

*****3-DIGIT 857
 S117298 DOB 9802
 TOM MILLER 315
 ASST CHIEF ENGINEER
 KTZR
 2033 S AUGUSTA PL
 TUCSON AZ 85710 7905

Radio World®

**Why Use AAC
 For DAB?
 Opinion, Page 17**

Vol 22, No 9

Radio's Best Read Newspaper

April 29, 1998

NAB '98 Draws Nearly 105,000

*Digital Equipment, Low-Power Issues on
 The Minds of Radio Attendees*

by Leslie Stimson

LAS VEGAS By now, the jet lag has worn off and radio engineers and other managers are following up on the stack of contacts they made at this year's spring NAB show in Las Vegas.

The transition to digital broadcasting seemed more imminent as approximately 104,805 attendees listened to simulated in-band, on-channel DAB in the USA Digital Radio and Digital Radio Express booths, and saw the fruits of years of work into DTV.

On the regulatory side, attendees saw William Kennard for the first time as FCC chairman; indeed, all five commissioners were in attendance. Several members of Congress addressed broadcasters, including two key telecommunications regulators, Senate Commerce Committee Chairman John McCain, R-Ariz., and subcommittee chairman Conrad Burns, R-Mont.

Digital broadcasting figured prominently in the annual State of the Industry address by NAB President and CEO Eddie Fritts "We feel NAB '98 ... marks the birth of the digital broadcasting era," he said. "After years of talking and plan-

ning, digital is finally here."

Digital was also on the mind of keynoter Steve Jobs, co-founder of Apple Computer, who addressed broad questions of implementation.

"The problem right now is that we have a zillion standards," he said. "How do we deal with all of this?"

Jobs told broadcasters he wants to work together. "This digital thing is happening, whether any of us want it to or not. It can happen in a messy way, or in a much nicer way."

Linking digital to public service

The big regulatory issues of 1998 were on display here. Regulators are debating hotly whether broadcasters are meeting their public interest obligations; the so-called Gore Commission is deciding whether to recommend to the Clinton Administration

whether further obligations should be imposed on radio and TV.

Although McCain has expressed open disdain at what he calls the "spectrum giveaway" for the TV industry as it transitions to digital, he was equally



Rush Limbaugh (left) and NAB's Eddie Fritts

disdainful of efforts by both the Gore Commission and the FCC, which are looking at broadening the scope of

See WRAP, page 7 ▶

IBOC DAB Proponents Square Off

by Leslie Stimson

LAS VEGAS Both proponents of in-band, on-channel DAB are moving forward in their efforts to develop a viable IBOC system.

USA Digital Radio has conducted some signal work on its FM characterization tests currently being conducted in the Washington, DC area. Director of Engineering for USADR Glynn Walden said, "We're in the process of finishing up the hardware necessary to do the channel characterization study...The hardware may be finished at the end of this month."

Both IBOC DAB proponents USADR and Digital Radio Express had displays at NAB '98 to give broadcasters an idea of what digital radio will sound like.

At the USADR booth, attendees heard audio clips of music using

See DAB, page 6 ▶

The Next Generation Digital Console



Harris DRC 2000
 Digital Radio Console

Harris is proud to introduce the next generation Digital Radio Console, the DRC 2000. Features include a new low profile design that emulates familiar analog consoles, minimizing operator training and on-site installation costs. The DRC 2000 is the world's most advanced digital radio on-air console. Yet, it provides the simplicity of the analog console operation. Best of all, it's ready to ship!

**Harris Corporation
 Broadcast Division**

1-800-622-0022
 FAX: 765-966-0623
 www.broadcast.harris.com



© 1997 Harris Corp.

Low-Power Protesters Shadow Radio Debate

by Leslie Stimson

LAS VEGAS Low-power radio was debated hotly at NAB '98. Meanwhile, proponents protested outside the Las Vegas Convention Center, carrying signs that read "NAB Gags Free Speech" and "Rush is wrong."

Many attendees were unaware of the protest, which was moved off of the convention center property quickly and without incident.

During the show, FCC Chairman William Kennard was asked if the FCC was "serious" about licensing some form of low-power service. He said not to confuse so-called "pirates" with low-power broadcasting. He assured broadcasters the FCC would do everything it can to get illegal broadcasters off the air.

Of the low-power petitions, Kennard said, "We're developing a record, and we

are going to look carefully to make sure that anything we do does not undermine the technical integrity of the broadcast airwaves."

