Radio World®

Towers, Antennas And DTV in This Buyer's Guide

Vol 22, No 8 | Radio's Best Read Newspaper | April 15, 1998

Canadian DAB Is Delayed

by James Careless

TORONTO Radio broadcasters here are still waiting for DAB.

Having worked out the details for simulcasting 15 commercial and four public AM/FM analog stations using Eureka-147 in the L-band, Toronto broadcasters had hoped to

start simulcasting DAB signals by January of this year. But commercial DAB here may now have to wait until late summer.

Delays in licensing DAB services by the Canadian Radio-Television and Telecommunications

See DAB, page 10 ▶

Expanded-Band CPs Come to Life

by Lynn Meadows

WASHINGTON A steady trickle of pioneers has begun planting flags on the virgin radio spectrum called the AM expanded band (1605-1700 kHz), which was opened for newcomers in 1993 as part of an FCC plan to reduce clutter on the existing AM band.

The most troublesome task for the FCC was deciding which of the many applying stations should be allowed to migrate. The FCC released its third proposed allotment plan 13 months ago, after the first two were overturned because of issues raised in Petitions for Reconsideration.

Although the third plan was met with two Petitions for Reconsideration plus a court case, the FCC decided to move forward and accept applications from stations on the list. Sixty-seven of the 88 stations on the list filed applications by the June 1997 deadline.

The FCC began issuing construction permits in late September of 1997, and had granted most by mid-March of this year. About a dozen stations had begun broadcasting on the expanded band by mid-March, said Peter Doyle, assistant chief of the FCC Audio Services Division.

The first two expanded-band stations, WJDM(AM), Elizabeth, N.J., and KXBT (AM), Vallejo, Calif. actually have been broadcasting for over two years with Special Temporary Authority. Both had been guaranteed a spot on the new band.

Stations with expanded-band frequencies have five years to use both their expanded- and existing-band frequencies. After that, they must turn one back in to the FCC.

Gear needs

The equipment required to hop onto the new piece of spectrum will vary widely. Cris Alexander, director of engineering for Crawford Broadcasting and a columnist for **RW**, said that, at the very least, stations will have to buy a transmitter, new or used. Crawford is using a Nautel XL-12 transmitter with built-in C-Quam exciter for KKJY(AM), Lake Oswego, Ore., at 1640 kHz.

C-Quam is the AM stereo modulation scheme that the FCC adopted in 1993. AM stereo is an important consideration for most of the stations contemplating the expanded band. When the allotment process first began, also in 1993, the commission asked stations that applied to move if they would operate in AM stereo. The 95 percent of the stations that pledged to use AM stereo were given an advantage in the allotment process.

Consequently, construction permits for expanded-band stations that pledged to operate in stereo include that condition. A handful of stations did not make that pledge, said Doyle, and those construction permits do not include the condition.

To diplex or not is a big issue for expanded-band stations. Crawford

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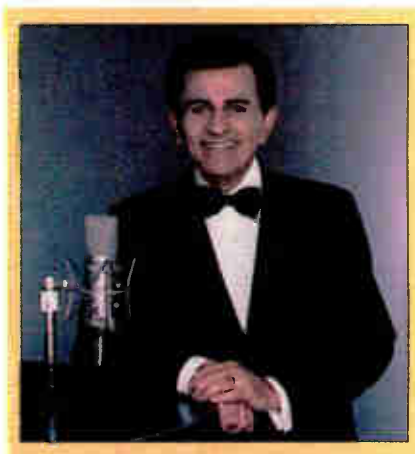

AMFM Lands Casey Kasem Countdown.

See Page 22

Analog Giant NPR Breaks Digital Equipment Barrier

by Alan R. Peterson

WASHINGTON Soon, all programs and newscasts originating from National Public Radio will be completely digital from beginning to end, as NPR headquarters — once called "the last great analog facility" — makes the transition to an all-digital operation.

The practice of editing and archiving analog tape at 130 edit desks is giving way to a Dalet Digital Media Systems network, fiber optics and an entirely system way of producing the most popular NPR shows and features. The process started with the news division in March.

'Two networks'

Jeffrey Dvorkin, vice president of news and information, came to NPR from the Canadian Broadcasting Corporation last summer, and declared to the staff, "There are only two radio networks left that are not digital: NPR and Radio Bosnia!" Dvorkin committed to rebuilding the NPR audio model into a contemporary, streamlined editing, distribution and archiving system.

Beyond its dependence on quarter-inch tape for editing and archiving, NPR has also used Sonic Solutions workstations for music production and recording. The facility still maintains 10 units. A number of new Dalet workstations are being moved into the news division. After the newscast group makes the switch, weekend shows will be next, followed by portions of the early newsmagazine show "Morning Edition." Progress on the infrastructure continues on a parallel path with training and expansion to other departments.

"We wanted a whole workflow environment," said David Gray, digital audio network administrator, NPR engineering and information technology. Gray inherited a $389 000 budget for

See NPR, page 6 ▶

NEWSWATCH

California Pirate Shut Down

SACRAMENTO, Calif. The FCC in mid-March shut down a pirate broadcaster who authorities said was interfering with air safety at a Sacramento airport. It was the fourth time in five months authorities shut down an illegal broadcaster for interfering with air safety, officials said.

FCC investigators reviewed complaints to the Federal Aviation Administration about an alleged unlicensed broadcaster operating on four different frequencies (119.5, 122.2, 125.0 and 126.8 MHz). FAA authorities said station could be heard on the pilots' air traffic control radio channel and that the signal appeared to be drifting or changing frequency.

FCC investigators identified the source of the interference as a station operating at 107.2 MHz from a business called Dollar and Sense Productions, in Sacramento. FCC technical measurements showed the transmitter of the illegal station was sending out many other spurious signals on aviation frequencies, in addition to the intended signal.

FCC officials said the operator of the illegal station shut it down voluntarily when notified of the interference.

Kennard Presses Minority Ownership

CHICAGO FCC Chairman Bill Kennard plans to begin a proceeding to explore new incentives to promote minority media ownership. Speaking in Chicago at a meeting of the Rev. Jesse Jackson's Rainbow/PUSH Coalition, Kennard said he supports ways to restore "a properly structured tax certificate program — one that is narrowly tailored and provides benefits only to bona fide minority ventures." In 1995, Congress directed the FCC to eliminate the program, which provided tax benefits to owners who helped minorities buy stations, because of alleged abuses.

Kennard also told the group he is interested in the possibility of creating a low-power radio service, "so that small businesses and churches and community groups can use the airwaves to broadcast to their communities." In a world in which most Americans get most of their news from broadcasting, Kennard asked, "How can America have a strong democracy when most stations are concentrated in the hands of only a few?"

Spectrum Management Chief Leaves NTIA

WASHINGTON Richard Parlow, the man who lead the Office of Spectrum Management for more than 14 years for the Commerce Department's National Telecommunications and Information Administration, resigned in March.

William Hatch, acting associate administrator for the Office of Spectrum Management, is handling Parlow's duties until a permanent replacement is named.

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Low-Power Proposals Spreading

by Leslie Stimson

WASHINGTON The FCC has received yet another petition for rule making asking it to create a new class of low-power FM service. A petition was submitted in March by a group called the Community Radio Coalition. Its Web site *www.broadcast.airwaves.com/LPFM* bears the slogan, "Radio For the Rest of Us."

The CRC is made up of five people, some of whom have radio experience. Bill Spry, one of the group members, told **RW** he used to run a pirate station out of his home and now owns a lawn-care business and automation software for small-market stations. He said the proposed new class of low-power FMs would not interfere with existing stations: "There's so many holes on the dial," he said. An LPFM station that competed with a full-power station would be unlikely to succeed, he said, because of the LPFM's limited coverage and resources.

Under the CRC proposal, LPFM stations would be permitted to operate with a maximum ERP of 250 W at 100 meters maximum HAAT, or any equivalent combination of ERP and antenna HAAT. Minimum ERP would be 5 W, with no minimum antenna HAAT.

The FCC has received other proposals for new low-power stations with a range of suggested power levels and antenna height, including 1 watt or less, with antenna heights of just 50 feet; 1 to 50 watts, with antennas up to 150 feet HAAT; and 50 W to 3 kW, with a maximum HAAT of 328 feet.

The CRC says the FCC should allocate licenses on a first-come, first-served basis, with ownership limited to one station per company.

To discourage speculation and trafficking in LPFM construction permits, the sale or transfers of CPs would be illegal, although the sale of LPFMs on the air would be allowed. Upgrades from LPFM

A Roundup of News and Comment Affecting Radio From the Nation's Capital

status to any full-powered FM station class should also be prohibited, stated the petition, because upgrades could have the effect of "allowing some applicants to use LPFM stations as a back-door" to owning a full-power station.

The commission had not solicited comments to this proposal in March, but was asking for comments on two other proposals until April 27 (**RW**, April 1).

Ownership under microscope

In other news, the commission has begun its review of all broadcast ownership rules, as required by the Telecom Act. Any rules the FCC decides are no longer in the public interest would be either changed or repealed. How soon that would happen is undetermined. FCC Mass Media Bureau Chief Roy Stewart speculated that, if needed, changes could happen by the fall.

The relaxation of local radio ownership rules as passed in the Telecom Act is under scrutiny. Commissioner Susan Ness said, "We should not confuse 'multiple' choices with 'independent' choices." On radio consolidation, Ness said the commission found that "Control by the top four radio group owners over total radio advertising dollars in markets across the country has gone from 80 percent in 1996 to a whopping 90 percent in 1997."

Station employees already gathering employment information to file with the commission can hold off. The FCC has changed the filing deadline for stations' Annual Employment Report (Form 395-B) from May 31 to Sept. 30. The modification — part of the commission's effort to simplify paperwork regulations — matches the deadline for employment information that stations file regularly with the Equal Employment Opportunity Commission (**RW**, Feb. 4).

The new filing deadline applies to commercial and noncommercial radio and TV stations that employ five or more full-time employees.

Employment information still must be sent to both the commission and the EEOC on two separate forms, but now the data can now be compiled once, instead of twice, a year.

EAS Fine Upheld

WASHINGTON The FCC has upheld what may be the first fine for violations of the Emergency Alert System rules. The commission said Mt. Rushmore Broadcasting, licensee of KRAL(AM) and KIQZ(FM), in Rawlins, Wyo., owes $4,000 for not correcting "EAS deficiencies" that FCC Denver field officials found during two inspections.

Specifically, only one EAS source was monitored, instead of two required by FCC rules. Also, said the FCC, "no tests had been received since June 20, 1997, and no logs of the sent or received tests were being maintained."

Rushmore President Jan Gray told the FCC that two employees, no longer with the station, told him the problems were corrected. He also said the station was losing money, and asked that the fine be eliminated. Calls to Gray by **RW** were not returned by deadline.

FCC officials were not persuaded by the claim of economic hardship. The fine was upheld, said the FCC, because Rushmore is responsible for its employees' actions.

— Leslie Stimson

AMRC Closer to Launching DARS

by Leslie Stimson

RESTON, Va. American Mobile Radio Corporation has taken a step closer to providing the United States with satellite digital audio service. AMRC, holder of one of two FCC licenses to provide satellite DAB, said it has signed an agreement worth more than $400 million with Hughes Space and Communications International to build and launch two satellites. Meanwhile, CD Radio, the other license holder, is signing up program suppliers.

AMRC President Lon Levin said construction of two Hughes geostationary orbit satellites has begun. Payloads will be provided by the French firm Alcatel Espace.

AMRC plans to launch the satellites serially, with the first launch scheduled for the second quarter of 2000 and the second satellite set to launch in the third quarter of that year.

Like CD Radio, AMRC plans to offer subscribers 50 channels of music and talk programming.

"We believe this is a mass-market item," Levin said. The company is negotiating with a number of programmers, Levin said, and targeting commuters and long-distance travelers and young adults 18 to 34.

AMRC, a privately-held company, is owned by American Mobile Satellite and WorldSpace, both high-tech telecommunications companies based in the Washington, D.C., area. American Mobile Satellite provides L-band voice and data service in the United States, while WorldSpace is an investor in WorldSpace International, an international satellite digital radio company scheduled to provide service to Africa, Latin America and Asia beginning this year (**RW** April 1).

Meanwhile, CD Radio has announced programming agreements with C-SPAN and Bloomberg to carry radio news. CD Radio also announced plans to move its staff and studios to New York in a lease agreement backed by tax breaks.

CD signed agreements with Space Systems/Loral, a subsidiary of Loral Space & Communications Ltd., to build three satellites, with one as a spare. It plans to launch the first in late 1999. CD has contracted for two launch slots with Arianespace.

Both companies are working on a receiver standard so that car radios can receive the S-band signals from either company.

Until that happens, consumers using CD Radio's proposed system would need a card that can be inserted in the radio's cassette or compact disc slot. Once inserted, listeners would be able to switch between AM, FM and CD Radio. Consumers would also need to buy miniature satellite dish antennas.

Will This Be a Muscular ARM?

A group of radio equipment makers wants to form an association to stage several regional, radio-only conventions around the country. Is it a good idea?

Managers at five equipment companies — Energy-Onix, Radio Systems, Fidelipac, QEI and Logitek — have formed an "interim organizing committee" for a proposed new American Radio Manufacturers' Association. They will hold a regional convention at Harrah's in Atlantic City, N.J., on June 4 and 5, including several sessions and a small exhibit floor. They hope for 500 attendees and 50 exhibitors. Admission is free; exhibitors pay a nominal fee.

"ARM is an organization for manufacturers only," the group stated in its letter to potential exhibitors. "This first convention is an effort to test the effectiveness and efficiency of this concept."

Ernie Belanger, marketing vice president of Energy-Onix, acts as spokesman. He told me this is not a group that wants to bash the NAB or sponsors of other national shows.

"What may have started because of some dissension over trade show costs and other matters has turned into essentially a positive thing," he said. "What I hope it will become is an organization of manufacturers who, through a series of convention-style events, can give something back to the folks who have kept us alive over the years — radio owners, engineers, the folks who buy our equipment."

Belanger said the group hopes to have an organizing meeting at the June show. Long-term details will wait for that meeting. Even the group's name is in flux; they've used two, American Radio Manufacturers' Association and Association of Radio Manufacturers, in their preliminary materials.

"We're looking, hopefully by next year, at being able to move into three or four regions," Belanger said, "to put this show into areas where a station owner or engineer who can't afford to spend three days of road time and thousands of dollars in airfare can drive or take a train 500 miles or less."

Existing regional shows don't meet that need, he said. "There isn't enough draw from a single state to justify the expense (of exhibiting) sometimes," Belanger said, "plus you have conflicting dates to exhibit, with events on opposite ends of the country a week apart. I'd love to see the state associations do a calendar so they don't conflict, but that's not going to happen."

From the Editor

Paul J. McLane

The group itself would be non-profit. "We're not a trade organization with other agendas, like lobbying, insurance and other things traditional trade organizations do," Belanger said.

Are these the same companies that anonymously handed out flyers at NAB '97 under the acronym REMAA? Belanger said no.

"I believe the folks that were initially involved with REMAA were militant, they have issues with NAB concerning costs of the NAB show and others," he said. "I don't know if those issues have been addressed. REMAA is not the same as ARM." Belanger took pains to say ARM is not anti-NAB, and would in fact invite the NAB's participation in its event.

Belanger reported strong initial interest from suppliers, with commitments to exhibit from Clark Wire and Cable, Studio Technology, Marti, ERI, Marantz, Nautel, Scott Studios, MediaTouch, and Antenna Concepts, among others.

What do other companies think of the idea? I asked Sam Wenzel, president of ATI Audio Technologies Inc., why he had declined to exhibit.

"We felt that it would be a local show," he said. "The Pennsylvania Association of Broadcasters has a show, there are other regional shows. We just didn't need another one. And it's not an alternative to the ones NAB does. We feel we get to meet the local people at the SBE chapters.

"You have national manufacturing associations, the EIA, NAMM," Wenzel said. "They're not specific to radio, but to have another one in a market that is consolidating, you don't really need it."

A manager at another major supplier, who declined to be identified, told me regional shows may have their place, and he predicts this event may pull well from New York and other area cities. But he kept coming back to comparisons with the NAB. Vendors may like to gripe about the big NAB shows, he said, but companies and broadcasters are willing to accept the cost to exhibit and attend.

Ed Miller, the president of the SBE, was more positive. Although a series of small regional events would presumably compete with those sponsored by SBE and its chapters, Miller told me such shows may fill a void left by the expired World Media Expo concept.

"I think there's need and interest. The engineering folks are hungry for what's out there and (to learn) what they need to be prepared for. ... Our official position is that we want to get as much information out to the industry as possible."

Belanger said it's up to radio makers whether this all succeeds. "It will only be as effective as they choose to make it. ... This is not a show organized by an outside association for them to attend in support of that association, this is a show organized by manufacturers, for manufacturers, as an effort to give something back to our customers."

★ ★ ★

From where I sit, I don't sense any pressing demand from radio engineers and managers for more shows. I also think some equipment companies tend to forget how effective the NAB shows have been at bringing radio buyers under one big tent.

But ARM, or ARMA, or whatever it calls itself, deserves a chance to show what it can do. The NAB has indeed let its booth costs escalate; those costs are passed on to you, the equipment consumer. All the attention given of late to DTV, the cost of attending national shows, and the very crush of non-radio people at those events would seem to argue in favor of regional radio-only events.

ARM should think carefully about how it will include equipment *distributors* in its events. I also encourage the sponsors not to overlook the potential power of a manufacturers' association. Such a group could do much to help set technical standards, coordinate show schedules, and argue forcibly with industry leaders about radio trends.

What do *you* think? Send e-mail to *pmclane@imaspub.com* . For information about ARM and its June event, call Dave Strode at (215) 464-2000.

★ ★ ★

This is the last issue in which you will see the work of Susan Kreis, our *Buyer's Guide* editor. She is moving on to become editor of the weekly Lake Gaston Gazette newspaper, based in Littleton, N.C. We congratulate her and wish her well.

Mission Statement:

"The sole purpose of the American Radio Manufacturers' Association is to provide a venue for Radio Equipment Manufacturers to directly show their appreciation for our past, present and future customers by providing free regional Radio Equipment exhibits complete with no-charge Radio Engineering, Radio Management, and industry related educational and informational seminars for attendees.

"As such we are philanthropic in nature, utilizing the venue of regional 'mini-conventions' to give something back to our customers, who through their patronage of our businesses, directly or through dealers, have helped make our companies successful."

READERS FORUM

If you have comments for Radio World, call us at (800)336-3045 or send a letter to Readers Forum (Radio World, P.O. Box 1214, Falls Church, VA 22041 or e-mail radioworld@imaspub.com). All letters received become the property of Radio World, to be used at our discretion and as space permits.

Webcasting revenue review

Dear **RW**,

Thank you for the interesting articles on Webcasting.

My company, KL Comm, is a communications and marketing company engaged in broadcast media development, production and marketing for radio, television and the Internet.

I consult for WTRR(AM), a 1 kW radio station in Sanford, Fla. As general sales manager and director of business development for WTRR, my task is to find and explore all revenue possibilities for the radio station. This has been the biggest challenge of my 16-year broadcast career, which up until this time had centered on large broadcasting networks.

In its quest to transcend geographical boundaries plaguing small AM stations, WTRR has entered the Webcasting world and has been successful at it. The Web site, *www.wtrr.com*, averages 2,600 hits per day and has sparked international interest.

Finding a niche for a small AM station is not easy in the world of mega radio networks. The idea is not to compete in the traditional manner, but rather to innovate. Through the Internet, WTRR can be just as big, if not bigger than a lot of radio stations.

By broadcasting its programs on the Internet, WTRR has been able to increase its listening audience dramatically and has attracted out-of-state advertisers.

Kathy Llamas
President, KL Comm
Longwood, Fla.

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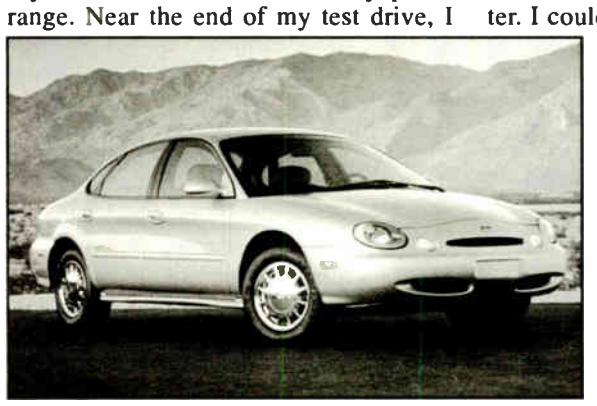
April 29, 1998

Auto acoustics

Dear **RW**,

I had an experience similar to the one related by Dave Hendricks ("Driving Dissatisfaction," *Readers Forum*, Feb. 4). While car shopping last year, I came across a 1993 or 1994 Ford Taurus which I really enjoyed driving. It met my needs and was within my price range. Near the end of my test drive, I decided to see how good the antenna was by tuning in some of my favorite out-of-town AM stations. Like Mr. Hendricks, I found I could receive only stations picked for me by the scan or seek functions. I was close to buying that car, but was luckier than Mr. Hendricks — I discovered the problem *before* contracting to purchase the vehicle.



1997 Ford Taurus

Also during 1997, I had occasion to rent a 1997 Ford Taurus GL for a trip across several states. That vehicle had a Ford cassette player/AM-FM radio that was able to tune any AM or FM frequency I chose, and, I must say, it was the best-sounding car radio I've heard in my life. So, apparently Ford got the message between 1993 and 1997 that drivers want to make their own decisions about choices of stations.

And another thing! Who among us has a memory good enough to remember which 18 stations he put on the buttons and in what order? A radio with five AM and five FM buttons is fine for me. That coincides with the limitations of my memory.

Chris Astle
WHRV(FM)/WHRO-FM
Norfolk, Va.

Little Bird, Big Issues

It is natural to be optimistic about the state of our business these days. The radio, audio and multimedia exhibits at NAB '98 tell a tale of exciting technology. High stock prices and strong ad revenue point to a healthy industry.

But like a canary in a mine shaft, a recent report from Duncan's American Radio gives us reason to pause. According to Duncan's Radio Comments, radio is experiencing listening loss. It isn't a huge bite, but it is worth noting.

Duncan's studied the spring 1997 Arbitron ratings and found what it terms a small year-to-year decline in the mean Average Persons Rating, or APR, which is the percentage of the population that is listening to radio in any average quarter hour (Monday-Sunday, 6 a.m. to midnight, age 12+). The current rate is 15.94 percent. This marks the fourth straight year of decline, and the first time since 1981 it has dipped below 16 percent.

The authors of the study worry that if delivery drops too much, it could offset the "remarkable sales gains" radio has experienced over the past five years. Further, they argue, if usage rates go down, radio's overall cost-per-point goes up.

Duncan's offers several reasons for the trend: Less money is being spent on marketing and promotion, thanks in part to consolidation and the resulting domination of a market segment. Some listeners may have gone elsewhere because we took away their favorite station — the report cites the examples of the commercial classical and easy listening formats, claiming their listeners are lost to radio, which is "offering less and less to listeners outside the 'golden' 25-54 demo."

A third reason is what the report calls a disturbing trend away from "localness." This is a biggie. Radio's forte has been our ability to connect with the listener like no other medium. Duncan's calls this local identification bond "radio's long-term insurance policy."

The report also asks whether program segmentation to ever-narrowing groups of listeners, and increased commercial loads, may have been carried a bit too far.

Duncan's says our business is prospering, and will continue to do so. **RW** agrees. But we encourage our industry leaders to consider these points carefully, and not get caught up in the good news of the moment.

— **RW**

Dear **RW**,

Kudos to Dave Hendricks on his letter. I couldn't agree more with his comments. I am also in broadcasting and have noticed this problem with several car radios.

It insults my intelligence to think that the manufacturers of these radios design them with virtually no user controls other than VOLUME, PROGRAM, AM/FM, etc. You cannot just simply dial in the frequency you want and then set it — the radio won't let you!

Thanks, Dave, for the input, and thanks to **Radio World**.

Bob Henry
KNME-TV
Albuquerque, N.M.

The MD experience

Dear **RW**,

In response to your article "MiniDisc Moves to Center Stage" (**RW**, Feb. 4), you asked for shared experiences.

We run a nationally syndicated daily radio show on alternative and natural health, and recently had our new studio installed, including an MD machine. I was amazed at how easy it was to edit spots and liners without using reel-to-reel splices or digital workstations.

Moreover, I was equally impressed at the seamlessness of edits when programming different cuts to play in an out-of-sequence order.

Hooray for MiniDisc! Anyone who is using a DAT machine (let alone cassette) in the studio or out in the field should really consider making the switch.

Steve McCreery
"Here's To Your Health"
Talk Radio Network
Clearwater, Fla.

MD: A sound solution

Dear **RW**,

I feel that MD is the perfect solution for the broadcast environment. There is virtually no chance that a talent is going to physically damage the medium ... and the discs are quite small, thus allowing more of them to be stored within arm's reach of the talent (an important plus for fast-paced shows on the air, at a remote, in a theater, and so forth).

I know some of the golden-eared, 24-bit guys are snickering, but I wouldn't hesitate to use MD as an on-air playback or production medium, or to archive material for posterity. ... When I do hear a difference, it's always in the "air" around high-frequency transients and reverb tails, never low or mid frequencies. If I were to only get one shot at recording a once-in-a-lifetime event of mega-proportions, I'd probably chose something linear, full 16-bit, but I'd definitely roll an MD on a Tascam MD801R as a backup. Why? I've had a lot of linear media crash and burn, but never an MD.

Where I think the format could use some improvement is in the ability to do "on the beat" music edits. I'd love to have an audible "rock the reels" sort of sound instead of just a repetitive playing of the same snippet/frame of audio.

Eric T. Smith
President, Auralex Acoustics Inc.
Fishers, Ind.

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NPR Enters Digital Equipment Era

▶ NPR, continued from page 1

building the system and training the engineers. He has spent about 80 percent of that.

"If we wanted to just 'go digital,' we would have bought a workstation," he said. "We wanted a network."

The environment Gray is helping to create requires a room dedicated to servers and Dalet workstation computers. A room formerly filled with Otari 5050 reel machines is now occupied by "bakery shelves" that will be stacked with PCs.

"Everybody's computer will be here," said Gray. "We will use Cybex KBM boxes to connect everyone to their computers." The KBM boxes are booster devices to use monitors, keyboards and computer mice some distance from the PC.

Simple Ethernet cables are used for short and medium runs. Longer runs up to the sixth floor at NPR require fiber optics.

There is no real interaction between the new NPR audio network and the in-house corporate network, except for one single 10 Mb Ethernet crossover connection. Beyond that, the two networks remain separate and independent.

Familiar feel

Editing virtual tape on the Dalet Surfer workstation screen closely matches what NPR news people already do on their well-worn Otari and Scully reel-to-reels.

If we wanted to just 'go digital,' we would have bought a workstation. We wanted a network.

— David Gray

"Training takes about a day-and-a-half for news people and two days for technicians," said Gray. "Most are up and cutting in the first hour. The rest is just practice and reinforcement."

The Dalet system uses MPEG 4:1 compression. Gray would rather see the system work in a linear, uncompressed manner and is working with Dalet to make that happen.

"We want to eliminate one cycle of compression and decompression," he said. "From NPR headquarters, to the station, then to the listener's radio, there could be a minimum of three cycles of compression — worst-case, as many as seven or eight cycles."

Photo by Alan R. Peterson

Streaming live audio directly into the Dalet system during a telephone interview in NPR's big studio 4A.

Eventually, all NPR bureaus will be equipped with a mix of Dalet and Sonic Solution workstations. Now, NPR headquarters keeps seven Sonic systems in its cultural programming department and two in the news department. Filing of audio would be done over the NPR Internet FTP site as WAV files.

The ability to embed text and ancillary information into a WAV file is the idea behind BWAV, the Broadcast Wave format. Gray faces a difficulty with loading such files into the system.

