and, of course, more music."

he asked.

"In the future, we will have some national stations on our service because some stations have unique programming and personalities," Del Beccaro said. He cited Howard Stern or Garrison Keillor as the type of widely-popular radio personalities that could justify airing a station on a national basis.

With five of the nation's largest cable MSOs holding an ownership position in DCR, can we expect to see the service expanding beyond cable for distribution?

Yes, Del Beccaro answers firmly. "I think all of us will be available on DBS continued on page 10 ►

**"Within the next 10 years, DCR will offer a diverse line-up of 250 audio channels, including sports, news, education, foreign languages, local programming—and, of course, more music."**

— Dave Del Beccaro

"pay-per-listen" event when it aired the Metropolitan Opera's 25th Anniversary Gala.

By the end of 1992, DCR will add 10 new music channels to its lineup. Among the new additions are channels devoted exclusively to Rap, Regional Mexican, New Age/World Fusion, Tropical Rhythms and Triple A—Adult Acoustic Alternative.

DCR also will add a popular DMX feature to its tuners: a remote control

DCR adds some local radio stations to its service but does not carry any station yet on a national basis. The reason, Del Beccaro said, is DCR already provides more complete and varied music programming than most radio stations.

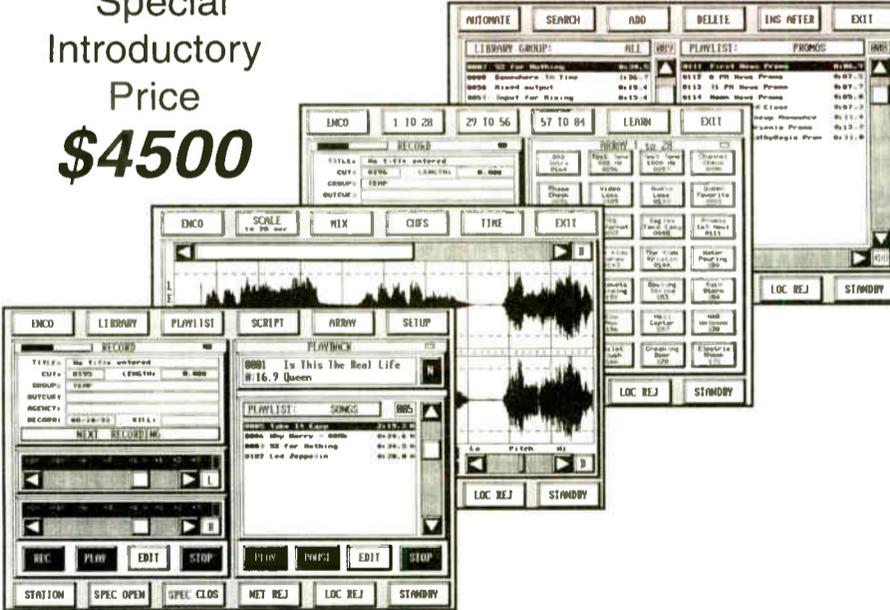
**National station likely**

"Digital Planet (a competitor) was bringing in a New Age station, but we have a New Age channel. Why would we want to add a New Age station?"

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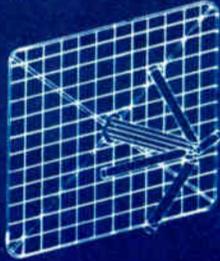
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# Digital Cable Radio Attracts Listeners

► continued from page 9  
 (direct broadcast satellite)," he said. "We are not limited to cable because we happen to have some cable partners."

As to whether DCR is negotiating a spot on Hughes Communications' DirecTV DBS service slated to begin in 1994, Del Beccaro declined to answer. "I have no comment on

specific negotiations. If it makes sense for us to be on the Hughes bird, we'll be there. If it doesn't, we won't," he said.

What about the possibility of DCR and

## 61 Years Ago

Reprinted from **Radio World** September 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.

### The Big Show

**T**HE Radio-Electrical World's Fair that will open on Monday, and run for a week, at Madison Square Garden, New York City, comes as a most welcome stimulus to the radio business at a time when it needs that assistance more than at any previous time. That show week is taken by almost everybody as the elongated opening of the radio season, and no doubt what the visitors will see at the show will stimulate them to purchase radio sets and accessories, for there is much from which to choose, and prices are most reasonable.

Even aside from the commercial phase of the show, there is much of interest, including an insight into the latest trends in radio sets, television improvements and exhibitions, and the view of noted performers broadcasting from the crystal room.

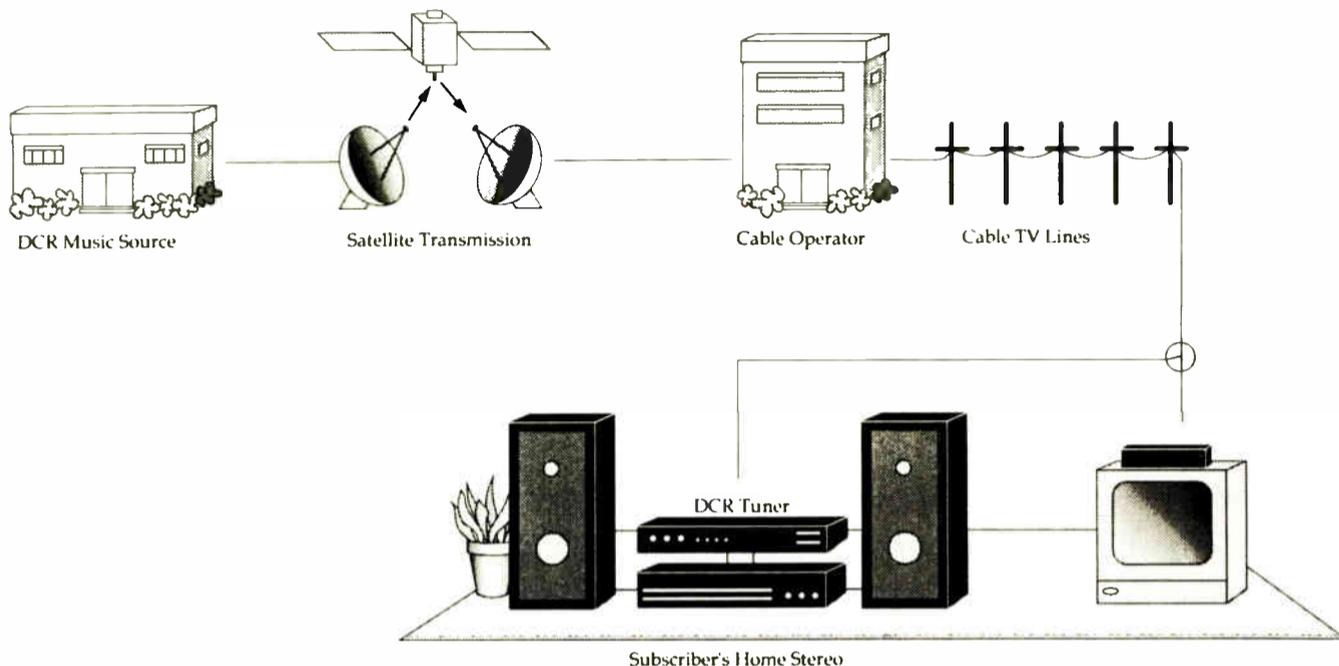
Interest in radio may be said to be highly specialized nowadays. This seems to be part of the trend of the times toward specialization. Formerly a person to whom radio was strange would roam through the show and fill a handbag with circulars and an assailed head with miscellaneous information and image retentions. Now a prospect has a fairly good idea of what he wants, but will look over the wares, preparatory to hearing actual tests in dealers' stores later, before purchasing.

So the visitor-specialist will find it easier to "do" the show, and interest will be focused on exhibits that count in the prospect's estimation. The fair not only has gone over virtually completely to manufactured sets, so far as radio is concerned, with the important accessories of tubes as companion, but has taken in other things electrical, including washing machines, refrigerators and fans. That is not going too far afield, but it is an admission that radio has not been able to continue the exclusive support of so large an undertaking as an annual fair in the great arena in New York City, no more than it was able to monopolize the trade show in Chicago.

The entry of radio manufacturers into additional electrical fields in part accounts for the augmentation, but this taking on of a side line is an expression of the same situation, that the fairs were too enormous for the industry.

Figure 1.

### How DCR Works



Digital Cable Radio (DCR) transmits pure digital compact disc sound, via satellite, to cable operators. The service is piped to home stereos over regular cable TV lines. Inside the home, DCR subscribers select from 19 channels of music and special programs, including simulcasts of live concerts and selected cable TV programs.

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DMX merging into a single service? Del Beccaro said he sees no merger ahead, but he left the door open slightly to such a possibility. "In fact, I think for competitive reasons it's probably good the companies don't (merge). It will hold down prices, etc. It doesn't have to happen. Will it happen? Who knows what will happen?"



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World Radio History

## INSIGHT ON RULES

# Ensuring Remote Control Compliance

by Harold Hallikainen

**SAN LUIS OBISPO, Calif.** We're continuing our review of the FCC's proposed AM self-inspection form (a sort of mail order inspection). The questions are probably similar to those that would be asked in an actual inspection, so they serve as a good review of station compliance.

Through this series of articles, you can examine a different part of your station each month, and check it in detail. I have considerably expanded upon each of the questions, giving the referenced rule sections and my interpretation of what it means and

what the FCC has found in station inspections.

## Assume nothing

Do not rely solely on my interpretation. Instead, use it as a starting point for further investigation of a rule. Further, do not rely solely on the FCC inspector's interpretation of the rule. If you read the rule differently, talk with the FCC staff in Washington or your communications attorney or consulting engineer. I like discussing rule interpretations with the FCC staff in Washington, because they tell the field offices what to do.

The next section of the self-inspection report deals with remote control operation. This section raises several questions where I believe the FOB's enforcement of the rules is not supported by the rules. There is quite a bit to discuss on remote control itself.

This month we'll use the section on remote control as a basis for the discussion, but will go considerably beyond the questions raised in the report.

I believe the shortcomings in the current remote control rules are serious enough to warrant a change in the rules. I'm working on a petition for rulemaking on this

subject. I'd appreciate your comments. Give me a call and I'll send you what I've got so far.

Here I must acknowledge the potential for a perceived conflict of interest on my part, as my company manufactures transmitter control equipment. I will endeavor, however, to present a discussion that is fair instead of one that benefits my company.

The FCC established the current remote transmitter control rules in 1984 (see 49FR47606). In a related matter, the commission established the current ATS rules in 1986 (see 51FR1374). A clarification of the remote control rules was issued in 1988 (FCC Public Notice 88-194). There is *still* considerable confusion as to what the rules require.

## Fall-safe

I recently received a copy of an Official Notice of Violation issued to a station in southern California. The station was cited for violation of Rule 73.1410(d): The remote control system was not designed so that malfunctions in the circuits between the control point and transmitter would not cause the transmitter to be inadvertently activated or to change operating modes or output power. At the time of the inspection at the transmitter site, the phone line circuit was open-circuited, but the transmitter continued its operation.

The station's response was based on a discussion with a member of the FCC staff in Washington. It said, in part: "(The staffer) indicated that a remote control system is not required to terminate transmissions upon disabling the circuit between the control point and transmitter.

"He indicated that disabling the circuit should not cause the transmitter to change modes or operating power and use of the remote control must be discontinued within three hours after the malfunction is first detected. It is believed that there has been a misinterpretation of rule 73.1410 by the inspecting officer, and no notice should have been issued."

Several stations have been cited for lack of "fail-safe" (as required by the rules prior to 1984), even though no such requirement currently exists in the rules.

I've seen several cases where stations were cited for violation of 73.1410(e), which requires a station to shut down immediately on detecting an uncorrected interference-causing condition. These stations were apparently cited for the "capability" of violating this rule. That is, how do they know they could shut down immediately in an interference-causing condition?

It appears to me, however, that a station cannot violate this portion of this rule unless it actually causes interference and does not shut down.

## Continued operation allowed

The Report and Order establishing the current rules says "the new rules will permit continued operation following a loss of transmitter control, pending repair of the control circuits, as long as the station continues to operate properly. Loss of telemetry, on the other hand, means that the transmitter parameters cannot be monitored remotely.

"Therefore, the amended rules will require termination of use of remote control within three hours after detection of telemetry failure." This allowance for "loss of control" made the use of non-dedicated control circuits practical (dial-up remote control).

Many FCC inspectors, however, continued to cite stations for lack of some sort of automatic fail-safe system that would

continued on page 18 ►

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# WORKBENCH

## Sensing the Sound of Silence in AM

by John Bisset

**FALLS CHURCH, Va.** If you work at an AM/FM combo station, chances are you've seen the AM take the back seat in recent years.

In many automated settings, when local control is taken, the silence sense is defeated and a number of problems can occur.

TIME DELAY	74HC390 PIN	74HC390 PIN	NOTE
1 SECOND	3	3	BOTH GATE INPUTS TO THE SAME OUTPUT
2 SECONDS	5	5	BOTH GATE INPUTS TO THE SAME OUTPUT
3 SECONDS	3	5	
4 SECONDS	6	6	BOTH GATE INPUTS TO THE SAME OUTPUT
5 SECONDS	6	3	
6 SECONDS	6	5	
7 SECONDS	—	NOT AVAILABLE WITHOUT ADDITIONAL LOGIC	
8 SECONDS	7	7	BOTH GATE INPUTS TO THE SAME OUTPUT
9 SECONDS	7	3	

Operators could push "stop" and forget to join the network, or they could join, then split, and forget to start the automation. With no one listening to the AM, no corrective action was taken.

### Sense the silence

Jim Kunze was in this particular situation. His development of the "silence sensor" shown in Figure 1 solved the problem. The circuit accepts audio from two

with a peak value of +12 V into the positive input of half of comparator IC-4.

The negative input of this comparator connects to the +5 V supply. Whenever the transformer voltage exceeds +5 V, the comparator output goes high, resulting in a 60 Hz square wave output.

This signal is used to clock the first stage of IC-5, a 74HC390 dual decade counter.

The output from AQ-3 (pin 7) is a 20 percent duty cycle 6 Hz signal. This signal clocks the second half of IC5.

When the count of the second half of IC-5 reaches 6, a high signal is sent to the chip's MR input, which resets the counter to zero. The output from IC-5, BQ-2, becomes a 1 Hz signal.

The reset signal is derived from the two gates of a

74HC00 quad NAND gate. The first half looks at the 2-count (BQ-2, pin 10) and 4-count (BQ-1, pin 11) outputs and provides a low signal when the 4 and 2 BCD outputs are both high. This high signal is then inverted by the second gate to provide the reset pulse for the counter.

### Hearing double

There are two identical audio pulse circuits. The first stage of IC-3 acts as an in-

verting buffer, which is followed by an amplifier stage with a gain of 10. The audio is routed to the plus input of 1/4 of quad comparator IC-4.

Whenever the audio is higher than the set point formed by the voltage divider of pot R-10 (or for the second

channel, R-18) the comparator output will be a series of square wave pulses. When setting up this resistor, some care must be used to ensure that the voltage is higher than the noise level. If the level is set too low, the logic of the comparator is inverted. To alleviate this, a 14 kilohm resistor from the bottom of R-10 (and R-18) to ground will limit the minimum voltage to the +5V offset from the amplifiers.

IC-7 is the silence sense device. It is also a dual decade counter. The counters count the 1 Hz input from the time base. The audio input pulses reset the counter to zero. If no audio pulses occur, the device is allowed to count up to its alarm point.

Since the audio pulses should occur with a much higher frequency than the 1 Hz time base, the silence sense counter should never even reach a count of 1.

The first audio stage is connected to the automation output. When stop (manual operation) is pushed, a relay contact holds the "master reset" (MR input, pin 2) high and prevents any further counting.

Nearly any counting period can be used to trigger the alarm. Jim chose six seconds, which occurs by connecting the inputs of a NAND gate to the two and four count

set low from the first gate of IC-8. This low is inverted and drives Q-1, which pulls in the step relay. The step signal is a one-second relay closure.

The first step pulse comes after six seconds. If the situation is not solved, the pulse is repeated every 10 seconds until au-

TIME DELAY	74HC390 PIN	74HC390 PIN	NOTE
1 SECOND	13	13	BOTH GATE INPUTS TO THE SAME OUTPUT
2 SECONDS	11	11	BOTH GATE INPUTS TO THE SAME OUTPUT
3 SECONDS	13	11	
4 SECONDS	10	10	BOTH GATE INPUTS TO THE SAME OUTPUT
5 SECONDS	10	13	
6 SECONDS	10	11	
7 SECONDS	—	NOT AVAILABLE WITHOUT ADDITIONAL LOGIC	
8 SECONDS	9	9	BOTH GATE INPUTS TO THE SAME OUTPUT
9 SECONDS	9	13	

dio is restored. The alarm signal sets the RF flip-flop, which can only be reset by pushing the "clear" switch, S-2.

The second half of IC-7 is connected to the air monitor. The alarm for this warning is only connected to the alarm circuit, so that it provides an aural signal, but no step pulse.

The output from the air monitor is high for two out of 10 seconds. The time before a warning should be longer than the duration of the automation alarm, to allow the automation circuit a chance to clear the problem.

As with the automation alarm, a variety of counting periods can be selected. Table 2 lists the timing connections for other count periods.

Setup of the completed circuit is facilitated with an oscilloscope. Supply an input signal which corresponds to the level of the monitor input. Look at the output of this opamp and adjust R-5 so there is no clipping. Repeat the same procedure for the second section, adjusting R-15.

### Check out the wave

Now move the scope probe to the comparator output and check that square wave pulses are coming out. Turn the output of the signal source down, and verify that the comparator output goes low. The set points are adjusted by R-10 and R-18.

Proper adjustment occurs when the input has been lowered to the alarm point, and R-10 and R-18 are adjusted to just extinguish the square waves. If an oscilloscope is not handy, set R-5 and R-15 to about 2 kilohms. Then use a voltmeter to set the voltage from the wipers of R-10 and R-18 to +5.5 V.

Perhaps the biggest advantage to this circuit is its simplicity and low cost. Building the circuit using totally new parts will run about \$30. Since the audio source could be a portable radio, similar circuits could be built for the GM or PD, for home use.

Jim Kunze can be reached at WTCA Plymouth, Mass.: 219-936-4096.

John Bisset is a principal with Multiphase Consulting, a contract engineering and projects company. He can be reached at 703-379-1665.

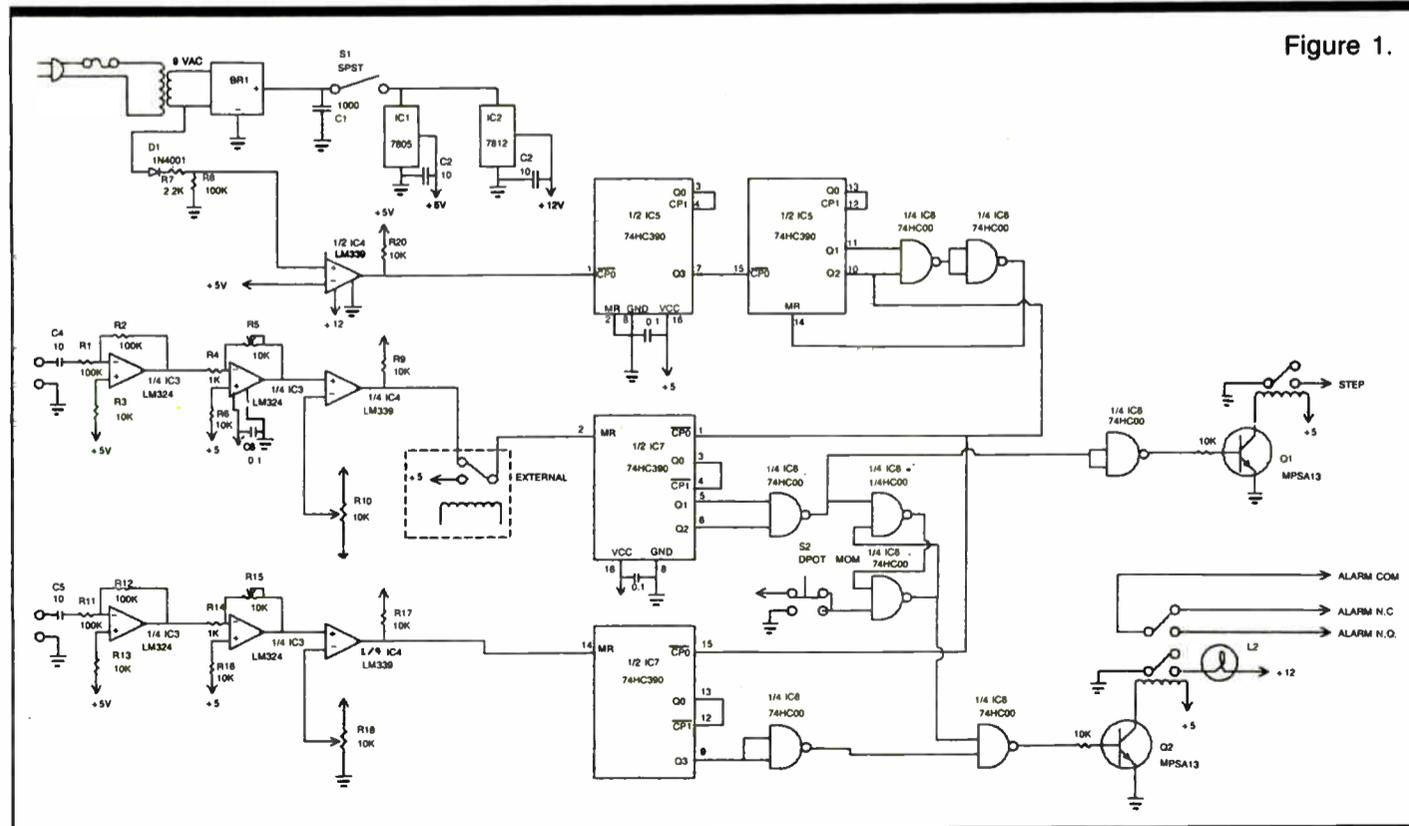


Figure 1.

sources, converting each into a series of +5 V square wave pulses which trigger the silence sense circuitry.