The FCC has been accepting comments on two petitions for rule making to create a



Low-power demonstrators outside LVCC

low-power radio service. The debate over whether such a new service is needed has polarized factions of the industry. Opponents believe the AM and FM spectrum is too

See LPR, page 8 ▶

NEWSWATCH

Capstar Buys Prophet Systems

AUSTIN, Texas At 300 stations and growing, radio giant Capstar Broadcasting Partners has agreed to purchase radio automation developer Prophet Systems.

Prophet Systems President and CEO Kevin Lockhart said the buyout gives Prophet access to Capstar's deep pockets, without cutting into Lockhart's autonomy.

"We are going to be at arm's length," Lockhart said. "We're staying in the same place. We're doing the exact same job we've always done." Prophet is based in Ogallala, Neb.

The infusion of Capstar cash allows Prophet to focus on getting new business as well as enhance existing products.

Capstar is one of Prophet Systems' clients, using its Audio Wizard for Windows software to share resources across stations. The purchase price was not released by press time.

CBS Promotes Mel Karmazin to President/COO

NEW YORK CBS is reshaping its top management team. Mel Karmazin has been promoted to President and Chief Operating Officer for CBS Corp. In his new role, Karmazin will be involved in all aspects of the corporation's media business.

Karmazin had been chairman and CEO, CBS Station Group since May 1997. He will continue to oversee the

group—comprised of CBS Radio, which will soon encompass 150 stations, the 14 CBS-owned and operated TV stations and CBS' outdoor business.

CBS Corp. Chairman and CEO, Michael Jordan said Karmazin "has achieved tremendous growth in the quality and market share of CBS Radio stations and our 14 owned TV stations."

Jordan also announced the promotion of Leslie Moonves to president, CEO, CBS Television.

CBS Television will report to Karmazin, as will CBS Cable. Karmazin reports to Jordan.

Reporting to Moonves will be CBS Entertainment, CBS News, CBS Sports and

CBS Enterprises (which includes Eyemark Entertainment) — as well as the network affiliate relations, research and planning, and advertising and promotion functions.

MPR Parent Sells Catalog Business

ST. PAUL, Minn. The parent of Minnesota Public Radio — the for-profit Greenspring Company — is selling its mail-order catalog business to

See NEWSWATCH, page 3 ▶

Index

FEATURES

AM Hybrid IBOC DAB System by David C. Hartup, Daniel M. Alley, Don R. Goldston	22
Routine Cleaning for DAT Machines by Jeff Johnson	23
Ergonomics and Alphabet Soup by Barry Mishkind	24
T1 and You: Perfect Together by Jack Conners	28
Early Days Come Alive at Museum by Bob Rusk	31
ATU ABCs for the Expanded Band by W.C. Alexander	35
Research Rules at Your Library, on Web by Harold Hallikainen	38
Workbench by John Bisset	43

RUNNING RADIO

PSA Count Up; Ad Council Cheers by Sharon Rae	46
Dobson to Focus on Republicans by John Montone	46
Harry Caray Dies at 83 by D.C. Culbertson	46
Beyond the Basics: Get a Clue by Mark Lapidus	47
Gospel Radio Grows in Popularity by Mark Stevens	48
L.A. Station: Show Must Go On by Dee McVicker	48
Arbitron Eyes Europe and Beyond by S.D. Yana Davis	51
Fuhrman: Off the Beat, On the Air by Bob Rusk	54
Morning Milestone in Detroit by Randy Stine	56

STUDIO SESSIONS

B400 Board Good for Production by Keith Spencer-Allen	64
Sennheiser Scores at World Café by Tom Vernon	64
NPR Maps a Battle Plan of Action by Rich Rarey	64
Notes from California's 'V/O Guy' by Travis	66
The Agony of the Abused Instrument by Alan R. Peterson	66
Software Recreates Sonic Spaces by Read G. Burgan	68
Milk Another Year Out of Old PC by Alan R. Peterson	72

Take a LOOK at THIS:



Then look at our competition.

OF COURSE many stations are cost-conscious these days—just remember why you wanted a new console in the first place: to **UPGRADE**.

The **R-60** has what's needed, with all the right features: our **SIMPLE PHONE®** module for easy error-free talk segments; twin six bank preselectors, so you won't run out of input capacity; onboard machine control panel, clock, timer, a well-designed cue system, and a truly effective control room and studio monitor interface. And because it's totally modular, service is easy—even while you're on-the-air! Documentation: this can determine whether you have an installation day or an installation week. We've done it right to guide you through. And **PERFORMANCE?** Of course we've handled that; simply compare our specs.