"Our European correspondents file via our FTP site," he said, "and the BWAV file format just wouldn't read into the Dalet. Files longer than 20 minutes would slow down screen redraws as the BWAV format was being read. There is a standard EDL (edit decision list) format in development that may take care of all this."

Miss it already

Barry Gordemer, director/associate producer, "Morning Edition," said he is excited about the new technology, but he does have one regret.

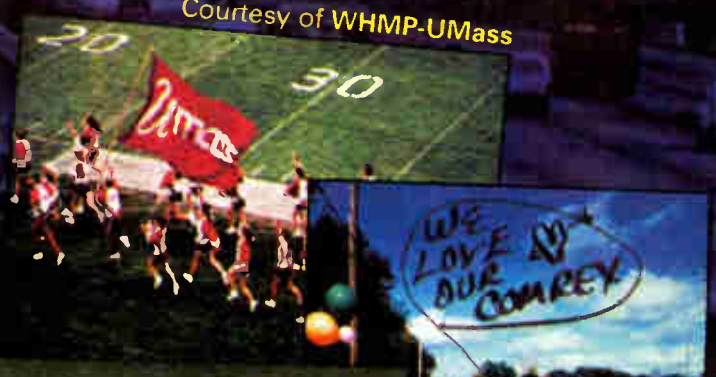
"There was satisfaction in holding a reel," he said, "in running to the studio and throwing a tape to the person on the air. There was a physical sense of accomplishment, but now ... " He punctuated his statement with a shrug and a pantomimed mouse-click.

Dvorkin is pleased with the progress. "The time for digital radio at NPR is overdue, and we have been ready for a technical change," he said. "One of its great qualities is that it expands. We can make NPR news and services much bigger and better as people are discussing new ways of using it."

■ ■ ■

Another large-scale digital build-out has been underway at Minnesota Public Radio headquarters in St. Paul. RW will report on that project in an upcoming issue.

Hit the Road



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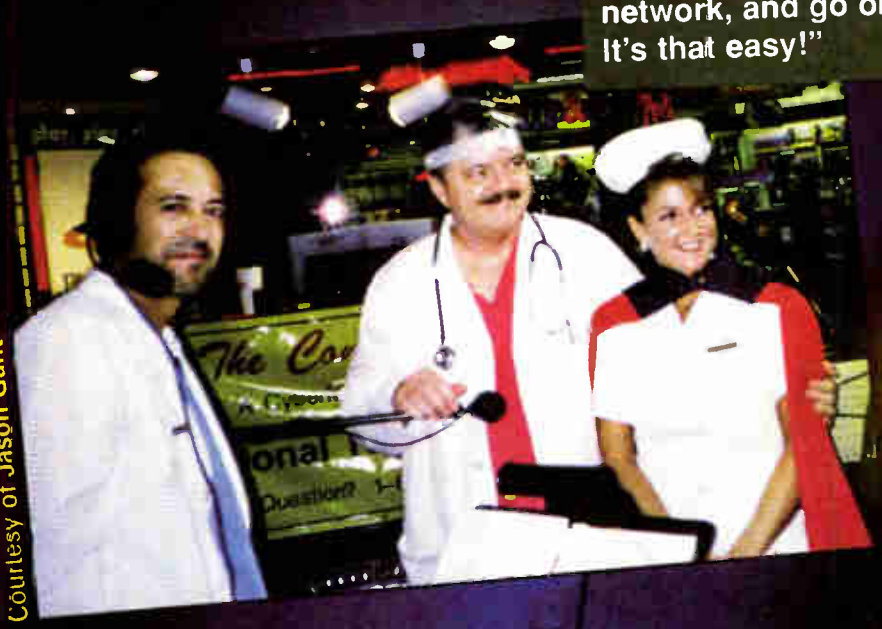

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Circle (107) On Reader Service Card

Radio Explores Expanded Band

▶ AM, continued from page 1

planned to diplex KKJY with its Portland station, KKPZ, but simulcast with KKSL, the existing-band station in Lake Oswego.

Elsewhere, KRZI(AM), in Waco, Texas, planned to close on property for a new tower in March. The station is eligible to move from 1580 to 1660 kHz.

In Iowa City, Iowa, Steve Bridges, owner of KCJJ(AM), at 1560 kHz, said his station plans to begin construction in late summer and be on the air by November. KCJK will simulcast KCJJ at 1630 kHz.

"We basically want to have a better signal," said Bridges, who described the station as a full-service, "high-energy, locally committed station."

KCJK will be heard across Iowa, Illinois, Wisconsin and Minnesota, Bridges said, although his interest is the local market of 230,000 listeners.

"It will make us more appealing. We'll go head-to-head with the 100 kW FMs," he said. "Right now, we're going head-to-head with them with 1 kW and we're doing very well."

Station tests

Chris Bennett, owner and general manager of KRIZ(AM), Renton, Wash., said his station was testing on 1620 kHz at press time while work continued on a diplexing system. Seattle-based Hatfield & Dawson Consulting built the system to add the new non-directional antenna to a two-tower directional antenna array.

In order to cover the Seattle-Tacoma market, Bennett used both KRIZ, a 1 kW directional at 1420 kHz, and KZIZ, a 5 kW non-directional at 1560 kHz. The new KYIZ, 1620, was being tested at 1 kW in early March and was covering the market better than the two existing-band stations combined. Bennett had heard from DXers in Montana, California, Arizona and Finland.

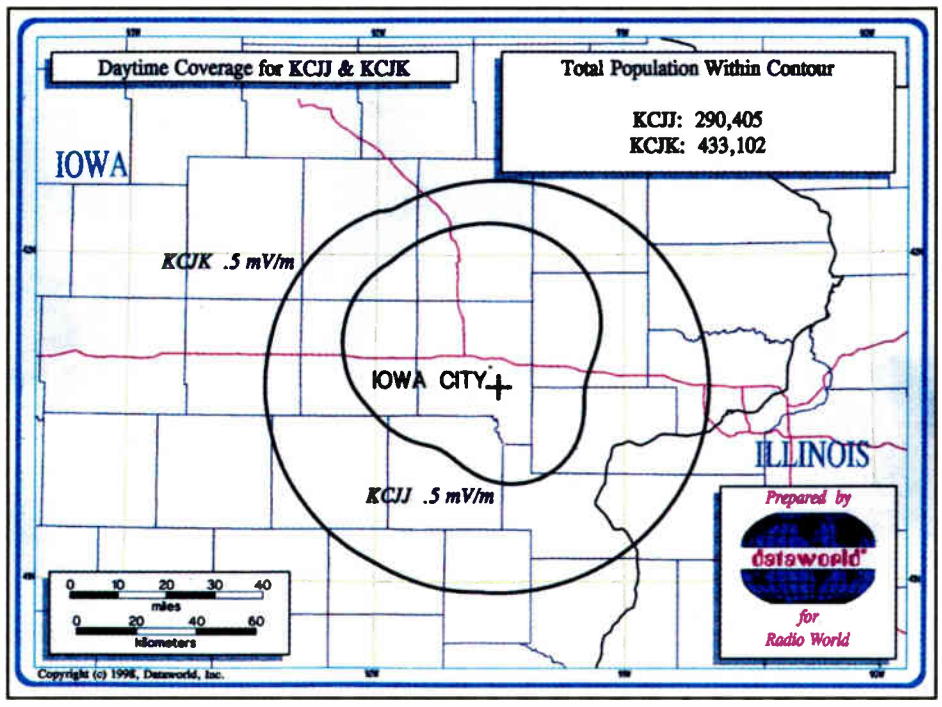
KYIZ is using a 10 kW Nautel transmitter. The station will use an Orban Optimod stereo processor and a Broadcast Electronics stereo generator.

Bennett said a new studio was being built for the urban contemporary station.

"On that frequency, we're hoping that we can get a good quality — as close to CD as we can ... I don't know if you'll ever achieve that with radio," Bennett said. The station will use MiniDisc equipment for audio playback.

After KYIZ goes to full power, Bennett said the KZIZ format will change to gospel. He is toying with academic enrichment programming on KRIZ, with the help of some local community organizations.

"We're going to have the use of it for five years, so we could probably make a dent in some academic enrichment," said Bennett.



The 0.5 mV contour of KCJK at 1630 kHz will reach the outer circle.

In Miami Springs, Fla., WCMQ(AM) was on the air in record time at 1700 kHz. Owned by Spanish Broadcasting Systems, the station placed orders for its transmitter and ancillary equipment at the end of September. The station is using the Harris DX10 transmitter.

Finding a contractor to build the diplexing system proved to be more challenging. The first two companies the company approached said they would not be able to do the work in the time required.

Time-consuming

"We were hoping to have it done in two or three weeks," said Ralph Chambers, director of engineering for Spanish Broadcasting's Florida stations. The station ordered its system from Virginia-based consulting engineering firm Carl T. Jones Corp. on Oct. 14 and it arrived on Friday, Oct. 31. The station began its extensive test and adjustment period the following Monday.

Engineers discovered monitor point parameters that were out of tolerance when they conducted a partial proof of performance. Correcting that problem and adjusting the two systems so they worked together properly was a time-consuming process.

Chambers said the design of the filtering system had to be changed slightly to make it work properly between 1210 and 1700 kHz. Filters were also added to limit interference from a shortwave station on the property.

Spanish Broadcasting sold WCMQ to One-On-One Sports along with its other AM stations in New York and Los Angeles in November. As part of the sale, One-On-One agreed to lease the expanded-band frequency back to Spanish Broadcasting.

Spanish Broadcasting kept the call letters WCMQ at 1700, and One-On-One used WNMA(AM) for 1210 kHz. WCMQ simulcasts Spanish news/talk in the morning and music in the afternoon with 50 kW station WZMQ(FM) in Key Largo and 100 kW WVMQ(FM) in Key West. WNMA has since been sold again.

At 1210 kHz, WCMQ had a 25 kW directional signal aiming south. Chambers said the signal was excellent but it only fully covered Dade County. At 1700, WCMQ reaches listeners in local Broward County. He has heard from Dxers "all over the globe," including Africa, Australia, Ireland and New York.

Band power

WCMQ is broadcasting in C-Quam AM Stereo, although Chambers said he would prefer to be using the Kahn Communications POWER-side. He used POWER-side on 1210 kHz and said he saw a "noticeable improvement."

"I would prefer to use it on 1700 also and I know there are other engineers that feel the same way. For that high on the dial, the best thing to do would be to go single side band."

Instead, Chambers is using a Harris AM stereo exciter, Orban Stereo Optimod and Delta AM stereo modulation monitor.

Chambers said he has found that there are plenty of expanded-band receivers in the market, but a shortage of stereo receivers. A spokeswoman for the Consumer Electronics Manufacturers Association said AM stereo is popular in Japan, but very few receivers are shipped into the United States.

AM stereo

"We were concerned that there might not be as many listeners by going into the expanded band. We find that we are getting a lot of response from listeners who have switched over," said Chambers. "On one hand, we are glad that people can listen to us on 1700, but on the other hand, there aren't any AM stereo receivers out there — or I should say I've only heard of one, and I haven't been able to find it in any stores."

Scott Wright of Delco said Cadillac radios come with AM stereo capability.

There are two AMAX home receivers on the market, said Dave Wilson, manager of technical regulatory affairs for the NAB: the Sony SRF-42 and the GE Super Radio 3. But neither offers AM stereo. Calls to two Radio Shacks in Hampton Roads, Va., indicate why engineers at expanded-band stations may find the pledge frustrating.

"AM is never transmitted in stereo," said the clerk at one store. "I've never seen an AM stereo," said the employee at the second store.

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GUEST COMMENTARY

Low-Power FM: The Time Is Now

by Rodger Skinner

The author is the proponent of a low-power FM service for radio. His proposal, discussed below, is one of two petitions that call for new low-power radio services on which the FCC is accepting comments.

In 1960, at age 16, my friend Jack and I built our own radio station and ever since then broadcasting has been in our blood. Over the next few years, I worked at 10 radio stations on the air and later as the top-billing salesman at a few stations before starting my own consulting firm.

I have always wanted to own a radio station where I live. I came to South Florida 30 years ago and I like it here. I don't want to move, but I still want to own a radio station. In 1976 I created Tunnel Radio, broadcasting on all AM channels inside a tunnel where AM reception faded out, and sold 10-second spots in a 20-second tunnel in Fort Lauderdale trying to create my own radio station. In 1980, I got my own low-power TV station, only to find out now that my station, along with others nationwide, will be displaced by the new digital TV channels.

Not having $50 million to buy an FM here, I did the next-best thing. I filed a petition for rule making at the FCC (RM-9242) requesting the creation of a low-power FM broadcast service. After working on my petition for over two years, I read an interview in **RW** (Feb. 4) with FCC Chairman Kennard, in which he said he thought there should be a licensed low-power radio service, with a lower barrier to entry for minorities and others. I sensed that the time had come for LPFM. My petition allows entry into FM station ownership, often for less than the price of a new car. This low barrier to entry makes legally-challenged minority

See LOW, page 13 ▶

Canada DAB Start-up Is Delayed

▶ DAB, continued from page 1

Commission (CRTC) have set things back considerably, according to Steve Edwards, vice president of corporate engineering and technology at Rogers Broadcasting.

"It took an actual application for Toronto to realize they did not have the structures in place," Edwards said.

Licenses for the Toronto installation were delayed, and none had been issued by Mid-March. This means that delivery of DAB transmission equipment to Master-FM, the broadcaster-owned consortium that will operate DAB transmitters from the CN Tower in Toronto, will be delayed as well.

Theoretically, the consortium could purchase and install the equipment before licenses are confirmed, but this is impossible in practice, Edwards said, because no bank would lend them money without a license.

Autumn start-up

Master FM President Kirk Nesbitt said he does not expect commercial DAB to begin until August.

When the Toronto system does go live, it will look somewhat different than the setup envisaged by Master FM. This is due to a drop in equipment prices driven by healthy European sales.

Edwards said Master FM will probably buy five complete five-channel transmitter pods with their own antennas, rather than combining the feeds into just one or two towers. (The fifth pod would be a backup.)

Edwards estimated that a broadcaster could get on the air with an investment of between $24,000 and $28,000 (figures quoted are in U.S. dollars).

Meanwhile, in Vancouver and Montreal, the two other cities slated to "go digital" in the near future, there are no consortia like Master FM.

Broadcasters are negotiating among themselves to share transmission facilities; once this is complete, license applications and equipment purchases will be drawn.

However, there is good news for Canadian broadcasters regarding consumer receivers, Nesbitt said.

Not only have many radio manufacturers committed to building L-band DAB sets, but Pioneer announced plans for an add-on DAB tuner for existing in-car receiver systems, Nesbitt said.

Some 25,000 appropriate Pioneer receivers are installed in Canadian cars, equipped with a bus that connects the main chassis to a CD changer in the trunk.

Said Edwards, "They have been able to adapt the bus so that you can also hang a DAB box on it."

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Minn. Stations Get Flood Kudos

by Joy Plaschko

BLOOMINGTON, Minn. It has been just over a year since the Red River overflowed its banks, ravaging land and stations in the Dakotas and Minnesota. But the floods and recovery efforts were still very much on the minds of attendees at the Midwest Broadcasters Conference & Telecommunications Expo, sponsored by the Minnesota Broadcasters Association, held here.

Radio and TV stations airing special news coverage of the floods and relief efforts were recognized at the convention with MBA awards. So were Twin Cities stations, for jointly producing and airing relief effort coverage and for jointly raising cash and collecting goods for flood victims.

Sen. Rod Grams, R-Minn., sent the special nomination and congratulations that were bestowed to 253 radio and 26 TV stations by MBA President/CEO Jim du Bois.

"As a former broadcaster, I applaud the commitment of each and every one of them ...for their public service," Grams wrote. "Minnesota's broadcasters are always there, ready to lend a hand. ... Minnesota couldn't have done without the leadership role our broadcasters assumed in our disaster relief efforts during the last year."

Attendance for the January MBA conference was about 320. That figure is down slightly from the year before, partly because of snow and also due to the effects of station consolidation. Du Bois said, "We lost some major-market GMs to consolidation, and medium and small markets will begin to feel it too."

Zoning concerns

Going digital was the hot topic at the conference. So was consolidation and its effects. In a session titled "Room at the Top: Finding Space for DTV Antennas," options, zoning and FCC intervention were key areas of discussion.

Session attendees expressed concern that as TV broadcasters begin their digital buildout, some FMs may find themselves towerless.

"My advice: just start working on it now," said panelist Skip Erickson of WCCO-TV, Minneapolis. Erickson encouraged radio broadcasters to discuss the option of tower reinforcement with their tower owners. With lease income at risk, owners may be willing to participate in a joint tower study or share the results if it has already been completed, he said.

Additional towers aren't really an option, said panelist David Byrd, WFTC-TV, Minneapolis. "We've done FAA studies and there is no place to put a tower in the Twin Cities."

EAS Panelists, from left: Greg Skall, Pepper & Corazzini; Don Heppleman, KTCA-TV, St. Paul; Jerry Miller, Superior Broadcasting; Ken Benner, K.J. Benner Associates; and (standing) Rod Kazda, KSTP-FM, St. Paul.

With the added pressure of needing to act on tower upgrades to make the target 2006 digital transition deadline, broadcasters have found themselves facing tough and time-consuming local zoning regulations. "Studies show that broadcast towers are equally disliked to landfills," said Greg Skall of Pepper & Corazzini.

Minnesota broadcasters will be watching closely the pending FCC rule-making that would allow the FCC to pre-empt local governments in certain tower-siting disputes.

Panelist predictions of increases in the cost of tower leases made one broadcaster from southern Minnesota anxious. "We have a small FM in downtown Blue Earth County. Our lease is up in three years and it probably won't be renewed. Perhaps $300,000 for a new tower isn't a big deal for WCCO(AM), but it makes me wake up in a cold sweat," the broadcaster said.

Meet the challenge

As in other parts of the country, station consolidation and the retirement of experienced engineers mean radio technical people are doing more work, and different types of work, than years ago. In a session titled "Meet the Challenge," attendees explored how to do more with fewer resources, human and financial. At some Minnesota stations, engineering duties are being shifted to other departments. Panelist Jerry Miller of Superior Broadcasting said, "With consolidation, engineers are responsible for transmitter sites, local area networks, studios and remotes. The shifting of duties is occurring as some producers are starting to engineer their own remotes."

Technological changes are more complex and are coming more frequently now. Attendees called for more broadcast engineering recruitment and more technical training.

Panelist Ron Kazda, KSTP-AM-FM, said, "With consolidation, we have seen some increases in pay, but then many young people choose a 9-5 job over being tied to a pager 24 hours a day, 365 days a year as a radio engineer. It's a complicated issue."

'House' FM Wins Awards

The owners of a 25,000-watt FM with studios in a home north of Minneapolis/St. Paul won two of MBA's "Media Best" awards. The awards are given annually to honor the work of small-, medium- and large-market radio/TV stations in several categories: news feature, station promotion; public service announcement; commercial; and miscellaneous.

Husband and wife John Godfrey and Colleen McKinney, who own and operate KBEK(FM) in Mora, Minn., won in both the small-market public service announcement and commercial categories.

In the winning PSA, KBEK morning show host Todd Rust spoke emotionally about his cancer treatment and his doctors' efforts. In the commercial, Santa became trapped in a chimney and shouted to his elves to use their Davis Communications cell phone to call for help.

Godfrey and McKinney received their FM license eight years ago. The two have been piecing together and growing the station in the lower level of their home ever since.

Colleen and John, an audio engineer, supervise a staff of four full-time and five regular part-time employees. The 24-hour format "is basically oldies," said McKinney, but other contemporary pop music is mixed in with local news, weather and sports. The programming is automated from 11 p.m. to 5 a.m., driven by software authored by Godfrey and by Media Player for Windows.

Skinner: Why We Need LPFM

▶ LOW, continued from page 10

preferences unnecessary to achieve dramatic increases in minority ownership.

This is the right time for LPFM. A new FCC chairman, sensitive to lowering the barrier to entry, helps. Also, the negative consequences of consolidation are being felt nationwide resulting in the loss of local ownership. For many years, the FCC recognized the importance of integration of ownership into daily management at a station and gave a preference for it in comparative hearings to select a licensee. Today, executives of corporations sit in distant cities with little knowledge of the local communities their stations serve.

Rodger Skinner

Under RM-9242, an LPFM applicant would have to live within 50 miles of the proposed station antenna site. This includes all stockholders of a corporation or partners of a partnership. Any sale or transfer would have to be to another local entity meeting these same requirements. Any applicant for an LPFM that owns any other "primary service" media (AM, FM, TV) or other media, excluding secondary service LPTV, would have the odds stacked against them, favoring the applicant who owns no media.

Three classes proposed

I proposed three different classes of LPFM stations. Starting at the bottom and working up, there would be a Part 74 secondary-service LPFM-3, which would be a temporary 10-day permit for special event stations, such as boating regattas, auto races, tennis tournaments, etc. It would have an ERP range of 1 to 20 watts with maximum antenna height of 100 feet HAAT. It may be necessary to commission a private industry organization to handle the processing of the thousands of these requests expected annually. Each would require a non-interference showing for the channel specified. Maximum range of the 1 mV/m contour would be about 2.3 miles.

My petition allows entry into FM station ownership, often for less than the price of a new car.

Second, there would be a Part 74 secondary-service LPFM-2, which would be the answer to license many of the so-called "pirate radio" stations, many operating with community volunteers. This service would have an ERP range of 1 to 50 W with maximum antenna height of 150 feet HAAT, again with a non-interference showing from a consulting firm. A minimum of regulations would apply to this class station, mainly technical regulations to prohibit interference. Maximum range of the 1 mV/m contour would be about 3.6 miles. An LPFM-2 threatened with displacement should have the opportunity, if desired, to upgrade within 60 days to LPFM-1 status.

The highest class station would be a Part 73 primary service LPFM-1 with a range of ERP from 50 W to 3 kW and maximum antenna height of 328 feet HAAT. This class station would have to comply with most of the Part 73 rules that apply to standard FM stations. Maximum range of the 1 mV/m protected contour would be about 15 miles, similar to the old Class A FM.

Type acceptance

Type-accepted equipment should be used at all stations, and prices of this equipment are expected to drop when this large market opens up. Deletion of the second and third adjacent channel restrictions is proposed. The short-spaced grandfathered FM proceeding proved this was possible due to receiver improvements over the years since those rules were established. Co-channel protection of 20 dB and first adjacent channel of 6 dB is proposed, exactly the same as existing rules.

The complete petition RM-9242 can be viewed on the Internet at *www.concentric.net/~radiotv* and the FCC web site at *www.fcc.gov/mmb*

Interested parties should file comments at the FCC by April 27 and replies by May 26.

■■■

Skinner is president of TRA Communications Consultants, a firm that prepares FM and LPTV applications. His phone number is (954) 340-3110.

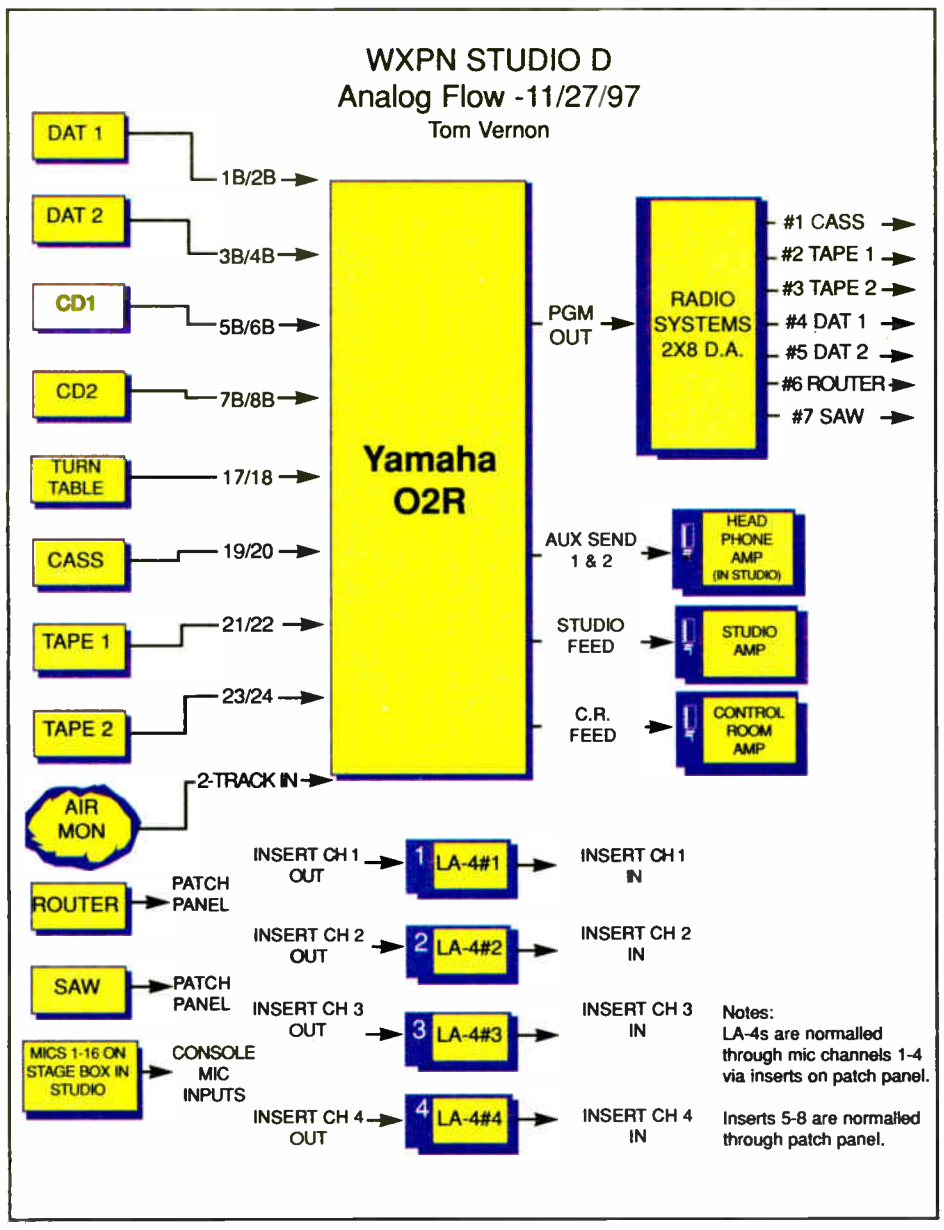
***RW** welcomes other points of view.*

Potent System Documentation Tools

Tom Vernon

Documentation of broadcast systems is a topic few people want to discuss or, apparently, write about. The documentation process only seems to get worse over time and can be costly to fix.

thing, as technological changes shortened the 20-year system lifecycle to three years or less. All the while, system complexity also seemed to be increasing at an exponential rate. Major-market stations often had an "AutoCAD jockey" to maintain documentation.



Mac users can provide detailed documentation with 'PowerCADD' from Engineered Software. Some say it produces more detailed drawings than AutoCAD. Courtesy of Communications Engineering Inc.

In this article I will identify some of the trends in system documentation, and discuss software tools that are available to help you.

In years past, equipment installations had a life cycle of 20 years or more. While there might have been minor changes in equipment, the infrastructure remained relatively fixed. Large stations had draftsmen who created the documentation by hand, and the final output was done in large Diazo sheets.

Because pages were so large and cumbersome to fold and unfold, people usually tacked them up on the wall. There they deteriorated quickly due to moisture and sunlight. Still, they enabled you to quickly get an overview of how a system was laid out. Some of the large diagrams produced in the 1940s and '50s by RCA for its equipment are testimony to the art and craft of drafting with pen and ink. Those leisurely days are gone.

Beginning in the late 1970s, computers changed how systems were documented. Computer-aided drafting programs like AutoCAD could produce precisely drawn programs in a fraction of the time it took a drafting person.