Bridge rectifier BR-1 feeds IC-1 and IC-2 to provide separate 5 V and 12 V supplies. D-1 and R-7 and R-8 couple a signal

verting buffer, which is followed by an amplifier stage with a gain of 10. The audio is routed to the plus input of 1/4 of quad comparator IC-4. Whenever the audio is higher than the set point formed by the voltage divider of pot R-10 (or for the second

outputs. Table 1 lists the timing connections for other count periods.

### Flip-flopping

An RS flip-flop is formed by two more NAND gates of IC-7 (74HC00), which is

## FEEDLINE

# Should You Buy That FM Station?

by W.C. Alexander

## Part I of II

**DALLAS** In the last *Feed Line*, we examined the important technical items to look for when prospecting an AM station for possible purchase. This time, we'll talk about studying an FM station.

When the boss asks you to take a look at a particular station, your objectives should be to give him an evaluation of the station as it now exists, and with an eye to the future, looking for possible improvements. You will want to unearth any hidden problems there may be with the allocation, site, and signal environment before an on-site inspection is made.

## Start at the source

The best place to begin is with the FCC database. Retrieve all the records that pertain to the station. You can do this through Dataworld, Broadcast Data Services (BDS), independent database suppliers, your communications attorney, or consulting engineer.

Database records will show the licensed facility as well as any outstanding construction permits and pending applications.

If there is an outstanding construction permit as well as a licensed facility in the database, you will have to dig further to determine the status of the CP. The database

will not show whether or not the station is operating under *program test authority*; you will have to get that information elsewhere.

The easiest way to do this is to have your communications attorney research it. For pending applications, some similar research will be required to determine the status of the application.

Once you have determined the station's authorization status, you will want to obtain a copy of the engineering portion of the FCC Form 301 that pertains to the current or proposed mode of operation. Your attorney can get this for you or you can get it from the Downtown Copy Center or through the broker.

Brokers are generally a pretty hungry lot—if one really wants to sell a station, he will really bust his hump to get you the information you need. If he offers a "sales map," don't be misled. Insist on the actual exhibits filed with FCC Form 301.

With this information in hand, you will have all the information that is a matter of public record on the station's technical operation. Immediately, you can see if the predicted coverage is small, large, or just adequate, and you will get a feel for the terrain averages and the location of the transmitter site.

## Separation study

The next step I take when studying an FM station is to look at the allocation. I

do this by running a separation study.

The separation study will reveal the distance and bearing to all co- and adjacent-channel stations as well as stations on the channel 10.6/10.8 MHz removed from the station's channel. Short spacings will be apparent, as will areas where there may be a little breathing room.

Sometimes, particularly if the station is located in the northeastern part of the country, there will be numerous grandfathered short-spacings. In essence, these short spacings will limit interference-free coverage in the direction of the short-spaced station.

Take careful note of any such short-spacings, and remember that the possibilities of upgrade or even minor improvement are few where such short-spacings exist.

After running a separation study for the allocation's existing class, I like to try a "what if" study on the next higher class (if any). For instance, if the allocation is for a 6 kW Class A, if there are no short or close spacings, I will run a C3 or B1 study to see if there is the possibility of upgrading. If the existing site will not meet spacing minimums for the higher class, will a site move help?

When examining the results of the separation study, keep in mind that even if a station is a little bit short spaced to others for the next higher class, there may still be room to upgrade under FCC Rule 73.215, provided that there is a site area that meets all the spacing requirements set forth in Rule 73.207.

Contour protection from the existing site can sometimes be employed to allow an upgrade even in the presence of limited short-spacings. This is, of course, dependent upon the practicalities of directional antenna design, so it would be wise to talk to a consulting engineer before drawing any conclusions.

One other thing that can be determined from the separation study is the permissible site area. This is particularly important

if the transmitter site is leased and a move may be required at some point in the future.

## Terrain

Besides antenna height and power, terrain is the limiting factor in FM station coverage. The 3-16 km average terrain elevation is used to compute the predicted contour distances, and many times this provides a fairly accurate picture of the coverage.

For a prospective purchase study, however, I like to look at several radials over each area to be served. The purpose of this is to find out if there are any terrain shielding problems that will affect reception in principal service areas.

Get the terrain elevation every half mile or so from the transmitter site to the far side of the area to be served on a sufficient number of radials to give you a clear picture of the terrain. You can obtain this from topographical maps, or from the National Geological D.C. (NGDC) 30-second database (or even a three-second database) on BDS or Dataworld.

Plot the elevation versus distance on a piece of rectangular or 4/3 graph paper for each radial. Draw a line from the antenna center of radiation elevation to the end of the radial, and look to see if there is good clearance. Be sure to consider 0.6 first Fresnel zone clearance plus room to clear trees and buildings.

Calculate the first Fresnel zone at the midpoint of the path using the following formula:

$$R = 1140 \sqrt{d/f}$$

R = the first Fresnel zone radius in feet  
d = the path length in miles, and  
f = the frequency in MHz

You can pencil in the heights of known obstructions along the path to give a clearer picture of what shadows are likely to be encountered.

In many cases, the terrain study will show that there is a good line-of-sight path between the transmit antenna and the desired coverage area. In other cases, however, you may discover that a high ridge or even a line of low hills significantly blocks signal propagation, even though the predicted coverage map shows good coverage in the shadowed area.

This is the kind of hidden trouble that the seller may not be eager to reveal. If you find it and bring it out in your report, you may well save your boss (and yourself) a lot of grief and aggravation later.

One last thought while on the subject of terrain: Look for rapidly rising terrain on the opposite side of the target coverage area from the transmitter site. If such a situation exists, it can indicate the potential for big multipath problems as signals reflected off the high terrain mix with the direct path signal.

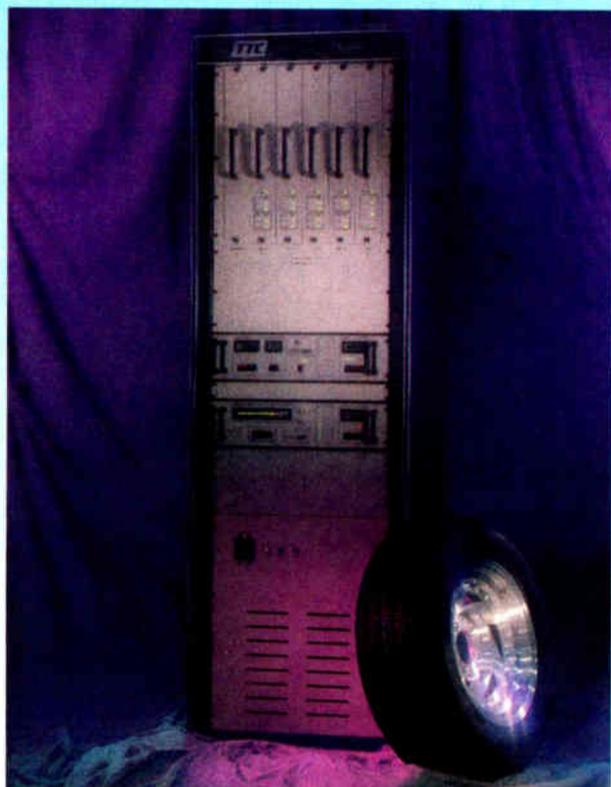
The same and more can be said for a downtown area or other cluster of tall, man-made structures—the area between these structures and the transmitter site may be prone to multipath, while the area beyond may be shadowed.

Next time we will look at how to examine the station's transmitter site, the possibility of intermod and troublesome mixes, predicted coverage, and how to finish your study by writing a comprehensive report of your findings.

□ □ □

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

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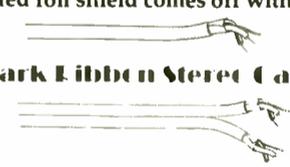
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# A Road Tour of AM Radio Stations

by George Riggins

**LONG BEACH, Calif.** It's been hard to get back in the saddle after being out to pasture for a couple of months. Even the fingers don't want to hit the proper keys on the keyboard.

The summer travels took my wife Helen and me as far as Columbia, S.C. We were surprised to hear the lack of interference east of the Allegheny, Blue Ridge, and Smoky Mountains. I was able to hear some very weak stations on my little Sangean AM stereo receiver.

Yes, there was a slow fade (QSB for you hams) on some of the weaker stations, but

I was able to figure out most station locations even though I could not always understand or hear the call sign.

## Not so clear a channel

Philadelphia's KYW(AM) had a weak but audible signal. I heard one New York station—I know the station was located in New York City because a Washington Heights business was airing a spot. Every time the station call was given the signal seemed to be at the low point of the fade cycle.

A Philadelphia station was broadcasting the Phillies baseball game and alternating local and national spots. One can almost always figure out the general location of a

station by what is being advertised, even if the call sign is given in such a way that only a regular listener can tell what the letters are supposed to be.



Interestingly enough, the one station I thought should be as good as any local station in Columbia, had considerable QSB. In looking at a map, the distance from the station—about 100 miles—did not seem to be that far, but perhaps I was listening off one of the lower power lobes of the antenna pattern. The station in question? WBT(AM) Charlotte, N.C.

## Sound qualities

Another area I use as a barometer of what is happening to local radio is further east on the interstate. The station in question has been on and off the air many times over the past 10 to 15 years. I saw the station facilities several years ago, and from the exterior appearance and sounds, the equipment has deteriorated even more since then.

The satellite feed had decent quality, but when it came to the local audio, you had to put in the earplugs and hold your nose. The level difference between the satellite feed and the local audio—whatever its feed—was dramatic.

While listening to a local station in another market during morning drive, I heard almost nothing but commercials. Yes, there was a two- or three-second bridge between spots.

All the spots sounded live, but is that good programming or just time brokering? The station lists itself as "talk," but perhaps there should be more than just advertising and short musical bridges.

We also noticed how far signals from

some of the AMs carry during daylight hours. One high plains 10kW AM station has a good signal almost twice as far east as it does west, and yet there are at least two mountain ranges between the station in question and the next station to the west.

In one major market of the south, a station was so overmodulated as to be hard to understand. Both the local audio sources, mic and telephone, were just too mushy to know what was being said. The cart machine was just a little better.

## Big band sounds

We stayed a couple of nights in a small western Kentucky town. I was able to listen to WGN(AM), WSB(AM) and WBBQ(AM) from the north in addition to some stations from the south and west. I heard more *big band* music in this area than in previous years.

On a well-maintained AM station, Glen Grey and Ray Noble sound just as good as when the programs were broadcast from the ballrooms of the late 1930s and 1940s.

When Helen and I went back into the hills of Kentucky, I found an interesting and different mix of stations that could be heard from the same location as last year. One local station moved to another hilltop for "better coverage," they said.

The station cannot be received this year where it was loud and clear last year. Our hostess reported the same condition using an outside antenna on her FM receiver.

Kentucky Public Radio, as broadcast by Western Kentucky University, Bowling Green, (WKYU), continues to present interesting programming. On one night I was very pleased. The hour for the big bands passed very quickly, and the second hour of jazz was not too bad.

One other location I'll mention is Pampa, Texas. Pampa is an agricultural community northeast of Amarillo. One morning at around 5 a.m., I tuned across the AM band to hear what was available. The best signal was from WOAI, San Antonio, Texas.

KRLD in Dallas-Fort Worth came in but with a poor signal. It was subject to slow fade. There was just nothing more available for the little "tin ear" type receiver (those small shirt pocket size units with either a two-inch speaker or ear phones).

There were no FM or local AM stations to tune in, because the local stations go off the air at about midnight and sign on again at 6 a.m.

My thought is that I was able to hear the weaker stations while near the eastern shore of the U.S. because there are no AM stations to the east for several thousand miles, and the Allegheny, Blue Ridge and Smoky Mountains block the signals from the west.

To me it seems that too many policymakers have never tried to listen to radio in the great stretches west of the Mississippi River.

□ □ □

*George Riggins has experience in radio and electronics dating back to the 1930s. He also is a licensed ham radio operator and has had his own broadcast sales and service company, Riggins Electronic Sales, for more than 20 years. He can be reached at 310-598-7007.*



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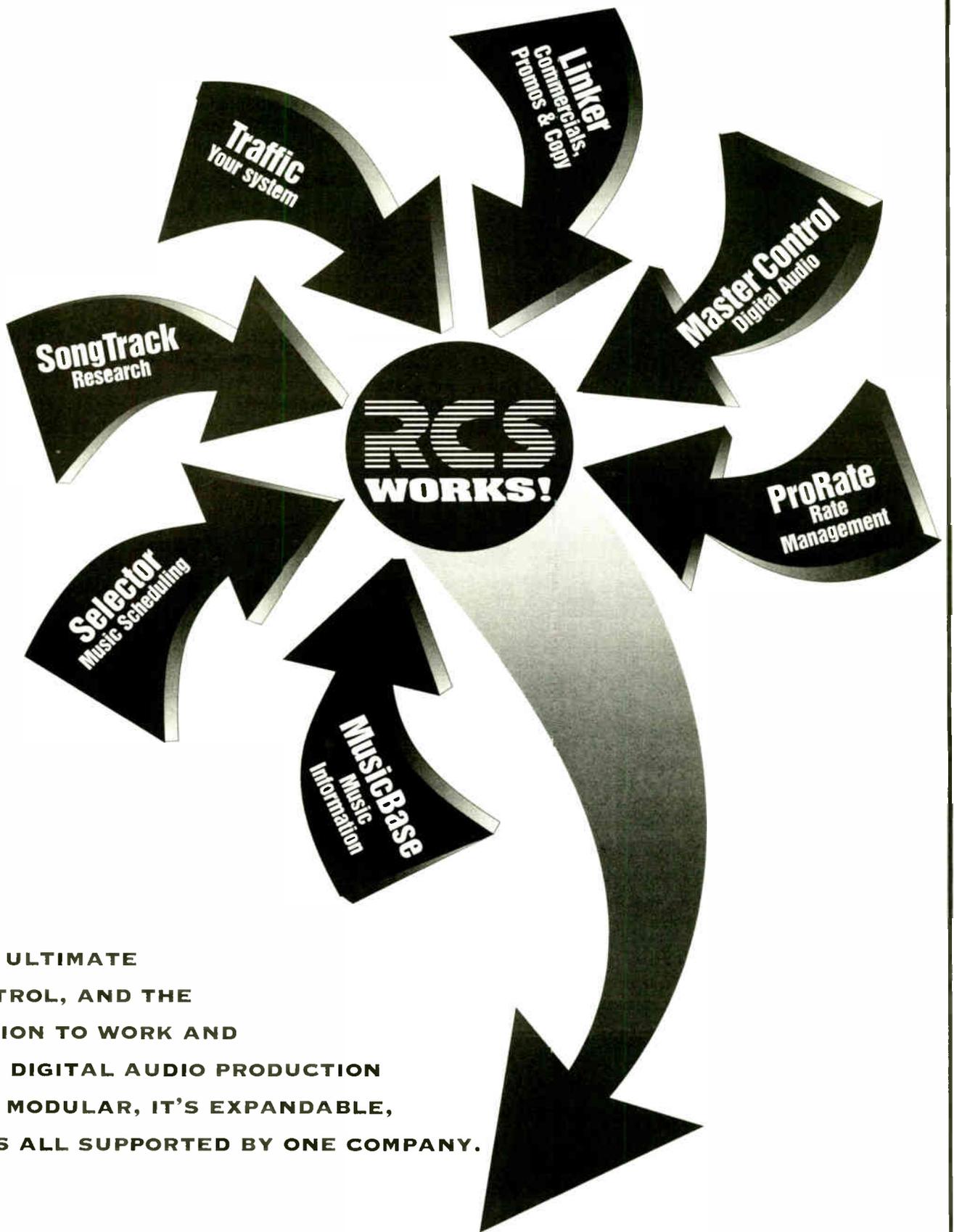
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## BOTTOMLINE BROADCASTER

# The Proper Use of Composite Clipping

by Jim Somich

**BROADVIEW, Ohio** The processing of the composite stereo signal is the most controversial of all the methods of achieving "dial dominance." Because it has often been overdone or implemented in a crude fashion, composite clipping is often rejected.

When implemented correctly, composite clipping can be a very effective technique and an integral part of a competitive processing chain. Improper processing of the composite will result in the destruction of the 19 kHz stereo pilot signal which will result in very poor

stereo or mono reception on most radios.

Even a well-designed composite clipper can destroy the pilot when consistently overdriven. The best indication of correct composite processing is the pilot injection meter on your modulation monitor. If the pilot fluctuates more than  $\pm 1$  percent, either you have a poorly designed clipper or you are pushing it too hard. Pilot modulation greater than  $\pm 1$  percent injection can earn you a ticket from the FCC also.

The peak level of the composite signal is equal to the peak level produced by the larger of the left or right audio inputs. This

is due to the "interleaving" property of the FM baseband signal. If the peak level of the stereo subcarrier does not coincide in time with the peak of the audio, the peak modulation is lower than it would be if the two peaks were precisely coincident.

## Watch peak modulation

The 19 kHz pilot tone is correlated to the 38 kHz stereo suppressed subcarrier. Therefore its peak level does not add arithmetically to the peak level of the rest of the composite signal.

If modulation is purely monophonic, the pilot will add arithmetically because there is no stereo subcarrier. If the modulation is pure left or right, the same conditions will only result in approximately 97.2 percent modulation because the pilot has partially interleaved with the remaining composite signal.

As the stereophonic content of the program material increases, peak modulation decreases slightly and loudness is lost. Inaccuracies can be caused by composite STLs and exciters with poor low-frequency transient accuracy. Low frequency program energy can cause such devices to ring and bounce, causing unnecessarily high peak modulation.

## How clipping can help

Clipping the composite signal eliminates interleaving problems. Only clipping can limit the composite signal precisely to the desired level of modulation. There are only two caveats: The clipper should not act on the pilot signal, and the clipping process should reduce harsher distortion to a minimum. It is interesting to note that an effective low-distortion digital (DSP) clipper has yet to be designed.

Composite processing has a large advantage over conventional audio-domain processing as stereo separation increases (large amounts of L-R).

All of the harmonics produced by composite clipping of the stereo subcarrier will fall above 53 kHz and out of the range of audibility. A well designed and adjusted composite clipper will produce no audible distortion in the audio passband. The amount of measurable distortion is highly dependent on the ratio of L+R to L-R energy in the program material and depends somewhat on receiver design.

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Well-designed composite clipping can restore this lost loudness by allowing you to set your maximum modulation point very precisely, thus eliminating the effect of stereo separation on modulation level.

## Bottom line

You can be noticeably louder if you use a good composite clipper. Your composite clipper should not affect the pilot tone and should use an advanced, distortion-cancelling circuit. No other form of processing can provide you with the brick wall necessary to overcome all of the small overshoots and bounces in your system.

Cumulatively, these signal imperfections rob you of considerable loudness and dominance.

Most audio processors contain "safety clippers" to prevent overshoots from overloading transmitters. When you are using composite clipping, these safety clippers are unnecessary and undesirable. Hitting a safety clipper instead of your low-distortion composite clipper will only

continued on page 38 ►

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## Remote Control Compliance

► continued from page 12

shut down the transmitter on loss of control.

The FCC further muddied the waters with its Clarification of 1988. They listed guidelines that would allow the use of dial-up circuits for transmitter control.

Guideline No. 4 allows the use of dial-up circuits if the station licensee ensures the dial-up circuit remains available at all times for the duty operator, provides a means for the duty operator to interrupt or preempt other telephone access, or provides some alternate means of shutting down the transmitter. Listed possibilities include a second dial-up line and interruption of STL carrier or audio.

This "clarification" seems to go well beyond the requirements of the rules and the intent as discussed in the Report and Order.

Guideline No. 8 requires that any automatic alarms (though automatic alarms are not required) of interference-causing conditions be directed to the duty operator first.

According to this section of the clarification, the remote control is required to shut down the transmitter within five minutes if a "corrective response" is not received from the duty operator within five minutes. As written, the remote control rules do not have any requirement for an automatic shutdown. This is, however, similar to the automatic shutdown requirements for ATS. Should we disregard this portion of the clarification?

What other parts should we disregard?

The FCC self-inspection report asks, "Does your remotely controlled transmitter have positive on/off control from all control points? (73.1410)." Positive control is not defined in the report, nor in the Rules. Is this an implied fail-safe?