DON'T MISS your opportunity to upgrade. Choose the R-60 radio console from AUDIOARTS.

FREQUENCY RESPONSE	
Line (10Hz-20KHz)	±1/10dB
Mic (20Hz-20KHz)	±1/10dB
THD+N (20Hz-20KHz)	
Line, +4dBu	.005%
Mic & Line, +16dBu	.005%
IMD (SMPTE)	
Mic & Line, +4dBu	.004%
DIM	
Mic & Line, +16dBu	.005%
DYNAMIC RANGE	
Line	114dB
Mic	98dB
HEADROOM	
ref +4dBu	24dB
OFF & ASSIGN ISOLATION	
1 KHz	-110dB
20 KHz	-105dB
BUS CROSSTALK	
1 KHz	-100dB
20 KHz	-75dB

7305 Performance Drive, Syracuse, NY 13212
tel 315-452-5000 / fax 315-452-0160
E-mail Wheatstone@aol.com

 **AUDIOARTS ENGINEERING**

► NEWSWATCH, continued from page 2
 Minneapolis retailer Dayton Hudson for an estimated price of \$120 million. The catalog business, Rivertown Trading Company, specializes in merchandise that promotes shows produced by MPR. Rivertown was formed in 1981, as a product marketing division of MPR, to design, produce and sell products related to Garrison Keillor's "A Prairie Home Companion." Rivertown was separated from MPR in 1996 and reorganized as a for-profit company to earn revenue and build value for the non-profit MPR.

After paying outstanding obligations, MPR is expected to net about \$110 million from the sale, of which about \$90 million will be added to its endowment fund. The conversion of Rivertown's value as an "operating asset" into an "endowment asset" will provide long-term annual support for MPR equal to or exceeding the amount MPR has received each year from Rivertown's earnings, MPR said.

Three people who founded Rivertown, including MPR President William Kling, profit personally from Rivertown "value participation units." MPR President William Kling will receive \$2.6 million in the deal.

Clinton Proclaims New African Radio Service

WASHINGTON President Bill Clinton announced a new radio service for Africa to begin in May. "Radio Democracy for Africa" will be a new division of the Voice of America and will

focus on promoting democracy throughout the continent. VOA Director Evelyn Lieberman said, "Radio Democracy America will allow us to expand our role in Africa, building on existing programs, adding more news and increasing in-country reporting in Africa." VOA will train public and private media in Africa.

Telos to Provide Algorithm For DRE IBOC DAB

LAS VEGAS Telos Systems will use MPEG-2 Advanced Audio Coding for the in-band, on-channel DAB systems proposed by Digital Radio Express. Telos Systems intends to provide audio encoding and transmission equipment to broadcasters should the DRE IBOC systems be used by broadcasters. The AAC system can encode CD-quality audio at 128 kilobits per second.

Telos Systems President Steve Church said, "MPEG-2 AAC has more coding power, allowing more efficiency and reliability on the RF modem side."

Cleveland Pirate Equipment Seized

CLEVELAND Officials seized the equipment of a radio station operating without a license that authorities said was interfering with Kent State University station WKSU-FM. The unlicensed station, based in an office building, was a 24-hour Christian station authorities said was operated at 89.9 MHz by Angel Dones. WKSU operates at 89.7 MHz.

NRSC Dissolves Its Subcarrier Group

by Lynn Meadows

LAS VEGAS The National Radio Systems Committee and two of its subcommittees met during NAB '98. The Federal Highway Department selected MITRE STIC modulation as the U.S.

was to select an HSSC modulation standard. Systems from Seiko, Mitre Corp. and Digital DJ were in contention. Both laboratory and mobile testing of the systems were completed, but the committee could not muster enough votes to accept the results of

It was suspended because it was just going nowhere.

— Charles Morgan
 NRSC Chair

standard for use in mobile traffic applications. But the show also apparently marked the last meeting of members of the High-speed FM Subcarrier Subcommittee.

Months of arguing resulted in an impasse, so the HSSC Subcommittee suspended its activities. In a letter to the chairman of the NRSC, co-chairs Michael Rau and David Kelley wrote that the subcommittee could not even get sufficient votes to pass a motion to disband.

The charter of the subcommittee

the mobile tests.