This evolution turned out to be a good

With the era of downsizing, that type of employee began to disappear, leaving individual engineers in many cases responsible for documenting their own projects. The resulting chaos prevails today, as engineers are faced with documenting more complex systems that change more quickly, with fewer resources to do the job.

The word "documentation" can mean many things. It includes simple flow diagrams for operators; complex flow diagrams for installers and engineers, showing connectors, wire numbers, and equipment types; 3D diagrams indicating equipment locations in a studio; runlists, which show cable sources and destinations in tabular form; and bills of materials and equipment lists. Complex systems may represent equipment layouts with different layers for audio, control, timecode and video signals.

Good documentation should tell you everything you need to know about a system. It should give both a macro and micro view of a system. A large duopoly might use a drawing with a macro overview of how the signals from several stations arrive at the transmitter site. On a micro level, other documentation would show the wire number and destinations for the digital audio input to the STL for a given station in that duopoly.

The documentation business is made all the more difficult because there are no real standards. We can all look at schematic diagrams and identify transistors, resistors and diodes. Not so with flow drawings. Punch blocks, XLR connectors and patch panels may be represented differently by different manufacturers.

Efforts to develop ANSI standards for audio devices have been largely unsuccessful. About all that is universally agreed upon is that inputs should go on the left, and outputs on the right. The situation is a bit more orderly in Europe, where the German DIN standards for drawings include uniform symbols for equipment and connectors.

Several computer programs are available to document broadcast systems. The prices for the more powerful packages limit their audience to systems integrators, networks and a few major-market stations. But small- and medium-market broadcasters can purchase programs that do a good job of documenting studio layouts for $300 or less.

You can create simple flow diagrams with Inspiration, an inexpensive program available for both Mac and Windows platforms. Custom symbols for audio equipment may be easily created or imported. Drawings may be created and printed in color, and objects may have hidden text fields as well as links to parent/child drawings.

Inspiring

Standard flow chart symbols and computer graphics are included with Inspiration, along with many other management and ISO 9600 icons. Drawings may be exported or imported as Windows Metafile (WMF), Bitmap File (BMF), Pict, GIF or HTML. The program is easy to learn, and you can create precise drawings quickly. Documenting more complex systems may be difficult, as the program limits you to eight connections on each side of the object.

For simple installations, a basic signal flow diagram and cable runlist may be all you need. Cable runlists are the electronic outgrowth of paper-based charts showing wire number, source and destination data. More elaborate runlists may include data on things like type of cable, connectors or color code of multipair cable.

Using a database program like FileMaker Pro can make quick work of what used to be an arduous task. Maintaining these records electronically has advantages over paper-based systems. While runlists are usually printed out listing wire numbers by ascending order, there may be advantages to sorting and printing the list differently.

For example, suppose you need to trace some wiring to punch block #7 in your system. Sure, you could sift through 20-odd pages searching for all the wire numbers that have punch block #7 as their source or destination. Or, you could do a sort and have FileMaker Pro print out all the wires on punch block #7, listed by terminal number.

A database program is also useful for maintaining equipment lists and bills of materials. FileMaker Pro has a large installed base of users, and is available for both Mac and Windows platforms.

For users with Windows 95 and a robust PC, Visio Professional offers a lot of attractive features. This object-oriented program allows you to represent a system at different levels of detail in a single drawing file. Drawings are created by dragging objects from the stencil onto the drawing page and then linking them together.

If the symbols that you use are set up with custom property fields, you can use one of Visio's 22 Wizards to generate a Microsoft Access 7.0 database from the diagram. If you want to pass data between the two, you can link the drawing to the database. Visio Professional has more than 90 task-specific stencils, but broadcasters must create their own shapes, which is easy to do.

You can even import Autodesk AutoCAD files as floor plans and then overlay your equipment layout plans on top.

Mac happy

While the CAD software market is predominately for Windows, Mac users are not without potent tools for system documentation. PowerCADD from Engineered Software facilitates object-oriented drafting for users of the Power Macintosh. A variety of libraries are available for this program, most related to architecture.

You may need to create your own broadcast symbol library before starting serious work. Files can be exchanged with your PC colleagues via the DXF file format, a common ground for users of different CAD software. One systems integrator I interviewed for this article preferred PowerCADD, not only because engineers can quickly come up to speed, but also because he felt that it enabled him to produce more detailed drawings than any PC-based CAD program.

FileMaker Pro, Inspiration, and Visio Professional are available through many of the popular software catalogues. PowerCADD is available through Mac Zone, via direct sales from Engineered Software or their dealers.

Next time, I will discuss the VidCAD program from VDP Inc., and provide some tips from the pros on how to lay out your next project.

■ ■ ■

What are your experiences with documentation programs? Drop us an e-mail at radioworld@imaspub.com *or write to the address on page 5.*

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FEED LINE

Toroid Cores Come to the Rescue

W.C. Alexander

This is the 11th in a series of articles about constructing an expanded-band AM facility. The previous part appeared in our April 1 issue.

A secure RF termination is just as important at the tower end of the line as it is at the transmitter end. If you have a choice, construct your antenna tuning unit (ATU) to accept an EIA flange connection. Otherwise, do your best to make a low-impedance, mechanically-secure connection to both inner and outer conductors.

Toroid cores can be placed on all the other conductors entering the transmitter; the transmitter RF output connection is another place where your installation can benefit from a few toroids. Large-diameter toroid cores that will fit over a 1-5/8-inch transmission line.

Low-pass filter

I like to place two or three cores on the line right above the flange at the transmitter output. One caveat: Place the toroids on the transmission line *before* you install the connector, lest you do a wonderful job of putting the connector together and then find the toroids still lying on the workbench! If faced with this unfortunate result, you will be tempted to omit the toroids, but that is the wrong thing to do.

The other side of the low-pass filter created by the transmission line toroids is a positive ground connection on the outer conductor of the transmission line, as near as possible to the point where it enters the building. This will give lightning currents flowing on the outer conductor of the line a place to go to ground before entering the transmitter itself.

Good discharge paths for lightning/static electricity for the inner-conductor also are necessary. These can take the form of ball gaps, horn gaps or gas-discharge devices. Most late-model transmitters will employ a gas-discharge device or other gap inside the transmitter on the RF output termination.

If your transmitter is an older model and has no such protective device, you can purchase and install one, giving the transmitter a last line of defense. You can even make one using ordinary hardware, a pair of cap nuts, some L-brackets and some ceramic insulators.

AM stereo

Because most U.S. expanded-band stations will transmit in stereo, an external RF drive feed will have to be connected to transmitters not equipped with built-in AM stereo exciters. This feed should pass through a toroid with the other control and monitor cabling. In addition, you should use double-shielded cable. One of the biggest killers of AM stereo performance is RF induced into the external drive feed. In severe cases, this can cause the transmitter to oscillate. In most cases, it simply contributes to incidental phase modulation (IPM), which destroys stereo separation and performance.

What is "ground," anyway? Earlier installments of this series discussed the antenna ground system and lightning ground at the tower base.

There are three objectives of the transmitter site ground: to provide a low-impedance return for RF; to provide a low-impedance return for AC fault currents; and to provide a low-impedance discharge path for lightning energy. The common denominator for all three objectives is a low-impedance path.

AC energy at RF frequencies exhibits "skin effect." In other words, the RF currents travel on the surface of the conductor only, making surface area, not cross-section, the limiting factor for conductors carrying RF currents. This is why we use a wide, thin copper strap for RF grounding.

There is nothing special about AC fault currents. They travel like any other 60 Hz AC current, and so any ordinary copper conductor of adequate size will work.

Lightning

Lightning energy exhibits some of the properties of both DC and RF currents. The leading edge of the lightning pulse has a very fast rise time, making it behave like an RF current and thus requiring a conductor with a lot of surface area. The peak DC current of a lightning discharge can be very high, requiring a conductor with a large cross-section. This is why, in a typical transmitter plant, we see an AC safety ground (usually a green wire run from the transmitter to the AC distribution panel with the other AC power conductors), a strap connection for RF ground and a large-conductor "reference" ground for lightning.

One of the most important requirements for transmitter site grounding is that all three grounds bond together at a single point. The best place for this is at a ground rod or series of rods as close as possible to the point where the transmission line enters the building. This is known as a "star" grounding scheme, and the objective is to keep ground currents from flowing through equipment to get to a ground.

See GROUND, page 18 ▶

Workbench

Radio World, April 15, 1998

Spare Fans Can Save You Trouble

John Bisset

Dwight Morgan is the chief of KJOL(FM) in Grand Junction, Colo. He recently purchased a new transmitter and exciter from Continental Electronics. During a routine inspection, he found the "overtemp" fault indicator lit on the exciter. He said he purchased a spare fan "just in case," and sure enough, had to replace it. A couple of months later, the problem repeated itself.

Continental sent out another fan at no charge. It seemed to Dwight that the company got a batch of bad fans, because a few weeks later he lost another fan in a relatively new exciter (15 months old). Dwight has purchased a spare to keep on hand, just in case. When the cooling fan stops working, the PA gets steaming hot and the protective circuitry folds back the power. Not good for that PD or GM that wants to be at 100 percent power all the time.

Dwight's replacement fan was purchased from Grainger, and is manufactured by DAYTON, model 5C115. The fan inside the 802B is a Papst Typ 8500N.

If you standardize on equipment, buying a spare fan or blower motor is good insurance. If the terminals on the motor or fan are soldered in place, wiring up a short pigtail to a male Molex plug will make the change out job easier.

Simply break the existing wiring inside the exciter or transmitter and add matching male/female Molex plugs. When it comes time to change the motor or fan, simply remove the screws and unsnap the connector. The replacement is screwed in place, and the wire pigtail is connected to the Molex plug already in place.

I suggest that you buy a spare fan for your exciter, regardless of the manufacturer. Pick up a spare for that critical satellite receiver, too. So often we do not think about the pieces of equipment that need cooling — until the cooling system fails. Don't get caught in a bind; buy yourself some insurance.

Dwight Morgan can be reached at KJOL, (970) 243-4361.

★ ★ ★

If you have a friend who works in video or at a television station, ask if you can have a few of the plastic tape cases in which they store their videotapes. Carefully use a single-edge razor blade (to us old timers, known as an editing blade), to slice off the two plastic hubs inside the boxes. You now can store a variety of parts or small tools inside.

Figure 1. Mount cross-connect wire on your wire board to simplify changes.

A contractor friend of mine has about a dozen of these boxes lined up in the rear of his sports utility vehicle. He has slipped paper labels inside the clear plastic flap on the spine, identifying the contents of each box. One box is male XLRs, another holds female XLRs, another is his screw and bolt junk box and still another holds chips pressed into squares of nonconductive foam.

He can put his hand on a spare part in moments, and the plastic latch on the lid keeps the contents secure — no more drawers or boxes tipping over and littering the floor with parts (especially screws and nuts!).

★ ★ ★

Keeping cross-connect wire within reach is the idea behind Figure 1. Use a long nail or even a plastic spindle to permit the reel to spin as the wire pays out. This prevents the wire from kinking, and keeps the reel off the floor.

If you use heavy-duty staples to anchor a pouch formed out of folding a plastic sheet protector into a sleeve, you have a place for your punchtool to reside. While you are at it, staple another plastic sheet protector to the backboard and store a copy of your documentation sheets there, along with a pencil for making changes.

In today's station, where we are trying to handle too much with too little help, good intentions of updating the documentation get shoved aside with the realities of our job. If all the tools are together and in place at your cross-connect board, the job gets done and the documentation is updated at the same time, before you run off to put out the next fire!

★ ★ ★

It must be the luck of the draw: We have been called in for several FCC inspections recently. One area of concern expressed by the inspector was exposed AM RF connections. Examples are where the RF leaves the top of the transmitter via an exposed bolt tied to the transmission line inner conductor, at the RF contactor, or the wire feed going out to a shunt-fed or unipole transmission system.

In a couple of cases the stations have operated this way for years. One had been inspected several years earlier, and nothing was mentioned of the exposed wires during that visit. My theory is that as the areas of enforcement continue to shrink, the inspectors are taking a closer look at what is left: EAS, RFR, tower lighting, and operation according to the instrument of authorization.

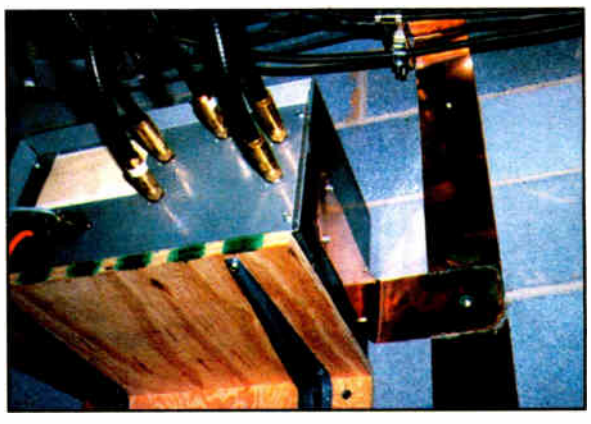


Figure 2. An inexpensive RF enclosure reduces RFR hazards.

Play it safe, and consider enclosing your RF lines as shown in Figure 1. Not only does this contactor box reduce exposure to RF burns, the shielding reduces stray fields that can wreak havoc in the studio.

■ ■ ■

John Bisset is a principal with Multiphase, a technical services company. Reach him at (703) 323-7180. Printed submissions qualify for SBE recertification credit. Fax submissions to (703) 764-0751, or send them via e-mail to wrwbench@aol.com

Pause Detector Automates 'ATC'

Chris Scott

Public radio stations experienced mixed success using timed break triggers to automate the National Public Radio program "All Things Considered." NPR is unique among radio networks in that many programs are fed without cue tones or other break-start signals. Instead, NPR producers use scheduled timeposts, which flank the cutaway breaks. Theoretically, these one-second pauses would be simple to target with a carefully timed automatic insertion, given the time synchronization accuracy available. In practice, however, several factors conspire to cause transitions to occur during network announcer speech, resulting in upcut or truncated audio.

A system in use at WKYU-FM in Bowling Green, Ky., part of Western's Public Radio network, effectively solves this problem, using a time-constrained pause detector to both trigger the break and rejoin the network.

Timing environment

A cutaway beginning at the top of the minute starts with a pause at :59 seconds, plus or minus variances. Network program producers find it burdensome to end each audio segment at :59 seconds and resume at :00 perfectly, every time, without compromising program flow.

WKYU management decided that these timed break failures impaired the air product too much to allow automation to substitute for a human "board operator."

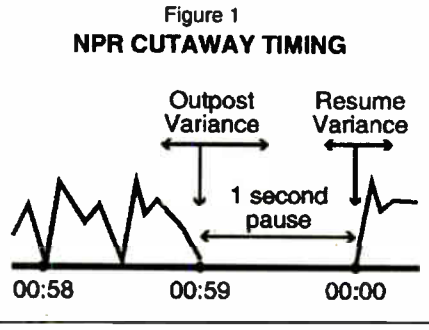
We tried to augment timed break triggering with additional "smarts" (additional decision-making circuitry) to track break timing variances. We developed a pause detector that identifies absence of audible program and signals the automation system when 0.7 seconds was exceeded.

The pause detector had to provide a reliable output signal to the automation system. Silence sensors exist for detecting automation system stoppage, but have not been adapted for this purpose.

To enhance reliability, the threshold of audibility detection was carefully controlled. We shaped the frequency response to emulate human hearing sensitivity. The Fletcher and Munson response curves were the weighting factors. Fletcher and Munson produced a well-known study in 1933 on the interdependence of loudness and pitch.

Because quick pulses of frequencies normally audible will not generally be heard if they are brief enough, the attack time of the level detector was tailored to approximate the DIN standard 45406 for peak program meters that addresses this effect. Figure 2 shows the pause detector system interconnection diagram.

Figure 1
NPR CUTAWAY TIMING



resumes at :00 seconds. This cycle repeats at the end of the cutaway. The :59 outpost is variable due to the difficulty of dynamically adjusting copy and prerecorded material to reach the second precisely. The resume post is more consistent; therefore, both the cutaway time and the theoretical one-second pause duration are variable. Experience shows that the pause may occasionally be as brief as 0.7 seconds, or less during weekend programs. Figure 1 shows the pause timing.

The OS/2-based Satellite Operating Support System (SOSS) PC hardware supplied by NPR provides a convenient momentary signal each hour, allowing precise automation PC sync. Many automation systems allow events to be scheduled only in integer second increments, which seriously limits break timing adjustment unless the basic clock sync is skewed. This skewing must be avoided if feeds from more than one network will be automated.

It is estimated that timing agreement between NPR and the automation clock can be maintained to less than ±100 ms, if synchronized every hour. With this accurate agreement, it would seem reasonable to initiate a centered cutaway at :59.5 and expect the half-second margin of error to prevent audio clashes.

Even after experiments in clock skewing, only 80 to 90 percent of the timed breaks at WKYU were smooth. The most common break corruption was truncation of NPR announcer speech. This was caused primarily by NPR, where timepost variances are introduced. Announcers and

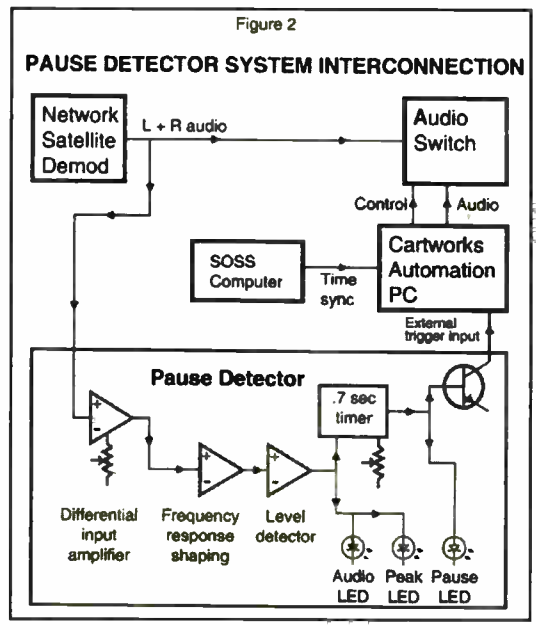
Automation system integration

Because 700 ms pauses are common during the body of normal network programming, premature triggering had to be prevented. WKYU uses the CartWorks PC-based audio cart replacement and automation system. This system is user-friendly and cost-effective. A scripting language is provided with CartWorks that permits great flexibility in handling automation tasks. It also allows simultaneous background recording with parallel "script processors" allowing various combinations of simultaneous task execution. CartWorks accepts external trigger signals using a "watch window" of time that can be set as briefly as 12 seconds. Only during this eligibility period will the automation react to a pause.

The most common break corruption was truncation of NPR announcer speech.

The detector is permanently connected to the network downlink demodulator. This is essential if program re-entry is to be pause controlled. Its output feeds one of 12 external trigger inputs on the CartWorks system. This trigger not only senses cutaway breaks but also simultaneously records embedded promos fed during these breaks.

Figure 2
PAUSE DETECTOR SYSTEM INTERCONNECTION



Time-constraining the pause detector trigger prevents audio switch operation during the body of a program segment. The automation script event begins pause detector triggering at :57 and ends 12 seconds later. A narrower window of perhaps five seconds would be optimal, but the CartWorks minimum of 12 has proven quite satisfactory.

An automation script "safety event" is included with the automation script for the network rejoin, or in the case of background recording, a recorder stop. Examination of our automation logs shows that this safety feature has not yet been necessary, but we think it is essential should a major network variance result in no pause at re-entry time, causing rejoin failure. It consists simply of a timed rejoin at the last possible moment.

Pause detection appears to be a robust interim automation technique until NPR adopts cue tones or other external signaling. Automation clock sync accuracy and stability requirements are reduced considerably. The method may not be transportable to every automation system, but most should permit its use through external triggering similar to cue-tone detection. WKYU is making available a more comprehensive information package including detailed timing diagrams, system interconnections, schematic diagrams and sample CartWorks scripts. This is free to any station making a formal request. The completed pause detector module is available from the author.

■ ■ ■

Contact Chris Scott via e-mail at chris@scott-inc.com

He tries to keep the Public Radio Service of Western Kentucky University on the air most days. He discusses related topics at http://www.scott-inc.com

Good Grounding Required

▶ GROUND, continued from page 15

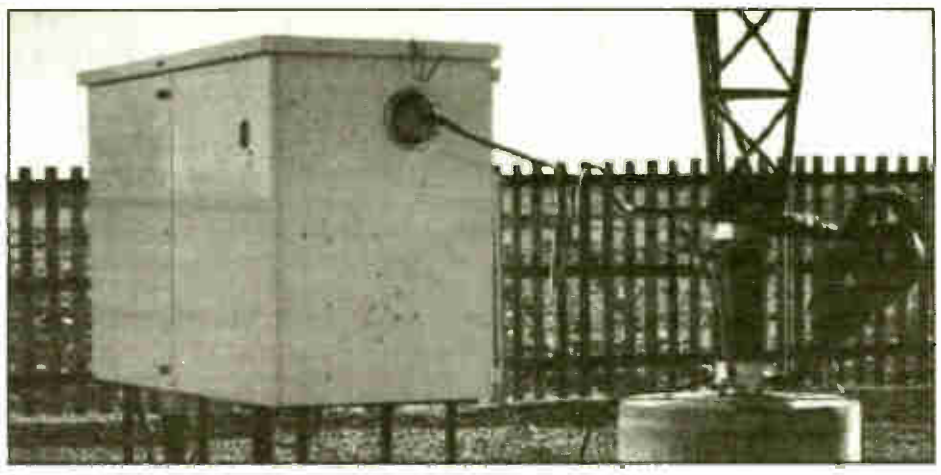
I have seen a lot of damage from improper grounds over the years. In most cases, the trouble could be traced to grounding schemes where the three grounds had not been properly tied together. In one memorable case, lightning energy would come in on the outer conductor of the transmission line and then flow through the transmitter cabinet, seeking the reference ground. On the way, it found the fuse holders on the front panel a more attractive path to ground through the AC distribution system than through the safety ground or strap.

The damage, as you can imagine, was substantial and occurred time after time. The fix: simply tying the AC service ground, the ground strap from the station RF ground and the reference ground from the array of rods at the tower base together right outside the building.

Since the fix was made, there has been no more damage from lightning. Before the fix, the station could count on five or six lightning damage claims each year.

The tower base is likely the most lightning-prone location at your site. Attention to proper grounding here is imperative because the potential for disaster is great.

As in the transmitter building proper, the key at the tower base is providing a low-impedance path for all three types of ground-seeking energy. We previously discussed providing an array of ground rods connected to the ball or horn gap via large conductors. That takes care of the lightning discharge path at the tower base.



A Properly Installed and Grounded ATU and Tower

The ATU network will need a low impedance RF path to ground. This should be provided by a copper strap, at least 3 inches wide and 0.024 inches thick, between the ATU ground strap connect point and the central ground strap for the antenna ground system.

If the tower is lit or if there is utility AC power at the tower base, a safety ground is important as well. I recommend that all outlets at a tower base utilize ground fault interrupters, the outlets often seen in bathrooms with the "press-to-test" and "reset" buttons on them. The circuitry inside senses ground current and will trip should the ground current exceed a preset point. Ordinarily, there should be no ground current flowing. The presence of ground current indicates a fault — say, a shorted field wire in the electric drill you are using. A GFI can save your life! Use them on all tuning house outlets!

Lightning energy exhibits some of the properties of both DC and RF currents.

Important decision

Is it necessary to run a copper strap from the transmitter building to the ATU or tower base area? For years, this has been the standard practice, but I think it is unnecessary and a waste of money. With a 1-5/8-inch transmission line running from the transmitter building to the ATU, the outer conductor provides a better RF ground conductor than would a 4-inch ground strap. In my installations, I omit the trouble and expense of running a ground strap to the tower from the transmitter building.

Pay careful attention to proper grounding of Austin Ring transformers and to proper bypassing of lighting chokes. These devices are designed to be installed with a properly-placed ground, so follow the manufacturer's recommendations and ground them properly. Improper grounding can lead to photocell/flasher circuits that do not work properly, RF in the AC power distribution system and damage from lightning.

■■■

Cris Alexander is director of engineering for Crawford Broadcasting in Dallas. Contact him at (972) 445-1713.

Running Radio

Radio World — Resource for Business, Programming & Sales — April 15, 1998

Holiday Listening Trends Examined Page 26

Stock Surge Marks Quiet Quarter

Lynn Meadows

The radio industry celebrated the second anniversary of the passage of the Telecommunications Act in the first quarter of 1998. But the buying and selling action in the first three months of the year was far more subdued than the gargantuan sales announcements the industry has seen in the past two years.

Below are the stock prices for the top 10 owners as ranked by revenue (at time of publication), showing the price at the beginning of the first quarter and ending on March 24. The group rankings are provided by BIA; stock prices are from other resources.

Group	Jan. 2	Mar. 24
CBS	28 9/16	33 15/16
Chancellor	74 5/16	47*
Jacor	51 17/32	59 13/16
Capstar	Not Traded	
Clear Channel	77 9/16	99 1/8
ABC (Disney)	99 5/8	106 15/16
Cox	40 1/8	41
Emmis	46 1/2	50 3/4
Heftel	46 3/4	46 1/2
Susquehanna	Not Traded	

*Reflects stock split

Radio stock prices soared to new heights in quarter one. Heftel Broadcasting Corp. (NASDAQ:HBCCA) was bolstered by rosy reports of fourth-quarter revenues. Chancellor Media Corp. (NASDAQ:AMFM) became the second radio group to earn more than $1 billion in revenue, joining CBS Corp. (NYSE:CBS) in that exclusive club.

As the end of the first quarter neared, Clear Channel Communications stock (NYSE:CCU) had gained more than 21 points in 1998. Business Week listed the company 47th in its "1998 Business Week 50," an annual ranking of America's best-performing companies.

Merrill Lynch upgraded its view of Jacor Communication's (NASDAQ:JCOR) stock from "accumulate" to "buy" as the price rose more than 10 points.

CBS, the top-earning group in terms of revenue, continued to be at the bottom of the top 10 radio groups in terms of stock price. Its price at long last conclusively surpassed the $30 mark in the first quarter. Morgan Stanley upgraded the company's stock from "neutral" to "outperform."

Both Chancellor Media and Clear Channel had their ratings upgraded from "outperform" to "buy" by Saloman Brothers. Chancellor did a two-for-one split in January that it had promised in December.

Despite a lack of over-the-top deals in the first quarter, the agreements that were hatched illustrate just how diverse the radio industry is becoming.

Clear Channel, for instance, in keeping with its interest in international investing, announced it would purchase 40 percent of the equity of Grupo Acir Comunicaciones. The group owns 164 radio stations in 72 Mexican cities and covers approximately 75 percent of the Mexican population. Clear Channel also announced it would buy the More Group, a U.K.-based outdoor advertising company that operates in 22 countries.

Emmis Broadcasting Corp. (NASDAQ:EMMS) announced that it would purchase Mediatex Communications Corp. for $37 million plus the assumption of subscription liability. Mediatex has a custom publishing division and advertising sales division and is the parent of the company that publishes TEXAS MONTHLY magazine.

Emmis Broadcasting owns Emmis Publishing Corp., which publishes three regional magazines: Indianapolis Monthly, Atlanta Magazine and Cincinnati Magazine.

'Sobering effect'

Jacor, pursuing a different venue, announced that its subsidiary Premiere Radio networks would buy Chancellor Broadcasting Co. and Talk Radio Network for $9 million. The two are syndicators of several talk radio programs.

While groups explore peripheral businesses, they continue to swap stations, complete their suites in selected markets and shuffle people around to find the right formula for operating.

"I think there is a sobering effect going on as owners begin to take a hard look at their portfolios and do what they have to do to run a business," said Steve Pruett, senior vice president of the New York-based investment bankers Communications Equity Associates.