Next month, we'll continue our discussion of the FCC self-inspection report and remote control. What transmitter parameters are required to be telemetered? What is the required remote metering accuracy? What controls must be remotized? Must the operator be able to see the remote meters from routine operating position?

If you'd like a copy of a 46-page "compliance package" including the FCC self-inspection report, an FAA Obstruction Light Outage form, some FCC correspondence regarding inspections and compliance, FCC broadcast inspection forms, and the FCC Denver Broadcast Inspection Summary, send \$5.00 to cover copying and postage to H&F, 141 Suburban Road, San Luis Obispo, CA 93401-7590.

□□□

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 and is learning Contra dancing. He can be reached at 805-541-0200. He can also be reached on internet at ap621@cleveland.freenet.edu or hhallika@pan.calpoly.edu or through CompuServe at INTERNET: ap621@cleveland.freenet.edu.

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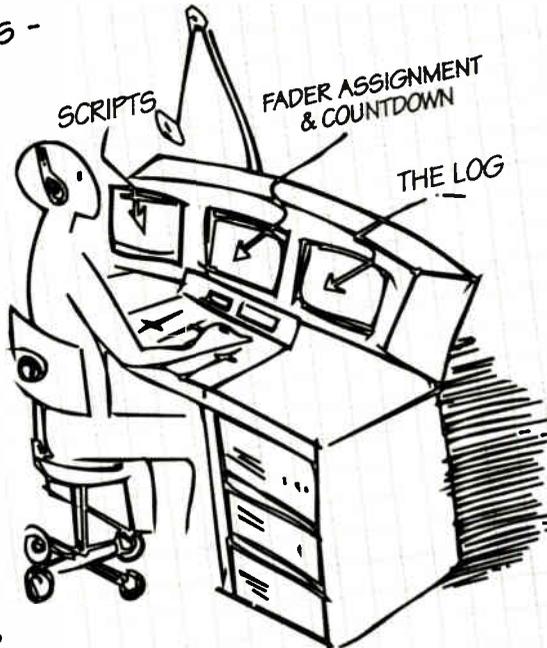
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## DIGITAL DOMAIN

# Tracking Down I/O Incompatibilities

by Mel Lambert

**STUDIO CITY, Calif.** Recently, I had occasion for some very rewarding detective work. As I've mentioned in previous columns, I also serve as a technical consultant to a variety of pro-audio companies, including a leading manufacturer of DAT recorders.

In addition, I have made something of a study of incompatibilities between "consumer-grade" and AES-format digital I/Os—reporting on recent developments, including enhancements to the original AES3 Recommended Practice in these hallowed pages.

Recently I received a call from a local production facility that was attempting to use a well-known DAT recorder to record stereo mixes via a popular analog-to-digital converter. The A-to-D in question offers both "S/P DIF" and AES/EBU outputs.

## Recognition problems happened

The studio's technical staff had decided to use the AES/EBU output to carry 16-bit digitized signals to the DAT recorder. AES-format interfaces are electrically more reliable, and capable of running greater distances between source and destination. So far, so good.

The problem arose, however, when the DAT recorder failed to recognize the digital bitstream from the converter. Changing cables did not cure the problem, nor did

the use of a short length of twisted-pair computer lead.

Swapping over to the S/P DIF interface (more correctly referred to as the IEC 958 Type II I/O) proved that both the converter and DAT machine were functional because the latter would enter record-ready mode when connected via a short length of coax cable.

What was the trouble, the studio's technical staff began to muse? A second, portable DAT recorder was quickly located in another studio, and hooked up. Via both AES/EBU and S/P DIF inputs, the portable DAT recognized the converter's bitstream.

Obviously, they concluded, something was wrong with the first DAT machine. At this point in the saga my telephone rang. I knew about each of the components being used, and ascertained that the hook-ups were being performed in a reasonable manner, but with confusing results.

I also knew, from previous conversations with the manufacturer of the A-to-D converter, that it featured well-designed circuits for both the AES-format and IEC 958 output ports. (In fact, the firm had criticized the design of the same DAT machine that was currently "misbehaving," on the grounds that its digital output circuits—particularly the IEC 958 port—had problems communicating reliably with their companion reference D-to-A converter.)

It just didn't follow that one input port

on the DAT would function correctly, but not the other. The only reliable solution was to bring the suspect DAT machine and A-to-D converter to my laboratory, so that I could analyze what was really going on.

## Analyze the I/Os

To date, the best tool I've come across for examining digital I/Os comprises a format converter (AES/EBU to/from SDIF-2 and various consumer formats) that also includes a channel status analyzer and editor. As *RW* readers should already be aware, aside from electrical differences (impedance, voltage levels and connectors), the fundamental differences between AES/EBU and consumer-grade I/Os lies in the 192-bit blocks of data referred to as channel status, carried one bit per audio sample.

By examining the sequences contained within the channel status, we can determine whether the bitstream is coming from an AES/EBU or consumer output; its sampling frequency; mono/stereo mode; and a host of other valuable information.

Cutting to the chase, it turned out that no matter which setting was selected on the front panel—AES or S/P DIF—the A-to-D converter was outputting a data stream whose channel status conformed to the IEC 958 format. An internal wiring fault was not selecting the correct DSP lookup table that changed the appropriate channel status sequence according to which output format was selected. (I also confirmed that an XLR-to-phono lead connecting the AES/EBU output from the A-to-D converter to the DAT's IEC 958 input allowed the DAT to enter record-ready mode.)

Why, you might be asking, was the A-to-D converter able to communicate successfully with the other DAT machine? The digital input does not check for information within the channel status to determine interface format (nor, I suspect, sampling frequency).

In the case of this popular portable DAT

recorder, the input simply slews the digital input's phase-locked loop to match sample rates, locks sync against each subframe's four-bit preamble group, extracts the 16 valid data bits, and lays them onto the DAT tape.

## The newer the better

Later-generation DAT transports, however, feature digital I/Os that have been implemented according to the various international standards and recommended practices. In the case of a correctly-designed AES/EBU I/O, this means examining various bits within the channel status block, and determining precisely which format of bitstream has been presented to the recorder, and acting accordingly.

In this case, the "suspect" DAT machine had determined from the channel status data that the AES/EBU input was formatted to IEC 958 Type II criteria, and would not enter record-ready mode. The portable DAT recorder wasn't concerned about the difference, and did enter record-ready mode when presented with this *mis-format* signal.

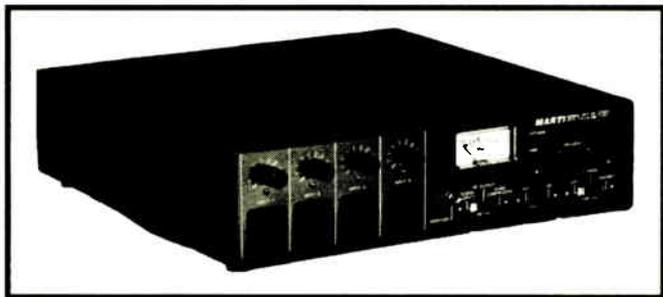
The lesson to be learned is an important one, I would suggest. Rather than jump to conclusions—the last system/device to be connected must be faulty if it doesn't behave in the predicted or prescribed manner—we need to make sure that we fully understand exactly what is being carried across these interfaces. And provide ourselves with sophisticated tools to analyze and measure suspect interfaces.

Unless the hardware to which they will be connected is capable of responding correctly to the presence or absence of vital source, destination, timing and other data, life in the digital fast lane will become progressively more complicated—and frustrating—before it becomes more simple.

□□□

*Mel Lambert has been intimately involved with the production and broadcast industries on both sides of the Atlantic for more than a dozen years. Now a 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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## ECLECTIC ENGINEER

# Holding on to a Good Engineer Means More than Just Money

by Barry Mishkind

**TUCSON, Ariz.** One of the most difficult personnel problems for the station manager is finding a good engineer to hire. In our last discussion (RW Aug. 5, 1992), we highlighted some of the points to check when interviewing applicants. So, let's assume that you've used them and hired someone. Now, how long will your new engineer last?

Have you ever noticed at some stations the engineer seems to have been there so long there are cobwebs all over him, yet other stations run through engineers faster than disc jockeys? Likely you're sighing, expecting me to say, "the reason is money." While money is important, holding on to a good engineer requires your attention in several areas.

So, before we consider salary, let's talk about some of the other factors that keep a smile on the face of your resident technical wizard.

## Engineers are people too

Despite any impressions you might have of your engineer—what with his pocket protectors, crepe soled shoes for lightning protection, and a tendency to spout what could pass for a foreign language—he is a

## Holding on to a good engineer requires your attention in several areas.

real human being with feelings and pride in his work. His goal is really the same as yours—to keep the station on the air, sounding good, while minimizing operating expenses. In fact, among all your employees, you'll find few as sensitive to the value of a dollar as the engineer.

One of the first mistakes many managers make is to assume if the engineer isn't fixing something, he's loafing. Hence, they try to fill up the engineer's day with tasks, from changing air conditioning filters, to fixing computers, to plumbing repair. That's *not* the job for which he was hired.

Admittedly, the engineer may know how to do these other things, and even be willing to help out in non-technical areas. But again, that is *not* why he was hired.

You hired an electronics technician, ready day and night to care for any problems that could put you off the air. To maintain the studio equipment so the station sounds professional. To help make your station a winner.

So, what am I suggesting?

You don't put a lawyer or accountant on retainer and ask him to change your air filters during slack times. You wouldn't dream of asking your plumber to change your tire.

The point is the engineer needs to be respected as a professional. He's a trained electronics technician, rather more special than the fellow you pay \$45 an hour to fix your VCR. He's more special because he's your safety net against disaster.

## Show your care

How can you show this respect? The first step is to take some interest in what he's

doing. The engineer tries to keep the equipment running, and minimize repairs and repair costs.

When the engineer seeks cooperation from the staff in treating the gear carefully, back him up. Don't make "grouchy engineer" jokes. The jocks' creativity isn't squelched by asking them not to destroy things.

In a more positive direction, consider how the engineer is treated compared with the sales staff. Often salesmen are given a plaque or award for their efforts. They might be sent to dinner as reward for a good week. Have you done this for your engineer?

Why not present the engineer a plaque "in appreciation of a month (or quarter) without any down time," or "for outstanding effort in repairing storm damage"? Send him and his wife out for dinner. Treat him like part of the team.

Do your salesmen get cars? Why not a vehicle for the engineer, especially if he's got a long ride to the transmitter, or visits lots of remote broadcast sites? It doesn't have to be brand new, just reliable.

Do your sales people go to seminars or RAB conventions? Isn't it for education, to help them do their job better? Do the same for your engineer.

## Long-term gains

Send him to the NAB convention. Fly him there; put him in a comfortable hotel. Encourage him to learn as much as possible about current and new technologies. You'll be the beneficiary.

These suggestions may sound like expensive budget busters. But remember, an educated engineer will work smarter for you. The result is reduced down time, fewer lost spots, lower electric bills, better sounding remotes, and more time spent testing and preventing problems from developing.

Finally, the paycheck. I can't tell you how much to pay your engineer. There are too many factors to consider, from market size to the facility's complexity. Yet, saving a few dollars here can be as costly as losing your star salesman.

Try getting a VCR or TV (much less your car) repaired today. Labor rates of \$35 to \$55 are not uncommon. Yet, none of these are as important to your livelihood as being off the air for several hours.

No, your engineer isn't fixing the transmitter every hour he is working. But, paying him less than you'd pay for a plumber, or your sales "draw," isn't going to create the work environment needed to keep a good engineer.

Perhaps you might offer incentives for things like increased transmitter efficiency (lower electrical costs) or reduced down time. You don't have to pay huge amounts of cash, just enough to show appreciation for what he's accomplished.

Back there—in the shop—lurks a true professional. He's as important to your bottom line as the sales staff, the air staff, or any employee including yourself. Treat him that way, and you'll have a well-run physical plant. And you'll keep your engineer around for a long time.

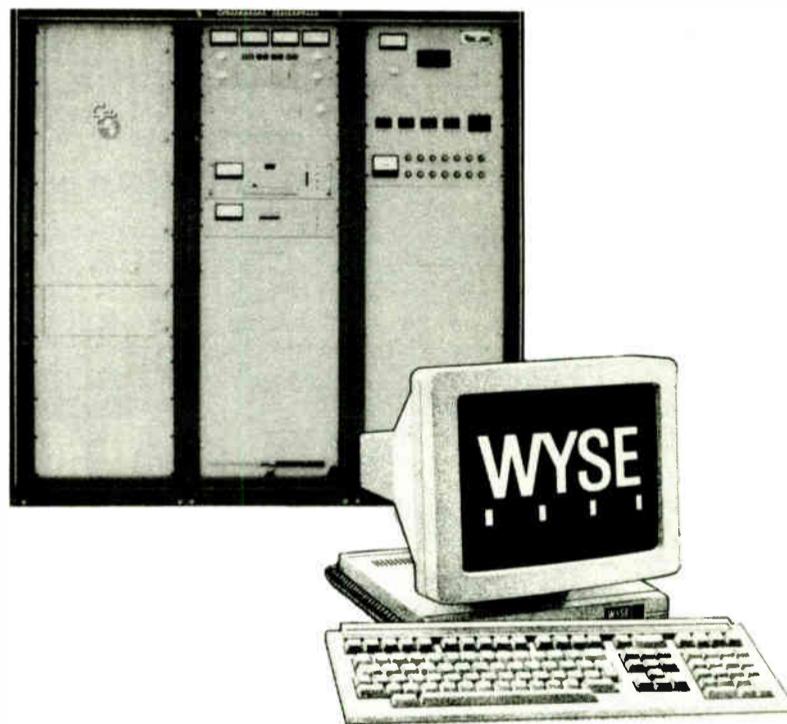
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Barry Mishkind, aka RW's "Eclectic Engineer," is a consultant in Tucson. He can be reached at 602-296-3797, BMISHKIND on MCI Mail, or "barry@coyote.datalog.com" on Internet.

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## WJPC Brings All-Rap Format to Chicago

by Bruce Ingram

**CHICAGO** On the cover of the July 26 Chicago Tribune Arts section, classical music critic Howard Reich and rock critic Greg Kot were duking it out about rap.

"It's the crudest form of popular music ever made," wrote Reich, adding that the lyrics are racist and sexist.

"It's the most vital pop music of the last decade," countered Kot, arguing that rap lyrics are simply tough and honest.

### Portrayal versus reality

Maybe yes, maybe no—maybe something entirely different, says Charles Mootry, general manager of WJPC(AM), Chicago's first 24-hour, all-rap radio station. WJPC, which previously aired black adult contemporary fare, made the switch roughly a week before the Tribune feature appeared, joining KNOK(AM) Houston as the only two stations in the country currently playing rap full time.

In Mootry's view, the media portrayal of rap music as angry, tough and straight-from-the-street, whether crude or vital, brutal or honest, has generally distorted the

public's impression of the genre.

"Ninety percent of all rap is not negative—it's positive," he said. "The media has just concentrated on the negative 10 percent."

Mootry says his station will have nothing to do with rap's more incendiary minority, choosing not to air hardcore tunes like Ice T's "Cop Killer" and Sister Souljah's "Killing Me Softly."

"We will not play any explicit language or 'gangsta' stuff," he declared. "We're not going to play songs about killing police or dealing drugs."

### Enhance the brightest

Instead, WJPC will emphasize upbeat messages by core artists including Arrested Development, Kriss Kross, EPMD, Queen Latifah, Chicago's own Tung Twista, Das EFX, Eric B. and—surprise—Public Enemy.

"Public Enemy is a very positive group if you really listen to them," says WJPC Program Director Jay Alan (at 23, the youngest PD at a commercial station in Chicago). "They're very pro-black, but they're not prejudiced against anyone else. They're not bad guys."

WJPC's relatively wholesome program-

ming strategy neatly side-steps potential indecency problems with the FCC. More importantly to Mootry, the policy is also in line with the mainstream reputation of the station's owner, Johnson Publishing.

Johnson Publishing, purveyor of Ebony,

Jet and E.M. magazines, among others, is the largest black-owned publishing company in America. Mootry is Johnson's vice president/director of broadcasting, overseeing WJPC, its sister FM station and WLOU-FM Louisville, Ky.

"We want responsible programming that reflects the image of Johnson Publishing," said Mootry, a 20-year veteran of black radio in Chicago, who started his career at

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## Industry OKs New Limits

▶ continued from page 1  
public interest."

Reaction to the decision from industry leaders was mostly positive, although some would have preferred the original relaxation to stand. Jim Thompson, president, Group W Radio, said the decision will provide relief to the industry.

"I think it is a positive," Thompson said. "There are those stations that are struggling and this will allow them to consolidate and continue to serve their communities." In addition, Thompson said, "Although there are those who will say the FCC didn't go far enough, I say thank you for not leaving the limits where they were."

Where they were before the March decision was the long-held 12 AM/12 FM group ownership total, with no more than one per service per market. The latest revisions simplified the local ownership rules that were changed in March but were criticized as too complicated and too liberal.

### Good for you

FCC Chairman Alfred Sikes—who had pushed hard for the initial 30 station limits—said the revised rules still keep intact the intent of the March decision.

In a statement, Sikes said, "Today's radio ownership rules—like those first concluded in March of this year—will be beneficial for one central reason: The Commission abandoned the 'one-size-fits-all' local ownership limits. There was then, and there is today, a recognition that attaining and sustaining economic and, thus, programming health might well require larger holdings in bigger markets than in smaller ones.

"This conclusion, and the resulting deregulation, are at the heart of our action to provide radio station owners with more freedom and listeners with better programming."

Sikes also acknowledged the pressure to reduce the expanded limits following the March decision. "We were asked by key members of Congress to reduce the limit, and we did," he said.

Edward Fritts, president/CEO of the NAB, also endorsed the new rules. "The Commission has answered the radio industry's distress signals with rules that will clearly help keep the industry afloat and on course . . . We applaud the Commissioners for the thoughtful consideration they have given this important issue and for moving this proceeding forward expeditiously."

Along with the revised national ownership limit, groups now will be able to own up to two FMs and two AMs in market with more than 15 stations. In markets with

less than 15 stations, a group could own three stations—with no more than two in the same service. The three station maximum in the smaller markets applies if the total is less than half of all the stations in the market.

Shamrock Broadcasting President Bill Clark said the FCC action will benefit mid-size and smaller markets the most. "I think the FCC made a prudent decision," Clark said. "I don't see that it will cause great grievances, and in fact it will allow help in mid-size and smaller markets. Most stations involved in LMAs will probably take advantage of the new rules."

The Commission's latest action did not alter the Local Marketing Agreement (LMA) rules that were restricted in March.

In addition to the revision of the national and local ownership limits, the new rules allow a group to own an "attributable interest" in three additional stations in each band if they are controlled by small business entities or are more than 50 percent minority controlled.

### Hatching a new plan

The Commission adopted a further notice of proposed rulemaking (NPRM), seeking comment on whether group owners should be allowed to exceed the national ownership limits by some defined number of stations if they establish and successfully implement a broadcast "incubator" program designed to provide management or technical assistance, loan guarantees, direct financial assistance and/or training to small businesses.

"In addition, the Commission's Small Business Advisory Committee will be asked to address this and alternative proposals in this area," the NPRM said.

Commissioner Andrew Barrett—who had concerns about the March decision and abstained from voting—was pleased with the new rules, especially the incubator program.

"I view this incubator program as an opportunity to move forward with additional methods to increase the participation of all segments of our diverse population," he said.

In praising the overall ownership revision ruling, Barrett said he believed "that the Order we adopt today provides for a level of fundamental fairness and consideration of the impact on diversity and competition. It is a decision which I am pleased to support."

The success or failure of the new rules will rest squarely on the industry, according to Barrett. "Hopefully, the radio industry can move forward in a cautious manner toward achieving greater economies of scale and greater participation by diverse entities."

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Digilink is the perfect replacement for magnetic tape based cart or reel machines. With Digilink, you can replace your cart machines with CD quality digital audio that requires no calibration, no maintenance, and the media has a 15 year average life. You can replace your reel to reel machines, razor blades, and tape with fast, nondestructive, CD quality, on screen waveform editing. You can cue virtually instantaneously. Digilink even costs less than comparable analog cart or reel machines. Digilink is the perfect audio record and play system for professional radio broadcast applications.

## **Digilink performs ALL types of automation...**

With Digilink you can operate fully live or mix various automation types into your daily programming. You can store all of your audio on hard disk at an incredible price or you can use hard disk for only commercial material recording. Digilink has an internal audio switcher with machine logic control. Digilink therefore supports satellite automation, reel and DAT tape automation, CD automation, and full hard disk automation all out of one compact box. Because Digilink is a computer, you can print out a log of what you have scheduled to play or print out a log of what really did play. With Digilink, you can be live on the air with full CD quality audio or program the system and walk away forever. Digilink even interfaces with all major traffic and billing systems through a Digilink import-export routine.

## **Digilink is engineered and manufactured by Arrakis...**

Digilink is not simply a hardware package assembled from parts built by *other* computer manufacturers and run under our software. Arrakis is the *only* manufacturer to build nearly all parts of the digital system in-house. We build our own *Arrakis* DSP board, SCSI board, I-O board, switcher board, cabinet, and cabling. Because Arrakis builds the system and doesn't simply mark up someone else's hardware, Arrakis can offer you Digilink with broadcast features and performance unmatched by anyone *and* at a truly remarkable price !!!