"It was suspended because it just was going nowhere," said Charles Morgan, chairman of the NRSC. "At this particular point, I have no real hope that it will come back, although it could."

Gary Gaskill, director of Systems Architecture for Seiko, said his company intends to enhance its system and improve its multipath performance so there will be no need for someone to use an alternative system.

See NRSC, page 6 ►

LEAPFROG TECHNOLOGY



CLARK COMMUNICATIONS

211 Commerce Park Drive,
 Cranberry Township, PA 16066-6403
 (724) 772-2310 Voice
 (724) 772-4770 FAX

Fifty years ago, diesel locomotives appeared on the scene. The railroads were very skeptical about them. It took the four-foot-tall wheels and belching smoke of a steam locomotive, many felt, to pull a heavy freight train. Diesels, with their barely one-foot-tall wheels, might be all right to use as a switch engine in the yard, but they couldn't deliver the muscle required for the open road.

Today, there isn't a single steam locomotive left in revenue service in the US. Early reservations about diesels were more emotional than they were based in fact. People were simply rooted in the paradigm of the previous technology. They had seen it work for years and felt emotionally comfortable with it. Diesels were not an evolutionary change which slowly morphed the past into the future. Diesels were a "leapfrog technology".

Twenty-five years ago, broadcasters saw their first AM transmitter using pulse-width-modulation (PWM). PWM transmitters didn't use a modulation transformer, which made many people uncomfortable. The majority of AM transmitters at that time had a modulation transformer, a massive block of iron... taller than a man for some transmitters... that buzzed and groaned in time with music. The new transmitters were smaller, lighter and cheaper. Conventional wisdom held that you couldn't get more with less. Many people had trouble believing that the new designs

could deliver the goods.

Today, not a single US manufacturer produces a plate-modulated AM transmitter. Another leapfrog technology had changed the rules of the game.

Today, conventional wisdom holds that it takes ten-thousand dollars worth of digital electronics to get a major market performance from your on-air, FM, audio processor. If you want to run with the big dogs, that's the price.

But even digital isn't immune to leapfrog technologies. Remember that 1997 was the year that IBM's DEEP BLUE beat a chess grand master, a feat which many felt would be impossible for all time. If you want to know more about the latest technology, call us at (724) 772-2310 and ask for our white paper *ARTIFICIAL INTELLIGENCE: It's What Comes After Digital*.

Some people don't care about the technology. They just want to sound bigger and better than the station down the street. And that's OK too. If you're one of those people, you'll be happy to know that you can plug artificial intelligence into your existing Optimod 8100* in under 30 seconds. You'll be even happier to know that the cost is under \$2,000.

Call today to set up a no-obligation, 10-day demo of COBALT BLUE™, the world's first Neural Network audio processor.

* Optimod is a registered trademark of Orban, Inc., San Leandro, CA.

Guy Wire Climbs Onto the Web

An interesting undercurrent at the NAB '98 convention was the health of AM.

"It's nothing I can put my finger on," one supplier of data analysis services told me, "but a lot of people are asking about AM products." He sensed renewed interest in how managers can improve the performance of their AM station holdings.

On the same theme, a radio group engineer based in the Northwest said the idea of in-band, on-channel digital radio holds particular promise for AM stations. In years past, he said, most of the attention paid to DAB centered on how it would benefit FM stations, presumably because they have been growth and profit centers for so long. But this year, he said, people at the show seemed more excited about what DAB could do for occupants of the AM band.

Reinforcing the AM theme was the induction into the NAB Radio Hall of Fame of talkmeister Rush Limbaugh (in his new thinned-down incarnation). Many people consider Limbaugh the savior of AM. Ignoring the hyperbole, I agree nevertheless that Rush has helped change the face of the band through his innovative and attention-grabbing programming.

Keep your eye on AM. If in-band DAB comes to pass, expect big things from members of that senior service.

At the show, Morris H. Blum picked up the SBE Lifetime Achievement Award at NAB '98. The 67-year veteran of broadcasting was honored during the spring membership meeting of the SBE at the Las Vegas Convention Center. Readers will recall our front-page story about Blum in September.

"It's a matter of great pride to receive this award," said Blum. "The SBE does a great job in keeping the ball rolling in our industry."

Elsewhere, Dick Ferguson of Cox Radio, the NAB joint board chairman, showed that radio people can laugh at themselves as he introduced humorist C.W. Metcalf. That's him with the arrow through his head. Who said the NAB show is all work?