"I think there is a digestion going on right now of all the consolidation," said Charles Giddens, managing director of brokerage firm Media Venture Partners. He predicted the action would increase again in the third quarter when groups begin to decide which stations to hold onto and which to let go.

Station swap

Some of that is happening now. Once its acquisition of SFX Broadcasting is complete, Capstar Broadcasting will swap 11 SFX stations in Dallas, Houston, Pittsburgh and San Diego with Chancellor Media for several small- and medium-market stations.

Sinclair Broadcast Group (NASDAQ:SBGI) agreed to sell WRNO-FM, KMEZ(FM) and WBYU(AM) in New Orleans to Centennial Broadcasting for $16 million to meet regulatory ownership guidelines. The group had picked up WRNO and WBYU after purchasing Heritage Media.

Elsewhere, in targeted purchases, groups finalized their positions in individual markets. Chancellor Media rounded out its hand in the Washington market. In a transaction expected to

See QUARTER, page 24 ▶

VOA Honors Humanitarian Reporting

The Voice of America gave first prize in its Cowan Award for Humanitarian Reporting to Rashmi Shukla of VOA's Hindi Service. Shukla was selected for her work on "Child Labor in India."

The Cowan Award, named after former VOA directors Louis and Geoffrey Cowan, recognizes distinguished humanitarian reporting.

Pictured left to right are VOA Director Evelyn S. Lieberman; ABC and National Public Radio journalist Cokie Roberts; Shukla; Hindi Service Chief Jagdish Sarin; and former VOA director Geoffrey Cowan.

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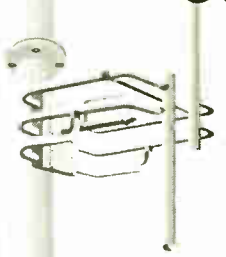

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COLE'S LAW

Is Low Power Going to Happen?

Harry Cole

Just when you thought it was safe to be in the radio business, up pops a proposal so jam-packed with potential downsides that it is hard to know where to begin.

We give you (drum roll, please) "low-power radio" or LPR, one of the latest hot ideas at the FCC.

Those of you who have been in radio for more than 10 or 20 years may be wondering what's new about LPR (or LPFM, as some people describe the FM-only version). After all, some FM translator operators made several serious runs, to no avail, at getting some such authorization in the 1980s.

But this time somebody at the FCC seems to be taking the idea seriously. To the surprise of many veteran observers, the future of LPR may be now.

Baby steps

In February, the commission issued a public notice inviting public comment on a petition for rule making filed last summer by three individuals who proposed the creation of an LPR service (for our purposes, we'll call this the "Leggett" proposal, after one of its proponents, Nickolaus Leggett). Such an invitation for public comment is just the first step in the process, but it is an important step because it signals that the FCC may actually have some interest in pursuing the proposal. Sure enough, Team Cole's Law has learned from sources in the commission that no less a luminary than Chairman Kennard is apparently sincerely interested in exploring the possibility of a new low-power "microbroadcasting" service, despite the historical (and repeated) rejection from the FCC of such a service. This will not be surprising to readers of **RW**, who have followed the chairman's comments on the topic.

The petition is available on the Internet (*www.fcc.gov/Bureaus/mmb*). The FCC is soliciting comments on another petition, submitted by Rodger Skinner, for a low-power service (see page 3). Other proposals are making their way forward.

Let us belabor ever so slightly some of the more obvious potential problems with the concept of LPR.

Frequency question

First, where will the frequencies come from? The Leggett proposal suggests that one FM channel and one AM channel be utilized for low-power broadcast service nationwide. The proponents do not bother to provide any detailed engineering information, so it is not clear how they propose to realize their concept. Skinner's proposal does provide more technical information.

Second, how will existing broadcasters be protected from interference? The Leggett proposal urges that low-power operators be permitted (if not encouraged) to design, build and maintain their own transmitters. Maybe we are missing something here, but we at Team Cole's Law understand that even with good off-the-shelf equipment, it is not unusual for stations to interfere with one another. If a bunch of mom-and-pop operations (and the proponents are apparently talking in terms of hundreds, if not thousands, of new "microbroadcasting" stations) all of a sudden crank up with their own home-grown gear, it seems to us that interference problems will increase astronomically.

Proponents of both petitions suggest the FCC allocate low-power licenses on a first-come, first-serve basis, for applicants who meet certain criteria. But what isn't clear is how mutually exclusive applications would be resolved. Proponents urge the commission to utilize lotteries to dispose of the proposed low-power licenses. But Congress just told the commission that it is supposed to use auctions for choosing among competing applicants.

Although the LPR proponents may be correct that auctions might increase the cost of getting a station up and running, that additional cost may be unavoidable unless somebody manages to get Congress to change the law.

Regulatory burden

Fourth, both of the LPR petitions suggest that certain rules and regulations should be imposed on the LPR service that are not imposed on the existing full-power services.

While the commission is undeniably authorized to adopt a variety of rules, it is far from clear whether it has any inclination whatsoever to do so. After all, this is an agency which has, for the last 15 years or so, engaged in an aggressive program of deregulation. The FCC is likely to be even more reluctant to increase its regulatory program in the face of apparent congressional approval of its direction during the last decade.

Fifth, even if the foregoing problems could be worked out, does the FCC really want to have to deal with the thousands of applications which the proponents suggest would pour in? The commission has, of late, finally arranged its staff and procedures so as to streamline and expedite the processing of most broadcast applications. Inviting a huge influx of new applications likely would tax commission resources and slow down all the services it provides to the industry and to the public.

There are more potential problems, as you might imagine. For our purposes, though, it should suffice to say that the whole idea of a low-power broadcast service is one which does not seem to fit at all with the course of the radio industry — both regulatory and business-wise — over the last decade or two. Indeed, it seems to run directly contrary to that course.

In fairness to the LPR proponents, there are perfectly valid and understandable motivations underlying their ideas. In general, the proponents seem to be suffering from frustration borne of the massive consolidation of radio ownership since the Telecommunications Act of 1996. They express concern about the need for greater diversity of media ownership and programming, and claim (without any specific supporting data) that consolidation has driven up advertising prices beyond the reach of many small businesses.

Misguided solution

Consolidation *has* reduced the diversity of radio ownership exponentially, and the current trend appears to be in the direction of still greater reduction. Perhaps this is bad, perhaps it is good. But whatever the merits and demerits of consolidation (and its various fall-out effects), it seems acutely wrong-headed to address them through some indirect mechanism like the creation of a whole new service. Problems with consolidation should be identified and addressed directly. A new LPR service would create at most a distraction from consolidation, without stemming any undesirable aspects consolidation may carry with it.

Comments on the both proposals must be filed with the commission by April 27, with reply comments due May 26. If you have strong opinions about this matter, you should certainly consider letting the commission know about them.

If you have any questions about the LPR/microbroadcasting proposals or need any help in preparing comments for submission to the commission, you should consult with your communications counsel.

■ ■ ■

Harry Cole is a principal in the Washington-based law firm of Bechtel & Cole, Chartered. Opinions expressed are those of the author. *For another view, see page 10.*

***RW** welcomes other points of view. Write to* radioworld@imaspub.com *or to the address on page 5.*

Whatever the demerits of consolidation, it is wrong to address them via a whole new service.

Casey Counts 'Em Down on AMFM

Chancellor Media Makes Big Entrance In Network Radio Programming Game

Bob Rusk

Countdown king Casey Kasem has returned to the microphone that made him a star and is once again hosting "American Top 40," one of the most popular syndicated music shows in radio history.

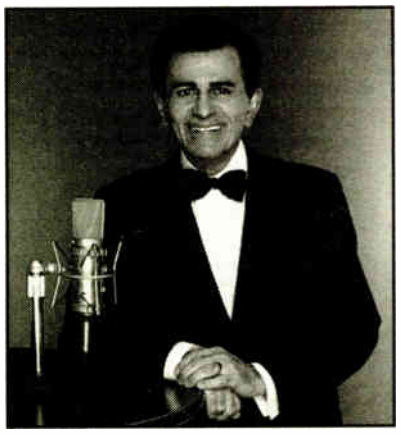
Kasem was the original host when the show debuted in 1970, but left the program a decade ago to join Westwood One. He recently opted out of the Westwood One contract and signed a multi-year deal with AMFM Radio Networks, where "American Top 40" has come back to life. AMFM is owned by Chancellor Media.

"Reuniting Casey with the show title 'American Top 40' brings the two best and most recognized names in countdown radio back together," said David Kantor, senior vice president, network operations, Chancellor Media. "His style and delivery offer an excellent association for advertisers and stations, while listeners can count on the personable style only Casey can offer each week."

Women first

Kantor hopes to attract "anyone who wants to listen to a countdown show," but said the target audience is women.

"If you look at the demographic of CHR and hot AC stations in general," Kantor said, "they tend to skew toward women."



Casey Kasem and a Classic Neumann U87 Microphone

While listeners tune in to hear the 40 most popular songs of the week, "brand loyalty" helps the show stand out from other the countdowns on the air, Kantor said. "If you talk to women between the ages of 12 and 50 and say 'American Top 40,' they still think of Casey and the countdown. So why not use what has been one of the best brands in radio?"

In addition to the CHR-formatted "American Top 40 with Casey Kasem" that runs for four hours, AMFM also offers a pair of "American Top 20 with Casey Kasem" two-hour shows each week, targeted to AC and hot AC stations. All three shows were scheduled to debut on more than 350 stations in late March.

The shows are expected to air on many of the stations that had run Kasem's three Westwood One countdowns, which had a "lack of clearance in the top markets," said Kantor. "Casey did not have an affiliate in New York, Los Angeles or San Francisco. We have stations in those markets that are now going to carry Casey."

Lawsuit

Westwood One, at press time, was pursuing a breach-of-contract lawsuit against Kasem, who had two years remaining on his contract with the syndicator and had asked for a five-year extension, according to Peggy Panosh, Westwood One vice president of marketing and promotion.

"That would essentially be a seven-year contract," Panosh said. "We were not willing to do that. So he made a deal with AMFM, which is in breach of his contract with us." Panosh declined to comment further on details of the lawsuit.

A press release issued by Kasem's attorney stated that he "elected to exercise a right of termination under his contract with Westwood One when the network's performance fell below (the) agreed-upon benchmark."

Kasem stated, "I am deeply disappointed that after so many years together, Westwood One has chosen to end our relationship in this way. There is no basis for suing me, and I am confident that my lawyers will handle the case appropriately. In the meantime, I am looking forward to new challenges and opportunities with AMFM Radio Networks."

Kasem said he anticipates that his audience share will "increase considerably," because Chancellor owns so many radio stations in the top markets.

Other programming

"American Top 40" and "American Top 20," as well as the weekday feature "America's Top Hits with Casey Kasem" are the first programs offered by AMFM, which launched in January.

"Chancellor was one of the few major companies that was not participating in the network advertising pool, which is a $600-million to $700-million (annual) business," Kantor said. "A lot of companies just do network advertising. By starting a network it allows us to share in these revenues and to build a new business based on our strong distribution."

In addition to the Chancellor lineup, the Capstar Broadcast Partners stations are also AMFM affiliates. The two groups share a connection with investment firm Hicks, Muse, Tate & Furst, which owns Capstar and is a stockholder in Chancellor. Between Capstar and Chancellor, AMFM has an estimated reach of 60 million listeners each week on such major-market stations as WLTW(FM) in New York, KKBT(FM) in Los Angeles and WGCI-FM in Chicago.

'Talent driven'

Kantor, who left his previous post as president of ABC Radio Networks to take on the challenge of developing the start-up AMFM Networks, said his strategy is to develop additional programming that is "talent driven."

In addition to Kasem, AMFM has signed jazz personality Dave Koz to host a two-hour weekend show.

Chancellor Media joins the long list of major groups, such as Jacor Communications and Salem Communications, that offer network programming. "The strategy really isn't very complicated," said Pam Taylor, Jacor vice president of communications. "If you have in-your-face programming, you have a better radio station than the guy who does not do that. Jacor invests in programming that is hard to duplicate and makes a difference."

See AMFM, page 26 ▶

HE DARED TO GO THERE.

Big Groups Target Smaller Markets

▶ QUARTER, continued from page 19

close this quarter, the group agreed to buy WWDC-AM-FM for $72 million. The move takes the group to the legal maximum (five FMs and three AMs) in that market.

Still, Pruett said, acquisitions are "less primary" for broadcasters in 1998. "Companies are trying to define themselves," he said.

Michael Rice, managing partner of brokerage New England Media LLC, said he has noticed the early stages of inquiries from groups interested in getting into small and unrated markets. He said it might be something groups are thinking of a "little later in their business plans."

Greg Merrill, director and partner with the brokerage firm Media Services Group said his firm had a record first quarter this year mainly because of closings on transactions agreed upon in the third and fourth quarter of 1997. His office is in Utah.

Group owners continue to search for the right operating formula.

"In my part of the country, they are definitely going down into the smaller markets," said Merrill of group operators. He pointed out that Jacor is already into Idaho cities like Twin Falls, Pocatello, Idaho Falls and Boise. The group also owns stations in Salt Lake City. The philosophy, said Merrill, is to make a regional cluster.

Merrill said the inventory for buying these days is very limited, but there are still one or two independent operators in medium and large markets that "are getting a lot of courting." Media Services Group plans to remain active in the business while exploring peripheral types of industries like cable, outdoor, programming, towers and antennas.

AFTRA Reaction

As consolidation continues, one of the increasingly vocal players in the business may be the American Federation of Television and Radio Artists (AFTRA). Indeed, the union had a very busy first quarter.

Campaign

AFTRA has about 75,000 members in all areas. About 7,000 are broadcasters. Paul Worthman, national director of organizing and research, said AFTRA is campaigning actively at a number of radio and television stations. He knew of at least six that had unionized in the first quarter.

The group also successfully brought the Metro Network in San Francisco into AFTRA and was involved in an election campaign for Metro in Philadelphia.

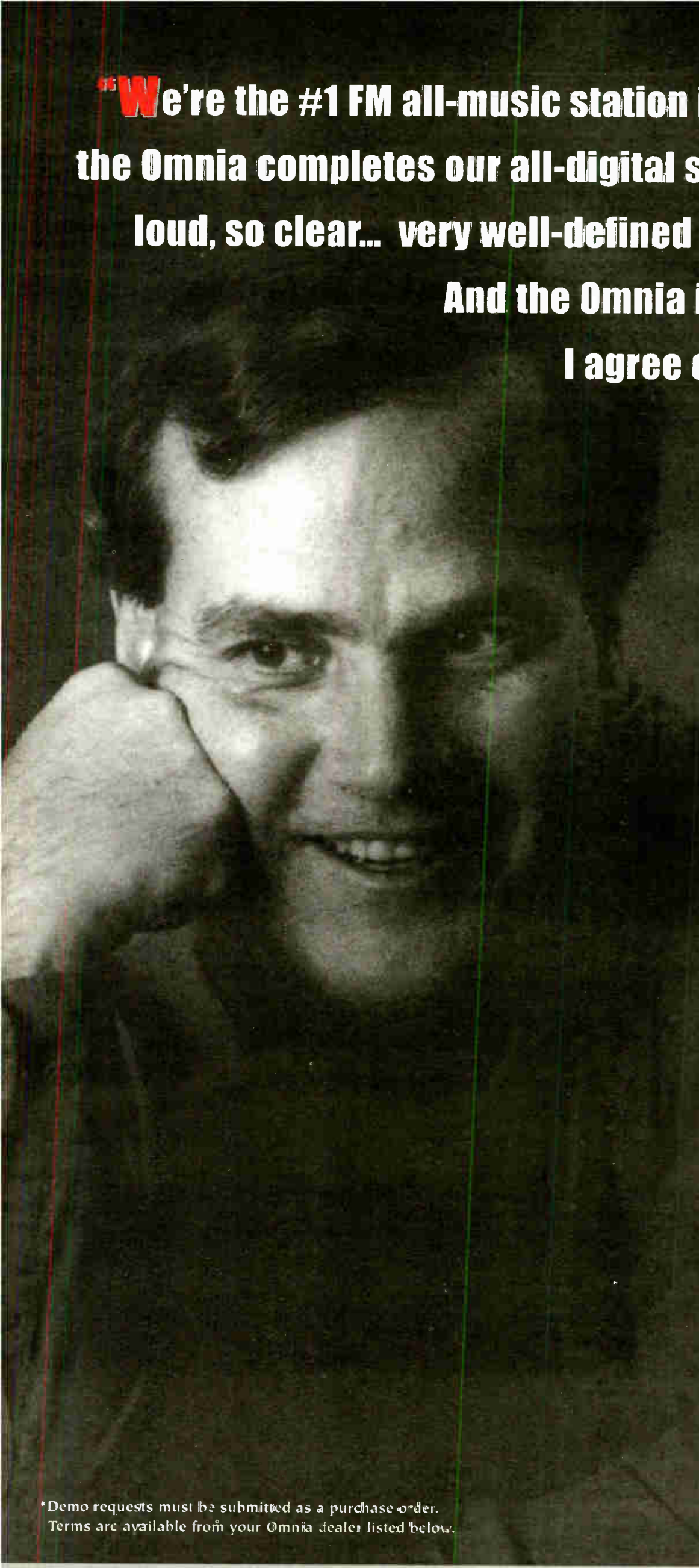
The union's discontent with CBS changes in personnel policies and benefit structure came to a head in the first quarter when AFTRA filed charges of violation of labor laws against the industry giant.

As CBS has consolidated with ARS and Infinity and Westinghouse, Worthman said they have also begun to unify their personnel policies and benefit structures and in doing so they encounter "what a union is all about."

Insecure

He said broadcasters are much more conscious of the insecurities of the business in light of consolidation and the corporate changes that result from it, including rapid changes in wages and benefits and working conditions.

AFTRA also is campaigning at a number of Spanish-language radio and television stations. Worthman expects more news regarding elections and representation requests, making AFTRA an unexpected guest at the industry's celebration of the second birthday of the Telecom Act.



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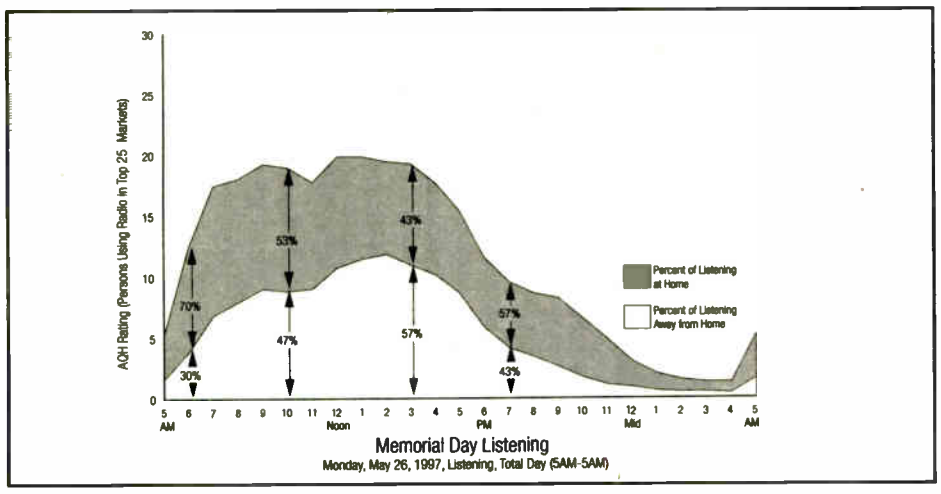
The holidays noted in the preview are Memorial Day, Fourth of July, Labor Day and Thanksgiving.

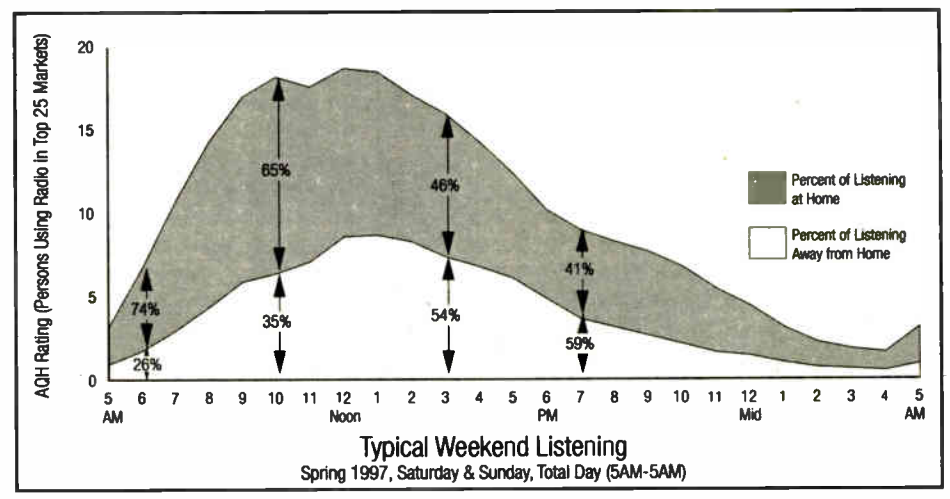
Of those, Arbitron concluded advertisers can reach the most listeners on the Fourth of July.

Later this year, Arbitron will release a more comprehensive study of holiday listening.

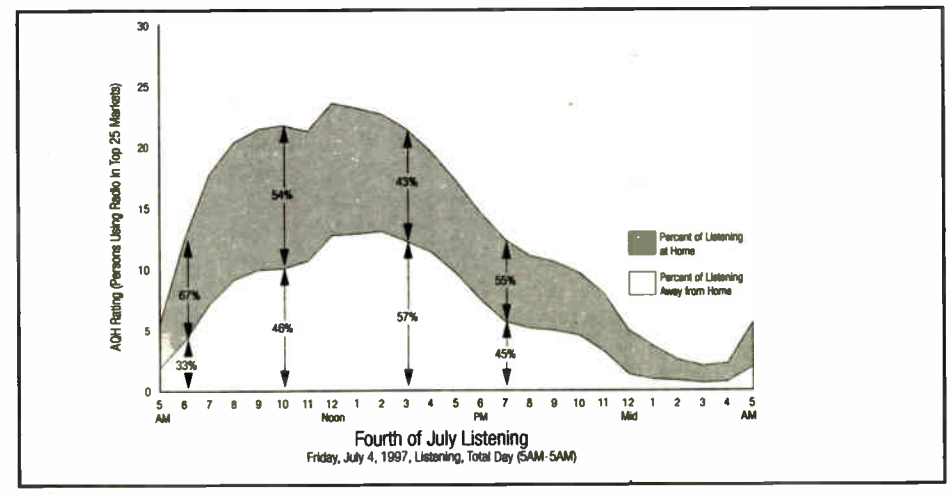
— Chris Hamaker



Memorial Day Listening



Typical Weekend Listening



Fourth of July Listening

Chancellor Media Enters The Network Radio Race

▶ AMFM, continued from page 22

The star-studded Jacor lineup includes four of the biggest names in talk radio: Rush Limbaugh, Dr. Laura Schlessinger, Dr. Dean Edell and overnight host Art Bell.

The Salem Radio Network, which was started in 1993, has found its niche with a strictly conservative blend of programming that includes the Michael Medved and Alan Keyes talk shows and SRN News.

As a result of consolidation, groups can create a strong affiliate base by placing the programs on their own stations. "Immediately we have multiple affiliates in multiple markets," said Kantor, "especially in the top ones, where we own plenty of stations."

Now Kantor is scouting the airwaves for talent that could make AMFM a major voice in talk radio. "If I could find the next Rush or Dr. Laura," he said, "I would certainly sign them up."

The Equipment Roster at 'AT40'

Casey Kasem's new programs for the AMFM Radio Networks are produced in Hollywood, at the studios of Brandon D'Amore Productions. Kasem is using the same Neumann U87 microphone that was used when he originally hosted "American Top 40."

The mic had been in storage since Kasem's departure from the show in 1988, when Shadoe Stevens was brought in as host; ABC Radio Networks ceased using the name "American Top 40" in 1994.

D'Amore worked on the show with Stevens. D'Amore's four staff engineers, as well as Kasem's personal engineer, work on the AMFM programs, which are mastered digitally and then sent to radio stations on CD.

"The shows are being produced about as high-tech as you can get," said D'Amore. "We have three suites and a tracking room, all run with ProTools 4.0. There are about 40 GB of storage just for these shows. It's all removable media. We're doing a round-robin effect. We record an hour or two, then the drives are removed and brought into another editing suite; then they are digitally edited, assembled, and mastered to DAT digitally. Then that goes to the manufacturer to be duplicated to CD. There is no analog, except Casey's voice."

— Bob Rusk

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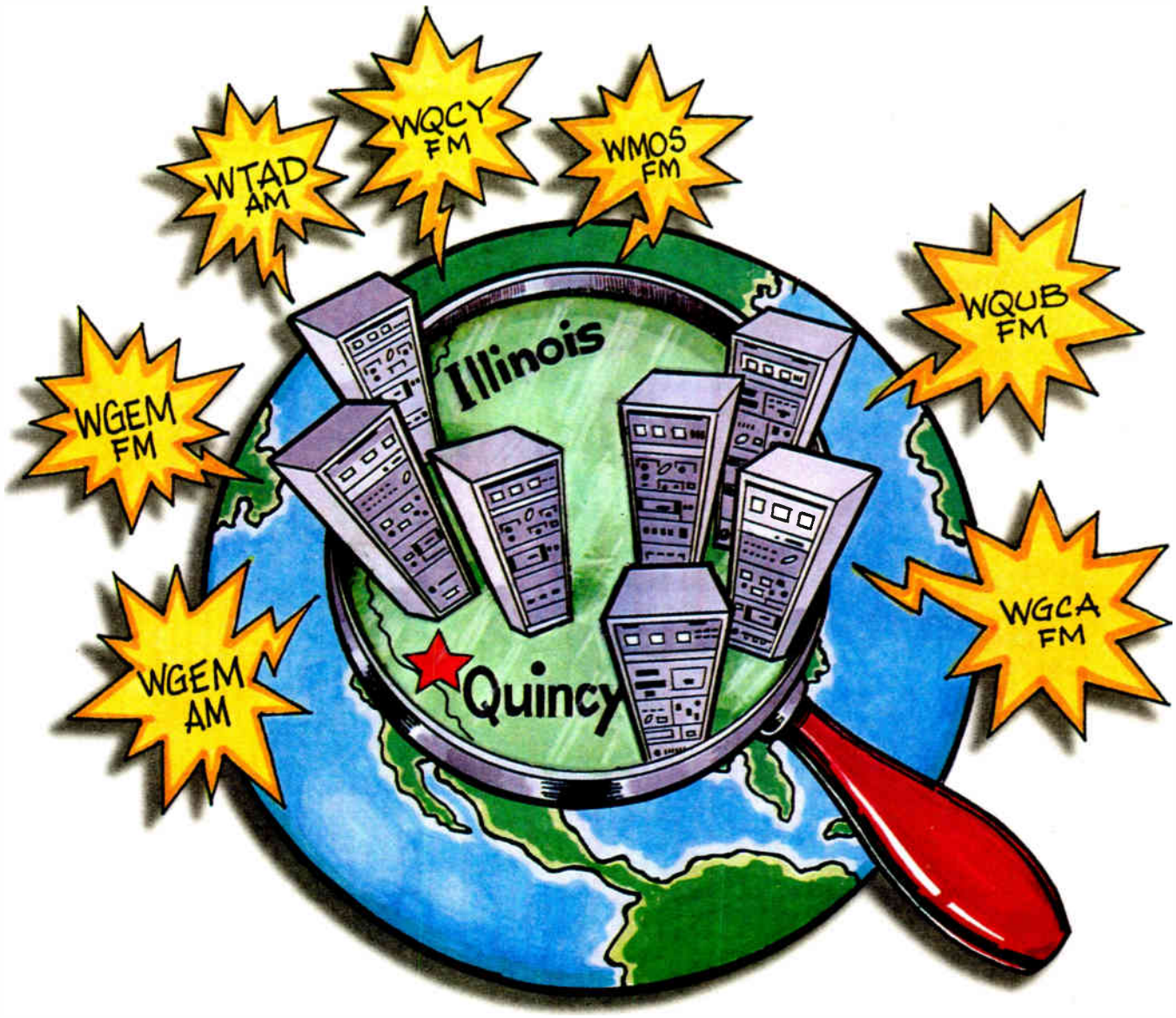

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Studio Sessions

Product Guide
Page 35

Radio World | Resource for Radio Production and Recording | April 15, 1998

Pyramix for 'Type A' Production

Flip Michaels

There are basically two kinds of production directors out there in radio's version of the classic board game "Monopoly": Production Director "A" spends the workday engaged primarily in creative clientele projects, perhaps two promos and an occasional emergency commercial overload dub — all the while delegating the day's grunt work to others. Nice work if you can get it; let us know when you're leaving.