2619 Midpoint Drive, Fort Collins, CO. 80525

..... at an incredible price. !!!!!!!

**SALE \$7,995**  
under \$9,000  
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whether you lease for under \$300 a month or buy, with Digilink you can literally make money by ...

- reducing maintenance,
- reducing staff demands,
- improving On Air sound,
- improving Production,  
*and improving all areas of your station performance !!!*



## FEATURES

- Simultaneous record- play !!!
- Uncompressed CD quality audio  
*or mix 2:1 or 4:1 compression*
- Use keyboard, mouse, trackball,  
or even a touchscreen
- Digital Waveform Editing
- Mix mono and stereo files
  
- Live Cart Machine replacement
- Reel to Reel machine replacement
- Satellite Automation
- Tape Based Automation
- CD Automation
- Hard Disk Based Automation
- Traffic and Billing Interface
- supports digital networks

## SPECIFICATIONS

*all tests performed at 1:1 compression*

### Digital Signal Processing System (DSP)

Sampling System- 16 bit linear PCM, 2 channels  
 Sampling Rates- 44.1,32,22kHz, fixed filter on routing switcher  
 Compression- 0,2,4...adaptive differential PCM

### Controller -

Floppy Disk- 3 1/2" 1.44M capacity, System Hard Disk- 40MB  
 Printer Support- IBM compatible, parallel port

### Audio Performance- Digital Record playback

THD- .008%, Dynamic Range >85dB,  
 Freq Response- (+)(-).5dB 10Hz-15kHz

### Physical Specifications

Dimensions- 19" Rack mounted- 19"W x 5 1/4" (3RU)H x 16"D  
 Weight- 60lb's , Power- 110/220VAC, 50/60Hz, 100W

### Audio Performance- Routing Switcher

THD- .005% typ, S/N < 100dB below +4dBm  
 Dynamic Range- >120dB,  
 Freq. Response- (+)(-).1dB 20Hz-20kHz

**by ARRAKIS SYSTEMS inc.**

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# Radio's Technical Future Lies in PCs

by Phil Simon

**FALLS CHURCH, Va.** Have you noticed that the world has become a binary place? The ones and zeros have taken over. In our industry, personal computers are everywhere; they do traffic, music scheduling, budgets and financial planning, audience research analysis, word processing, sales proposals and presentations, equipment automation, newswire capture, and more.

If you're an electronics technician, this is your meal ticket into the next century. Most users only care about their applications, and are intimidated by all the technical sophistication of a modern PC. (Let's face it, an ABORT, RETRY, FAIL? mes-

sage certainly intimidates me.)

So station engineers find themselves in the role of in-house computer guru, whether they like it or not. Your company will value anything you can do to make computer use painless and hassle-free; you want to make the computers simple, reliable, and powerful enough to do the job. Here are some ideas.

## Educate yourself

You'll have to educate yourself. If you have a computer, great. But read the computer trades, like BYTE and PC Magazine, too. If you're going to be an expert, you've got to know some answers.

Every user will appreciate a good menu program. I've been impressed with Direct

Access. It's easy to set up, and lets the user select any application from a simple menu. You can also set passwords for some very light-duty security. You'll want this on almost every machine so the users always see a familiar start up screen.

Take a floppy disk around to all the PCs, and make a copy of the root directories for yourself; keep the disk in a secure place. The root directory files are usually the hardest to rebuild; if someone corrupts an AUTOEXEC or CONFIG file now, you can restore it easily.

If you have to rebuild a hard disk after a crash, you can reload that disk and the application software, and you've only lost the user's personal data. (They were doing peri-

odic backups on their own, weren't they?)

Speaking of backups, stress to your users how important it is to backup their own data. (They still won't do it.) You can make it easier if you write a batch file that backs up only their data directories (not the applications); make that batch file an option on the menu. At least then, when their system crashes, you've done everything you could.

You probably want to setup and configure each machine your station buys, personally. Extra RAM is best used as a huge disk cache on a music scheduling PC; for an office manager's machine, you'd set it up for multi-tasking. Know how each computer will be used, and tailor the configuration accordingly. You'll need a good memory manager like QEMM, and some experience with device drivers to do this.

Try to keep the software consistent within the station. Standardize on one word processor, one spreadsheet, and one graphics program. And try to plan ahead . . . when you install new software, load the printer drivers for all the different printers you have in the station . . . if you swap printers around later, you won't have to reload.

Also, when you set up the machines, make sure to create default directories for the word-processing documents and financial spreadsheets. You want the data files stored in a separate subdirectory from the program itself. Most users won't do that; and it makes it very difficult to upgrade the software package later, or to backup just the data.

Most computers can operate reliably with just a surge suppressor on the power line; but do encourage users to power down during thunderstorms. Some critical machines have to stay on-line, and there are solutions you can offer, from line filters to true UPSs.

You should keep an inventory of equipment and software that the station owns. It's a good idea to save the title page, registration form, or license serial number from each software package so you can show that it is a legitimate copy. You'll need this to get discounted upgrades and (with some software companies) technical service. Also, try to keep the documentation secure; it's important, and it has a way of walking off.

From time to time, run CHKDSK or another, more sophisticated, utility on each computer's hard drive. It will help you spot corrupt files or disk problems before they get too serious. Find a utility that fixes file fragmentation and run it occasionally, too.

## Standardize where possible

You might also consider replacing some of the older floppy drives in your station so that all your computers have the same size and type of drive. It's a real convenience not to have to copy between 360K, 1.2M and 1.44M drives.

You can even start doing hardware repairs; spare parts are readily available at the computer superstores now. Floppy and hard disk drives, power supplies, keyboards, monitors, modems, and video cards can be replaced pretty easily; they're almost generic parts.

You can extend the life of an older system by upgrading the disk drive, video, or mother board pretty inexpensively.

Finally, get involved in the purchasing of the computers. You want a reliable vendor who can give you the level of support you need, and ensure that all the station's machines are compatible. Perhaps the toughest buying decision is the trade-off between advanced technology/long useful life/high price, and older technology/earlier obsolescence/low price.

□ □ □

Phil Simon is a contract engineer working in central Pennsylvania. He can be reached care of RW.

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World Radio History

# SLEEP EASY WITH WATCHDOG And Automate Your Remotes

By John Schad, President  
SMARTS Broadcast Systems

All broadcasters would like to see absolute perfection in every product they purchase. The ideal piece of broadcast equipment would perform flawlessly for hundreds of years, be so easy to operate that no training is ever necessary, and retail for under \$20.00!

We at SMARTS are always striving toward that perfect concept, but we realize that the realities of the world work against us. That's why we developed our latest product, the WATCHDOG.

The WATCHDOG is really a separate computer, with a separate power supply, whose only job is to watch over the SMARTCASTERS at work in the station. Each WATCHDOG can monitor the functions of two SMARTCASTERS so that only one WATCHDOG is needed for AM-FM operations.

These units keep an eye on both SMARTCASTERS. If any type of failure, for whatever reason occurs, the WATCHDOG resets the SMARTCASTER, then checks to see if the problem is gone. Should the problem persist, one more reset is attempted—and if that doesn't fix it, the WATCHDOG can trigger an alarm or auto-dialer to call for help.

The great thing about the WATCHDOG is that it doesn't care about the original problem. Power spikes, brown outs, total power failures, lightning strikes, spikes from lightning strikes, all can cause a computer to 'lock up'. Usually a simple reset fixes the trouble, but if that reset involves a 20 mile drive at 2 a.m., it looms as a much larger problem! WATCHDOG quietly and efficiently takes care of the vast majority of these incidents, then calls out the Marines only if the problem goes beyond the usual limits.

Another great feature—the SMARTCASTER watches the WATCHDOG! If the WATCHDOG goes haywire, the SMARTCASTER detects it and resets the WATCHDOG itself!

In practicality, our systems work reliably week after week, without any WATCHDOG intervention, but this little computer gives our customers the additional security that comes from one highly reliable system watching over another highly reliable system. That's really important for weekend and overnight walk away.

The WATCHDOG is only available from SMARTS and works only with SMARTCASTER.

Small and medium market stations everywhere are wrestling

with cost cutting measures that allow them to remain viable, but not detract from the sound. The industry is lucky to have a good selection of satellite services providing music and talk programming in a wide variety of formats. These services, when teamed up with our SMARTCASTER, have provided an alternative to the labor intensive 'disk jockey approach to radio.' However, the stations have to work at retaining localism in their sound. That's why we invented another member of the SMARTCASTER team called the SMART-TOUCH.

The SMART-TOUCH allows you to do remotes without anyone at the studio! Everything from simple 2 minute inserts from the car dealership to complex hours-long sports broadcasts can be handled with a simple touch tone phone—even a cellular! With the SMART-TOUCH you can leave the network (or other automated music source), play an intro, put the phone line on the air, play spots, monitor the station, monitor the network, play a close, then rejoin the net (or other source) smoothly and easily. It can all be done from any touch tone phone. The SMARTCASTER responds to the touch tone commands just as it does to network cues. The system answers the

phone, is protected by a security code, and will rejoin the net in the event of an accidental disconnect! You no longer need to have anyone 'riding the board' during those evening ball games.

These two little products we make are indicative of our company's dedication to the total picture of producing equipment and services to reduce the cost of your radio operation, thereby making that operation more profitable. SMARTCASTER digital audio, the Jock-In-The-Box, and the Night Watchman CD System, and the SMARTS Billing, Accounting and Traffic program have helped hundreds of stations with that task.

The SMARTCASTER is a total digital audio storage and retrieval system that can work with satellite, CD, even open reel music sources. The Night Watchman and the Jock-In-The-Box are two levels of CD automation that have advanced features that up to now have been impossible in broadcast automation, yet are priced well below conventional prices.

Can we be of service to you? Give us a call so we can talk about everything we offer the radio industry.



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## MARKETING &amp; MANAGEMENT

# Boost Your Revenue with Database Marketing

by John Cummuta

**ALGONQUIN, III.** *How to become a billionaire:* First, get a million dollars. Second, invest it in the stock market. Third . . . well you get the picture. The first step of any process is the hardest, and the most important.

It would be easy for me to say, *Here's how to be successful in using database marketing to build your station's audience and its revenues. First, build a database. Second begin a dialogue with these people. Third . . . you know what I mean.*

Building and maintaining your database is the crucial step to database marketing

success, and I would do you a gross disservice to brush over it. So let's examine the process, step-by-step.

## Try a new approach

Database marketing is the opposite of radio advertising. Where radio communicates with masses of nameless people, most of whom have common demographic attributes, database marketing communicates with specific individuals, directly, by name. This creates much more than an affinity for the station in each person's mind. It creates a *relationship* between the station and the listener.

This relationship is a strong bond, making the listener more loyal to your station

and less susceptible to being stolen by another station. You become the listeners' *personal* radio station.

So, with database marketing, it's no longer a "numbers game," but rather a one-by-one game of bonding with listeners. With database marketing we go beyond the demographic description of the typical listener, to the specifics of John Doe, who lives at 1234 Pleasant Avenue, in Anywhere, Illinois. He's 27 years old, has two kids named Jeff and Ashley. His wife's name is Susan, and they love playing tennis on weekends. He also golfs, and occasionally plays the lottery.

Does that detail astound? Well it should.

Database marketing is serious business, but it is potentially successful beyond anything your competitors are doing. And it's what many of your advertisers are and will be doing as well. Database marketing will increasingly be a critical component of all future marketing strategies, for all types of businesses.

You can see from the description of John Doe that a database should contain specific information. So what you want to do first is decide what pieces of information you will want to collect and maintain on your listeners (or advertisers if you're using database marketing to increase time sales).

These pieces of data will become the components of what is called the *record structure* in database parlance. Each piece of information is called a "field" in the record.

For example, the listener's first name would be one field, his or her last name would be another field, street address yet another field, city another field, state another field and so on. Each spouse name, child name, hobby, prize won, favorite day-part, etc. can be another field in the listener's database record.

Once you've determined what pieces of information you want to track, and you've put them in a logical order, you have created your record structure. Now you are ready to start gathering the data to fill those records.

## Storing the Information

No respectable radio station today is without the venerable PC. But the key tool is actually the software you'll build your database in. There are two ways to approach this issue: You can buy one of the several good database programs that allow you to construct your own system, or you can buy a pre-designed program that you simply customize and run.

Unless you have someone on staff who is a capable database programmer, I don't recommend the first option. But just in case you or your engineer are programming whizzes, I'll suggest a few programs that can do the job: dBase, DBXL, FoxBase and PFS File.

This is by no means an exhaustive list, but it includes some of the major players. There are some differences in the programming complexity and operational capabilities of these programs, but assuming that you know enough to use them, you'll also understand those differences.

What I do recommend, for most stations, is to buy a pre-packaged database program. There is only one PC program, that I am aware of, designed specifically to be a database marketing package. However, there are a few others, called "contact management" programs, that can be used as database marketing systems.

These include ACT!, Telemagic, SMART OFFICE, and several others. ACT! can be purchased at most computer stores. Telemagic must be purchased through distributors. Most computer stores can tell you how to get in contact with one of them. SMART OFFICE is available by calling 800-777-9188.

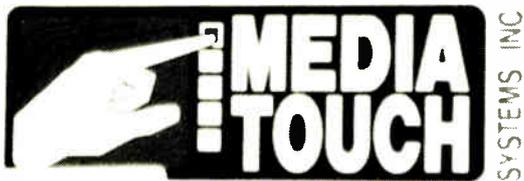
These programs require some customizing, but they will allow you to store and track the information you will be collecting to build your marketing database. They also let you merge personal letters and help you do telemarketing to your listeners.

Now that we've discussed the necessary tools for the database marketing process, next month we can begin dealing with how to use them to build audience and revenue.

□□□

John Cummuta is an independent marketing and management consultant, and the author of the Sales Machine database marketing course. He can be reached at 708-658-9107.

# Sound Better Save Money



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Play *any* Compact Disc back-to-back with any other CD! Media Touch Music is first to combine Pioneer's new double-player 300 tray CD changer with Dolby AC-2 MediaDISK digital commercial recorder-player. Everything you need for live-assist and automation for only \$19,995! (1.6 hour stereo or 3.2 hour mono spots.)

You'll pay for it quickly by replacing live jocks with inexpensive recorded voices, locally or from Media Touch.

2 NSM or Sony juke boxes available at same price. Larger networked systems and other features available for duopoly, LMA or AM-FM.

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5.6 hours stereo @ \$9,995 (or 11 hours mono overlap or record while play).

11 hours more (5.6 hours stereo) adds \$4,995.

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# WJPC Brings All-Rap Format to Chicago

► continued from page 22

black-talk giant WVON(AM). "We want to keep kids in school and reduce gang violence. We really believe we can be a catalyst for that."

### In step with the times

Less than a month into the rap format, Mootry reports that audience reaction has been extraordinary, with the station averaging 2,000 calls a day and requests from as far away as Michigan and Wisconsin.

Certainly, the station has nowhere to go but up.

WJPC didn't show up at all in Arbitron's

spring survey, but Mootry hopes it will appear by the fall. Going even further, he predicts that the station could be in the top 10-15 a year from now.

"Ten years ago I thought rap was just a fad," Mootry said. "But it is not. We've hit on something hot."

"Rap music is considered—by the demographic I'm after—to be the purest expression of black music today. Arrested Development and Kriss Kross are today's Temptations and Aretha Franklin."

Mootry's target demo is 12- to 34-year-olds, with special emphasis on listeners 12 to 17 and 18 to 24.

He expects to draw those numbers from a variety of stations, but primarily urban contemporary WGCI-FM. For years, Gannett's WGCI-FM has generally held onto the number two spot in the market behind Tribune Broadcasting's WGN(AM).

WGCI-AM-FM Vice President and General Manager Marv Dyson says he expects that WJPC will draw away some younger listeners, but he does not see it as a major threat.

"During the summer months when the kids are out of school, they'll probably come some healthy numbers," Dyson said. "But I don't know how they'll hold up the rest of the year."

Dyson also speculated that WJPC's AM mono sound quality might ultimately be frustrating to listeners.

Interestingly, Dyson said he also wrote rap off as a fad years ago but he has definitely changed his mind. "Somebody

recently asked me what the next big format was going to be," Dyson remembered. "I said rap, without a doubt."

### Truly alternative music

Mootry says he has no concern about his station's AM sound, though he is considering an upgrade to stereo.

"When you give somebody something on AM that they can't get anywhere else, they'll come to AM. If they want rap, 24 hours a day, they've got to come to me. They've got no choice."

For that reason, Mootry says he sees the rap format as a genuine opportunity to en-

liven the AM dial, especially in larger cities. Advertisers, he claims, are knocking on his door. Already, the station has signed on sponsors including several beverage companies, fast food chains and candy products.

More significant, perhaps, is the interest WJPC(AM) has stirred in the rap record industry. Def Jam Records head man Russell Simmons has already contacted Mootry personally and arranged a promotional tie-in with the station, supplying a new Jeep to be given away in a listener contest.

Mootry is clearly delighted by that aspect of the rap operation, compared to his artist and record label experience with sister station WJPC-FM.

"Mariah Carey doesn't call me and ask me to play her record, but these rap artists do," he said. "And so does Russell Simmons. It's fantastic."

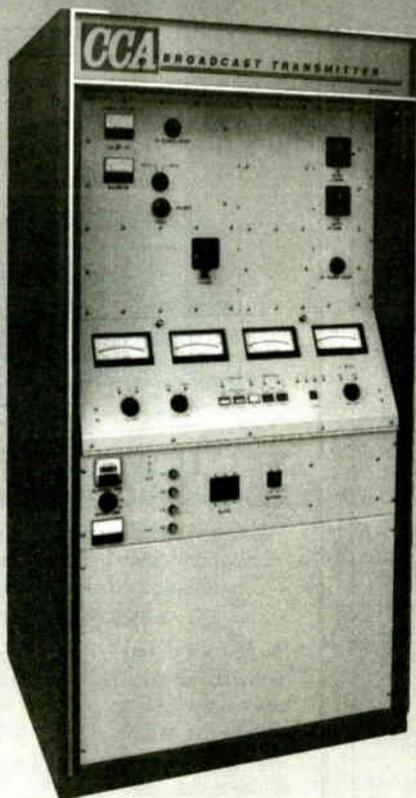
## Rap Sheet

Following is a sample of songs played on the WJPC morning show.

- "Warm It Up" . . . . . Kriss Kross
- "One Night Stand" . . . . . Father M.C.
- "Throw Up the Peace Sign" . Wildlife Society
- "The Doo Bop Song" . . Miles Davis
- "The Jam" . . . . . Shabba Ranks
- "What's the Scenario?" . . . . . A Tribe Called Quest
- "Can't Truss It" . . . . . Public Enemy
- "Home Girl Don't Play That" . Yo-Yo
- "No Typa Drug DLA" . . Black A.G.
- "Around the Way Girl" . . . . . L.L. Cool J

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\*Manufacturer's Suggested Retail Price.

Circle (33) On Reader Service Card

## UPLINK

# Automation: Something for Everyone

by Karl Baehr  
and Harry Nelson

**ALBUQUERQUE, N.M.** For the next two installments of *Uplink*, we will be looking at some of the hardware available for automation and satellite feed management. There are a number of systems in the marketplace and we have tried to get a cross-section of what is available.

When you think of automation, what comes to mind? Usually it is a clunky room-sized cart- or reel-based system that has regularly scheduled "temper tantrums"

and is at best mostly reliable. Not so anymore.

The automation systems available today are high-tech. They can interface with everything from reels, carts and cassettes to multiple satellite feeds and CD changers.

Systems can include CD changers and "jukeboxes," digital cart machines, hard disk data storage to digital mass storage on video formats. What was once a room-size behemoth has been reduced in some cases to fit in a few rack spaces or on a desk top. Automation has come a long, long way.

Some PC-based system providers include SMARTS Broadcast Systems, Media Touch, The Management, IGM, Computer Concepts Corp. and Prophet Systems. Hardware can be obtained from other companies as well, such as the Wheatstone Not So Hard Disk, the Gentner Audisk and the Broadcast Electronics CORE 2000 and AudioVAULT. Each of these manufacturers offers a product that bears looking into.

Perhaps the most common types of automation are CD-based systems. For this article, we spoke with Galen Angle and Brad Young at TM Century regarding their "Ultimate Digital Studio," and Jim Lamarca at Broadcast Programming Inc. about the "Format Sentry."

On the other end of the high-tech spectrum, we talked to Jim Hansen, president, Schafer Digital, providers of elaborate automation systems that utilize video format tape to achieve a versatile mass storage and access system.

First, let's look at the CD systems.

## Format Sentry

**RW:** We've seen a lot of folks entering the realm of computer-based automation systems in recent years. How long has the Format Sentry been out there?

**Lamarca:** The Format Sentry controller was one of the first of its type and has been in the field for 15 years. It is currently in use by close to 400 radio stations.

**RW:** Tell our readers about the system—the highlights, what it is designed to do, how it works.

**Lamarca:** The Format Sentry is a modular system designed to interface with any type of programming source. The "brain" or controller plugs directly into a PC and acts as the "air traffic controller" for your station. The Sentry can handle both time- and tone-based sources. This creates versatility. The controller can be adapted to

any new technology meaning that it will not become outdated.