★ ★ ★

Visitors to **RW Online**, our new Web site at www.rwonline.com, can look forward to a special treat.

Guy Wire is the pseudonym for a prominent broadcast engineer who holds forth regularly with analysis and commentary about some aspect of the world of radio. Guy's column is an exciting feature among the useful resources for radio professionals on our new site.

Why the mask?

Guy gets around, visiting conventions, radio stations, corporate suites. He (or she?) has the experience and the knowledge to offer some pretty pungent analysis and perspective. We like that. With the mask of anonymity, Guy can go where few others dare and offer comments others might be too timid to give.

In his first commentary, Guy wrote about digital audio broadcasting, and his concerns that an in-band, on-channel system might not compare favorably to the performance of the Eureka system.

"Whether USADR or DRE, the NAB and the U.S. broadcast industry have said, more or less: 'Give us IBOC DAB or give us nothing at all.' But a lot of things still need to happen precisely the right way for either system to succeed. Computer models are fine for perfecting theory, but I need to see them turned loose on the cold, cruel, real world."

Guy Wire columns are available only at www.rwonline.com. Read them there, e-mail him your reactions, and go back often. He (or she?) wants to hear back from you.

★ ★ ★

The radio industry at large is beginning to realize something **RW** readers have known for some time: that the conversion process in digital television will carry a cost for radio stations. The most obvious impact is new competition for space occupied by your FM antenna on the tower.

RW has reported on these problems and will continue to do so. What is your experience? Have you been asked to move your antenna? To take part in a new combiner system? Are you co-owned with a TV station, and if so, does the imminent cost of DTV mean cutbacks in your budget?

Tell me how DTV affects you and your radio facility. I'll share your story with our readers. Send e-mail to pmclane@imaspub.com or write to the address on page 5.



★ ★ ★

Our friends at the IEEE Broadcast Technology Society are asking for papers to consider for their 48th Annual Broadcast Symposium. Topics may include digital and analog radio and television transmission, AM, FM and TV antenna systems, measurements, RF radiation, standards, testing and other

From the Editor



Paul J. McLane



NAB '98: Blum honored (top left, with SBE President Ed Miller); Ferguson, self-skewered.

developments in broadcast transmission engineering.

If you have a paper to submit, send a 250-word abstract by May 15 to Edmund Williams, Public Broadcasting Service, 1320 Braddock Place, Alexandria, VA 22314 or send e-mail to ewilliams@pbs.org

The event itself is set for Sept. 24 and 25 in Washington, D.C., with a background tutorial on Sept. 23.

Next issue: We reveal our 1998 Cool Stuff Award winners.

Remote Control can be this easy.

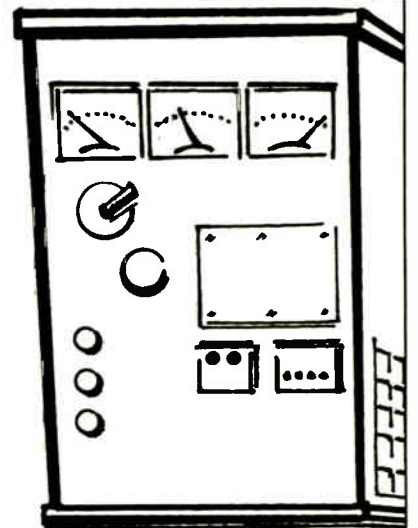
BURK
TECHNOLOGY

7 Beaver Brook Road, Littleton, MA 01460
Phone 978-486-0086 • Fax 978-486-0081
email: control@burk.com

ARC-16
Transmitter Remote
Control System



AVAILABLE THROUGH:
ABG
Audio Broadcast Group Inc.
800-999-9281



For information and our new catalog, call TOLL FREE 800-255-8090

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.

A broadcaster speaks up

Dear RW,
Radio World, our radio friends, our Washington communications counsel, our NAB, are all talking about "low-power" or "micro-power" radio.

My comments may come off as a greedy incumbent licensee who seeks to build an empire, and the heck with serving the public. I hope I address this on a higher plateau.

If the FCC chooses to add still another class of radio, I simply ask they 1) treat all radio on the small level playing field, and 2) determine their own mission and focus.