Production Director "B" walks in the door with three scripts needing to hit the air by 10 a.m.; 20 to 30 dubs, half with tags that don't fit a 60-second window; two missing carts that will have to be redone and another six scripts handed in at 4:05 p.m. that must air on the following day's morning drive show. Oh, by the way, the program director has yet to stop on by with his or her *own* special requests.

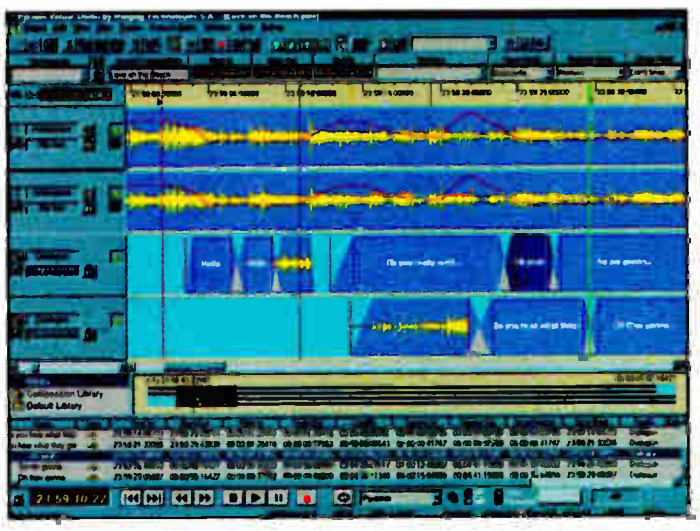
Today's production workstation needs are obviously dependent upon which category the production director falls into. If it happens to be anywhere near Category A, there is a DAW that fits that "state-of-the-art" title tossed about so loosely today: the Pyramix Virtual Studio, a PC-based eight-track hard-disk recording system from Merging Technologies.

Under the hood

The name is pronounced somewhat like *pyramid*, rather than "Pie-ra-mix," and Merging Technologies is hoping broadcasters become more aware of this product.

The engine powering the Pyramix system is a custom 32-bit DSP board. This means that Pyramix can record, mix and process multiple 16-, 18-, 20-, or 24-bit audio streams with no overload. There are actually four of these AT&T 32-bit floating-point DSPs in the system for additional horsepower, as well as for supporting the high sample rates of DVD-compatible counterparts (64, 88.2 and 96 kHz).

In contrast, other 24-bit DAWs have to reduce the gain of two audio elements merely to perform a basic crossfade between them. And this does not even include dynamics, parametric EQ or other processing.



Editing in the Multitrack Mode

The "virtual studio" concept means just what it sounds like. Pyramix allows you to customize a studio workspace in a few seconds. The system runs on Windows 95 or NT 4.0. This familiar working environment makes it easy to alter settings: Find and pull down the Virtual Settings window, define characteristics like sample rate, mix routing (input, mix, and output of external and hard disk tracks) and choice of in-line digital effects processing.

The user's manual was easy to follow. It is refreshing when a manual includes plenty of illustrations and instructions,

See PYRAMIX, page 31 ▶

Ricoh CD-RW Makes Good 'Yankee' Sense

Carl Lindemann

Working in small-market radio — particularly in New England — fosters something of a "Yankee frugality." Reels used to deliver spots are reused for other production purposes. Demo cassettes take on new life when utilized for airchecks. And costly commodities are worked to exhaustion. At one station, I captured a daily feed on the same DAT tape for over a year. Who knows how long my successor used it before it finally wore out.

Ricoh Mediamaster MP 6200

Notice that it is exclusively magnetic media that is recycled. Optical media sent to stations, mostly in the form of CDs and CD-ROMs, is altogether another story.

Until recently, CDs and CD-ROMs have been "read-only" disks. This written-in-stone quality gives them a permanence that magnetic media cannot approach. The tradeoff is in recordability and re-recordability. With the advent of CD-R, the offsets are reduced. Re-recordable CDs further diminish the functional differences between optical and magnetic media. And re-recordable CD-Rs — called CD-RWs — are flooding the market.

The first CD-RW deck worth a mention is the Ricoh Mediamaster MP 6200. It can read audio and data discs and create CD-Rs. It connects through a computer SCSI interface, and comes bundled with a SCSI card, and mastering and backup software as well.

The difference is the device's ability to read, record and erase CD-RW media. For this, Ricoh calls the MP 6200 a "dual function" unit. CD-RW is not a replacement for CD-R. Rather, the technologies complement each other.

The added capabilities of CD-RW are especially welcome in audio applications. The lifeblood of radio production is the tweaking that polishes works-in-progress. CD-RW accommodates this quite well. The medium allows the experimentation of EQ, dithering and different mixouts, then saving these variations on disc without burning up permanent CD-R media.

Working with one-shot recordable

See RICOH, page 32 ▶

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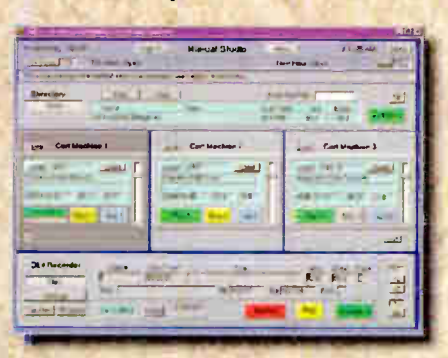

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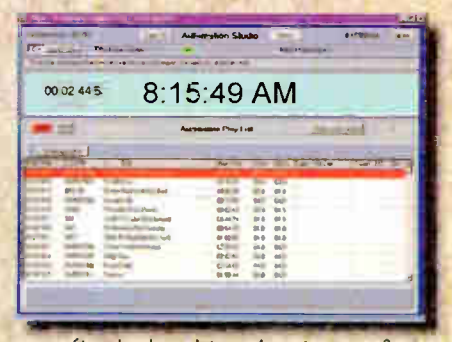

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Cutting Production With Pyramix

▶ PYRAMIX, continued from page 28

written by an author who helped to create the device and uses it as well. The book made it simple to impress techno-weenie colleagues.

Recording is done with the "Digitize Tool," a recording mode window that allows the custom configuration of Pyramix for a variety of media presets (DAT, CD, analog quarter-inch and the like). It also includes the ability to time-stamp recordings, give names to recording sources and control some of these external decks during the recording.

Editing has evolved past the WAV file functions of Cut, Copy and Paste, to now read Trim, Split, Abut, Group and Ungroup. Whatever you feel like calling these functions, Pyramix seems to have an advantage over the earlier word-processing-equivalent terms.

Pyramix is replete with the kinds of editing tools that give producers extensive control over their projects. There are five Insert modes, five Snap modes, unlimited named markers and, most important, 32 levels of Undo/Redo with history menus.

Cutting up

The editing is done on the Composition Editor, providing graphical editing with waveform displays, list editing and an overview display that simplifies navigation during multitrack sessions. A royal nod goes to the designer of the screen graphics and layout. Production directors must stare at monitors for hours every day, and this screen — especially on a 17-inch monitor — is easy on the old eyes.

Producers expect effortless crossfades on a DAW; the Pyramix is on par with any other digital editor now available. Digital effects processing includes parametric and graphic EQs, dynamics control and delays. Pitch shifting, time companding and de-noising are in development for a future upgrade.

Flexible

Merging Technologies made flexibility a key feature of the Pyramix. The options available in this system rival those found in ProTools and, as powerful as the latter system is, it took years for users to receive a true upgrade.

Networking multiple workstations can be done with Pyramix, allowing users to access remote volumes of audio in either peer-to-peer or client/server configurations. This system can play eight tracks of 48 kHz linear audio in real time over a 100 VGAnylan network (that's a 100 Mb Ethernet with load sharing, for those who need to know).

This is not the only network app offered on the Pyramix. It is possible to use any standard PC-compatible network — Gigabyte Ethernet, for example — and the Merging Technology folks can find a way to make it happen.

CD-R mastering with a DAW usually means you are required to buy additional software. The Pyramix Virtual Studio comes ready-to-burn and is compatible with more than 50 CD-R drivers. The program lets you place CD Track Start, End and Sub-Index code markers directly into an audio editing project, then create a master.

A Pyramix portable laptop also is available, working off preliminary specifications of a 180 MHz Pentium Pro with 64 MB RAM and Windows NT 4.0, an Adaptec Wide SCSI adapter, a 4 GB IDE drive and 9 GB Fast & Wide SCSI audio drive. There are numerous I/O options, with ADAT and S/PDIF format I/O on optical connectors plus S/PDIF on coax. This would be a lot of power to bring along on a big-time radio remote.

Familiar feel

Setting noise reduction algorithms feels as if one were using an external-processing module in a recording studio. The Cedar NR-1 plug-in is a familiar noise reduction program that allows the removal of, say, tape hiss from your only copy of a favorite commercial produced back in 1983. Another plug-in option is the AudioExpress, allowing you to send and receive e-mail directly within Pyramix. Regular e-mail is fully supported with a mailbox and text editor, with the ability to attach audio files.

File format conversion is especially important these days. Audio can come into your facility in AIFF, OMF, WAV, AU (SND), MPEG Layer 3 or LRC formats. Merging Technologies included "Convert" in Pyramix; this is a batch file utility allowing you to use just about every known file extension for audio.

Time is money in the production room. Should your job description fall into the production director "B" category of "Sixteen more commercials to go today," it is likely the basic editor you are now using — and I hope it is not a razor blade this late in the decade — is probably fitting.

If, on the other hand, your job description includes "Spend as much time as needed to make this an A-plus project," you will find the Pyramix Virtual Studio a capable performer. The system never crashed while I was using it, nor did it indulge in demonic acts sometimes experienced with other digital gear, where the box goes crazy and then stops the moment the engineer walks in the studio.

A stripped Pyramix Virtual Studio lists at around $6,995. To find out more, contact the company's U.S. distributor, Panasonic, at the number shown below.

■ ■ ■

For information, contact Panasonic at (714) 373-7277; on the World Wide Web at www.merging.com *or circle* ***Reader Service 114.***

Flip Michaels is production director for classical-formatted WGMS-FM, Washington. His most recent article for ***RW*** *was a review of the Denon DN-T620 combined CD/cassette deck.*

Consider Advantages of CD-RW

▶ RICOH, continued from page 28

CDs short-circuits the process. Burning a disc puts an end to the production process. Having afterthoughts on some mix or EQ decisions becomes problematic: You either settle for the adequate version you just burned, or try again.

This same ability makes it well-suited for data archiving applications. Jeff Lengyel, marketing manager for the Ricoh Consumer Products Group, said CD-RW makes most other solutions, especially tape-based ones, obsolete. "Magnetic media was an interim step until optical storage came about," he said. "It is now here."

CD-RW is more reliable. Magnetic-based media, according to Lengyel, "can degrade over time or be influenced by environmental factors like magnetism or impact."

Of course, CDs can suffer from scratches, but are relatively impervious to anything else. Data stored on CD-RW is secure for at least 30 years.

CD-RW also is good for at least 1,000 rewrites. As with magnetic media, dropouts will still happen over continual use, but do not affect CD-RW reliability.

With magnetic media, it is possible to unknowingly record data to a damaged sector. You never find out about it until you unsuccessfully try to recover that data. On CD-RW, a bad sector will only slightly reduce a disc's capacity. But what remains is reliable.

According to Lengyl, "If it gets to the point where a sector won't reliably hold data, it won't; it writes to another sector instead." For Lengyl, that means never having a false sense of security when backing up data with CD-RW.

Despite all the advances and advantages, there are a few significant drawbacks. CD-RW is a new standard and, at the moment, the emphasis is more on "new" than it is on "standard."

As with any new media, CD-RW discs are pricey. Lengyel admits, "Rewritable media is relatively expensive." At roughly $25 a disc, it is some eight times the price of bulk CD-R media. But the high initial expense is an investment.

The bottom line is that, with a lifetime of over 1,000 rewrites, CD-RW will save many times their cost in wasted CD-R discs.

Getting accepted

Where CD-R discs will play in most any CD-ROM or standard audio CD player, CD-RW requires a multi-read drive to decode its less-reflective surface. Not all CD-ROM drives currently sold or installed conform to multi-read specifications.

Naturally, this will change in time, but what will not is CD-RW's incompatibility with standard audio CD players. You will not be able to pass around an audio CD-RW work-in-progress disc for review on home or car CD players. It is not a universal function CD format.

For all of these limitations, the Ricoh CD-RW is a remarkable piece of technology. Not long ago, re-recordable CD technology seemed impossible, or at best highly impractical. The Ricoh unit accomplishes this at a price not significantly higher than standard CD-R units. For around $100 extra, you greatly enhance CD-R functionality.

One more thing about the Ricoh MP 6200. On a subjective level, the experience was anxiety-free from the moment I first clicked the Record icon.

I had not noticed how accustomed I had become to living in fear and self-doubt while burning CDs. Had I forgotten anything? Was I about to toast another coaster? *(Editor's note: "coaster" is a slang term for a ruined CD-R.)*

Obviously not. With the ability to erase and rewrite the contents of a disc, these nagging thoughts disappeared. CD-RW is soothing to "Yankee" sensibilities.

The Ricoh Corp. is at 475 Lillard Drive, Sparks, Nev., 89434.

■ ■ ■

For information, contact Ricoh in Nevada at (702) 352-1600 or circle ***Reader Service 140.***

Carl Lindemann produces and hosts the syndicated radio feature "Cyberscene" and contributes to ***RW.***

CD-RW vs. JAZ

With this added functionality, CD-RW encroaches on other storage devices like the Iomega JAZ and ZIP drive products. Such magnetic media-based "removable drives" contain up to 1.5 GB of information. While these devices have more capacity than a 650 MB CD-RW, cartridges are significantly more expensive — around $100 per GB.

Despite this, CD-RW is a reasonable contender in the removable storage market. If you are using or considering a JAZ drive or the like, you may want to give some thought to CD-RW as well.

If you are actually using removable media for audio production — reading and writing through a digital editor/recorder — these drives are relatively fast. They may not be fast enough to do multitrack production in real time, so be sure to check out the specs on access times.

It is more likely you are using it to store and transfer large files to hard drive. If so, CD-RW may actually be a better way to go.

— Carl Lindemann

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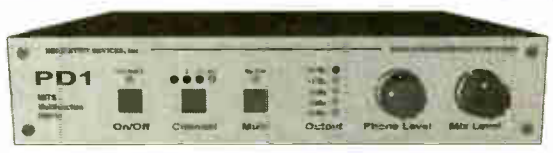

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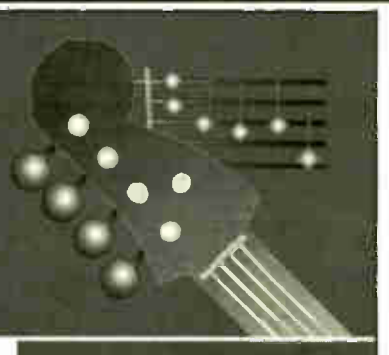

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PRODUCT GUIDE

Products for Radio Production

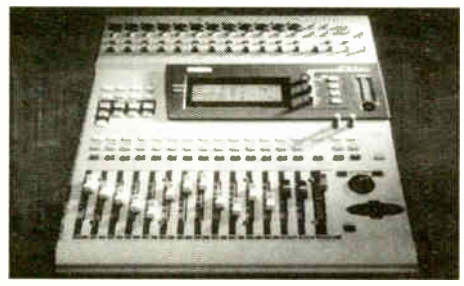
Mail info and photos to: RW Product Guide, P.O. Box 1214, Falls Church, VA 22041

New Yamaha Digital Console

In March, Yamaha introduced the 01V, a digital mixing console with similar performance to the 02R and 03D mixers, but at a price comparable to the four-year-old Yamaha ProMix 01.

The 01V has 24 full-featured channels, two stereo effect returns, six mix busses and six Aux sends. Two 32-bit processors provide a variety of special effects and sonic performance comparable to the 03D. A graphic LCD window displays the status of levels and processing.

Fifteen motorized faders on the control surface are tied to the 01V scene memory, with 99 mix snapshot locations. Dedicated rotary controls adjust EQ and



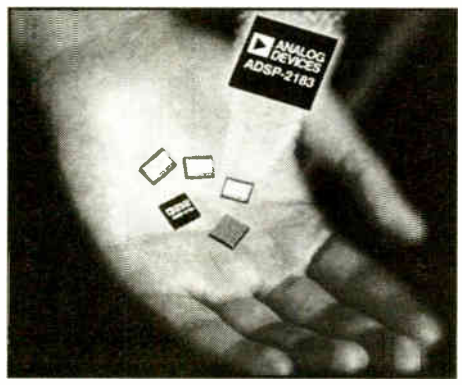
Pan. Built-in MIDI and To Host ports allow the 01V to connect to personal computers and additional 01V mixers.

Optional features include I/O cards for Alesis ADAT, Tascam TDIF-1 and AES/EBU. Suggested price of the 01V is $1,999.

*For information, contact Yamaha in California at (714) 522-9011 or circle **Reader Service 166**.*

Analog Devices Miniature DSP

Analog Devices of Norwood, Mass., announced the creation of what it calls the "world's smallest DSP," the one square-centimeter ADSP-2183 chip.



While designed primarily for consumer electronics, this development may have applications for tinier, more powerful audio processors as well.

The 2183 joins two other circuit chips in the Analog Devices line, the 2187L and 2189L. Both offer up to 1.5 Mbits on-chip SRAM. The small size and low (3 VDC) power requirements of the new processors are augmented by the performance of each: up to 29 MIPS for the 2183 and 66 MIPS for the 2189. At present, uses for the Analog Devices DSPs include two-way paging, cellular equipment and Internet appliances.

There are 36 DSPs available in the ADSP-218x family.

For information, contact Analog Devices in Massachusetts at (800) 262-5643 or circle Reader Service 192.

Gepco Digital-Ready Mic Cable

Designed for high-performance analog applications and anticipated digital audio needs, type 5522M digital microphone cable from Gepco International is available in bulk lengths and custom-cuts.

Said to cost less than one-half the price of conventional high-end digital cables, the 5522M consists of two twisted 22-gauge tinned copper conductors and a 22-gauge tinned copper drain wire. The shield is a 95-percent tinned copper braid, coated in a thick and durable PVC jacket.

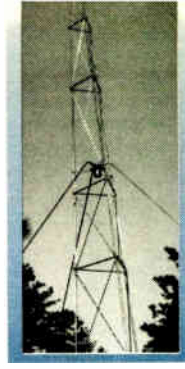
Capacitance is stated to be one-fourth of most quad-wired mic cables, allowing cable runs of two to three times as far as conventional cables, with no significant high-frequency rolloff.

For information, contact Gepco International in Chicago at (312) 733-9555 or circle Reader Service 89.

STATION/STUDIO SERVICES

Buyer's Guide

Radio World | Antennas, Towers & RF Cable | April 15, 1998



Meet the Umbrella Antenna Page 41

SPECIAL REPORT

FM Stations Pay for DTV Rollout

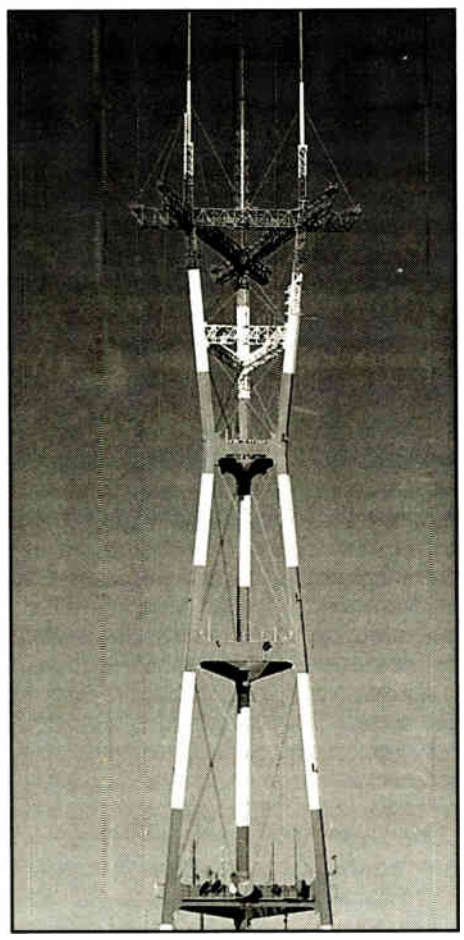
Demands of Digital Television Raise Many New Questions for FM Tenants

Lynn Meadows

The rollout of digital television is taking a physical and financial toll on FM station owners nationwide — particularly those who lease space on television towers.

Look at the northeast, where tower space often is scarce. Prior to DTV, Clear Channel station WKCI(FM) in New Haven, Conn., leased tower space from WTNH-TV, Channel 8, and shared it with WTNH 8, WTVU 59 and WPLR(FM).

WKCI had a lifetime lease on the eight-foot-face tower, provided the tower owner did not dismantle it, said Fred Santore, technical director for WKCI and two AM stations in the market. The owner, however, *did* tear down the tower, and, to accommodate DTV equipment, erected a tower with a 12-foot face in its place.



Sutro Tower in San Francisco

Limited options

The tower owner then told WKCI to lower its antenna from 750 feet to 550 feet, and increased the rent by nearly 400 percent, Santore said. The station is fighting the decision.

That tower is now for sale, and Santore hopes to negotiate with the new owners. But the station's options are limited. Santore said local zoning is partly responsible for the lack of available towers. The city has a moratorium on cellular phone towers, which decreases the chances of constructing another 1,000-foot broadcast tower.

In Boston, WCRB(FM) shares space on the WBZ-TV tower with four television stations. The fate of the station antenna has been an open question for a couple of years, said Director of Engineering David Maxson. The station has been operating with an "at-will" tenancy since its lease expired.

"We're hanging on," said Maxson. "We have been told that they expect to be able to keep us at a reasonable height on the tower."

Given the new conditions, however, the station may not want to stay. WBZ must significantly alter the top of the tower. To accomplish those changes, it plans to lower all antennas below a certain

See DTV, page 39 ▶

In This Issue

In this *Buyer's Guide*, we look "out back," to the antennas and towers that serve our radio stations.

Long-time **RW** contributor Harold Hallikainen provides an update of the FCC tower database project.

FM station owners already are feeling the effects of DTV. Lynn Meadows and Mark Croom discuss your options and report on how some stations are protecting their FM antenna placements and adjusting their RF facilities.

Because tower space has become scarce and more valuable, a team of engineers has developed a new AM antenna design, described here by respected consultant Clarence Beverage, one of its developers.

Having problems with moisture in your cable? Consider pressurization. Gordon Treichler, business unit manager for Andrew Corp., explains how cable pressurization works, defines various pressurization systems and provides a preparation checklist to help you decide which system fits your needs.

We welcome your feedback and ideas for the *Buyer's Guide*. Send your suggestions to *srae@imaspub.com*

— Susan Kreis

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Executives Consider RF Consolidation

Mark Croom

If studio consolidation benefits the broadcaster, can RF facility consolidation do the same?

Such consolidation is more likely for FM. Unless they can attain major financial or practical gains, AM stations owners probably will not consolidate their RF facilities, especially when

directional AM systems are involved. The engineering of those systems is complex to the point of impossibility and they are costly to build and maintain.

Before any project, an engineer with financial perception will ask "Can this save — or earn — my company money?"

It would not be practical to bring a group of stations having several transmitter sites together. Regulatory concerns force stations to locate within certain — often small — areas to maintain distance between adjacent channel stations. Another prohibitive factor is the cost of engineering and building transmitter facilities, and applying for changes for one or more stations.

DTV will have an impact on some radio broadcasters, and it may push some to consolidate RF facilities.

Influencing factors

Usually, political and competitive realities prevent stations with diverse ownership from sharing transmission. Daryl Buechting, FM product line manager for Harris Broadcasting, said alliances may be forged in the future, but "only with time, unless there is a strong driving force."

Buechting said that DTV will have an impact on some radio broadcasters, and that it may push some to consolidate RF facilities. But, he said, many will consolidate during normal equipment replacement cycles.

Co-owned stations can have an advantage combining their RF facilities. Normally, consolidated FM facilities share a broadband antenna system, and use a combiner and filter system to get the signals to a common feedline without interfering with each transmitter's operation. In the past, chiefly "major markets" used this setup; but now more stations consider it an option.

"Stations are definitely interested in combiner and shared-antenna systems," said Joe Rohrer, sales engineer for Shively Labs, a provider of antenna and combiner systems. He said owners and engineers are thinking ahead, and that quotations for such systems are up 15 to 20 percent at Shively. "Orders are definitely up, too, but not what they will be." Rohrer predicted in less than two years, Shively will see a great increase in the domestic combiner business.

Dave Davies, engineering manager for Electronics Research Inc., said the company is seeing not only an increase in quotes, but in real business, too. "We're pushing about six combiner systems a month out of here" to destinations within the United States.

Davies said some of the larger media groups are trying to get an early start, possibly anticipating the increased demand that may be ahead. According to Davies, the major manufacturers, which have a limited production capacity, may have difficulty in keeping reasonable shipping timelines if demand for the systems climbs in proportion to the number of quotations that ERI has been producing.

Though combined FM facilities have been around within larger markets for some time, occasionally stations in smaller markets will benefit from consolidating RF facilities. Delta Radio Inc. owns a group of a half-dozen stations in Mississippi and Arkansas. Larry Fuss, president and general manager of Delta Radio said, "Our original plan was a station upgrade with a new 540-foot tower for WDTL-FM in Cleveland, Mississippi."

When the tower serving WOHT-FM in nearby Drew, Miss., collapsed, Delta Radio began to explore the possibility of bringing the two stations together into a single facility, rather than rebuilding. The completed engineering plan showed that WOHT could be moved to the site near Cleveland, where they had begun working on a full C2 upgrade for WDTL.

Delta Radio also considered whether combining the stations would be worthwhile. The alternative was using separate antennas and feedlines. They found that the cost would be about the same. They elected to diplex the stations into

a single antenna at 150 meters.

Because WOHT-FM is a 6 kW, Class A station, they reduced the ERP of the lower-powered station from 3 kW to 2.65 kW, enabling them to use the higher antenna. Fuss said WDTL gets better coverage from the Class A signal with the added height than with the original 3 kW signal they had before the tower collapse.

If there is a downside to all this combining, it has to be with the common components. Fuss said they experienced some frustration from sharing one antenna and feedline when "some idiot put a .22 bullet through our feedline and knocked us off the air for about two days while we located and patched around the problem."

However, he is happy he diplexed and recommends it to anyone with the circumstances to justify it.

Paul Jellison, engineering manager of Jacor-owned properties in Cincinnati, said the company is bringing five stations together in a single master antenna system and combiner. This "big-time" project includes four Jacor frequencies and one

owned by ARS. The new building can also accommodate a DTV transmitter system for the Jacor-owned station on channel 12.

Jellison said the project was put together for several reasons: "First, a signal upgrade for a former Class A to a B1. Then the other issue of a tower lease going away on one station, and just a really good opportunity to improve all the signals" influenced the decision. The group is working on a two-phase project that would provide a nearby auxiliary site for all the backups, eventually resulting in almost full redundancy.