**RW:** What about system operations? How truly radio friendly is the Format Sentry?

**Lamarca:** The system is simple and logical and designed for radio use. Operations can be boiled down to a handful of function keys. It only takes one day in-house to train people, in most cases. Another unique feature is that the Format Sentry can be accessed by a standard modem interface.

**RW:** What about support?

**Lamarca:** BPI offers complete support for the hardware and software systems in-house. We also offer 35 format options that plug into the Sentry, and the additional depth of programming consultation, format updates, etc. . . . all in-house.

## TM Century

Another CD-based system is TM Century's Ultimate Digital Studio (UDS) which utilizes "CD Jukeboxes." According to TM Century's Galen Angle and Brad Young, the two-way data transfer possible with these units make for a formidable system.

**RW:** What exactly does two-way data transfer mean in layman's terms?

**Young:** There is a constant exchange of data between the jukebox and the system controller which constantly monitors that data. As an example, if the CD starts to skip, the system can detect it and correct the problem. That is not possible with other systems using consumer CD decks, where that CD would skip for the length of the element. The UDS is self-correcting.

**RW:** What about the actual system functions and layout?

**Angle:** The UDS is set up like a radio station. The on-screen configuration is familiar

continued on next page ►



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► continued from previous page to broadcasters, with sliders and knobs, etc. It is extremely user friendly in the broadcast sense, with on-line help menus, a unique "Weather On Line" feature that displays the weather forecast and tells you when it was last read and/or updated.

The system can back time into news if needed. It is all set up with live-assist in mind and can be operated with a few function keys—not complicated at all.

**RW:** Can the system adapt to other CD player configurations or does it require the jukeboxes?

**Angle:** The UDS can control up to 60 standard multi-disc CD changers. Keep in mind, though, that with this configuration the data monitoring is not possible, as it is with the jukeboxes.

**RW:** How about user support?

**Young:** TM Century offers complete support for the system. It is easy to set up and get on-line. Again, because the system is configured for broadcast, learning time is minimized—you can become comfortable with the system very quickly. We also offer the GoldDisc music libraries for the system.

Some of the features of the UDS include password protection for critical functions, pre-programming of voice tracks well in advance of broadcast, and a unique software lock for jukeboxes that prevents access to the music library discs. The UDS interfaces with digital cart machines offering up to eight hours of digital stereo with this configuration.

**Video tape systems**

There are other options for automation. Reel-to-reel, cassettes, DAT and systems that use video tape for mass storage and access. Taking this technology to new highs is Schafer Digital. Schafer Digital is active throughout Europe where the company's applications vary from stand-alone units to network head-ends. We talked to Jim Hansen about his systems.

**RW:** What is the main difference between your system and other automation systems out there?

**Hansen:** Our system uses video tape for the most effective mass storage and access to programming elements. The Schafer systems utilize actual digital recording, up to nine hours per tape, with 100 percent random access to the library.

Our Spectrum System will be able to interface with almost anything. Our satellite controller was designed and is fully supported in-house.

**RW:** How does the Schafer System handle day-to-day operation with regard to traffic scheduling and on-air elements, such as liners, voice tracks, etc.? Are these on tape too?

**Hansen:** Yes, but a unique aspect of our system is that though the commercials are stored digitally on video tape, they are downloaded and compiled into commercial sets on hard disk up to three hours before air time. There is no data compression, so the quality is maintained and the system can time-correct because of this. Our systems will interface with most existing traffic systems.

**RW:** So in this case the hard disk is temporary rather than permanent data storage?

**Hansen:** Exactly. Local elements such as commercials, jingles, voice tracks, etc., are compiled on the disk and then dumped after airing—making room for the next

series of elements. The importance is this is twofold: random access and retention of the digital quality of the system.

**RW:** What about system size? What does it take to adequately utilize your systems to run a radio station?

**Hansen:** Not as much as you may think. Our DigiSat II satellite system only requires two VCRs and fits into a 43-inch rack. Other systems can give you complete automation access with as few as eight decks.

**RW:** And support?

**Hansen:** We offer complete support for our systems in-house. We strive to address the individual needs of our clients and we stand fully behind our products.

**Will it work for you?**

The Format Sentry, the Ultimate Digital Studio, the DigiSat II and other Schafer systems all offer ease of operation, in-house support, interfacing with most existing broadcast media and traffic scheduling systems, training and support.

The systems discussed in this column vary in price from under \$6,000 for a basic controller to over \$65,000. Quite a spread, but price alone must not be the deciding factor when selecting a system for your station.

Be brutally honest about your individual needs. Make a list that includes some of the following questions:

- ✓ Will the system need to control multiple broadcast sources? Satellite feeds, tapes, CDs, phone lines?
- ✓ Will the system be utilized as an autopilot or for live-assist?
- ✓ Will you need programming support? If yes, will the company offer it with the service? If not, what are your options with the system? Will the company install the system?
- ✓ How long has the company been in business? Will it be there tomorrow? How long has the system been in the field? Who is using it? How long have they been using it?

You should also call some of the company's clients and ask them the tough questions. Ask about day-to-day operations, problems or glitches, what they like or dislike about the system. Ask them if they are getting adequate support, and if they are getting everything they were promised.

Cost is a factor, but it should not be the only deciding factor. If you save a few bucks and get a system that does not fill your current and potential needs, you have not saved at all.

You can reach Jim Hansen at 800-831-1021; Galen Angle and Brad Young at 800-937-2100, and Jim Lamarca at 800-426-9082. Our thanks to them for their participation in this month's Uplink.

Next month in part two on automation systems, we will look at PC-based controllers for satellite only, as well as a couple of "Magic Box" systems that are out there. Until next time.

□ □ □

*Karl Baehr is president of KBE Broadcasting By Design, a consultancy offering a variety of services to satellite affiliates. Baehr is a former programmer and air personality. Harry Nelson is president of Harry Nelson & Associates, a satellite consultancy and an Operations Manager at Satellite Music Network for nearly a decade, programmer and former air personality of the year. Harry Nelson can be reached at 800-67-RADIO and Karl Baehr can be reached at 505-264-0450.*



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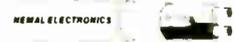
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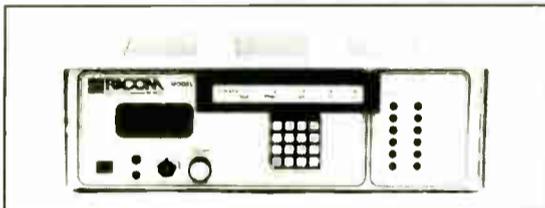
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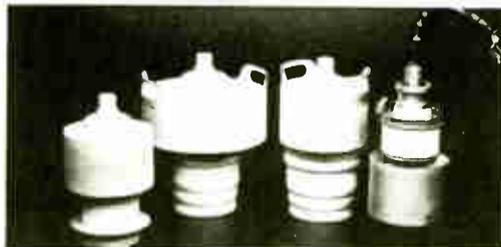
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# Fine-Tuning Your Station's On-Air Sound

by Jeffrey Loughridge

## Part IV of V

**RICHMOND, Va.** We make our living in the communication business and that is where we start the process of designing a sound identity. We all know that when developing a format, a primary consideration is the target demographic, because musical tastes vary depending on age and sex.

The first task is to determine who will be in on the design of the sound. Typically this will include yourself, your PD and your CE. Try to keep the number involved to a minimum—get them together and discuss your target audience.

Make sure everyone has a full and intimate understanding of who your listeners are. You should consider where most listening will take place—at home, work or in a car. This will play a role in the overall setup of the system since it will define the audience's "typical" listening environment.

The sonic impact your station will have on its listeners can be broken down into three basic areas: spectral balance, definition (or clarity), and loudness.

### Spectral balance

Spectral balance is the relationship between high, mid, and low frequencies. This can be altered by a basic graphic or parametric equalizer, or a dynamic equalizer. While all of these alter the spectral balance, they do it in very different ways.

A graphic equalizer has a row of slide pots that boost or cut predetermined, fixed "center" frequencies. The position of the slide pots provides a "graphical" representation of the frequency response.

A parametric equalizer allows you to set not only the center frequency, but how far away from the center that particular band will boost or cut. Each of these equalizers maintains its response curve exactly as you set it, regardless of the program material.

A dynamic equalizer attempts to keep the same spectral balance as its output, regardless of its input. This type of processor will split the audio into several bands and vary the output by compressing or expanding each band.

Whichever type you use, it is important to understand exactly what frequencies are affected by each of the bands, so you can identify what band to change when you begin to make adjustments.

This can be easily demonstrated by reducing the output of all bands as low as they will go. Starting with the low band, turn one band at a time all the way up, then down. Listen to the frequencies it affects.

In your mind, relate these frequency segments of noise to frequency segments of music. If you find that difficult, use a song you are familiar with instead of noise. You will be surprised how easy it is to identify which band to change when you can visualize it in your mind.

### Clarity or definition

Clarity relates directly to how fatiguing your sound is. The more grunge, noise or distortion you allow, the more fatiguing and unpleasant your sound will be. Your quality control system is now fully in action so these negative effects should be minimized.

During pauses in programming and low parts of music there should be *no noise*. There is no hiss allowed. Your listeners should hear the sonic equivalent of "black velvet," not "gray flannel." You might consider some form of noise reduction if hiss is obvious.

Clarity also relates to spectral balance. A misadjusted system may sound boomy or tinny and seem spectrally disjointed. In other words, there is no cohesive quality to the sound. While developing the mix you want, strive for a smooth blend of highs, mids, and lows.

The single most detrimental, yet necessary, effect of processing is *loudness*. Loudness at any price is, in my opinion, a recipe for disaster. It is a mistake to make loudness your primary goal when processing.

### A personal matter

I have heard all the arguments about how listeners equate loudness with power and how a station should jump out of the dial and catch the attention of someone flipping around looking for a station.

Research aside, I personally have never

talked to a listener who knew, much less cared, how much power a station had, nor have I ever had someone say they listened to a station because it was louder than some other. I have heard people complain about the difference between how their favorite song sounds at home on their CD player and on the radio.

Today's processing has taken us to the theoretical limit of loudness. One hundred percent modulation can only be so loud—there just isn't any more blood left in the turnip, if we still want to recognize the turnip.

Being competitive is one thing; taking audio and shredding, mutilating, clipping, compressing, and limiting it into oblivion should be a goal of the past.

### Back to our group

All the participants in the audio design should have a *standard radio* to which they listen. This is one with which they are intimately familiar, one they listen to all the time. It will do no good to listen on a strange radio. You won't be accustomed to its sound qualities and cannot judge what you hear.

Also, don't use too many radios at one time. Limit each person to two at the most. I use the radio in my car as a standard when I am able to drive to a client. It is an average system with some enhancements, but I know how it sounds and how to evaluate what I hear.

When you are ready to start, refer to your manuals and start with the most conservative setup recommended by the manufacturer of each box in your audio chain. This may be called "clean," "classical," "open," or some other name.

Begin with every box set this way. When you begin to make changes, make them on *one box only*. It will become impossible to correlate the effects of your changes if you change more than one parameter at a time.

Start with the spectral balance or equalization. Make a change and dissect the sound. How has it affected the clarity, noise and distortion? Listen after each change to how it has affected the quality of the sound, the spectral balance, the tightness or "sizzle." When comparing to your competition, it is only a valid comparison if you listen to the same song on both stations.

You can get a general idea at any time, but each song is produced differently and has distinctly different sound. This is a long process and you must be willing to take the time necessary to do it right. Allow at least three days to complete the entire process.

### React slowly

Don't make a change in your setup until you have listened at least 15 minutes. Any faster and you may be reacting to something in the music instead of your processing. Listen to several songs before you make a conclusion.

continued on page 36 ▶

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Please circle only one entry for each category:	
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D. Combination AM/FM station	F. Recording studio
A. Commercial AM station	G. TV station/teleprod facility
B. Commercial FM station	H. Consultant/ind engineer
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# Studio Design Must Be Up to Codes

by Edwin Bukont

## Part III of VII

**GREENBELT, Md.** This third article in our series on studio building is a first step in laying out the physical space plan. We shall explore some commonly enforced building codes and construction terminology to see how those codes provide parameters for our design.

First, familiarize yourself with the local and national codes or required building practices for electrical and building construction. The best place for guidance through this territory is your local general contractor.

A good general contractor, or the building manager, may be able to recommend a local interior planning firm to handle details of the space plan and provide appropriate blueprints for construction and submission to local inspection agencies.

## Network for the future

The emphasis here is on developing a network of local service firms who know the quirks of the local system. Even though your plan may be subject to review by your corporate office in another city, that plan will have to be reviewed, approved and built by local talent.

Typical limits and requirements from federal or state legislation include:

- Two means of emergency egress. This means that, as long as any personnel are in your leased area, they must have two

ways of leaving the building, even after hours. Watch for doors that might block traffic through parts of the station after hours and limit access to exits.

- Maintain width of passageways. In most localities, any common area or hallway that provides access to exits must maintain a passageway width of four feet between boundaries or obstructions.

If a hallway opens into a "bullpen," the width between walls and furniture must be

maintained at four feet around any portion of the area that leads directly to an exit. Other secondary hallways or areas are typically required to be two-and-a-half to three-and-a-half feet wide.

- Handicapped access rules. Enforcement and local codes vary widely. Generally, any area through which the public may proceed or in which work is regularly performed, such as the studios, will have to be accessible by those with limited ambulatory abilities.

- Sprinkler systems. These are generally installed with the building's infrastructure and may delineate wall placement, duct-work placement and light fixture placement in ceilings. Typically, sprinklers are spaced at intervals of four feet and within one foot of wall boundaries.

- Common plenums, and plenum wiring. This is another fire department favorite, but one which you can plan around to avoid confrontation.

## Plenum concerns

Most office buildings, especially above three stories, use a "common plenum" (duct) continued on page 36 ►

## USAirplay

# Commercial Clutter: The American Way

by Charles Taylor

**WASHINGTON** As many regions of the world unwind from government-regulated radio, one of the newfound responsibilities many station owners are facing is the need to financially support the services they provide.

As a result, audiences in many marketplaces are being exposed to advertising over the airwaves for the first time.

Here in the U.S., commercials have been a part of competitive radio for 70 years. For one, advertising pays the expenses—station staff and talent, equipment, licensing fees, building rent and upkeep, and the often bloated promotion budgets competing stations incur.

It also represents big business in the U.S.

Among national, network and local spot advertising in 1991, projected radio sales reached nearly \$8.6 billion, according to the Radio Advertising Bureau (RAB).

Hefty profits, yes, but all in all, advertising on radio generally is perceived as a necessary nuisance. Radio stations repress its presence, listeners tune it out, but both parties know that without it, the music would die.

## How odd it must be

When not accustomed to it, I can imagine advertising on radio much like being in the middle of an involved conversation with a friend, only to be interrupted time after time by a parade of salesmen summoning you to buy products that have relevance in your life.

On the flipside, during a trip to England in March, I listened to BBCI's weekly Top 30 countdown and was astonished at the difference of *commercial-free* music radio in terms of continuity—not to mention the fact that the whole show was wrapped up in a couple hours, not over the course of an entire afternoon.

Here, of course, Rick, Shadoc and Casey spin two songs, run two minutes of commercials, one or two more songs, another two minutes of commercials and so on. It's a real test of patience.

## The first ad

The concept of paid airtime is most often traced to New York outlet WEA, now WFAN(AM), which, on Aug. 28, 1922, broadcast a 10-minute paid "pitch" for Queensboro Corp. real estate development. The company paid \$100 for the airtime.

It was an idea that appealed to at least 30 more advertisers, who signed onto the station for their own 10-minute "infomercials" within the station's first year of service. Early believers included Goldwin Picture Corp., American Express and Metropolitan Life.

Initial perceptions of airtime for profit were searing. Herbert Hoover, then U.S. Secretary of Commerce, insisted that "the quickest way to kill broadcasting would be to use it for direct advertising."

But nobody seemed to be listening. While WEA's profits burgeoned, in other parts of the country, various merchants provided products for stations—records, for example—and were given plugs over the air. Companies also began paying to associate their names with popular radio dramas of the day.

The ideas caught, they spread and today, are standard business among privately owned stations around the world. Most commercials are 30 or 60 seconds, though some stations still accept block bartering of 30 or 60 minutes.

Across the nation and across the dial, sta-

tions unabashedly load up their dayparts with advertising. According to a survey supplied by the RAB, in 1991, large market radio stations averaged 12.1 minutes of commercials an hour during the AM drive, down to an average of 9.8 minutes an hour during overnight shifts. That is, you will note, as much as a fifth of an hour's programming.

Elaborate inquiries have been conducted regarding listener tolerance to radio commercials.

One study conducted by Statistical Research found that as lifestyles have hastened with time, levels of patience have receded. In 1981, 60 percent of listeners surveyed said they did not switch stations at all from the time they turned the radio on until they turned it off. A decade later, only four percent did not switch stations during a 20-minute experiment. The average person, in fact, scanned the dial almost every 90 seconds.

Another study conducted late last year by Paragon Research asked radio listeners what would prompt them to switch from one station to another. While 55 percent said they would turn the dial "sometimes" when commercials came on, 64 percent acknowledged they would "sometimes" switch when a station breaks from music and a DJ starts talking. Thus, it appears that listeners are as turned off by DJ chatter as they are by commercials.

The same survey asked how many commercials a listener was customarily willing to endure before changing stations. Seven percent said they would sit through none; 28 percent responded they would tolerate two commercials; 24 percent said one; 15 percent said three; and seven percent said four or more. A healthy 18 percent said they would not switch because of commercials.

The conclusion from all this research? Yes, commercials irritate a lot of listeners, even prompting many to change the station. Yes, the longer the flow of music continues, the longer a station is likely to snag its audience.

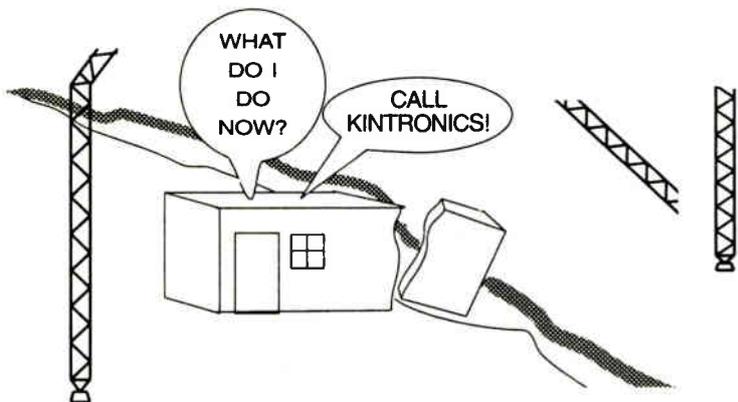
Stations react to these sort of statistics with slogans emphasizing long sweeps of music: "18 songs in a row!," "Less talk, more music!" Some DJs, when heading into a commercial block, announce that "the music will return in two minutes," so that if listeners are inclined to turn the dial, they know when to come back. Mind you, the station on the next frequency is likely doing the same thing; sooner or later, it will offer commercials of its own and the listener will be hopping stations again.

The bottom line, however, is that commercials are part of the free enterprise system that (increasingly) makes private radio thrive in many parts of the world. That fact is inherently understood by the medium's audience. Yes, advertising tirades can be annoying. But I would never trade my free private radio service to do without them.



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### Don't Take Our Word for It.

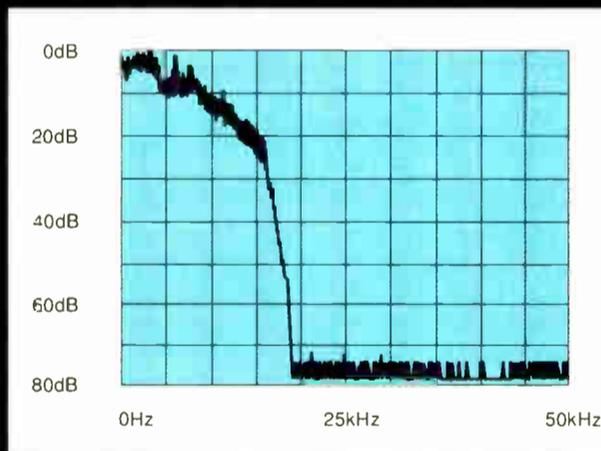
The 4000 provides transparent limiting with any source. Blind tests confirm that the sound of the Orban Transmission Limiter 4000 is virtually indistinguishable from the original source when driven as much as 15dB into limiting—even to trained listeners. Try it for yourself and hear what your facility can deliver when it is protected, not just restricted.

### Sophisticated, Easy to Use.

Orban engineers took years to develop the complex algorithms which permit the 4000 to protect inaudibly. Yet, they kept the front panel of the 4000 clean, clear and businesslike. The precision LED displays indicate any action of the compressor or HF limiter circuitry. The only adjustments are for INPUT level and OUTPUT level. The built-in tone generator and test mode permit rapid system setup and alignment.

### Orban Signature Quality.

The Transmission Limiter 4000 is one of a family of reliable, quality Orban products designed for demanding broadcast applications. Call your local Orban dealer for a hands-on demonstration of the Orban Transmission Limiter 4000—another breakthrough product from the leaders in broadcast audio processing.



Power spectral density at the 4000's output using "maximum peak hold" measurement. (5kHz/div. horizontal; 10dB/div. vertical)

# STATION SERVICES

News and Services for Business, Programming & Sales

## CD Music Library

**GLENDORA, Calif.** Halland Broadcast Services Inc. is distributing a new AC library that covers 1980 through 1992. "The Eighties Plus" is a 44-disc library of 765 AC and CHR hits.

"The Eighties Plus" is designed to include both mainstream artists and "harder-to-find" artists. The library is designed for use on AC-, Hot AC-, and CHR-formatted stations. The library is in stock and available for immediate delivery.

For information contact Steve Seinberg at 818-963-6300; or circle Reader Service 140.

## IBN Adds Programming

**CLEARWATER, Fla.** The Independent Broadcasters Network added five live programs to its line-up of talk show offerings.

"Battleline" is a daily edition of television's "Crossfire." Hosts Barry Lynn, Robert G. Grant and Peter T. Flaherty offer liberal versus conservative views on today's headlines.

"Sally Says" focuses on health and safety issues. Consumer advocate Sally Bowers hosts the two-hour weekly offering. Other program hosts include Ellen Rattner and Mort Crowley.

For information, contact Robyn S. Williams at 813-573-4402; or circle Reader Service 133.

## Financial Program Successful

**ATLANTA** "Your Personal Finance" is celebrating its fifth year on the air. The nationally syndicated radio program first aired on WVEE-FM Atlanta in 1986.

According to Financial Media Services, producer and distributor of the program, affiliates earned over \$500,000 in revenue from airing the program in 1991. "Your Personal Finance" offers financial tips to consumers.

For information, contact Larry Calhoun at 404-524-3830; or circle Reader Service 61.

## Call for Audio Materials

**WALNUT CREEK, Calif.** WPR/Pacific Multimedia, producers of "The Privacy Project," are developing a radio series on the history of the telephone monopoly.

The project hopes to bring to consumers an understanding of the relationship between technology, business strategy, law and regulation in the history of telecommunications. The producers are now looking for material for the project.

For information contact Gregg McVicar at Pacific Multimedia, P.O. Box 2282, Walnut Creek, CA 94595.

## Fishing For A Phone Number? Catch it in the 1992 Radio World Directory Issue

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## Design Studios Up to Code

► continued from page 34

to return air to the heating, ventilation and cooling (HVAC) system. This common plenum is actually the empty space between a suspended ceiling and the floor above.

The walls within your space stop at the suspended ceiling so that the area above forms one large duct. Because air is being forcibly moved through this area, and that air varies in temperature depending upon its distance from the HVAC system, a chimney effect is created in the ceiling area.

Any smoke caused by fire will be quickly spread throughout the area because of this effect and the lack of wall penetration beyond the ceiling.

The high volume of thick smoke given off by modern composite materials contains highly toxic and flammable gases. To remedy this, a standard called UL-910 was created and is enforced that requires special "plenum grade" coverings on any wiring running through common plenum ceilings.

This type of wire typically can cost up to six times what a standard jacketed cable may cost and is much harder to work with, thereby also increasing labor costs. You will use this wire throughout your office and common areas.

Any wiring through the office space such as telephones, warning lights, PA systems and stereo speaker wires, antenna cable and electrical power must meet the plenum specifications. Your local telephone/electrical contractors can give you more details.

### More fire concerns

- Fire alarms. At least one unit will be installed in your tenant space. Some localities will want to put one in each "sound-proof" studio. Not a good idea, eh? Ask for strobes instead of horns.

The strobe is basically the same as the intense white flashing light on the side of some towers. Install them in your actual studios or the areas immediately near your studios. Ask for an auxiliary relay that will mute background music/paging speakers so that alarms can be heard. If you do not ask, you may not have a choice later.

- Acoustical wall coverings. All materials, such as carpet, tile, or foam, must pass different tests to determine their resistance to the spread of flame. You should contact the manufacturer of your chosen material for specific information and test data which you can present to the fire department.

Companies such as USG, Armstrong and Illbruck make materials specifically designed for vertical, horizontal or di-

agonal mounting that meet all flame tests and provide appropriate acoustical control. Not all materials sold for acoustic purposes meet specifications for vertical mounting.

### Structure and cost

As you probably already know, when any building is designed, its cost of construction and future operation are calculated upon the "cost per square foot." However, this cost can be expressed in two ways.

The first is "usable" square feet. This refers to the cost of building and leasing the actual tenant space that you occupy. The building management then ascertains the "core cost" of the building.

Core cost includes those services and common areas which are used by all tenants. The annual cost of services is divided by the gross square footage to determine the core cost. Included in the core cost are parking, security, cleaning, HVAC, lighting, office electrical power, elevators, lobbies, loading areas and maintenance. The core cost is expressed as an amount per square foot.

When we add together the cost of usable square feet with the core cost square feet, we obtain the "rentable square footage." The core cost includes a charge for utilities such as water/sewer/power/HVAC.

This charge assumes that you will use the leased space during "building standard hours." Typically, that includes 45 hours/week excluding Sunday and holidays. Outside of those building standard hours, some services—such as HVAC—may not be available.

Most office buildings use some form of energy management system, usually maintained by an outside vendor, to control, monitor and report electrical, lighting and HVAC use. If you use more of these services than you pay for, you will be charged back for the overages.

In the case of HVAC, sometimes an entire floor may have to have its equipment running to satisfy your one suite—these overages can be quite expensive. In one office park with which I am familiar, cooling for nights/weekends of one office during the four months of summer cost \$1,100.

Another aspect of "building standard" affects the upfitting of your suite. The types of light fixtures, ceiling tile, carpet, doors (finish and height), window treatment and hardware (door knobs, outlets, switches) are usually predetermined to fit a specific taste and theme in the over-all building.

You will most certainly encounter resistance to changes which effect the look of

common areas such as hallways and windows visible from the street. You will also encounter overage charges and delays if you use something different within your suite.

The separately metered power line you install for your studio/HVAC power and the separate HVAC equipment are all considered "above building standard." Any construction or maintenance is usually done on a time and materials, per project, basis. Again, you will probably get a better rate and product if you deal through the building's general contractor.

In our next article, we will begin the actual space plan.

□□□

*Edwin Bukont is the CE at WPGC-AM-FM Morningside, Md. (Washington). He can be reached there at 6301 Ivy Lane, Suite 801, Greenbelt, MD 20770.*

## Fine-Tune Your On-Air Sound

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Once you have the spectral balance set for the mix of low, mid and high frequencies you want, and the system sounds good at a conservative setting, you can become more aggressive with the compression and limiting, and increase your loudness.

If you have been working for several hours, take a break. Your ears get tired, as does your mind. Critical listening is a very tiring process and you need to step away every few hours for a break. Stay away for at least an hour before starting again.

Have your engineer rig up a pink noise generator in a studio. Turn it on and sit down for 20 or 30 minutes to refresh your ears and mind. This is much like sampling wine: You eat a cracker in between glasses to ensure your taste buds start from zero. Use pink noise as aural "crackers" and you will have a clear head when you return.

What if you've tried and simply can't get the sound you want? You have several options: Call a specialist who may be able to get more out of your existing system as it stands, or by making custom modifications; make the modifications yourself; or consider buying a new system, which a specialist could also help you with. There are many new state-of-the-art processors available and we will discuss them in our final installment, next time.

□□□

*Jeffrey Loughridge is president of Audio Concepts and Engineering, a technical consulting firm that designs and renovates studios. He can be reached at 1-800-777-4172.*

**B**EFORE you buy any brand of 16-channel mixer, consider why the CR-1604's become the rack-mount mixer of choice for top pros. A quickly growing roster of TV & radio stations, post houses, production companies, studio producers, engineers, songwriters, sound track composers and late-night talk show bands have come to rely on Mackie's reliability and sonics.

**E**XCLUSIVE design features. One reason we specialize in mixing boards is so we can be maniacally meticulous about details others overlook. Some details help make the CR-1604 rugged and roadable. Others contribute to the mixer's excellent sound quality. And some, like our unique gain architecture and mix amp topology aren't really details at all, but rather represent a fundamentally better way to mix music.

**F**ANATICAL engineering means phenomenal sound. Compare our specs and features with anyone. But remember that the bottom line is what your ears tell you. Put a CR-1604 through a hands-on work-out and you'll understand why several major-label CD releases have been recorded and mixed solely on Mackie mixers.

ENGINEERING PART 1

# CR-1604 FANATICAL ENGINEERING PART 1

**OUTPUT-O-RAMA:** Main stereo outputs with enough oomph to drive any balanced or unbalanced input. In fact, all outputs have sufficient level to drive any input. Naturally all outputs/inputs are fully protected.

**TRIM** matches any signal from instrument levels to -10dBm semi-pro to +4dBu pro gear.

**7 SENDS** via 4 knobs with plenty of gain above unity for special effects and center detent at unity gain, **4 STEREO AUX RETURNS** with super-high headroom, low noise and enough gain to work with all levels.

**MUSICALLY-USEFUL EQ.** We're amazed at how many users tell us that our 80Hz, 2.5kHz and 12.5kHz turnover points and EQ circuit design not only sounds sweet but in some cases have replaced outboard equalization!

**COLD-ROLLED STEEL CASE**

**BUS 3&4 ASSIGN**

**STEREO IN-PLACE SOLO** maintains stereo perspective for all soloed channels and returns.

**UNITY PLUS** special-taper faders with 0dB gain at center detent minimize noise, maximize headroom, provide 20dB more gain above unity to reduce constant trim re-adjustment as input levels change.

**-90dB S/N ratio w/108dB dynamic range**

**REMARKABLY COMPACT, UNIQUELY FLEXIBLE:** In pod-to-back, rackmount configuration the CR-1604 takes up just 7 rack spaces (overall dimensions w/o rack rails 12"Hx19"Wx6.4"D). It can be converted in minutes in tabletop configuration (16.1"H x 17.34"W x 4.1"D) or with jacks on the control plane (15.8"Hx19"Wx4.8"D) with RotoPod bracket. Call Harris Allied for detailed 3-views, dimensions and specifications on the best small mixer value in America today.

**STUDIO-GRADE MIC PREAMPS.** Only the CR-1604 incorporates discrete, large-emitter-geometry transistor preamplifiers instead of just simple ICs. That's why only our mic preamps deliver -129dBm E.I.N., 0.005% THD yet can handle +14dBu max inputs without need for a pad. No matter what you're miking, you'll get all the punch and delicacy of big studio board preamps — but at a fraction of the cost.

**LARGE INTERNAL POWER SUPPLY** provides power for +48V phantom mike power, 12V BNC lamp socket, and bi-polar power for main circuitry, hi-output headphone amp and sophisticated enhancements such as our XLR10 mic preamp expander & internal full-fader/muting MIDI automation board. Our supply not only eliminates inconvenient "wall warts & line lumps" but gets rid of their hum-inducing magnetic fields, too. Instead of being driven into non-linearity (causing stray 25-35µV magnetic fields), our oversized, instrumentation-grade transformer loafs along, reducing stray fields to under 1µV for quiet operation.

**GNARLY CIRCUIT BOARDS.** Unlike brittle phenolic, our horizontally-mounted, double-sided, thru-hole-plated fiberglass boards and rigid, multi-point suspension prevent damage from external impact.

**MIX AMPS WITH TWICE THE HEADROOM.** Signals from all inputs simultaneously converge here. Conventional mix amps can overload and distort when you start pouring on the channels. Our gain structure solves the problem for audibly better sound. Cram the CR-1604 with 16 hot signals and it still has more headroom than other mixers running 8 inputs.

**ULTRA-DENSE CIRCUIT TOPOLOGY.** Unlike budget mixers which cut corners with passive circuitry, we added input and output buffers so the CR-1604 is compatible with a much wider range of devices.

**HIGHLY EFFECTIVE RF PROTECTION.** A plus for musicians, RF resistance is absolutely mandatory in broadcast. So we designed the CR-1604 with steel jacks and a shunting capacitor on each channel to route RF back out onto the main ground plane instead of re-radiating it through internal circuit traces. Read *Radio World*, March 25, 1992, pg. 27 for the rave results of a grueling RF field test on the CR-1604.

**Silky smooth SEALED ROTARY POTENTIOMETERS** prevent contamination from dust, smoke, liquids and are CO-MOLDED without the use of easily-shattered phenolic mechanical parts (a major reliability problem in many conventional mixer designs). Plus, our exclusive **ENERGY-ABSORBING KNOB DESIGN** transfers vertical impact away from pots and main circuit board, greatly reducing possible damage. Three more reasons we offer a generous 3-Year Limited Warranty on the Mackie CR-1604.

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TECHNOLOGY

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### LINE OUT

## A Basic Guide to PC-Based Editing

by Bruce Bartlett  
with Jenny Bartlett

**ELKHART, Ind.** In the past three columns, we've been looking at a typical digital audio workstation: the Turtle Beach 56K system.

Our next step is to use such a system. In this column of *Line Out*, I'll describe how to record and edit an audio program with the Turtle Beach 56K.

### From DAT to hard drive

Suppose you have a program on DAT—it could be a sample, a voice-over or several songs. First, you'll need to record the program from DAT onto your hard disk so you can edit it.

Recording to the hard disk is accomplished in five steps:

- (1) Load and run the supplied editing software;
- (2) Click on the Record icon;
- (3) Name the soundfile (the recording);

quence of zones, and the computer will play the playlist.

First, find the part of the recording you want to work on. To do this, type in its SMPTE start time (which you noted earlier). Or slide a cursor within the Overview bar, which represents the entire recording. The part you selected shows up on screen. To see if it's the part you wanted, play it by tapping the spacebar.

Within this part, you'll select a smaller area so you can define it as a zone. This might be a sentence, or a phrase or note you want to loop. Play the program. A cursor line moves left to right across the soundtrack. Watch where the cursor line crosses the area you want to select, and highlight this area by clicking and dragging.

Play the area you just highlighted to check it. You can slide the start and stop times of this area with your mouse.

If you wish, zoom in on the selected area to edit it in fine detail, all the way down to individual samples. A "previous view"

proximate end time of the zone. Trim the end of the zone, and click on "OK." The zone is trimmed and defined.

You can cut or remove a zone. This is useful for editing a mistake out of a narration track. You can also paste a zone (place it elsewhere in a soundfile), copy it, or paste-fill it over another zone to replace it. All these edits are destructive—they change the recording on disk—and are relatively time-consuming.

□□□

Bruce Bartlett is a microphone engineer and technical writer for *Crown International*, and the author of *Stereo Microphone Techniques* published by *Focal Press*. Jenny Bartlett is a technical writer. Bruce can be reached at 219-294-8388.

## The Proper Use Of Clipping

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increase distortion and not increase perceived loudness.

Some processors such as the Orban 8100A have safety clippers that can easily be removed from the signal path. When a manufacturer designs a processing block, he can never be sure how it will integrate into a processing chain. Therefore, the design engineer will include safety clipping to be sure that no overloads take place. Similar clippers can also be found in the Apex Dominator.

Here's a tip I learned from a top processing guru: *Use headphones*. Not just any pair of phones, but a top quality, audiophile-grade set of phones driven by a top-notch amplifier. If your headphone amplifier has a balanced-bridging input, you can insert it anywhere in your processing chain to evaluate performance every step of the way.

My favorite phones for processing setup are Grado HP-1s. Monitoring through phones will give you a new insight into the sound of your station and the competition. Even at transmitter locations with high ambient noise and/or poor monitors, you can fine-tune and tweak with confidence.

By listening to your entire chain progressively, one block at a time, you will be able to hear the contribution of each processing unit. Any artifacts of processing that are undesirable will be much more evident to you when monitoring with high-quality headphones.

You can improve any processing chain by evaluating how each link in your chain integrates into your total processing philosophy. The development of such a philosophy should be the mission of everyone responsible for the success of your station.

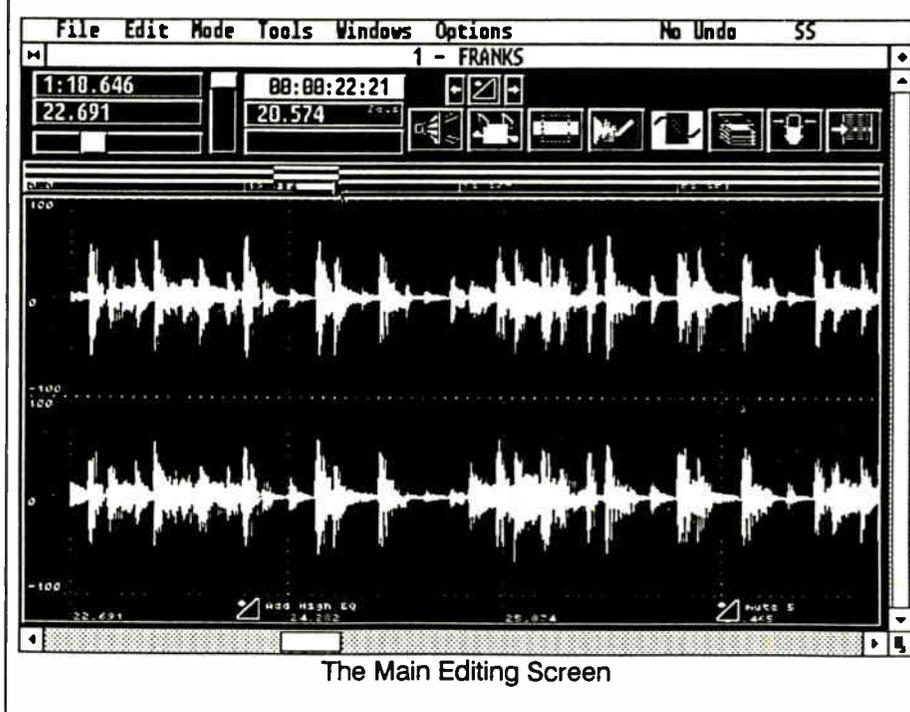
Your personal contribution should be to enable these key people to realize their sonic goals. Most program directors know what they are listening for, but don't know how to achieve it. This is where you can be invaluable.

Next month we will return to circuit design and show you how to build a low-cost, high-performance monitoring amplifier with just a handful of common parts.

□□□

Jim Somich is president of *Somich Engineering* and chief engineer of *WOIO(FM) Cleveland*. He can be reached at 216-526-4561.

Figure 1.



(4) Click the record button to start recording, and hit play on your DAT machine. The DAT recording will copy digitally to hard disk.

(5) While the recording is in progress, SMPTE time code is running in a window on screen. You might want to write down the approximate SMPTE start/stop times of each major event for later editing.

A stereo soundtrack of your recording appears on the screen (Fig. 1). This is the waveform—a graph of signal voltage versus time, one for each channel. Its time axis can be measured in real time, SMPTE time, number of samples, film feet/frames, or beats.

If you wish, tap your keyboard's spacebar to play back the recording. To hear the playback, you must set your DAT to monitor the digital input.

You can add a new recording at the end of an existing one, or record over an existing recording at any point.

### Editing procedure

Now you're ready to edit the recording. Basically, you'll define *zones*—segments of the recording that you want to keep—such as a song, chorus, phrase or word. You'll assemble these zones into a playlist, a se-

quence of zones, and the computer will play the playlist.

### Define your zone

Now that you've selected an area, define it as a zone. One way to define a zone is to click on "Define Zone" and type in the name of the zone. Or you can play the soundfile and hit "Z" just before and after the zone plays.

Zone definitions are time pointers to various locations on your hard disk. When you ask the computer to play a certain zone, the hard-drive head jumps to the zone's start point and plays the zone.

How do you define an entire song as a zone? First, as you record a song, note its start and stop times from the on-screen counter. Then go to the "zone-edit" screen. Type in the SMPTE time where the song (zone) starts. Now you can trim the zone precisely. With your mouse, move the cursor line to the exact beginning of the song.

If necessary, you can *scrub* the soundtrack—play it slowly forward and backward until you find the exact spot to trim.

After you define the beginning of the zone, click on "End" and type in the ap-

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**Dynair EQ-1530** post-EQ w/differential input for AC hum rejection, (2) 75-ohm outputs, \$225. P Paine, Video Velocity, POB K, Virginia City NV 89440. 702-847-9847.

**ATI P100** Encore series, turntable amp, little use, BO. P Forest, Musical Starstreams, POB 1989, Sedona AZ 86336. 602-204-1989.

**JBL 6233 300** Wch sound, reinforcement, \$350. M Everhart, KZRC, 111 SW 5 #1550, Portland OR 97204. 503-226-6731.

**Radio Systems PA-1** phono preamp, like new, \$50/BO. G Fullhart, WVKS, 4665 W Bancroft St, Toledo OH 43615. 419-531-1681.

**Gates M-2696** tube type mon amps, rack mount, antique, circa 1950s, \$250; RCA MI-12242 remote amps, single mic, circa 1940s, dB meter, excel cond, \$250. R Franklin, Franklin Studios, 1004 Dekalb St, Norristown PA 19401. 215-646-7788.

**Altec** plug in preamp, 1588C w/xfrmr & phantom for Altec M53, M54 mic systems, 1588 w/xfrmr, 1578A w/o xfrmr, \$20 ea. J Newman, 401-847-0455.