With such opportunities come challenges, too. Jellison said when compared with planning a single-station site, unique issues evolve when developing a multi-station site. Having to come up with STL paths to both sites in an already congested 950 band is one of them.

Remote control is another problem. Jellison said, "We analyzed all the current systems and came to the realization that no R/C system will fully handle our needs. To that end we are developing our own system." He said they are finally planning the heart of the project, which includes an ERI combiner with more than 30 cavity filters. The RF plumbing and transmitter work alone will keep the engineers busy for quite a while.

Soon, some FM stations that share tower space with TV stations may find themselves exploring their options as the TV owners look for room for their DTV antennas. *(See related story, page 36.)* Some towers will not have sufficient capacity to support all the antennas, and FM stations may get pushed off.

These trends, observers say, may produce even more demand for combined master antenna sites. If quotations are an indication, that business is increasing already.

■■■

Mark Croom is chief engineer of WNWC-AM-FM in Madison, Wis.

TECHNICAL TIPS

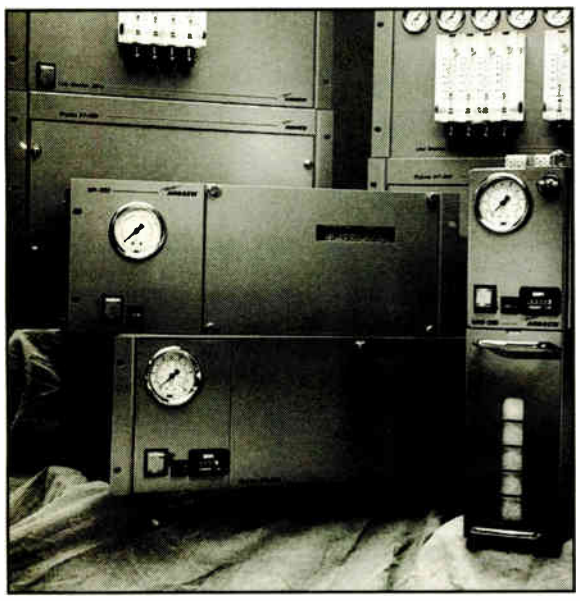
Get the Most From Pressurization

Gordon Treichler

The author is employed by manufacturer Andrew Corp. He prepared this discussion at the request of RW.

Reliable RF transmission lines are dry transmission lines.

Moisture entering a transmission line, whether it has an inner conductor or not, condenses and collects as water in the lowest gravity point in the horizontal run. Condensation inside the line leads to corrosion, voltage breakdown and increased VSWR.



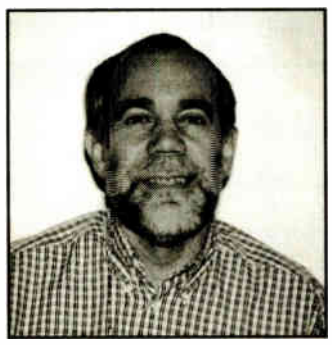
Andrew Pressurization Systems

Pressurization equipment will improve the performance of RF system components and save money. Dehydrator pressurization equipment protects antenna and transmission line systems from the effects of moisture penetration.

The constant supply of dry air under pressure assures signal quality and low VSWR, and reduces risk of component damage from voltage breakdown and corrosion. Maintenance costs are lowered, thus reducing operating costs.

Two natural environmental conditions — barometric pressure and ambient temperature changes — produce changing air pressure inside any air-filled closed space, in this case, air dielectric cable or waveguide. Barometric pressure changes have little effect on closed spaces, while changing temperature produces pressure up to several pounds per square inch.

When the temperature drops, the decreasing pressure produces negative pressure, drawing in ambient air that may have a high water vapor content. Daily temperature cycling creates a "breathing" effect that over time produces high levels of water vapor inside the cable.



Gordon Treichler

Properly pressurizing cable with a dry air source assures high signal quality, low VSWR and reduced risk of component damage from voltage breakdown and corrosion.

Once design requirements have been determined and the seven selection questions answered, choosing the best dehydrator for your RF system is simple.

Pressurization systems can be classified as *static* or *dynamic*. Static systems have no source of pressure after installation. Dynamic systems have the ability to re-pressurize the waveguide as needed to compensate for leakage.

Static systems

Static desiccators are suitable for short waveguide runs with low internal volumes, feeds or combiners that need protection from moisture. In a non-pressurized system, a breathing static desiccator may be used.

As the system pressure increases, air is forced out through the desiccator. As the pressure decreases, make-up air passes through the desiccator, absorbing the moisture before allowing dry air to enter the system.

A static desiccator will last many months on a small tight system of two cubic feet or less.

Pressurized static systems are suitable for very tight, small systems that have close supervision with frequent inspection and manual recharging.

The transmission line is pressured by an external source, such as a hand pump, and the source removed.

Since the system is not hermetically sealed, it requires frequent inspection for recharging. The gas inlet valve must be readily accessible, and system operation is very labor intensive.

Dynamic systems

A dynamic system incorporates a pressurizing source that provides dry gas on demand. The pressurizing source may be nitrogen tanks with a regulator, or an automatic dehydrator.

Nitrogen cylinders with regulators are suitable for small, tight systems where power is unavailable. There are no moving parts, and they provide a low dew point but the monitoring costs and tank replacement expenses can be high. Use them only for systems that have low internal and purge volumes. System leaks bleed down tanks rapidly, and nitrogen tank-delivery can be erratic.

Pressurized nitrogen should not be used at a site that is not always accessible. Vandalism, particularly a bullet hole in the waveguide, immediately depletes the nitrogen tanks. Nitrogen system maintenance also requires someone knowledgeable about the hazards.

At a minimum, that person must be trained to handle heavy cylinders, to know the proper operation of the valves and regulators, and must be supplied with proper

See PRESSURIZE, page 39 ▶

Pressurization Preparation Checklist

You must consider several design elements when you are considering pressurization.

- First, ascertain the mounting requirements and space availability.
- Determine the total system volume, including cable/waveguide runs, feeds and combiners.
- Check all system components for pressure limits, and identify the power source and type — voltage, frequency, current/power limits.
- List alarm requirements, review maintenance cycle needs and determine distribution and metering needs.
- Note all the types of cable runs and the number of connections to identify possible leak points in the system.

Answer the following seven questions to determine the proper pressurization system.

1. Can the dehydrator purge the system?
2. Is the dehydrator recommended for purging?
3. What is the required maintenance cycle?
4. How often must I check the unit?
5. What is the warranty period?
6. Is the dehydrator properly sized to the system?
7. Have all design requirements been met?

Once the checklist has been thoroughly completed and all seven questions have been answered, use the results to determine which pressurization system is best for your RF needs.

— Gordon Treichler

DTV Demands Force FM Changes

▶ DTV, continued from page 36

elevation for eight to 10 weeks.

Options for the WCRB antenna include three other local towers, which rise to the 1,000-foot range. Two of them lease to FMs. But the price tag for the move will likely be significant, especially if the station leases space on a tower with a master antenna.

Double trouble

Milford Smith, vice president, Radio Engineering for Greater Media Inc., said his group was affected in two markets by the DTV rollout. In Detroit, both the main and auxiliary antennas of WRIF(FM) are located on a tower owned by WXYZ-TV.

A lease, signed before Greater Media bought the station, gave the tower owner the right to remove the auxiliary antenna if necessary. Greater Media heard almost a year ago that it must move the auxiliary antenna. Luckily, said Smith, the group owns a large tower in the city and plans to consolidate a number of things on it, including the WRIF auxiliary antenna.

He also said another recently acquired station, WXXM(FM), Philadelphia, learned that the tower owners would not renew the lease for its main and auxiliary antennas. Although the station got an extension for the auxiliary antenna, the main antenna must be moved by June.

Greater Media also owns WMGK(FM), Philadelphia and decided to multiplex the main and auxiliary facilities of the two stations. It built a new transmitter room for WXXM and replaced a three-station multiplexer with a four-station multiplexer.

Smith said that while the upgrades, which cost more than $1 million, were desirable, DTV gave the group little choice in deciding when to do them.

Gene Zastrow is the manager of San Francisco-based Sutro Tower, a company that holds 10 television antennas and four FM antennas. The television antennas are on three spires above the tower.

"It has been quite a challenge to figure this out," Zastrow said. The tower was strengthened and a long panel is being added between the fifth and sixth level of the tower to house the new digital antennas. As a result, the four FMs will have to move to other locations on the tower.

Heftel Broadcasting Corp. owns KSOL(FM), San Francisco, and uses Sutro Tower for its antenna. The antenna, formerly on level five, will now be fitted on a pipe that hangs down from level five. David Stewart, director of engineering for Heftel, said early in the project, he worried a great deal about displacement. He said nobody has said anything about forcing a Heftel station off a tower to make room for DTV, but most Heftel stations are not on television towers.

While the upgrades were desirable, DTV gave them little choice in deciding when to do them.

"It is happening, no question," said Gary Hess, director of tower operations for American Tower Systems. ATS is involved in constructing new towers at antenna farms in major markets, said Hess. All of those towers include a master antenna for FM transmission.

Although he credited other factors like age of installation and stricter RFR rules, Hess said his company has seen "as big a market for FM displacement as there is for DTV."

Bob Surette, manager of RF engineering for Shively Labs, said that he has noticed FM stations are increasingly going on more "marginal" sites.

"As the FM owners are being forced to move to their second-, third- or fourth-best choice for a site, they are putting more and more demands on the antennas and patterns," said Surette. "It used to be that engineers were interested in increasing coverage. More and more often now, they are concerned with simply holding on to what they already have."

Surette said his company has noticed an increased interest in auxiliary sites.

"While I am sure that the accidents this past year have made a lot of people consider their vulnerability, the driving force again seems to be DTV. Many FM owners are looking at being off the air for an extended period of time when the new DTV antennas are installed."

■■■

Lynn Meadows is a free-lance writer based in Virginia Beach, Va., and is a frequent contributor to RW.

Pressurization Systems

▶ PRESSURIZE, continued from page 38

equipment. Larger, more complex nitrogen systems require highly trained personnel.

Manual regenerative dehydrators are an economical method for pressurizing small, tight systems. These dehydrators use a moisture absorptive desiccant that is regenerated by baking. They require electrical power, and the desiccant must be periodically inspected and regenerated or replaced.

Fully automatic membrane dehydrators are recommended for low- to high-system and purge volumes. Advanced air systems for pressurizing transmission lines, they cycle on and off, or, in an emergency, run continuously, providing a maintenance-free system.

These dehydrators provide high reliability and a low dew point. With about 80 fewer parts than a comparable swing system, a membrane dehydrator provides a mean time between failure as high as 55,000 hours and a minimum dew point of -50 degrees Fahrenheit.

Once installed, membrane dehydrators require minimal maintenance and a skill level commensurate with changing an air intake filter. In case of a line problem or vandalism, the dehydrator will prevent moisture from entering the transmission line, though optimum pressure may not be maintained.

Pressure swing automatic dehydrators are similar in function to the fully automatic membrane dehydrators. These are "older" style dehydrators that do not provide the same trouble-free performance, low noise and vibration, and continuous drying as automatic membrane dehydrators.

For the best long-term reliable performance of your RF transmission lines, a properly installed pressurization system, matched to your requirements, will provide many years of trouble-free service.

■■■

Gordon Treichler is business unit manager for the pressurization product line at Andrew Corp., Orland Park, Ill. "PSI System Select" dehydrator selection software is available free from Andrew. Call the company at (800) 255-1479, and request diskette M366.

HAM RADIO

Nets Cater to Ham Addictions

Al Parker, N2SAG

A few months back we discussed "nets." The world of ham radio networks is vast, running the gamut from service nets dedicated to emergencies and life-saving, to casual chat groups dedicated to nothing more than fun. Before launching into an ARRL-style promo about the lofty side of nets, we must purge ourselves of unclean thoughts! I guess it's safe to assume that we all have our little "peccadilloes," interests that we wouldn't want our friends and family to know about. Ham radio really is no different.

For some, the perversion takes the form of a secret desire to listen to chaos and "radio-rollerball," like some of the bizarre antics on 14.313 MHz. For others it is a shameful attraction to unusual equipment. Affection for prestigious brands like Collins, Johnson, Drake, Hallicrafters and the modern Ten-Tec, Yaesu, Kenwood and Icom rigs is considered as normal as Mom and apple pie!

While we all appreciate these mainstream products, there are many with a dirty little secret. They are Swan-o-philes, and there are a number of nets catering to this radio perversion!

Wings of a Swan

What's a Swan? Middle-aged or older hams know that the Swan Electronics Co. was founded by Herb Johnson in about 1960. The company was best known for its powerful, but relatively cheap single-sideband transceivers. Not long after the introduction of its most popular model, the Swan 350, the company actually was selling more units than any of its competitors. The formula of offering "the most for the least" worked quite well up to the late 1970s, when the Japanese invasion did to Swan what the Beatles and Rolling Stones did to Elvis.

Like the King, Swans got glitzy and bloated on the outside, but didn't really keep up with the times. The analogy to Elvis holds up in that that the Swan spirit lives on. You won't experience ghostly sightings, but you will see them popping up at local flea markets and hamfests. They are an ideal way to get into the hobby and learn about electronics for the price of a night out on the town.

Achieving a price point that would make a high-power SSB transceiver available to the average guy was quite an engineering feat. Johnson was able to sell his first mono-band transceiver for only $275, compared to almost $1,200 for a Collins KWM-2. In 1961, most hams still were using separate transmitters and receivers. The transceiver still was an exotic and pricey concept. The advantages, especially for mobile use and general convenience, were undeniable. The Swan was to transceivers what the original Mustang was to sporty cars. Suddenly, everyman could experience the joys of transceiving.

Pretty bird, dirty bird?

Swans, the birds, are beautiful to look at, but can be dirty and nasty. The radio Swans have a similar reputation. The beauty part emanates from Johnson's shrewd decision to spare no expense in the areas potential buyers were most likely to notice.

The Swan 350 and its successors were fitted out with the most spectacular "S"/Power/Current meter ever. The magnificent cinemascope gauge can be read clear across a large room. The meter ballistics are ideal for reading SSB signals. The other grabber was just that: a magnificently geared, vernier tuning dial with a large readout. The size and feel of the tuning dial probably sold more Swans than just about any other feature. Ironically, the tuning system offered poor resolution, with only 10 kc increments marked. The built-in crystal calibrator was some compensation. Swan engineers probably felt that SSB signals were best tuned by ear. True enough, but 1 kc reference points are so much nicer when you're calling CQ near the band (or privilege) margins!

The overall effect of the large windows, hefty tuning knob and dark-gray and black styling was a kind of masculinity. Contemporary Drake equipment came off as somewhat fragile looking by comparison. The rivalry between Drake and Swan is one of the most interesting competitions in radio consumer products history. Another car analogy might best illustrate the mood, maybe the classic battle between the Corvette and European sports cars. The less expensive, less refined, early Corvette, like the Swan, was designed around mundane components, depending on sexy styling and brute power, while the Drake had Jaguar-like sophistication going for it. Ultimate performance was neck and neck, but like the Jag, the Drake had the snob appeal.

As a kid in the late 1960s, I remember seeing those Swans at the Harrison Radio showroom. They beckoned to me like sirens. Little did I realize that it would take a quarter of a century to possess one of those gray and black beauties! That first Swan was a gift, an abused, very early vintage Swan 350. It didn't take long to realize that with a little TLC, these rigs could be made to sound better than most modern rigs. A 12AX7 speech-amp and audio-driver with easily adjustable SSB filter-balancing offers great potential for full-bodied transmit audio!

A recently acquired Swan 700S brings the story full circle. Built in the final days of Swan, this model looked totally different cosmetically, but was very much the same design internally. There is a sadness to the plastic external concessions to the slick Japanese competitors, contrasted against internal components unchanged from the earliest models. IC boards stick up through tube socket holes! It's so symbolic of the end of a glorious era.

Drifty 350?

Over the years, it seems that the Swan rigs have failed to retain their value as well as some of the equivalent Drake models. This is where the "dirty bird" side of the Swan equation comes in. Today, solid-state electronics have allowed designers to produce rigs more stable than the Rock of Gibraltar. The original classic Swan is the model 350, nicknamed the Drifty 350. The unflattering moniker emanates from the tendency of the early model to drift in frequency. You would begin your "old-buzzard" transmission on 3.8500 MHz and by the time you turned it over to the next person in the rotation, the group would have been forced to change frequency involuntarily to 3.8501 or 3.8549 MHz! In the '60s, this kind of drift was an inconvenience, but in the 1990s, with all those Phase-Lock-Loop imports, it's morbidly embarrassing!

The problem was not poor quality control or even cheap components. The trouble was in a unique band-switching strategy. The mechanical complexity of physically switching VFO frequencies along with the various IF and RF stages, instead of heterodyning a fixed VFO range, was at the root of the problem. The system worked as well as the more-conventional fixed VFO range system, until simple wear or dirt took its toll. Swans of more recent vintage owe their improved stability only partially to ongoing design improvements. Most of the perceived superiority in frequency stability is due to the cleaner, less shopworn VFO band-switch wafers of the newer units. Sadly, most owners of closet-bound Swans don't know that embarrassing drift can be greatly reduced with a carefully aimed squirt of contact cleaner! "Hard-wiring" the VFO portion of the band-switch for a preferred band totally eliminates drift in units beyond the cleaning solution. These rigs are so affordable, you could have one dedicated to each HF band. An external Swan VFO also negates the problem while maintaining utility on all bands.

■■■

Al Parker writes about ham radio for RW. Reach him at (516) 681-6733.

Information like this can come from experience, trial and error, and even heartache. It's much better to know people who have already learned the painful lessons and are willing to share their hard-won knowledge. Stu Morrison, K4BOV, is such a man. He contributes to a Swan newsletter, and runs several nets dedicated to the preservation of these wonderful old rigs. If you want to know how to obtain sweep-tube finals, fix, modify or restore any Swan rig, just tune into any one of these sessions:

Swan User Net: This Utah-based net meets Sundays at 5 p.m. (EST), on 14.250 MHz. The Net Control is WA9AZK.

Swan Technical Net: Based in Maryland and New York, this nuts-and-bolts net meets Wednesdays at 7 p.m. (EST) on 14.251 MHz with Net Controller K4BOV.

Swan Technical Net: Also based in Maryland and New York, this 40-meter edition meets Thursdays and Saturdays at 2 p.m. (EST) on 7.235 MHz with K4BOV again serving as Net Control.

Vintage SSB Net: A Nebraska-based group meeting Sundays on 14.293 MHz at 2 p.m. (EST). Net Control is WBOSNF.

It feels good to come out of the shadows and congregate with others who share the same obsessions! Before you know it, there'll be Swan-pride Parades all over the nation!

RW Radio Calendar

APRIL

New Mexico Broadcasters Association
52nd Annual Convention
April 16-18
Albuquerque, N.M.
(505) 881-4444

Texas Associated Press Broadcasters
Annual Convention and Awards Banquet
April 17-18
Dallas
(972) 991-2100

Comdex
Spring Show
April 20-23
Chicago
(617) 433-1500

Broadcasters Foundation
Golden Mike Award
April 21
New York
(203) 862-8577

American Women in Radio & TV
AWRT Gracie Allen Awards
April 27
New York
(703) 506-3290

International Radio & Television Society Foundation
Newsmaker Luncheon
April 28
New York
(212) 867-6650

MAY

Geller Media International
4th Annual Producer's Workshop
May 2
New York
(212) 580-3385

Broadcast Cable Financial Management Association
38th Annual Conference
May 17-20
New Orleans
(847) 296-0200

SPECIAL REPORT

A New Radiator Design for AM

Clarence M. Beverage
Alan M. Christman, Ph.D.

A problem sparked the idea. Imagination and antenna construction experience kindled the determination to plan a radical solution: a new AM radiator design called the Umbrella Antenna.

In many areas, need for land has driven purchasing and leasing prices higher.

Figure 1: The Umbrella Antenna

The unique design has aroused immediate interest because only the sloping cables, integral to the radiator, require tie-off points. The AM Umbrella Antenna radiator uses no other ground surface for its system.

Remaining the same

Prior to the mid-1980s, AM antenna systems had not changed much for 50 years, not since June, 1937, when Brown, Lewis and Epstein, published their paper, "Ground Systems as a Factor in Antenna Efficiency," in the Proceedings of the Institute of Radio Engineers, now known as the IEEE.

The unique design has aroused interest because only the sloping cables, integral to the radiator, require tie-off points.

But two developments in as many years initiated changes in AM antenna design. At the 1987 NAB annual Broadcast Engineering Conference, Grant W. Bingeman presented a paper on parasitic directional antennas. He proposed to configure one guy cable of a vertical guyed-tower as a parasitic element.

The following March, Christman, et. al. published "AM Broadcast Antennas With Elevated Radial Ground Systems" in the IEEE Transactions on Broadcasting.

Subsequently, numerous AM towers at power levels up to 50 kW and that employ elevated radial ground systems were constructed worldwide. Some directional configurations use as many as four towers. Canada, Mexico and other countries allowed the construction of slant wire directional antennas.

Nine years later, we presented a paper at the NAB Broadcast Engineering Conference, describing the Umbrella Antenna plan. Making this design practical are the cables suspended off the antenna. A 300-foot tower (Figure 1) would use three 1/8-wave cables — Umbrella wires — sloping downward from the tower at 150-foot elevation.

The first Umbrella

The owners of WPSP(AM) in Royal Palm Beach, Fla., commissioned from us the first full-size Umbrella design, completed in August, 1997. For Special Temporary Authority operation, WPSP(AM) owners located an existing 500-foot, self-supporting tower that featured top-mounted antennas already utilized by numerous VHF and UHF services.

Engineers use computer codes such as the "Method of Moments" NEC-4 to predict accurately the operating characteristics of complex AM antenna systems. To determine precise impedance and gain values, the computers allow the user to estimate the effects of the earth on antenna performance.

A computerized model of the WPSP(AM) antenna array (Figure 2) depicts the tower, major antennas and support pole and the three sloping Umbrella cables. For accurate results, engineers incorporated a total of 295 individual elements into the program.

Consequences

WPSP(AM) began broadcasting with the Umbrella in the fall of 1997, and noticed significant improvement in field

See UMBRELLA, page 42 ▶

Umbrella Decreases Space Demand

▶ UMBRELLA, continued from page 41

intensity over previous feed methods.

Since then, stations in several areas of the country have begun using Umbrella Antenna designs. Other Umbrella designs have been undertaken for a Class IV in Georgia and a new expanded-band station in California that wishes to use its existing FM tower.

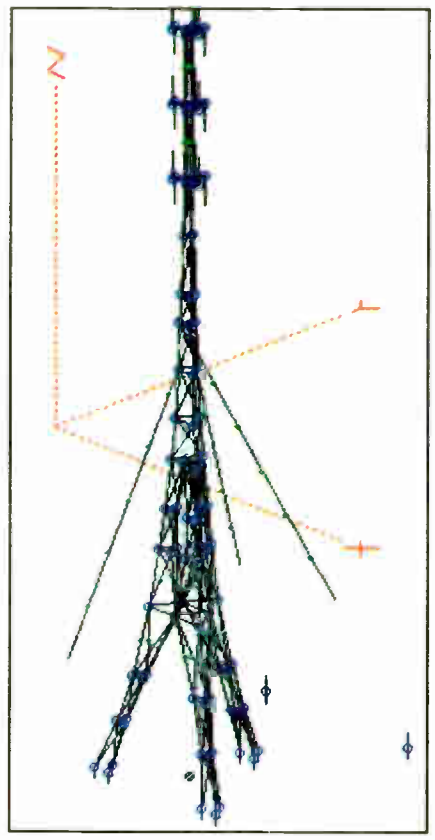
Umbrella for the wetlands

The edge of a sensitive wetland area in central Florida is the site for a new collocation system. Because a standard ground system, or even an elevated system, would have had too much impact on the wetlands, the Umbrella proved to be the solution.

To achieve radio signal emission and environmental protection, the engineers used a guyed tower and included the radiating cables into the design from the outset. Utilizing the AM Umbrella Antenna design can reduce user costs.

During completion of the central Florida project, the owners approved a few hundred dollars spent on engineers modeling the guy support system. It saved tens of thousands of dollars in material costs.

Usually, rules of thumb are used concerning the separation of guy wires and insulators. In this case, the engineers reduced insulator intervals and quantities by discovering that the 1-inch diameter guy cables required guy strain insulators, which cost approximately $2,000 each.



Engineers used computer modeling to help develop the Umbrella Antenna.

Can this be the start of a new era when our computational abilities are reaching a level where new, and sometimes superior, antenna designs can be implemented confidently? Perhaps.

Well-planned, practical options of antenna design should be pursued. Just remember that the fixed laws of nature limit every science.

■■■

Does your station use an unusual AM antenna design? Tell us about it. Write to radioworld@imaspub.com *or to the address on page 5.*

Clarence M. Beverage is the president of Communications Technologies Inc. in Marlton, N.J. He has been a radio engineer, specializing in broadcast engineering consulting since 1975. He has prepared numerous technical papers and FCC documents concerning AM and FM antenna designs and coverage predictions. Reach him at (609) 985-0077.

Alan M. Christman is a professor of Electrical Engineering at Grove City College in Grove City, Pa. He is an innovator in the design and testing of medium- and shortwave antennas, having worked on special projects at the Naval Post Graduate School, various military antenna designs around the world and most recently, new and innovative AM antenna systems based on NEC-4 analysis.

The authors are co-inventors and developers of the AM Umbrella antenna system.

Wired thing

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This spirited performer really moves AES/EBU or S/PDIF digital audio around with operational ease and long-term reliability.

Completely self-contained, the 16000D handles 32x32 routing in a mere two rack-units. Through a variety of schemes utilizing off-the-shelf, pre-made cable assemblies and cross-connect blocks, system interconnect is now faster than ever before.

This switcher gives you full-system access 'XY' controls; plus a bright read-out for displaying inputs/outputs, and system settings. A digital receiver and D to A converter provide confidence monitoring via a convenient front panel speaker!

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The 16000D moves with high-octane performance. The control system is versatile and thorough. Quality and reliability are never compromised.

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SPECIAL REPORT

Tower Registration Almost Done

FCC Tower Registration Decision Has Been Questioned by Some, Welcomed by Others

Harold Hallikainen

What's going on with the FCC tower registration process?

First, some history.

In 1993, the FCC handled approximately 17,000 notifications and applications for tower changes, and kept track of tower painting and lighting requirements for 900,000 licensees.

At that time, FCC rules required that all licensees using a tower submit notice of any tower modification. When followed properly, this rule caused the FCC to receive not just one notification from a tower owner, but notifications from *all users* of the same tower.

In November of 1995, hoping to reduce the number of notifications by a factor of 12 — the average number of users and notifications for a tower — the commission released a Report and Order on WT Docket 95-5 that changed FCC methods of ensuring the safety of antenna structures to air navigation.

The new rule raised several questions. Should *all* towers be registered? Only those near an airport? Or those greater than 200 feet tall, requiring Federal Aviation Administration notification?

A few proponents argued that all towers should be registered, resulting in a single comprehensive tower database. However, the commission was concerned exclusively with air safety, and decided to require FCC registration of only those towers requiring FAA notification. The decision reduced the number of registered towers from 500,000 to 75,000.