**RCA, Altec** tube mic pre's & tube amps & mixers; Langevin AM-16's, sale or trade. Tracy Eaves, 615-821-6099 (evenings before 10PM EST).

**New 250 W solid state amp**, \$1800. Call for details. Bill Hoffman, 518-583-9490.

### Want to Buy

**High impeded** to 600 ohm w/20 dB gain amp needed. Ron, 419-893-7968.

**Tube & remote mixers**, RCA, Gates, Collins, WE, 23-C. B Davies, Virgo Prods, 5548 Elmer Ave, N Hollywood CA 91601. 818-761-9831.

**Looking** for any cond blown tube amps, PA & musical instrument variety pref. Darren, 216-759-0579.

## ANTENNAS & TOWERS

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**Advance w/48"** face, 650'; like new, will support any ants, dishes, sell all/part. R Wright, WLLX, 1208 N Locust Ave, Lawrenceburg TN 38464. 615-762-6200.

**Gorman Redlich CMR** mon wired for 3 twrs, can have 6 twrs, 11 yrs old, \$1000. J Randolph, WHIR, Box 1230, Danville KY 40422. 606-236-2711.

**ERI FML2E** 2-bay, \$2300/BO. Dennis, WCCW, 121 E Front, Traverse MI 49684.

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**Jampro JSCP-3S** 3-bay circ polar FM, 30 kW, tuned to 93 MHz, any freq poss, never used, \$1250. K de Bruyn, ZOE 104.9, Box 16, Antwerp 2000, Belgium.

**Used towers bought and sold**. Call 1-800-643-6988.

**Scala PDR-2222/CX** 4-wy pwr divider, equal split, 93.5 MHz, 100 W, 50 ohm input, 75 ohm output, N conns, \$120. P Regier, Pasco Comm, 2906 E Randolph, Enid OK 73701. 405-233-6808.

**200'** of 6" hard line in low loss 72 ohm for TV; FM in 20' sections in storage w/conn bullets, spring hangers & elbows, \$5000 all. K Crosthwait, WTNN, 13206 Buttermilk Rd, Knoxville TN 37932. 615-531-2297.

**Andrew 7/8"** 150' foam coax w/female N conns on both ends, used less than 1 yr w/conns, BO; Cablewave 1 5/8" 60' air coax, never used, BO; (60) Cablewave angle member adapters, \$3.60 ea/BO; (55) Cablewave hangers for 1 5/8" cable, \$1.40 ea/BO; (36) Andrew angle member adapters, \$4 ea/BO. C Scherer, 215-370-9046.

**AM insulator** for heavy twr up to 42" wide, \$990+s/h. A Burgos, WNZN, Carr Vieja del Vigia #83, Ponce PR 00731. 419-588-3700.

### Want to Buy

**3-bay full wave FM** on/near 94.1 MHz, gd cond, need immed. B Dunkle, WTYS, POB 777, Marianna FL 32447. 904-482-2131.

**8 bay/larger** tuned to 100.9, working cond. K Austin, KFXI, 1101 Hwy 81 N, Marlow OK 73055. 405-658-9292.

## AUDIO PRODUCTION

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**Rane HC-6** 6-chnl stereo headphone amp, \$200+s/h; (3) Gentner 96-BA-AB patch bays, \$350 ea/\$900 all+s/h; (3) Fostex 3010 RCA type patch bays (32 ea) in Crown walnut rack, \$70 per bay/\$210 all+s/h. D Crepps, IBS, 29672 Silver St, Val Verde CA 91384. 805-294-9441.

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**Nexus 96-pt** patch bay (2), 1/4" front, RCA back, new, \$300 ea/BO; Loft 450 (2) delta line flanger, new, \$500 ea/BO; Symetrix SE-400 stereo parametric EQ, new, \$450; (2) Sym phase shifters, new, \$250 ea/BO; (2) Sym SG-200 2-chnl noise gates, new, \$300 ea/BO; Sym A-220 headphone amps, 20 W/chnl, new, \$200/BO; AB Syst 301 amp switcher, new, \$250/BO; (2) AB Syst pwr amp, new, XLR, trans input, \$500 ea/BO; Switchcraft 48-pt patch bay, \$100/BO. J Diamond, Blue Diamond, Box 102C Chubbic Rd RD1, Canonsburg PA 15317. 412-746-3455.

**Ashly SC-66** parametric EQ stereo w/manual, excel cond, \$300; Phase Audio DC-01 carting station w/timer, excel cond, \$200. D Bailey, Rock Shoppe Prod, 3422 Beech St, Rowlett TX 75088. 214-475-9796.

**ATI Emphasizer VGC**, \$495+s/h. C Rouse, 617-461-2699.

**Orban** stereo synthesizer, \$200/BO. J Hansen, WYRQ, 62 E Broadway, Little Falls MN 56345. 612-632-2992.

**Publison Infernal Machine 90** stereo in/out, stereo pitch shifting, dig delay, echo, .05 memory, excel cond, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

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**Schafer 903E** (2), 1 w/5) Audiofile I's, 1 w/2) Audiofile II's w/spares, BO. J Paoli, 818-744-5378.

**IGM 500** w/2) Scully 270. (1) Carousel. (1) PB cart. (1) R/PB cart, manuals & extras, nice cond, \$500. R Schneider, KPMJ, 1280 Oxnard Blvd, Oxnard CA 93030. 805-498-1830.

**IGM Go-Cart 24**(2), excel cond, \$900 ea; Harris 9001 System w/keyboard & terminal; (2) Otari ARS-1000 R-R; (2) IGM Go-Cart 24, gd cond, \$5000. D Quinlan, 503-882-4656.

**Harris 9001** in 3 orig matching Harris racks w/keyboard & terminal; (4) Otari ARS-1000 R-R; (3) stereo IGM Go-Cart 24-tray; (2) ITC single play decks, all gd cond, \$8000. D Quinlan, 503-882-4656.

**Bdct Auto** live asst controller w/thumbwheel operation, 24 prog events, LEDs at a glance, 1 yr old, operates cart machs, reels, CDs, \$1950. R Chambers, KSUE, 3015 Johnstonville Rd, Susanville CA 96130. 916-257-2121.

**Schafer 902** Sono-Mag Carousel w/4 Carousels, 3 big racks, BO. Bud, WYOAK, 4237 Airline Rd, Muskegon MI 49444. 616-733-4040.

**SMC syst, MSP 1**, 2000 event prog w/batt backup, (3) 452 bi-direc stereo Carousels, (2) 450 bi-direc mono Carousels, (4) SMC stereo play carts, (3) cabs, wiring, books, extra boards, \$11000/BO. J Johnston, KREC, POB 747, Cedar City UT 84721. 801-586-9812.

**Systemation X7 Dig Brain** (2) w/7-day memory, excel shape, (10) Nakamichi MR-2 decks for ea system w/all cables & printers, will part out, \$4500 ea. W Christensen, KIOH, Hwy 30 W, Pipestone MN 56164. 507-825-4282.

**SMC DP-2** in 3 orig matching racks w/control head; (4) Otari ARS-1000 R-R; (3) SMC Carousels; (1) dual single play unit, all gd cond, \$5000. D Quinlan 503-882-4656.

**Otari ARS-1000** (5), gd cond, \$750 ea. D Quinlan, 503-882-4656.

**SonoMag MSP12** in great cond, 3 yrs old, \$12000. J Ferguson, WSKS, 131 W Hancock St, Milledgeville GA 31061. 912-453-9406.

**Programmer 3A** live asst sequencer for 4 R-Rs. J Hansen, WYRQ, 62 E Broadway, Little Falls MN 56345. 612-632-2992.

**Sparta 1052** 10-source/52-event controller w/silent sens, (4) SMG Carousels, (2) 100B random select units, (2) Revox A77s, (2) 25 Hz det, (2) Tapecaster 700P w/EOM tone det & manuals, BO. R Hobbs, WMLR, 2009 Cromwell Dr, Nashville TN 37215. 615-373-2351.

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### Want to Sell

**Canon** color camera w/stereo mic, title gener, Quasar VHS, 3-spd VCR deck, 4-band Hi-fi, used twice, \$600. J Diamond, Blue Diamond, Box 102C Chubbic Rd RD1, Canonsburg PA 15317. 412-746-3455.

## CART MACHINES

### Want to Sell

**ITC 3D** triple play deck, 1 cue w/matching WRZ record amp, 1 owner, rblt & updated PS, heads, bearings, out of svc 3 yrs, \$1300. P Apple-son, Appleson Studios, 757 SE 17th St Causeway Ste 358, Ft Lauderdale FL 33316-2960. 305-587-7900.

**Spotmaster 505** plyr, recently refurb, gd cond, plays all sizes bdct carts, new gloss black paint, gd head & motor, \$225. R Franklin, Franklin Studios, 1004 Dekalb St, Norristown PA 19401. 215-646-7788.

**ITC R/P** stereo, triple cue, new hds, \$2000/BO; (2) ITC S/P stereo, triple cue, new hds, \$800/BO, both very gd cond. R McManus, McManus, 4011 Orchard Ave, San Diego CA 92107. 619-223-1730.

**Tapecaster 700 R/P** w/pushbutton cart release, secondary due tone detector & gener, \$595. R Franklin, Franklin Studios, 1004 Dekalb Studios, Norristown PA 19401. 215-646-7788.

**Spotmaster 505** mono/play, rblt. R Franklin, Franklin Studios, 1004 Dekalb St, Norristown PA 19401. 215-646-7788.

**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.

## CASSETTE & REEL-TO-REEL RECORDERS

### Want to Sell

**Scully 280** 4-trk 1/2", very gd cond in console, \$2500. F Virtue, Virtue Studios, 8809-11 Rising Sun Dr, Philadelphia PA 19115. 215-763-2825.

**Revox PR-99 MK II** 1/2-trk stereo play w/25 Hz sensor, \$1100. D Peluso, KJUL, 2880 E Flamingo Rd Ste E, Las Vegas NV 89121. 702-732-2200.

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**Studer Revox PR99** 2-trk, 7 1/2 & 15 ips, low hrs, excel cond, \$1950. L Wagner, Ardniga Radio, POB 1788, Orlando FL 32802. 407-299-1299.

**Technics RS1500** 2 trk; Sony/MCI JH110C on roll around metal cabinet, both excel cond. J Gelo, 813-642-6899.

**Fostex 250-AV** 4-trk combo w/Dolby C, \$400+s/h; Otari CR-705 remote for MX-5005/MKIII/2 1/2 trk, \$100. D Crepps, IBS, 29672 Silver St, Val Verde CA 91384. 805-294-9441.

**ATR 102/104 EC** (2) remotes, \$400 ea; Stephens 811D, 4-trk, 1/2", \$1800 ea. M Linett, 818-244-1909.

**Revox PR99 MKII** 2-trk, 7 1/2 & 15 ips, excel cond, 12 hrs use, manual, \$550. J Gasewicz, Post Modern Prods, POB 64980-418, Dallas TX 75206. 214-504-6743.

**Revox PR-99 MK II** 1/2-trk stereo Play units w/25 Hz sensor, \$1100 ea, FOB. D Peluso, KJUL, 2880 E Flamingo Rd Ste E, Las Vegas NV 89121. 702-732-2200.

**Revox PR99** (2), excel cond, \$500 ea. W Christensen, KIOH, Hwy 30 W, Pipestone MN 56164. 507-825-4282.

**Otari 1000** (5) 25 Hz tone sensors & manuals, excel cond, \$795 ea/BO. J Hansen, WYRQ, 62 E Broadway, Little Falls MN 56345. 612-632-2992.

**Tascam 42B** pro series 1/4" 2-trk w/remote VGC, \$850. Gary, 305-379-8391.

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MCI 110B motors, boards, head stacks & parts. M Shea, Precision, POB 723, NY NY 10276. 312-989-2684.

Ampex AG600-2 stereo deck in orig case, new hds in 1988, \$500. E Brouder, Man From Mars, 159 Orange St, Manchester NH 03104. 603-668-0652.

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Scully 284B-8 1" 8-trk, 3 3/4-30 ips w/V576 var spd mod, all manuals, perf cond, \$3000. T Sherry, 415-969-3030.

Otari ARS 1000 (7) 2-chnl w/25 Hz tone sensor & cue tone relays, excel cond w/manuals & racks, \$650 ea. R Chambers, KSUE, 3015 Johnstonville Rd, Susanville CA 96130. 916-257-2121.

Scully 100-16 w/8-trk heads, \$2900. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

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Ampex AG-440B 1" 8-trk, multi-trk in roll around console, gd cond, BO; Otari Mark II-IV 1/2" 4-trk, multi-trk, mint, less than 50 hrs, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

**Want to Buy**

Scully '100' recorders, record/play amplifiers, 8, 16, 24 track heads. Sequoia Electronics, 1131 Virginia Ave, Campbell CA 95008. 408-866-8434.

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Digital LQP02 (2) ltr-quality daisy wheel printers, serial port, \$25+s/h; Mac 820 (10) internal drives, pulls, excel shape, \$15 ea. P Russell, Bowdoin College, Brunswick ME 04011. 207-725-3066.

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Autogram IC-10B factory refurbished and ready for operation, \$4500. Call 806-372-5130.

McMartin B-802 8-chnl stereo, rotary pot board w/manuals & spare cards, \$995. M Everhart, KZRC, 111 SW 5 #1550, Portland OR 97204. 503-226-6731.

UREI Quad Mod-One w/P&G faders, PS, spares, XLR snake installed, Anvil case, excel, \$4250. Appleson Studios, 757 SE 17th St Causeway Ste 358, Ft Lauderdale FL 33316-2960. 305-587-7900.

Trident Series 65 32 in, 16 out, oak cab, pedestal base, wiring harness, mod extender card, new, \$10000/pr. J Diamond, Blue Diamond, Box 102C Chubbic Rd RD1, Canonsburg PA 15317. 412-746-3455.

Neotek Series I 16x4x2 w/patch bay & wiring harness, \$3500. D Gaydos, UGFTV, 721 Broadway, NY NY 10003. 212-998-1663.

Yamaha MR1242 12-chnl/tape returns, 3 aux busses EQ, 4 sub-groups, talkback syst, all docs, 1 yr old, mint cond, \$1000. C Yengst, WAWZ, Weston Canal Rd, Zarephath NJ 08890. 908-469-0991.

Ramko DC 8MS 8-chnl, 18 input, stereo bd, excel cond w/manuals & extras, \$2500. R Trumbo, KNLF, POB 117, Quincy CA 95971. 800-397-4146.

SMC 6-chnl mono, very gd cond, \$200+s/h. F Smith, WBSU, 2408 Chamberlain Ave, Chattanooga TN 37404. 615-624-7126.

Gates Yard 8-chnl mono, tube-type mixer for parts, w/o pwr sply, mon amp, will trade for Gates Sta-ivl or Miratel EBS air alert, \$40+s/h. E Lightman, WEDL, 550 Merchant St, Ambridge PA 15003. 412-266-2802.

MCI JH-618 18 in/16 out, non-auto w/VUs & patch bay, gd cond, \$5000. B Petruzzi, A-Z Music, POB 96192, Las Vegas NV 89193. 702-736-2303.

MCI 428 28x24, 336 pt patchbay, prod desk, \$7500. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

**Want to Buy**

8-12 chnl stereo, any cond, no tube, BO. T Crockett, Hot Tracks, Box 10501, Blacksburg VA 24060. 703-953-0222.

Stereo, 6-12 chnl. B Hale, 606-436-5580.

Svc manual & parts for Howe Audio 9000. K Austin, KFXI, 1101 Hwy 81 N, Marlow OK 73055. 405-658-9292.

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Soundcraftsmen 10-band graphic EQ w/big APL meter, 600 in/out, mono, walnut cab, \$100. L Beigel, On-Cue, POB 85042, Los Angeles A 90072. 800-726-9813.

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CBS Volumax 411 stereo, \$75. M Hiner, WHOK, 1660 Columbus Rd, Lancaster OH 43130. 614-653-4373.

UREI BL-40 EC w/manual, \$150; Neve 33114A pr w/meters & pwr sply, \$2600. M Linett, 818-244-1909.

Texar Audio Prism (2), \$1200/both; CRL Dynaflex DX-2 stereo noise reduc unit, \$350. M Gollub, WMJS, POB 547, Prince Frederick MD 20678. 410-5353-2201.

Orban Optimod 8100A mint cond, 1 yr old w/manual, \$4300. W Williams, KQFX, POB 7762, Amarillo TX 79114. 806-355-1044.

Aphex 300 Compellor, \$550. P Appleson, Appleson Studios, 757 SE 17th St Causeway Ste 358, Ft Lauderdale FL 33316-2960. 305-587-7900.

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Orban 8000A Optimod FM, excel cond, full documentation, \$1500. J McDonald, Wind River Bdcg, 329 E 3rd, Loveland CO 80537. 303-669-3442.

**We buy Optimod 8000A's and 8100A's 414-482-2638**

Aphex Compellor 300 stereo mdl; Aphex Dominator stereo mdl, \$1500/both/trade for UREI limiters. Gary, 305-379-8391.

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Neumann U-67 & pwr sply, like new, \$3000. F Virtue, Virtue Studios, 8809-11 Rising Sun Dr, Philadelphia PA 19115. 215-763-2825.

Nady 501 wireless w/2 mics, chnl D 209.15 MHz, \$500+s/h. D Crepps, IBS, 29672 Silver St, Val Verde CA 91384. 805-294-9441.

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**HELP WANTED:** Any company or station can run "Help Wanted" ads for \$1.50/word or buy a display box for \$55/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 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

### MICROPHONES . . . WTS

**Altec 639A** recond classic, ribbon dynamic, \$350. L Beigel, On-Cue, POB 85042, Los Angeles CA 90072. 800-726-9813.

**RCA MI-6204C** Varicoustic poly-direc ribbon bdct, brown gloss finish, \$180; RCA PB-90 A1 bi-direc ribbon, gd cond, \$500; RCA omni-dynamic, omni-direc remote bdct from early 50's, \$100. R Franklin, Franklin Studios, 1004 Dekalb Studios, Norristown PA 19401. 215-646-7788.

**RCA PB-90-A1** bi-direc ribbon, looks & works like 44, circa 1930s, \$500. R Franklin, Franklin Studios, 1004 Dekalb St, Norristown PA 19401. 215-646-7788.

**EV 664** dynamic, works well, \$35+s/h. R Zimmer, 602-326-2080.

**Sennheiser 405** (2) cardioid condenser, XLR, no sply, \$400. J Newman, 401-847-0455.

**Telefunken U-47**, Neumann U-67, KM-54 mint; RCA ribbon mics (2) KU3A's 10,0001, (3) 77-DX, (1) 44-BX, (2) BK-5; Altec tube mics M-11, M-20, M-30; 639 film version mic ect. Trade or sale. Tracy Eaves, 615-821-6099 (evenings before 10PM EST).

**RCA classic ribbon**. B Davies, Virgo Prods, 5548 Elmer Ave, N Hollywood CA 91601. 818-761-9831.

**Desk mics** (hiZ), EV-Shure mic stands, also baby booms (3); tubes, new (32) RCA, GE, Sylvania; Sams tube sub books #8 & #6; RCA tube manual; Sony head demagnetizer (new); jack femal connectors; EV 502 transformer primary/secondary. Mr. Oliver, 212-874-7660/0274. Call afternoons till 10PM.

### Want to Buy

**Will voice** station liners & promos for older mics, currently doing WBZ & others. T McCarthy, KOMO, 100 4th Ave N, Seattle WA 98109. 206-443-4010.

**Vintage** all makes, parts & stands; tube equip. R Van Dyke, Caffrey House, 2 Squires Ave, E Quogue NY 11942. 516-728-9835.

**RCA ribbon**, any cond. B Davies, Virgo Prods, 5548 Elmer Ave, N Hollywood CA 91601. 818-761-9831.

**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.

### MISCELLANEOUS

#### Want to Sell

**Printer sound isolation box**, hinged lexan cover w/fan, \$125. D Koehn, Central States, 609 S 15th, Quincy IL 62301. 217-228-2115.

**Weston 5 1/2 SQ 0-250** ACA switch-board type w/current xfmr, \$100. Bartkowski, 4923 W 28th St, Cicero IL 60650.

**Up timers**, (3) new, 2" readouts, counts to 9:59 & resets, \$57.50 ppd; Audio Dig mdl TC-2 delay unit, \$950 ppd w/o manual; audio & RF tech manuals for Sparta equip. D Peluso, KJUL, 2880 E Flamingo Rd Ste E, Las Vegas NV 89121. 702-732-2200.

**Sola Constant Volt** 8.34 amp, 120 V; Computemp 5 temp mon w/o probe, BO. M Hiner, WHOK, 1660 Columbus Rd, Lancaster OH 43130. 614-653-4373.

**Triad A-11-J** (2) audio input xformers, 50/233/600 ohm input, 60K ohm output, \$36 both; (4) Ampex 15095 & (9) 4580116-20 plug in octal 8-pin xformers, 150/600 ohm input, 15K ohm output, \$18 ea. S Lawson, KAK Prods, 928 Hyland Dr, Santa Rosa CA 95404. 707-528-4055.