One tower, two registrations

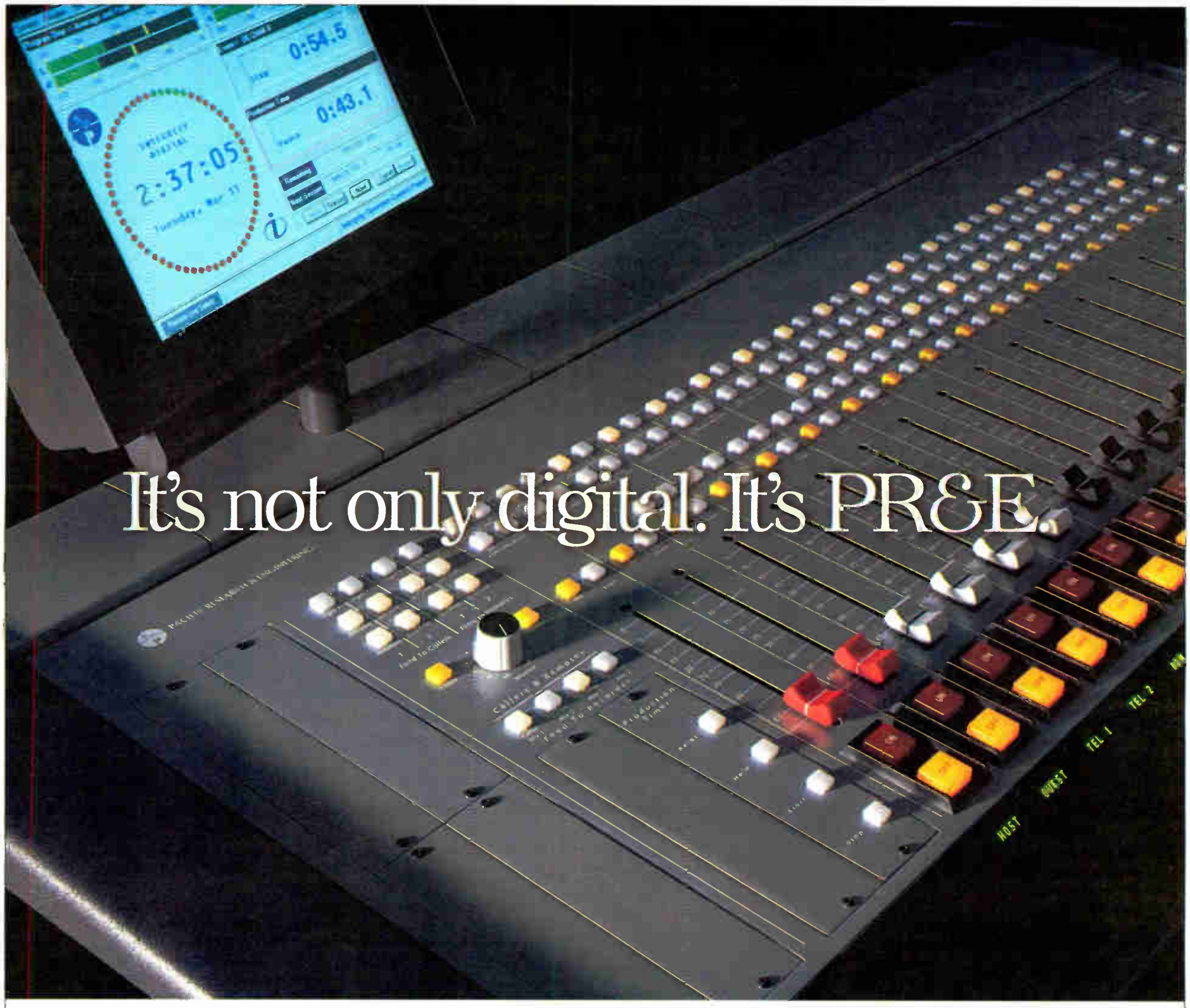
Because the FAA already has the data, many wondered why a second registration with the FCC was necessary. The reason, according to the Report and Order, is that the FAA tracks air navigation hazards but does not retain or compile structure notifications for future reference. Further, the FAA cannot mandate the painting or lighting of antenna structures.

The commission also decided that each tower in an AM array should be registered separately, thus simplifying the data to the location and height of one tower instead of identifying several towers. Further, height and/or differing lighting and marking requirements may exempt some towers in an array from registration. The new rule culls those towers.

FCC staff reports that the registration process has gone smoothly. The FCC Compliance and Information Bureau regional offices have been informing tower owners of the registration requirements.

The CIB plans to initiate an antenna

See REGISTER, page 46 ▶



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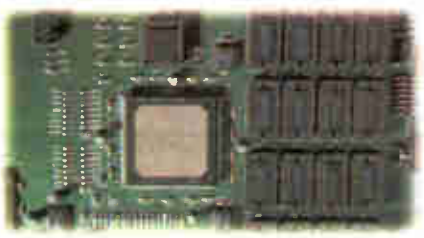
What's more, you get on-board DSP voice processing, remote or local configuration controls, and channel-specific remote control connections. And you can set, save and recall each board configuration at the touch of a button for seamless transitions from show to show.

For a brochure, call us at 760-438-3911, visit www.pre.com or e-mail sales@pre.com

The LCD displays audio levels, time-of-day clocks, session status and event timers with a Windows® interface to powerful configuration management and session-based features.

Integrity's difference is more than just digital. It also offers four special-purpose buses to provide automated mix-minus for telephone and remote feeds, each with IFB.



Integrity uses an array of state-of-the-art floating-point digital signal processors to perform its mixing, routing and other functions.

Each fader has a 10-character alphanumeric display. The display changes when another audio source is assigned, which can happen either manually or at a preassigned time.

PACIFIC RESEARCH & ENGINEERING

Circle (80) On Reader Service Card

But They Don't Match

Some structure owners have found tower location discrepancies between the FAA Determination, the FCC license and the actual newly determined position. Tower users and owners must rectify these discrepancies.

The station must obtain a new FAA Determination if:
- The latitude or longitude of the tower's location changes by more than one second or
- The height is increased by more than one foot.

The station must modify the license — using Form 301 or Form 340 — if:
- The newly determined tower location listed on the tower registration differs from that listed on the station license, or,
- If the HAAT differs by more than two meters.

The station must file within 30 days of receipt of the tower registration (FCC Form 854-R) from the tower owner.

Never throw anything away! One person who registered 10 towers found that on one, the lighting had been removed several years earlier.

The station had the FCC telegram authorizing removal of the lights, but could not find FAA authorization. In Washington, a search was conducted, with no success. Finally, the station found the original letter from the FAA in an old box of records. Had the letter not been found, the station may have had to re-light the tower.

— Harold Hallikainen

FCC Is Building a Tower Database

▶ REGISTER, continued from page 44

structure registration compliance measurement program after the last filing window closes on June 30.

The commission staff cautioned against sending in registrations prior to filing for an FAA Determination. A problem mostly for newer structures, the FAA Determinations should have already been filed for existing structures. However, finding the Determination for a tower that has existed for many years may be difficult.

The FCC Fact Sheet, available at the commission Web site, states that if a station does not have a copy of the FAA Determination for an older tower, the station should provide as much information as possible regarding the structure.

The FCC requires the FAA Study Number and previously assigned requirements, or "paragraphs," concerning the tower's painting and lighting specifications. Further, the FCC requires that the station notify the FAA office that the determination is lost. From this information, the FCC could verify that the FAA had previously cleared the structure. If they cannot, however, the FCC requires a new FAA Determination.

FCC on the 'net

With the FCC putting more of its data on the Internet, tower registration data soon will be available there. Tower owners have been able to file electronically, either through e-mail or through special computer software provided by the FCC.

During the setup of the tower registration program, the FCC did not have an adequate Internet firewall that allowed tower registration by a standard Web browser. As of March 6, it had received 25,694 paper and 17,165 electronic registrations.

Stations commented that, in general, the electronic filing went smoothly, while those filing by paper had to wait a while for their registration numbers. One station found that, over the years, its towers "grew" eight feet, one tower managed to move 50 feet and another moved 250 feet. However, the filing on those towers went smoothly.

Posting problems

The biggest problem, according to FCC staff, has been with posting of the tower registration number. Section 17.4(g) requires the tower registration number to be "displayed in a conspicuous place so that it is readily visible near the base of the antenna structure. Materials used to display the Antenna Structure Registration Number must be weather-resistant and of sufficient size to be easily seen at the base of the antenna structure."

The only exception to the rule concerns a posting that detracts from the appearance of a historic landmark, as defined by federal, state or local government.

The FCC review of the registration program will reveal how smoothly the process actually went. The decision to streamline the registration should make tracking towers easier. Some wish that the FAA would have done this long ago.

For more information, consult a group of Web pages at *www.fcc.gov/wtb/antenna/Welcome* They include the Report and Order adopting the new rules, clarifications of the rules, provisions for registering towers online or on paper, and frequently asked questions.

■■■

Harold Hallikainen is president of Hallikainen and Friends, a firm specializing in electronic design and technical writing. Reach him at (805) 541 0201, e-mail: harold@hallikainen.com *or visit the Web site* http://hallikainen.com

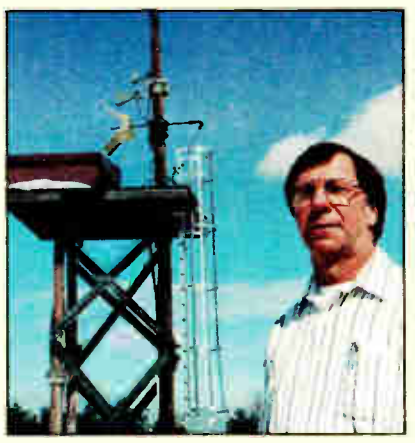
GUEST COMMENTARY

Observations on Radio And the DTV Rollout

An Antenna Manufacturer Sees Radio Engineers Playing the 'What If' Game

Bob Surette

*The author is manager, RF engineering, for antenna manufacturer Shively Labs. **RW** asked him whether the onset of digital television has affected his customers.*



Bob Surette at Shively Labs

Throughout the past eighteen months, engineering concerns and equipment requirements of FM broadcasters have been shifting. Increased demand by DTV and others have shrunk available tower space. Nearly everything has been affected, including equipment selection and project timetables, and engineers are increasingly interested in auxiliary sites.

Combiners

Stations that would never have considered buying a dual or multi-station antenna combiner now think of them as strong options. In fact, until last year, rarely would a Class A or B station outside of a major metropolitan area consider combined systems.

The equipment cost for a combined system for two Class A stations with no special engineering requirements was typically two to three times that of two separate antennas. Plentiful tower space eliminated the incentive for a low-power facility to combine, especially if it meant working with a competitor.

Now, Shively routinely supplies combined systems to lower-powered stations because equipment cost is no longer the driving factor. Many stations lease the same space with a new rent many times the old rate. Stations that own their own towers realize that they are losing out on possible revenue because of inefficient tower use. Many stations that talk to Shively still have time on their current leases, but they are moving out of fear that in the future, all the best sites will be taken.

Other problems

Lease problems have held up a number of Shively projects. At some sites, the plans for TV antennas have not gelled, setting back the FM engineers' projects. Faced with tight deadlines, a number of FM engineers have gone ahead with site engineering, assuming they had a lease for space only to find it yanked from under them at the last minute.

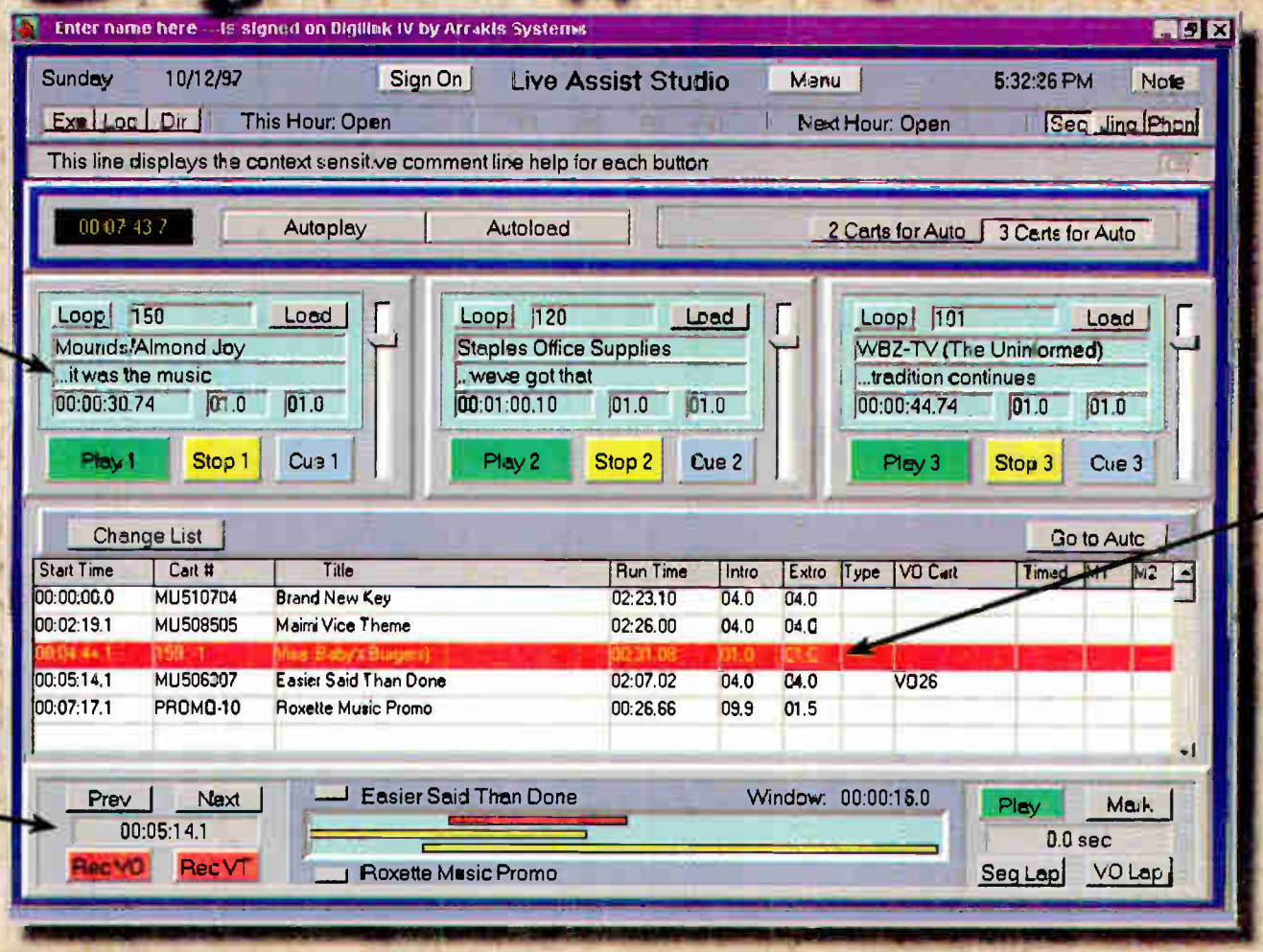
It is not uncommon for several different stations in a given market to approach Shively with their own proposals for a multi-station site, each with its own unique problems. People are spending a great deal of time and money playing the "what if" game now, but they are all facing deadlines. And as time and available space decreases, the race is on.

DL4 Workstation System

The #1 Live Assist Digital Workstation

3 Cart Machines with Play, Stop, Pause, End Cue, & Loop

Option Window-for Segue Editor, Phone Editor, Jingle Box & more



Play List feeds the Cart Machines for Live Assist Play

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model software

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complete - just add a Windows 95 PC!!!
(with 24 hours of audio storage-2,000 spots!!!!

- Easy to use Windows 95 software optimized for fast paced On Air Live Assist!!!
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- Features include Phoner Editor, Jingle Box, Segue Editor, Voice Over Editor, & more . . .

Just connect a Windows 95 PC to an Arrakis DL4 digital workstation and you will find yourself at the controls of the most powerful, reliable, and easy to use Live On Air, and Live Assist workstation found in broadcasting!!! Not a PC computer with an audio board inside, the DL4 is an audio appliance that stores your audio library on hard disk. If your PC goes down, your audio is still available on the DL4 for live playback!!! Produce your audio material directly into the DL4 or even produce it on your favorite PC editor (such as SAW") and transfer it in perfect digital to the DL4 audio library!!! The Windows 95 Live Assist software program gives you all of the exciting features your On Air staff will ever want: Phoner Editor, On-screen Jingle Box, & powerful features you would never find on your cart machine, such as Pause, End Cue, & Loop. Call today for details on the DL4 from Arrakis Systems, the #1 digital workstation manufacturer in Radio!!!

Arrakis Systems inc. (970) 224-2248 www.arrakis-systems.com

Circle (106) On Reader Service Card

TARGET: ANTENNA PRODUCTS

New Tower and Antenna Products

Andrew Corp.

The T-shaped Arrestor Plus Miniature Quarterwave Arrestor from **Andrew** provides multistrike lightning protection and outstanding RF performance. The new mini version of the Arrestor Plus bulkhead-mount T-series of surge arrestors is ideal for use in confined spaces such as OEM cabinets and tower top amplifiers.

Contact Andrew in Illinois at (708) 349-5661; fax: (708) 349-5222, e-mail to greta.brown@andrew.com *or circle* ***Reader Service 117.***

Antenna Concepts

The new FM1 Ultra from **Antenna Concepts Inc.** is side-lobe free, eliminating interference between the main beam and sidelobes and associated multipath. It eliminates RF problems and provides RF isolation from your tower, eliminating non-uniform impedance.

Features include fully enclosed feedpoints to reduce icing sensitivity; full DC short to tower at each element; and 6 MHz bandwidth for flat response.

For information, contact Antenna Concepts Inc. in California at (530) 621-2015; FAX to (530) 622-3274; visit www.antennaconcepts.com; *or circle* ***Reader Service 143.***

Dielectric

The DCR-MT Series Quadrapole Antenna is a top-mount version of a popular model from **Dielectric**. It is designed for applications that require a "near-perfect" omnidirectional signal.

The DCR-MT antenna is designed to be self-supporting above the top of the mounting structure. The company says it eliminates pattern distortion caused by side-mounting. The antenna is available in a single-bay design and is rated for 18 kW of input power.

For more information, contact Dielectric in Maine at (800) 341-9678 or (207) 655-4555; fax: (207) 655-7120, via e-mail: dcsales@dielectric.com *or circle* ***Reader Service 134.***

Electronics Research Inc. (ERI)

ERI provides engineering services and tower manufacture. The company performs structural analyses and feasibility studies to establish load capacities for new towers and possible modifications for existing structures.

Antenna performance can be digitally modeled and analyzed to "test drive" the behavior of planned structural changes, prior to manufacture. Annual site inspections and loss prevention are other services offered by the company.

For more information, contact ERI in Indiana at (812) 925-6000; fax: (812) 925-4030 or circle ***Reader Service 186.***

Jampro Antennas

Designed for broadcast applications that require relative insensitivity to icing conditions as well as high power handling, the **Jampro** JBCP-M Medium-Power FM Broadcast Antenna is fabricated with high-strength thick wall brass and copper with a 1-5/8-inch outer diameter and is capable of handling 12 kW.

On a single frequency, VSWR is 1.1:1, ± 200 kHz or better. Usually, deicers are not needed because typical VSWR is less than 1.4:1 with 1/2-inch of radial ice. The shunt-fed design eliminates the need to "slug-tune" the antenna.

For more information, contact Jampro Antennas in California at (916) 383-1177; fax: (918) 383-1182 or circle ***Reader Service 212.***

Kintronic Labs

To provide greater flexibility and functionality for the control of switching systems associated with broadcast, **Kintronic Labs** has developed a Programmable Logic Controller. Designed to control complex or large multi-tower antenna systems, the unit can interact with other modern remote control systems while occupying minimal rack space compared to equivalent hard-wired relay systems.

Features include a menu-driven touch screen and transmitter inhibit mode during switching. An integrated pattern clock has battery backup for automatic switching of antenna patterns. Each controller is customized to the particular site.

Contact Kinatronic Labs in Tennessee at (423) 878-3141; fax: (423) 878-4224 or circle ***Reader Service 109.***

LBA Group

Lawrence Behr Associates (LBA) has created turnkey conversion technology to allow wireless communication antennas on "hot" AM towers.

Until recently, AM towers were considered unsuitable for cellular and PCS antennas, due to interference and grounding difficulties. The LBA CoLoCoil isolates multiple coaxial cables on directional antenna systems. The AM CoLoPole, derived from LBA Tunipole technology, permits direct grounding of the AM tower for seamless coax installation and lightning protection.

Because the technology is applicable to existing structures, it can bypass zoning restrictions and community resistance to new tower construction. The new technology offers savings in site acquisition for new cellular tower construction and proximate antenna detuning, and a new source of tower rental income

Contact the LBA Group in North Carolina at (919) 757-0279; fax: (919) 752-9155 or circle ***Reader Service 161.***

Shively Labs

The Model 6014PB FM antenna from **Shively Labs** is a broadband (88-108 MHz) panel-style antenna designed for multi-station use.

With tower space becoming scarce, Shively says there is increasing interest in combining two or more signals on one antenna. The 6014PB is capable of true circular polarization and can handle 15 kW average power, with up to 100 kW peak per panel.

The panel antenna is designed for three-sided towers, with three panels comprising a "level."

Contact Shively in Maine at (207) 647-3327; fax: (207) 647-8273 or circle ***Reader Service 187.***

Stainless Towers

In anticipation of DTV, **Stainless Inc.** can perform engineering studies and modifications to evaluate a tower's capacity to support DTV antennas as well as existing loads. Structures are designed in accordance with local codes and ANSI/EIA/TIA standards.

For more information, contact Stainless, Inc., in Pennsylvania at (215) 699-4871; fax: (215) 699-9597 or circle ***Reader Service 213.***

Radio World

Broadcast Equipment Exchange

"Broadcast Equipment Exchange" accepts no responsibility for the condition of the equipment listed or for the specifics of transactions made between buyers and sellers.

ACOUSTICS

Want to Sell

Circle (234) On Reader Service Card

Circle (233) On Reader Service Card

AMPLIFIERS

Want to Sell

Crown D-150A SII, new in boxes w/manuals, $750. D Thompson, 612-290-1599.

Want to Buy

Crown amp, older model. M Miller, 812-448-8434.

ANTENNAS/ TOWERS/CABLES

Want to Sell

Andrew EW-20, 500', elliptical waveguide (microwave). K Diebel, KTJC, 1707 Louisa St, Rayville LA 71269.

ERI 5 bay FM hor only, used as backup, $500; Olektron impedance system, $500. G Kenny, 417-451-1400.

Harris/ERI FML-2 CP 2-bay in perfect cond, tuned to 105.5 Mhz, just removed from service due to pwr increase, $2300/BO. B Schneider or D Palmer, 614-593-6651.

Jampro JHCP-6 6 bay high pwr CP antenna tuned to 104.3 w/deicers, BO. D Martin, 213-882-8000.

Shively 6810-7 7 bay antenna, ready to ship, gd cond, makes 100 kW w/a 19 kW, TPO, $7000; Cablewave 3-1/2" flex, 560' on spool, ready to ship, $5600. C Murray, 541-484-9400.

Shively 6813-4 4 bay CP antenna w/radomes, input 3 kW per bay, tuned to 98.9, approx 7 yrs old, $3000. R Ruff, 301-334-4272.

Cablewave A10R 50507 1-5/8" Coax, foam filler, (4) approx 250' folls w/connectors, $1100 per roll/BO. S Ross, 317-852-9119.

Dissipator 500 point stainless, $350; rigid 3" 5' flanged transmission line, $200; Magnum tower 18" x 70', $800; Scala FM 1 bay all chnl 250W, $250. D Rose, 888-380-7423.

New 12-4 speaker or AC cable, 1000', $225 +shpg; Belden 9192 15 awg 1000' double shielded, $500 +shpg. Stephen, 541-346-4091.

RCA FM antenna, 2 section, cir pol w/heaters, excel cond, BO; RCA BR 84 racks, $200; RCA BFC-2 2 bay H&V, power gain =1 w/deicer & trans for each bay, on pole w/3-1/8" input. J Natoli, 614-922-2700.

Rohn 80 350' radio tower, guide, steel, no rust, $16,000 at site, 209-447-2688.

Shively 6810 10 bay FM tuned to 92.5, cir pol, recently rebuilt, excel cond, $6250. 406-265-7841.

Shively 6812-2 FM, cir pol, 2 bay on 91.5 Mhz, excel cond w/radomes & center feed, 1500 W, boxed & ready to ship, $1000 +shpb. G Park, 304-822-5151.

Want to Buy

Scala RP-450U antenna; Optimod 8100A; Andrew 7/8" connector. K Diebel, KTJC, 1707 Louisa St, Rayville LA 71269.

AUDIO PRODUCTION

Want to Sell

Shure 610 feedback controller & Shure mixer, excel cond, $150/both. D Kocher, 610-776-1455.

Altec 1606A mixer/amp, 4 chnl mixer w/plug-in transformers & Altec table top rack, $250. J Borden, 414-482-8954.

ART DR-1 reverb w/wired remote, excel cond, $450. M Schackow, 605-374-3424.

Crown straight line two stereo preamp, excel cond, $75. P Russell, 207-725-3066.

Kahn SP58-1A Symmetra Peak, very clean & in gd cond, $150. D Heidner, 406-388-4281.

Koss/Optimus PRO-90 stereo headphones, new in box, will trade for an older, working pair of AKG K-141 or K-240 headphones; Fostex 3180 stereo reverb w/24mS pre-delay, rack mountable, vgc, will trade for an old UREI cooper time cube (920-16); AKG R-25 console, mountable, remote control for AKG BX-25 reverb unit w/30' cable & connector, trade for Teac RC-170 or RC-90 remote control. J Roper, 812-877-2663.

Orban DSE 7000 digital editor, less than 1 yr old, $14500; w/Audicy upgrade & new warranty, $18000. Bob, 903-577-7423 or email: phi@1starnet.com.

Want to Buy

Sony MUR-201 reverb; Moog Taurus, Fender Rhodes or Yamaha BP-2 pedal bass unit. B Meuse, 650-969-2433.

AUTOMATION EQUIPMENT

Want to Sell

Arrakis Digilink systems (3) w/Gemini, capable of 3 stations & production, gd cond, will sell as package, all well networked, BO. C Eastham, 870-534-8978.

Arrakis Digilink 3, new in 1996, currently in use, year 2000 complaint. D Smith, 316-721-6161.

Arrakis GEM-600 Gemini System w/1.2 Gig + network board & software, w/cart wall; Arrakis TS-8C Trak Star workstation w/270 MG w/network board & software, 1 yr old, currently on air & working, $7500 negotiable. L Zeve, 717-249-1717.

Circle (232) On Reader Service Card

AUTOMATION EQUIPMENT continued...

Digital DJ system, CD and/or satellite, removed from service 11/97, other misc parts including audio cards, BO. C Webster, 601-843-4091.

Schafer 800-T automation controller, $650. J Bahr, 787-728-0364.

TM Century UDS I, 3 yrs old, excel cond, w/all system software, audio controller, Sony interface, manuals, 4 Sony CDK-006 CD Jukeboxes, $2000. T Marker, 619-320-3037.

Want to Buy

DigiLink System wanted, any model. Todd/Jim, 906-228-9700.

CART MACHINES

Want to Sell

Audicord DLPS, stereo PB cart deck, like new, $750; Audicord DLRP, stereo R/P cart deck (2), like new, $1075 ea. R Evans, 704-369-5033.

Dynamax ESD10 cart eraser, excel cond, $450. D Brou, 318-445-4843.

ITC Delta PB, mono, 2 cue, gd cond, $450; ITC Delta R/PB, mono, 2 cue, gd cond, $550; Audicord DL-RM R/PB, mon, 2 cue, gd cond, $350; Audicord TDS-1, dual deck, twin play, gd cond, mono, 3 cue, $450; Tapecaster 700-RP R/PB, mono, 2 cue, gd cond, $250. R Chambers, 530-257-2121.

ITC Delta PB mono 2 cue, gd cond, $450; ITC Delta R/PB mono, 2 cue, gd cond, $550; Audicord DL-RM R/PB mono, 2 cue, gd cond, $350; Audicord TDS-1 dual deck,. twin play, gd cond, mono, 3 cue, $450; Tapecaster 700-RP, R/PB, mono, 2 cue, gd cond, $250. R Chambers, 530-257-2121.

CD PLAYERS

Want to Sell

Sony Jukebox CDK-006 (5), 4 are working, 1 needs work, $800 +shpg. J Lotspeich, 915-533-2400.

CONSOLES

Want to Sell

Radio Shack SSM-1200 mixer, advise cond & price. V Zandt, 217-487-7711.

Radio Systems RS-12 12 chnl dual bus stereo audio console, slide pot style, gd cond (2), $2400 ea. R Ruff, 301-334-4272.

Arrakis 1200-10S, new, w/pwr supply, manual, all hardware, unused, 1 mic slider, 9 stereo sliders, 9 & 10 have push button selectable inputs, we ship COD UPS to you, $2200; Cetec Sparta A5-305 in excel cond, w/internal amps, 5 pots, 1 stereo mic & 4 stereo inputs, Pot 4 has 5 selectable inputs, we will ship COD to you, $800. B Mauldin, 336-632-9801.

Cetec 2007 8 chnl stereo, $900; Harris 80 8 chnl stereo, $900. D Rose, 888-380-7423.

Sound Workshop 1280-B, 12 in & 8 out w/double EQ echo ea chnl, gd cond, $1500. HL Sewell, 817-838-8001.

MCI/Sony 618, 24x24, $6.5K; Quantum 24x24, $4.5K; Soundcraft 600, 32x16, $5.5K, like new; Model 30, $295; 512, $950; 520, $1450. W Gunn, POB 2902, Palm Springs CA 92263. 760-320-0728.

Want to Buy

Trident Series 65 for parts, must have 10 gd chnls, also spare chnl strips. S Glassman, 914-764-4491.

LPB Signature III mono or stereo, 5, 6 or 8 chnl, must be in gd cond. C Dreibelbis, 717-436-2135.

DISCO-PRO SOUND EQUIP

Want to Sell

Custom mobile DJ system, all pro gear, (4) Peavey speakers, (2) subs, Mackie mixer, Rane crossover, Denon DC/cassette combo & more, $6000/BO. D Stewart, 800-322-3204.

Koss KCS 100, 6.5" woofer, 3/4" tweeter, 3 pairs, $150 ea/pr. P Paquin, 508-385-0805.

Stanton Trackmaster (2), gd cond w/2 new extra stylus w/cases, sell by pair only, $149. J Licano, 520-473-3938.

Ultimate silver speaker stands, $100/pr. D Kocher, 610-776-1455.

Peavey DS1502 PA speakers, $300. M Miller, 812-448-8434.

Portable DB system in carrying case w/shoulder strap, ultra light w/100W amp & speakers, $900. D Rose, 888-380-7423.

Want to Buys

Sony CDK-3600 Jukebox (auto disc loader), gd cond. J Vobbe, WLEW, 517-269-9302.

FINANCIAL/LEASING SERVICES

LIMITERS

Want to Sell

Orban 345E/F stereo synthesizer (3), $200 ea. D Brou, 318-445-4843.

CBS Volumax stereo 4110, $150; CBS Audimax stereo 4450, $150; Moseley TFL 280mono limiter, $100; Harris MSP 90 mono agc-limiter, $250; CRL Sep 400 mono processor, 3 chassis, $300. D Rose, 888-380-7423.

Optimod 8000 (2) both in gd cond, $1000 ea/BO. C Webster, 601-843-4091.

Want to Buy

UREI LA2A, LA3, etc, will pay $1200 for any black UREI 1176LN, other gear wanted. Dan, 415-546-0200.

Teletronix LA-2A's, UREI LA-3A's & LA-4's, Fairchild 660's & 670's, any Pultec EQ's & any other old tube compressor/limiters, call after 3PM CST, 972-271-7625.

CONSULTANTS

MICROPHONES

Want to Sell

EV 2576, $75; EV MC-100, $30; EV MC-200, $30; (3) Audix CD11, $30 ea +$10 shpg. J Swafford, 615-384-4121.

EV 649-B, no cable, $10; EV CO-90 mic condenser, Lavalier, $45; EV 647 CL Dynamic Lavalier, $40; Sony ECM22 MP mic condenser, $60. HL Sewell, 817-838-8001.

Neumann U47, $3900; U67, $3300; U87, $1800; KM83 or 84 pairs, $1400; KM88s, $950 ea; RCA 77DX, $1200; BK5, $700; BK1A, $300. W Gunn, POB 2902, Palm Springs CA 92263. 760-320-0728.

Want to Buy

Langevin 5116's, 5301, EQ's and more! 818-887-6600 fax 818-887-4700.

RCA 77-DX's & 44-BX's, any other RCA ribbon mics, on-air lights, call after 3PM CST, 972-271-7625.

MICROPHONES continued...

RCA 77-DX's, 44-BX's, WE KU-3A's On-Air lights, recording lights. Top price paid. Fast response. Bill Bryant Mgmt, 2601 Hillsboro Rd, G12, Nashville TN 37212. 615-269-6131, FAX: 615-292-3434.

MISCELLANEOUS

Want to Sell

Belden mic wire, (2) 100', (1) 50', short lengths, all have XLR connects, $150/all. P Paquin, 508-385-0805.

Harris AGC; UREI BL-40 modulimiter; Revox B-77; CRL mod controller; Belar RF amp; Andrews connectors, equip & cart racks & much more, call for more info. R Evans, 704-369-5033.

Jennings JCS500-15S RF vacuum capacitor, adjustable 50-500 pF @ 15 kV w/mounting brackets, $500. D Thompson, 612-290-1599.

PCL-725 computer relay card (2), new, $120 ea +shpg. M Butzner, 510-885-3588.

TM Century Ultimate Digital Studio, interface plus connectors, BO. J Lotspeich, 915-533-2400.

1929-1945 vintage radio collection, 8 piece, $800; Henry Mix-Minus-Plus, $100; Touchtone decoder/rackmount CS100, $150; Pioneer cassette rcdr CTF1250, $75; 9" black & white monitors, $50. D Rose, 888-380-7423.

ADC TT (Bantam) Patchbays, $149; TT or 1/4" cords, $10; new short MRL test tapes, $229 for 2", 1/4", $79; Gates dual stereo tube limiter, $1200; Gates top level, $595; Allen & Heath GL2 rack mixer, mint, 14x4, $795; CBS Labs Audimax, $400 ea; tube preamps, $300-400; MX10 mixers, $795. W Gunn, POB 2902, Palm Springs CA 92263. 760-320-0728.

Want to Buy

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.

MONITORS

Want to Sell

Belar FMM-2, FMS-2, RFA-1, vgc, manuals, original boxes, $2050. Cornerstone Radio, 217-487-7711.

Delta CPB-1/TCA20EX, AM 5 kW common point bridge w/remote reading meter w/manual, $2750. D Thompson, 612-290-1599.

Potomac Instruments AM-19/PMA-19, 6 tower, 2 pattern antenna monitor, AM-19, vgc, PMA-19 needs DVM, $2000/BO. D Niccum, 505-622-6450.

Used Mod Monitors, McMartin & Belar. Many to choose from, tuned & calibrated on your frequency, full guaranteed. Goodrich Ent. 402-493-1886.

POWER/SURGE

RECEIVERS & TRANSCEIVERS

Want to Sell

Celwave MiniPlexer, 6 cabity UHF duplexer w/circulator, 450-470 Mhz, $75. P Russell, 207-725-3066.

General Instrument 1000R info cypher data rcvr for news off of TV cable & MAC, $50. Stephen, 541-346-4091.

Motorola Mestar VHF FM 35W 16 chnl 440-470 Mhz 2-way w/5db gain ant & base tray, pick or pay shpg, $400/BO or swap to mod mon on 94.9 Mhz. R Chrysafs, 304-235-2292.

Circle (231) On Reader Service Card

Want to Buy

Comrex 2-line freq extender, xmtr & rcvr, $1995 for both ends. Steve Kirsch, 90 S Long Beach Rd, Rockville Centre NY 11570. 516-763-1776.

Musicam Prima 120 digital transceiver, brand new Layer 3 motherboard, $3495 w/built-in TA, $2995 w/X.21 interface card. Steve Kirsch, 90 S Long Beach Rd, Rockville Centre NY 11570. 516-763-1776.

RECORDERS

Want to Sell

Ampex 2" 456 tape, 2 rolls, slightly used & 4 rolls Ampex 456 1/4" new, $75/all. D Kocher, 610-776-1455.

Digidesign Audio Media III, Mac PCI Bus H disk, Digital Audio recording soundcard, $525. L Glenis, 520-722-9544.

MCI JH1 4 trk 10C, $1495; Ampex 440 stereo w/Ampex mixer, $750; Ampex 440C in console, servo motor 4 speed, $995; Ampex PR10-2 stereo, $295; Ampex tube rcdr 1/2" stereo 15 & 30 ips, $4500; MCI JH110A stereo in console, $495; MCI JH110B stereo in console, $795; MCI JH110C 1" 8 trk AL-3 (4 missing electr), BO; (2) Ampex AG350 R/P electr, $100 ea; Ampex 440 R/P electr, $100; Ampex mic preamps, $45; set of Ampex 8 trk eras/rec/play heads, BO. J Price Recording Studio, 214-321-6576.

Metrotech 554A 2 chnl 2 pass 10" r-r magnetic audio tape logging rcdr in gd cond, can record up to 307 hrs on one 0.5 mil reel, $200. B Schneider or D Palmer, 614-593-6651.

Sony SV-3700 DAT, new transport, fresh calibration, manuals & rack mount, $750. D Thompson, 612-290-1599.

Telex 1400, new heads, new switches, rollers, belts, bulbs, lifters, rack mount, $500/BO. M Gerardi, 860-928-1350.

Ampex ATR-800 open reel rcdr, 2 trk 1/4" in roll-around cabinet, works gd, heads gd, BO +shpg; Scully open reel tape rcdr, 2 trk, 1/4", extra FT head nest assembly, in tabletop case, works gd, heads gd, BO +shpg. R Howard, 520-797-3700.

RECORDERS continued...

MCI JH-110A (2), 2 trk 1/4", 3.75, 7.5, 15 ips, std rcdrs mounted in low-profile, roll-around cabinets, both in vgc, $1900 ea; Ampex 440-B (2), 1/4", 7.4-15 ips, FT std rcdrs in original roll-around cabinets, both in gd cond, $350 ea; Ampex 351 (2) 1/4", 7.5-15 ips, FT std rcdrs w/Inovonics 375 solid state electr, rack mounted & in working cond, $250 ea; dbx K9-22 (2) type I NR cards for Dolby 361 mainframe, $75 ea. B Kennedy, 612-772-5211.

MCI JH-110B 0.50", 4 trk r-r in HP-4 cabinet, $1500; Scully 280 4 trk r-r w/3 spare audio electronics, $450. J Borden, 414-482-8954.

Otari 5050B III 2 trk r-r, like new; Panasonic 3900 DAT rcdr w/remote controller. J James, 415-331-9346.

Otari 5050B, rack mount, average cond, in working order, $750/BO. B Hawkins, 317-684-8411.

Pioneer CDR-5 CD rcdr, very little use, one owner, w/a few disks, $1400. K Pappan, 316-650-3629.

Scully 2808 2 trk stereo reel deck, gd cond, refurbished, new reel motor/capstan, relapped heads; one non-working mono unit, both w/roll-around cabinets, BO. M Shepherd, 313-848-6453.

351-354 Ampex electr. J Price Recording Studio, 214-321-6576.

MCI JH-24 audio cards for JH-24. J Borden, 414-482-8954.

Tascam TSR-8 or 38, 1/2" 8 trk w/lo hrs. M Schackow, 605-374-3424.

Vintage portables & miniatures, tape/wire rcdrs, classic wind-up machines or special interest, also related access; tape recording magazine also needed. J Morinelli, 610-715-1720.

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

Ampex PR10 tape recorders. W Gunn, POB 2902, Palm Springs CA 92263. 760-320-0728.

REMOTE & MICROWAVE

Want to Sell

Comrex LTX/R (2), $700 ea, US Audio Whirlwind MX-5S stereo mixer, $225; SKB rackmount Case-4 unit, $120, excel cond. K Starks, 313-480-9981.

Comrex single line freq extender, transmit unit, $400 +shpg. M Butzner, 510-885-3588.

Sony TC-640B 2 speed, 3 head r-r deck w/sound on sound & echo, gd cond, $200 +shpg. J Roper, 812-877-2663.

Tascam 22-2 1/4" mastering rcdr, excel cond w/rack ears, $500. M Schackow, 605-374-3424.

Yamaha GC2020 stereo compressors (5), $100 ea; Radio System RS-1000 DAT's (3), 2 w/remote control, $500 ea; (2) Otari MX5050B II 2 trk r-r rcdrs, $750 ea; Magnafax 5-slave mono reel duplicator, 7-1/4", $500. M Jones, 501-329-6891.

Ampex 4 trk tube deck, $2500; stereo 351 (recond), $1800; Akai Adam, new, digital 12 trk, $3500; MM1000-16 w/new heads, $4500; Otari MTR10-4, $3500; Ampex ATR102s, search to cue, $495; Ampex locator for ATR or 1200, $895; MCI 110C-8, $3.5K; Tascam 85-16 recond w/dbx, rc & loc, $3K. W Gunn, POB 2902, Palm Springs CA 92263. 760-320-0728.

New & used Ampex 350 style tape transports, motors & parts, various prices. M Crosby, 408-363-1646.

Want to Buy

MCI JH110C 4 chnl amps for 1" & 1/2" guides for transport, cards & electr &

Marti STL-8 stereo, 2 rcvrs, 2 xmtrs, antenna combiner w/ CLA-40 limiters, vgc, $2750. Cornerstone Radio, 217-487-7711.

Adtran ISU 2x64 ISDN interface w/headphone amp, Shure mixer, CCS micro 56+ coupler; 3-line Comrex, Shure mixer, headphone amp, each in traveling case, $2000. R Carey, 813-573-2977.

Catlink digital STL system. W Navarro, 808-326-4470 or email: svp@uofn.edu.

Marti M-3-60C/11RS-20 w/turner mic, $250. M Schackow, 605-374-3424.

Marti STL-10 (2), xmtrs only, gd cond, $1000 ea/BO. C Webster, 601-843-4091.

Moseley 505/C, vgc, not FCC certified, $1500/BO. J Bahr, 787-728-0364.

Moseley TRC-15 in excel cond, will trade for a computer UPS system. G Park, 304-822-4838.

Telfax TFX-31C complete w/charger, manual & 2 headsets, $400. D Heidner, 406-388-4281.

Want to Buy

Moseley DRS-1 & TRC-15 manuals. G Park, 304-822-4838.

SATELLITE EQUIPMENT

Want to Sell

Circle (230) On Reader Service Card

10' sat sys, C/Ku LNB, feedhorn, starcast rec w/remote & 2' Ku w/feedhorn, LNB, you pick up or pay shpg, $300/bo or swap to EV RE20 w/boom, spider mounts. R Chryusafs, 304-235-2292.

SCA RENTALS

SOFTWARE/ DATABASES

Want to Sell

STATIONS

Want to Sell

1 kW AM in Ocean City MD. (301) 299-5383.

1000W AM daytimer near Albany NY, reasonable. 315-891-3110.

50 kW AM in South Central Mississippi. M Mathis, 601-849-9247.

AM daytimer, 1000 W, some real estate included. 315-891-3110.

25 kW FM, coastal Georgia, financial info accepted, $650,000. 25 Bristle Cove Dr, Savannah GA, 31419.

50 kW AM in South Central Mississippi. Mike Mathis, 601-849-9247.

Licensed non-commercial 10 watt AM station in Southern New England, $80,000. (401) 348-9222.

Want to Buy

Will pay cash and close quickly on Radio Stations at any stage of disrepair. 888-948-0521.

TAPES/CARTS/ REELS/CD'S

Want to Sell

Fidelipac Cobalt Series & ITC carts (90+), ranging from 40 sec to 10.5 min in length, BO. R Evans, 704-369-5033.

Flying Hands prod music, 8 CD buy-out library, $365 include shipping. Call 800-536-6007 for free 4 wk trial.

Microtran table top tape degausser, handles 1"-2" tapes, $150/BO; mechanical tape timers, Lyrec & Seike/Spotmaster, new & used. M Crosby, 408-363-1646.

TAX DEDUCTIBLE

Audiopak 3 min & longer carts, hundreds to give away. Stephen, 541-346-4091.

TEST EQUIPMENT

Want to Sell

Heathkit oscilloscope & Simpson digital multimeter, $150/both. D Kocher, 610-776-1455.

TUBES

Want to Sell

Circle (229) On Reader Service Card

EIMAC, RCA, AMPEREX, 3-500, 3CX1500A7, 4-400, 4X150A, 4CX250B, 572B, 807, 833C. Westgate 800-213-4563.

Circle (228) On Reader Service Card

Circle (229) On Reader Service Card

TUBES continued...

Want to Buy

Old radio tubes, 2 & 3 # digit types, new & used. Craig S, 1-800-398-1146.

TURNTABLES

Want to Sell

Rek-O-Kut Rondine Jr L-34 (2), 33 & 45 rim drive, like new, $150 ea. P Paquin, 508-385-0805.

Technics 1200 MK II TT's in gd cond, all knobs & dust covers, $329 ea +shpg. J Licano, 520-473-3938.

Technics 1200 MK2 (2) brand new, $420 ea +shpg. M Butzner, 510-885-3588.

Russco Cue Master, 33,45,78 rpm, excel cond, $100. M Miller, 812-448-8434.

Russco Studio-Pro, $50 ea. D Rose, 888-380-7423.

NEEDLES, CARTRIDGES, BELTS...all major brands including old/obsolete models, one of the largest stocks in the country. Expert consultation. **NEEDLES EXPRESS (800) 358-2030 or www.needleexpress.com.**

TRANSMITTERS

Want to Sell

Continental 317C2 1982 50 kW AM on 1020 kHz, spare finals, complete tech manual, currently on air, call for info. D Niccum, 505-622-6450.

Gates BC 250GY 250 W AM, gd standby, 800 pounds, local pick-up only, can be upgraded to 500 W, $1000; 3 phase, 10 kW, electric start 208 V generator, $500. G Kenny, 417-451-1440.

Harris FM2C 2 kW FM currently on air w/exciter, $6000; Harris/Gates FM250C 250 W FM w/exciter, ready to ship, $600. J Stromquist, 218-722-3017.

QEI 675-T300 solid state 300 W FM amp tuned to 92.1, 10 yrs old, gd cond, can be retuned, $1200. R Ruff, 301-334-4272.

BE FM-1B, .25-1.1 kW w/MUDS controller, gd cond w/manuals, w/o exciter, $6000. T Marker, 619-320-3037.

LPB AM, 25 W, vacuum tube, on 630kc w/coupler, very little use, $500 +shpg. J Morinelli, 610-715-1720.

LPB AM-30 2-30 W, freq 1610, FCC port 23 applications, RF pwr & modulations adjustment, $500. B Medved, 406-748-2027.

RCA Ampliphase in gd cond, very reliable, $36,000. J Bahr, 787-728-0364.

Used PTEK 500W FM amplifier, $2950, full manufacturers 2 year warranty. Other power amps and exciters also available. 408-448-3342.

Want to Buy

5 kW FM RF dummy load, for 105.5 MHz. D Palmer, 740-593-6651.

Any gd used 50 kW shortwave xmtrs, no conversions. G Richardson, 502-369-8614.

Tepco translators, 1 or 10 W. J Stromquist, 218-722-3017.

CCA 3.5-5 kW FM class, will pick up, working or not, BO. R Osborne, 304-273-2544.

Harris 2.5k plate xfmr, used rotron blower, overload relay board, filter chokes & filament xfmr. J Bahr, 787-728-0364.

McMartin AM/FM xmtr, any model, exciter or stereo modules. Goodrich Ent., 11435 Manderson, Omaha NE 68164. 402-493-1886.

Circle (226) On Reader Service Card

SERVICES

EMPLOYMENT

HELP WANTED

DIRECTOR OF TECHNICAL OPERATIONS

Sinclair Radio of New Orleans, Inc. is seeking an experienced Manager/Technician to work in its expanding New Orleans, LA facilities. The candidate should provide a minimum of ten years experience in the radio broadcast industry with the expertise of advanced electronics, computers and computer networks, audio and RF technologies. Applicants should be knowledgeable in management of staff, the maintenance of high power AM and FM transmitters, microwave, studio and related equipment. FCC license and SBE certification helpful.

Qualified applicants please send or fax resume and cover letter to:

Sinclair Radio Division
Attn: Lynn Deppen
2000 W. 41st Street
Baltimore, Maryland 21211
Fax: 410/662-5678

No calls please.

Sinclair Radio of New Orleans, Inc. is an equal opportunity employer.

Chief Engineer for group of FM/AM radio stations in Colorado Ski Country. Seeking full time engineer with experience in RF, digital, satellite, audio, and computers. Must be able to work on mountain top sites and be comfortable with severe winter conditions. Fax resume and cover letter to: 970-949-6208.

ENGINEERING OPPORTUNITIES!

Triathlon Broadcasting is looking for experienced chief engineers with excellent digital skills and the desire to manage complex automated technical operations in aggressive duopoly environments. There is an immediate opening in Washington state and others possible as we expand. Successful applicants will have at least 5 yrs. radio engineering experience with at least 2 yrs. as a chief and good references. FAX resume to Dennis Ciapura 520-204-2221.

Radio Engineer: WBT AM/FM & WLNK, Jefferson-Pilot Communications, is looking for a full-time engineer. Position requires experience in installing and maintaining studios and high power AM & FM transmitting equipment. Directional AM antenna experience also required. Knowledge of digital audio and computers required. Must have FCC license and SBE certification a plus. Excellent benefits and competitive salary based on experience. Jefferson-Pilot Communications is an equal opportunity employer. Minorities and Women are encouraged. Send resume to: Ted Bryan, Chief Engineer, Jefferson-Pilot Communicati ons, One Julian Price Place, Charlotte NC 28208.

CHIEF ENGINEER

For a large Los Angeles audio production facility. Must have extensive experience in studio maintenance, digital work station operation and maintenance, as well as computer network skills. Position requires experience in designing and building new studios and familiarity with all building support systems i.e. air, power, etc. Strong people skills and work ethic a must. Full benefits, moving costs and a very competitive salary discussed upon formal inquiry. Send resume to: Radio World, POB 1214, Falls Church VA 22041. Attn Box #97-10-15-1AW.

POSITIONS WANTED

15 yr vet, AC/Oldies, seeks on-air program/music director position, excel on-air, digital prod, Selector, computer, marketing, promotions & remote skills, avail immed, willing to relocate. Mike, 609-390-4539 or e-mail MIKER983@AOL.COM.

Experienced & avail for news announcing, production, AT for Adult Standards, Classic Country. Alex McKuen, 513-777-8423.

FCC licenced 21 yr old seeking position at central jersey station, for demo tape contact Brian: 27 Lindstrom Dr, Somerville NJ 08876.

Let me fill your Midday or Nighttime vacancy, 8 yrs on-air exper, ready to relocate. Drew, 330-633-5323.

Looking for a career in mgmt, on-air, or any other positions in broadcasting. Robert, 405-732-4041.

Morning AT, gd phone & fun, looking for new challenge, will consider any shift, anywhere. Kevin 517-739-0328.

Radio personality, hard working, self-starter seeks full time position in production or as on-air talent, many voices for any media task. Dave, 254-259-3042.

Young & new broadcaster looking to join a team, recent graduate w/copywriting skills, board ops & voice. Jon, 405-360-1338.

Batting in the #1 slot, fabulous on-air rookie w/great personality, vast sports knowledge, great production, want to relocate. Mandi, 405-273-6042.

Big sports fan! Trained rookie willing to travel & attend sporting events, also interested in talking about news & current events. Scott, 405-843-1072.

CE, FM/AM-DA, exper in studio construction & RF, major-market TV exper, troubleshooting to component level, seeking new opportunities & challenges, can emigrate:English/Espanol/Deutsch. Phil, 609-294-9796.

Experienced DJ specializing in R&B seeking position., 1/2 hr audiotape avail. G Foster. 718-528-9758.

Interactive Hot Mix DJ avail for custom mixes, remixes, live & club mix shows. Formats include house, techno, disco, R&B, Top 40 & retro, 10 yrs radio prod, freelance & club exper, have many remote & promo ideas. Dave, 888-981-5321.

Let me fill your Midday or Nighttime vacancy, 8 yrs on-air exper, ready to relocate. Drew, 330-633-5323.

News anchor/producer, AT & prod talent for all-new, adult standards, classic country available, experienced, but would accept entry level position. A McKuen, 513-777-8423.

News anchor/producer, AT & prod talent for all-news, adult standards, classic country. Experienced but would accept entry level position. Alex McKuen, 513-777-8423.

Semi-Fab A/T, mornings/MD, ready for phones 7 fun. Mike, 509-397-9176.

This CE makes FM worries go away, blowtorch clean audio & RF. 1-904-467-3122 or email: mychucky@funport.net.

ACTION-GRAM

EQUIPMENT LISTINGS

Radio World's Broadcast Equipment Exchange provides a FREE listing service for radio stations and recording studios only. All other end users will be charged. Simply send your listings to us, following the example below. Please indicate in which category you would like your listing to appear. Mail your listings to the address below. Thank you.

Please print and include all information:

Contact Name _____

Title _____

Company/Station _____

Address _____

City/State _____

Zip Code _____—_____

Telephone _____

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.

I would like to receive or continue receiving **Radio World FREE** each month. ❑ Yes ❑ No

Signature _____ Date _____

Please check only one entry for each category:

I. Type of Firm

- ☐ D. Combination AM/FM station
- ☐ A. Commercial AM station
- ☐ B. Commercial FM station
- ☐ C. Educational FM station
- ☐ E. Network/group owner
- ☐ F. Recording Studio
- ☐ K. Radio Station Services
- ☐ G. TV station/teleprod facility
- ☐ H. Consultant/ind engineer
- ☐ I.Mfg, distributor or dealer
- ☐ J.Other _____

II. Job Function

- ☐ A. Ownership
- ☐ B. General management
- ☐ C. Engineering
- ☐ D. Programming/production
- ☐ G. Sales
- ☐ E. News operations
- ☐ F. Other (specify)

WTS ❑ WTB ❑ Category: _____

Make: _____ Model: _____

Brief Description: _____

Price: _____

*Closing for listings is every other Friday for the next month's issue. All listings are run for 2 issues unless pressed for space or otherwise notified by listee.

Broadcast Equipment Exchange

PO BOX 1214, Falls Church, VA 22041 • Tel: 800-336-3045 • Fax: 703-998-2966

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Free Subscriptions are available upon request to professional broadcasting and audiovisual equipment users. For address changes, send current and new address to RW a month in advance at P.O. Box 1214, Falls Church, VA 22041. Unsolicited manuscripts are welcomed for review; send to the attention of the appropriate editor.

It Thinks

DIGITAL

It Feels Analog

The D-500 Digital Audio Console

603 Industrial Drive, New Bern, NC. 28562
(tel 252-638-7000/fax 252-637-1285)

Wheatstone Corporation

Circle (132) On Reader Service Card

Sometimes we have to settle for what we need...

Wouldn't you rather Get what you WANT?

*We've taken the very **best** technology, components and field engineering input to make this the FINEST console available.*

*The **A-6000** is engineered specifically for major market stations that demand a lot of function and need to lead with technical excellence. It's based on an open architecture mainframe that lets you change module locations with **no** restrictions, giving layout top priority and allowing easy reconfiguration as format needs change.*

*The **Wheatstone A-6000** has the appearance, features and power to excite the most demanding program and production staff; its engineering, performance and thoughtful design will help your personnel achieve broadcasting excellence.*

Wheatstone

315-452-5000

Circle (158) On Reader Service Card