**Rotron Blowers for Eicom, CCA, CSI, McMartin, Harris, rebuilt & new.** Goodrich Enterprises Inc. 11435 Monderson St., Omaha, NE 68164 402 493 1886 FAX 402 493 6821

**Radio Systems RSTM-2R** timer to 9:59:59 front panel/remote controls, 1/2" dig readout, mint, \$95; Ampex spkrs from 622 port spkrlamps, no rear bolt, excel cond, \$25/ea; Ampex input xfmrs, (5) 4580200 for 440 recs, (1) 4580116-01, \$30 ea; Sony C-38-B large diaphragm condenser, phantom/batt, cardioid/omni, grill corner dented, \$300; Han-D-Mag THIN-P 2-sided probe demagnetizer, \$35; Altec/Peerless plug-in line xfmrs, (7) red 15095 150/600 to 15K, (2) green 4722 38/150 to 50K, (2) black 15356 150/600 to 600, \$30 ea; (2) University HF-206 spkrs w/hypersonic tweeters; T-30 mid range drivers w/H-600 horns, \$30; Altec 8272-01GG fader slide, 600:600, new w/spec sheet, missing 1 mounting plate, \$20. J Newman, 401-847-0455.

**Antique bdctg & elect equip**, \$2/list. R Franklin, Franklin Studios, 1004 Dekalb St, Norristown PA 19401. 215-646-7788.

**Cutler-Hammer** 100-amp relay, 3-pole sgl throw, 28 V, DC coil volts contacts, 400 cycle, 115/200 V AC/28 V DC, BO; Audiscan slide adv tone gen, \$30/BO. S Gardner, 3-G Enter, POB 387, Hillsville VA 25343. 703-725-7935.

**Pearsons** (3) 4-chnl programmers w/auto feature & cables, \$300 ea. W Christensen, KIOH, Hwy 30 W, Pipestone MN 56164. 507-825-4282.

## PHONE: 703-998-7600 FAX: 703-998-2966



Call Simone Mullins, Classified Ad Manager, to reserve space in the next issue. Use your credit card to pay, we now accept VISA and MASTERCARD.

# Radio World

5827 Columbia Pike, Ste 310  
Falls Church, VA 22041

### Select from these categories for best ad positioning:

- |                            |                           |                         |
|----------------------------|---------------------------|-------------------------|
| Acoustics                  | Consoles                  | Stereo Generators       |
| Amplifiers                 | Disco-Pro Sound Equip.    | Switchers (Video)       |
| Antennas & Towers & Cables | Financial Services        | Tapes, Cartr & Reels    |
| Audio Production (Other)   | Limiters                  | Tax Deductible Equip    |
| Automation Equip.          | Microphones               | Test Equipment          |
| Brokers                    | Miscellaneous             | Transmitters/Exciters   |
| Cameras (Video)            | Monitors                  | Tubes                   |
| Cart Machines              | Movie Production Equip.   | Turntables              |
| Cassette & R-R Recorders   | Receivers & Transceivers  | TV Film Equip.          |
| CATV-MATV Equip.           | Remote & Microwave Equip. | Video Production Equip. |
| CD's                       | Satellite                 | Video Tape Recorders    |
| CD Players                 | Software                  | Positions Wanted        |
| Computers                  | Stations                  | Help Wanted             |

### Display Rates for Classified Advertising Effective January 1, 1991

	1x	3x	6x	12x
1-9 col inch (per inch)	\$55	53	50	45
10-19 col inch (per inch)	50	48	45	40
Distributor Directory	90	85	80	75
Professional Card	60	55	50	45
Classified Line Ad	\$1.50 per word			
Blind Box Ad	\$10 additional			

To compute ad costs: Multiply the number of ad inches (columns x inches) by the desired rate schedule for your per unit cost. Example: a 3" ad at the 1x rate is \$165, at the 3x rate \$159, at the 6x rate \$150, at the 12x rate \$147, etc.

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**Norac**

U.S. and Canada **1-800-366-3912**  
**207-783-4042**

## ACTION-GRAM

### Equipment Listings

Radio World's Broadcast Equipment Exchange provides a FREE listing service for all broadcast and pro-sound end users. Simply send your listings to us, following the example below. Please indicate in which category you would like your listing to appear. Mail your listings to the address below. Thank you.

Please print and include all information: I would like to receive or continue receiving Radio World FREE each month.  YES  NO

Contact Name: \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

Title \_\_\_\_\_ Please circle only one entry for each category:

Company/Station \_\_\_\_\_

Address: \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone Number: \_\_\_\_\_

**I. Type of Firm**

D. Combination AM/FM station F. Recording studio

A. Commercial AM station G. TV station/teleprod facility

B. Commercial FM station H. Consultant/ind engineer

C. Educational FM station I. Mfg, distributor or dealer

E. Network/group owner J. Other \_\_\_\_\_

**II. Job Function**

A. Ownership D. Programming/production

B. General management E. News operations

C. Engineering F. Other \_\_\_\_\_

Brokers, dealers, manufacturers and other organizations who are not legitimate end users can participate in the Broadcast Equipment Exchange on a *paid* basis. Line ad listings & display advertising are available on a per word or per inch basis. Call 1-800-336-3045 for details.

WTS:  WTB:  Category: \_\_\_\_\_

Make: \_\_\_\_\_ Model #: \_\_\_\_\_

Brief Description: \_\_\_\_\_

Price: \_\_\_\_\_

WTS:  WTB:  Category: \_\_\_\_\_

Make: \_\_\_\_\_ Model #: \_\_\_\_\_

Brief Description: \_\_\_\_\_

Price: \_\_\_\_\_

WTS:  WTB:  Category: \_\_\_\_\_

Make: \_\_\_\_\_ Model #: \_\_\_\_\_

Brief Description: \_\_\_\_\_

Price: \_\_\_\_\_

WTS:  WTB:  Category: \_\_\_\_\_

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Brief Description: \_\_\_\_\_

Price: \_\_\_\_\_

WTS:  WTB:  Category: \_\_\_\_\_

Make: \_\_\_\_\_ Model #: \_\_\_\_\_

Brief Description: \_\_\_\_\_

Price: \_\_\_\_\_

WTS:  WTB:  Category: \_\_\_\_\_

Make: \_\_\_\_\_ Model #: \_\_\_\_\_

Brief Description: \_\_\_\_\_

Price: \_\_\_\_\_

\*Closing for listings is the first and third Fridays for the next month's issue. All listings are run for 2 issues unless pressed for space or otherwise notified by listee.

703-998-7600

Broadcast Equipment Exchange PO Box 1214 Falls Church VA 22041

FAX: 703-998-2966

**MISC ... WTS**

**RADIO WORLD**  
reaches over **18,000** radio professionals twice monthly.  
**1-800-334-3045**

**Ampex 985 Music Ctr AM/FM** tuner & 3-sp'd stereo R-R in orig wood cab, new hds & belts in 1990, 33 x 9 x 16", \$500. E Brouder, Manchester NH 03104. 603-668-0652.

**Up timers (3)**, new, 2" readouts, counts to 9:59 & resets, momentary closure resets to 0:00, \$57.50 ppd; Audio Dig TC-2 dig delay unit, new w/o manual, \$950 ppd UPS; audio & RF tech manuals for Sparta Elec Corp equip. D Peluso, KJUL, 2880 E Flamingo Rd Ste E, Las Vegas NV 89121. 702-732-2200.

**SCA rcvr crystals**. 90.1k, 91.7, 100.3 FM, other freq avail in small quantities, \$1. Chris, 309-794-7500.

**Video sales (16)** training tapes, VHS, 30 topics, \$1500. R Trumbo, KNLF, POB 117, Quincy CA 95971. 800-397-4146.

**Rec-o-Kut** chrome headshell, gd cond, for 12/16" Rec-o-Kut tonearms, \$25 ea; Audio-Technica ATP-12 12" prof transcription arm, gd cond, \$150; Simplex (2) 20" resettable clocks, new, \$150 both; Alertlite WL-3 (2) verticl on-air lights lettered on 3 sides, \$65 ea; price list on antique bdcgt equip, \$2. R Franklin, Franklin Studios, 1004 Dekalb St, Norristown PA 19401. 215-646-7788.

**FM 5 kW RF load**, \$595.00. 1-5/8" connectors, \$50 each. 505-522-4162.

**Want to Buy**

**WE & RCA 16"** transcriptions literature; bdcgt equip. R Van Dyke, Caffrey House, 2 Squires Ave, E Quogue NY 11942. 516-728-9835.

**Info/description/literature** on latest state of the art equip for proc vintage recordings, auto equalization/harmonic expansion; Eventide voice proc/spec effects gener. Heritage Radio, POB 16, Boston MA 02167.

**Coffee mugs** w/call ltrs, logos, trade/buy. P Russell, Bowdoin College, Brunswick ME 04011. 207-725-3066.

**UTC xformers**. K Keller, Chez Flames Rcdg, 1229 Annunciation St, New Orleans LA 70130. 504-595-8623.

**Patch panel equip racks**, 5 1/2-6', 16" xcriptions. H White, 612-888-5306.

**Spotmaster TR-1A** clean, workable & have clock timer, will accept parts units. J Book, WOC, 3535 E Kimberly Rd, Davenport IA 52807.

**Jazz record collections**, 10" LP/12" LP be-bop, swing, dixie, highest prices paid. B Rose, Program Recdgs, 228 East 10th, Nyny 10003. 212-674-3060.

**Radio transformers** by Chicago, UTC, Triad, Peerless, Freed, Sola, send list. J Gangwer, 942 32nd St, Richmond CA 94804. 415-644-2363.

**MONITORS**

**Want to Sell**

**Collins 900F-1** 67 kHz FM SCA, BO; 54N-1 FM freq tuned to 93.3 MHz, BO; 900C-3 FM stereo mod tuned to 93.3 MHz, BO. R Egan, WIZM, 432 Cass St, LaCrosse WI 54601. 608-785-7914.

**Want to Buy**

**Potomac Instr 1960D** antenna. C Putbese, KWKY, POB 662, Des Moines IA 50303. 515-981-0981.

**Any older McMartin** mod monitors. C Goodrich, 11435 Manderson, Omaha NE 68164. 402-493-1886.

**RECEIVERS & TRANSCEIVERS**

**Want to Sell**

**McIntosh MR77** FM stereo tuner, excel cond, \$425. G Gabriele, WFOG, 215 Brooke Ave, Norfolk VA 23518. 804-622-6771.

**AM STEREO RECEIVERS**

Portable, Home/Studio, Auto  
**RRADCO GROUP**  
708-513-1386

**SCA decoder**, high quality micro-miniature 67/92 kHz, prewired & ready to install, \$15. D Jackway, Background Music Eng, 5742 Fairoak, Springfield MO 65810. 417-881-8401.

**SCA RECEIVERS—ALL TYPES**

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DAYTON INDUSTRIAL CORP.  
(Manufacturer)  
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Sarasota, FL 34233  
Tel: 813 378 5425 FAX: 3394

**REMOTE & MICROWAVE EQUIP**

**Want to Sell**

**Moseley 505 STL system**, late model, certified for new rules, good condition. Call 806-372-5130.

**Gentner VRC2000** w/cmd relay unit, mint cond, 1 yr old w/manual, \$1800. W Williams, KQFX, POB 7762, Amarillo TX 79114. 806-355-1044.

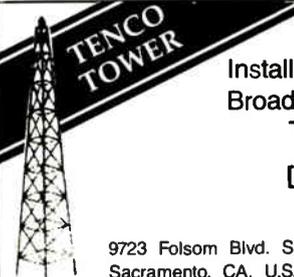
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**Contact Radio World Newspaper for availabilities.  
P.O. Box 1214 • Falls Church VA • 22041**



**1-800-336-3045**



**REMOTE . . . WTS**

**Moseley TRC-15AW** 15-chnl unit, gd cond, \$600/BO. G Fullhart, WVKS, 4665 W Bancroft St, Toledo OH 43615. 419-531-1681.

**TFT 8300** STL xmtr/rcvr, composite w/mdl 7770 auto changeover panel, freq agile; KLM PA 15-80BL, 80 W, VHF pwr amp, 12 V; Scala PD2-55 STL pwr divider; Moseley MSC-1 multi-syst combiner, studio & xmtr unit, BO. M Hiner, WHOK, 1660 Columbus Rd, Lancaster OH 43130. 614-653-4373.

**COMREX RENTALS**  
1, 2 and 3-Line Extenders  
Switched 56 Systems  
Call Steve Kirsch for details  
Silver Lake Audio  
(516) 623-6114

**Moseley MRC-1600** w/telco & sub-carrier cards, nds some work, \$1000; Marti RMC-2AX, 20 chnls, gd cond, \$300. G Arroyo, WONQ, 1033 Semoran Blvd Ste 253, Caselberry FL 32707. 407-830-0800.

**RENTALS RENTALS RENTALS**  
**COMREX**  
3-line extender  
Frank Grundstein 215-668-6434  
Audio/Video Consultants 215-642-0978

**Moseley TRC-15A**, excel cond, \$795/BO. J Hansen, WYRQ, 62 E Broadway, Little Falls MN 56345. 612-632-2992.

**Moseley SCG-4T** subcarrier gener & SCD-2AP subcarrier demod tuned to 185 kHz, very gd cond, \$400/both/BO. G Fullhart, WVKS, 4665 W Bancroft St, Toledo OH 43615. 419-531-1681.

**Moseley 303** 10 W xmtr & rcvr on 945.5 MHz, gd cond, \$2500/pair. D Dodd, KKTZ, Rt 11 Box 582, Mt Home OK 72653. 501-425-8834.

**Want to Buy**

**Rust TLC-O** control site unit & TLC-1 xmtr site w/2 direction control functions. J Sassak, WXEE, Box 1340, Welch WV 24801. 304-436-4191.

Single line/telephone link. B Hale, 606-436-5580.

**Marti RPT 15 & CR10** rcvr in 450 MHz band for TSL, nd PR450 ants. K Austin, KFXI, 1101 Hwy 81 N, Marlow OK 73055. 405-658-9292.

**SATELLITE EQUIPMENT**

**Want to Sell**

**Sci Atlanta DAT-32** 300-1 LNA, 7300 unit complete, 7325 unit complete w/(2) 15 kHz dual chnl cards & (1) 20 kHz dual chnl card Sedat, manuals, BO. R Hobbs, WMLR, 2009 Cromwell Dr, Nashville TN 37215. 615-373-2351.

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1 kW FM	1978 Collins 831C2	1 kW AM	1974 Harris BC1H1
1 kW FM	1971 Collins 803D	2.5 kW AM	1982 CCA 2500D
2.5 kW FM	1978 CCA 2500R	2.5 kW AM	1976 McMartin BA2.5K
3 kW FM	1975 CCA 3000D	5 kW AM	1968 Harris BC5H
3 kW FM	1974 Harris FM3H	5 kW AM	1972 CCA AM5000D
5 kW FM	1971 Collins 830E	5 kW AM	1977 RCA BTA 5L
5 kW FM	1971 Sparta 605	50 kW AM	1977 CCA AM5000D
15 kW FM	1975 AEL 15KG		
20 kW FM	1974 RCA BTF 20E1		
25 kW FM	1981 Harris FM25K		
25 kW FM	1988 TTC 25,000		
30 kW FM	1981 BE FM-30		

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Rydal PA 19046

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**Wegener 1601** w/cards for Unistar country & CNN news, \$2500; Heil SL-One SCPC rcvr, \$350. J Meyers, WKGH, 7871 116th Ave, Allegan MI 49010. 616-673-8094.

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Moseley SCG-4T 67 kHz SCA, \$150. M Everhart, KZRC, 111 SW 5 #1550, Portland OR 97204. 503-226-6731.

#### Want to Buy

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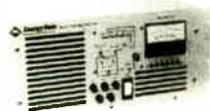
CSI/CCA 12000 E/F1/F2D or 20 kW E/G/F1/F2. J Wilkinson, 801-628-3643.

AM low pwr carrier current xmtrs, not/working; pwr splitters & line couplers; AM limiters & mod mon not/working, will pay s/h for both. P Ryan, KYMC, 200 W Argonne, Kirkwood MO 63122. 314-965-4277.

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Technics SL 1200 MK2 w/Stanton 881S cart, like new, \$265. P Forest, Musical Starstreams, POB 1989, Sedona AZ 86336. 602-204-1989.

Technics SP-25 direct drive, gd cond, w/ATP-12T arm, \$350. R Franklin, Franklin Studios, 1004 Dekalb St, Norristown PA 19401. 215-646-7788.

Neumann SX-15 disc cutting head, stereo w/helium cooling, excel cond, \$3000. S Kimball, Glen Glenn Sound, 900 N Seward St, Hollywood CA 90038. 213-962-4082.

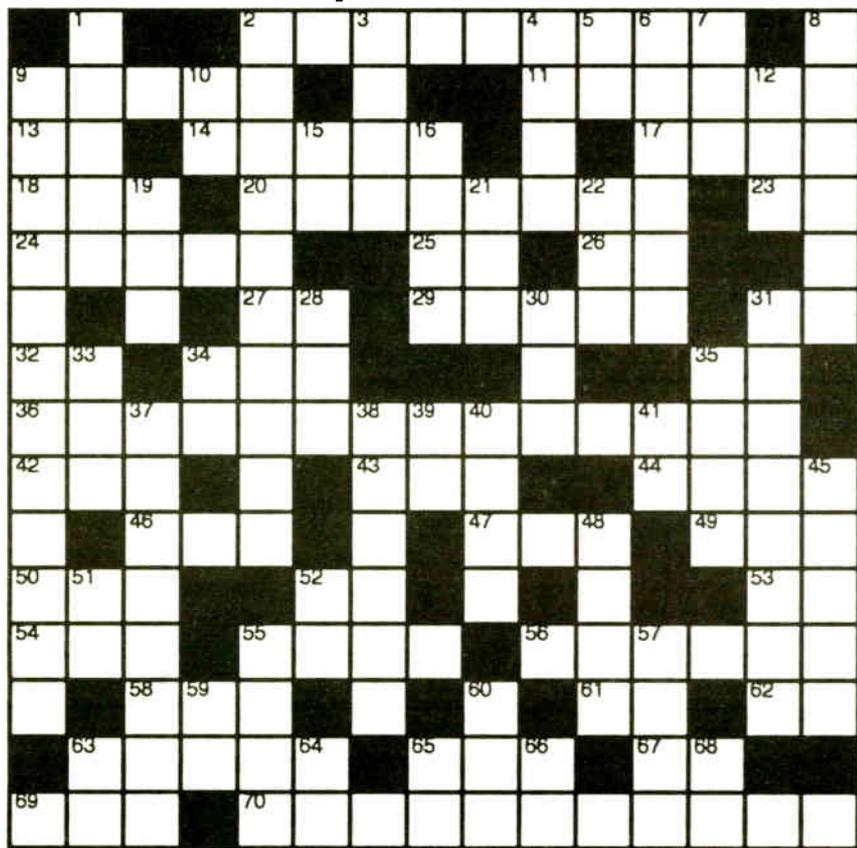
Technics SL 1200 MK II, (2), excel cond, covers still on, \$275 ea/\$500 all; SP 25 (2), unmounted w/ATP-12 tone arm, \$300 ea; ATI P100 (4), preamp, new cond, \$150 ea/\$500 all. J Travis WCIC, POB 506, Bath NY 14810. 607-776-4151.

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by Steve Walker



Solution in next issue of RW.

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2. Coaxial Dynamics' Model 81070
9. Formerly of kit fame
11. Wrote *Animal Farm*
13. In such a time or place
14. Planet
17. Not at home
18. Resolution Trust Corporation
20. "For the Blues"
23. Light bulb company
24. Bonnie (singer)
25. Pelican State
26. Digraph
27. Tin symbol
29. Transmission Limiter 4000
31. Against (abbr.)
32. Be quiet
34. "On Target" Consoles
35. Levi Strauss' home state
36. "We maintain a double standard"
42. Aloha state adornment
43. Paddle
44. Scrambled or fried \_\_\_\_\_
46. Hardware standard
47. Money machine
49. File suit
50. Corporation indication
52. Largest state east of Old Man River
53. Article
54. Consume
55. Drunk
56. "more than just an antenna"
58. Cheer
61. In the direction of
62. Title
63. Tele-vote polling system
65. Taxi
67. "We are the knights who say \_\_\_\_\_"
69. Albanian standard monetary unit
70. Sleek

**Down**

1. VW Model
2. "The closer you get . . ."
3. To land with bang or bump
4. Basketball equipment
5. Informal address
6. Rouse
7. Nouveau
8. Pilots
9. "Tuned to tomorrow"
10. The other broadcast medium
12. Fall behind
15. Greek N
16. Storage structure
19. The "Company"
21. Paddle
22. Automobile club
28. Nibble
30. R-U Confused
31. ATI console series
33. Color
34. Artificial Intelligence (abbr.)
35. Teeth on a wheel
37. BE's digital cart machine
38. DM-80 disk recorder
39. Per unit
40. Stuff
41. That is
48. Spanish Mister
51. Not available
52. One of several Liberian tribes
55. Stop
57. \_\_\_\_\_ Lisa
59. Current
60. Angry
63. In regards to
64. Personal pronoun
65. Company
66. Alongside
68. Contraction

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