Our employee-owned company operates 16 small-market (about 15,000 population communities) AM and FM stations. We take seriously our relationship

with the FCC and its rules. Annual employment reports, regulation fees, quarterly ascertainties, new EAS equipment and logging, and operating within licensed parameters are important to our company. We promised the FCC if they'd issue us a license, we would do each of these.

Then last February I heard the FCC didn't receive regulation fees from a sizable percentage of licensees. And my reporter tells me the FCC doesn't even have a database of who paid and who didn't! But apparently those who didn't are treated equally with those who did.

I can't remember the last station we've purchased where the seller had the foggiest idea of what the quarterly ascertainment process meant — or did they make much of an attempt to abide. But apparently those who didn't are treated equally with those who did.

And in early March 1998, we purchased a pair of stations where the seller had no interest in ordering, purchasing or installing EAS equipment which the FCC has required since January 1997. And again, the FCC treats the non-EAS station the same as the rest of those who spent the money and time to follow the law.

If the FCC intends to drop micro-power stations into communities with a different set of rules, is it any wonder incumbent commercial broadcasters are requesting equal treatment?

Dean Sorenson
Sorenson Broadcasting
Sioux Falls, S.D.

DAT details

Dear RW,
I read the first installment of Jeff Johnson's article on DAT service (RW, March 18).

Jeff mentions that a cleaning tape cannot do anything about the accumulation on the capstan or pinch roller. I discovered that a case of digital tearing was caused by slight tape skew. The slight skew was caused by an accumulation of crud on the capstan shaft similar to what accumulates on the capstan of a typical VHS VCR, only in this case, the accumulation was so slight as to be hardly visible. Cleaning the shaft eliminated the skew. So I looked for a way to clean the capstan regularly without pulling the machine and disassembling it to where I could get to the capstan shaft.

I was able to modify a DAT tape by installing a metal flap made from 0.005-inch brass shim stock hinged at the corner of the take-up side of the cassette. The flap is the same width as the length of the pinch roller. The tape leader is stuck to the back of this flap with a piece of splicing tape. I then cut approximately 3/8-inch long pieces of sticky note paper at the adhesive end. One of these I stick to the front of the flap. The tape loads, the pinch roller pushes the flap up against the shaft and the crud rubs off on the paper. Obviously the tape can't advance so the machine stays in this position only

The SBE Youth Program

It is no secret that opportunities offered in other technical fields have helped create a shortage of capable radio broadcast engineers. Better salaries and predictable hours in other occupations — along with economic cut-backs on the station level — have contributed to the migration of qualified technical people.

In the pages of RW, we have reported on this trend. We have called upon engineers to develop mentoring programs and to investigate other ways to develop

new talent in their specialized profession.

Rather than bemoan the "good old days," the Society of Broadcast Engineers has taken positive action by creating a youth education and membership program.

The program has been under study by the SBE since September 1997. Meeting this month in Las Vegas, the board of directors approved the creation of the program, which will become a reality Aug. 1.

When most young people think about a radio career, they think of emulating their favorite performers and little else. The SBE youth membership program looks to change that. SBE President Ed Miller said the program is aimed at students involved in high school-based broadcast facilities, amateur radio clubs and career clubs.

Combining educational material and close interaction with broadcast engineers now in the field, the SBE hopes to motivate technically adept young people to pursue careers in radio and TV engineering. Miller also hopes for increased opportunities for internships and the development of a college scholarship toward the goal of building up the ranks of qualified future engineers.

RW applauds the creation of this program. Modern technological advances have almost made obsolete the practice of apprenticing solely at the hands of seasoned engineers; new educational techniques are necessary. Computer skills today are as important as Simpson meters and Greenies. The draw of more glamorous and lucrative occupations will leave radio with a need for technically proficient people — a need that will intensify as more engineers retire or move to new careers. New engineers will come only from a pool of interested young people.

Perhaps in the future, the dynamics of the industry will change, placing more importance on the broadcast engineer and bringing more competitive salaries. Interest in broadcast engineering, along with educational opportunities, must be cultivated now. The society's youth membership program is a good start.

— RW



Vol. 22, No. 9 April 29, 1998

telephone: (703) 998-7600
editorial fax: (703) 820-3245

The editorial staff can be contacted at the phone extensions listed below

- Paul J. McLane** ext. 117 Editor in Chief
- Sharon Rae** ext. 126 Managing Editor
- Alan Peterson** ext. 135 Technical Editor
- Leslie Stimson** ext. 129 News Editor/
Washington Bureau Chief
- Chris Hamaker** ext. 147 Associate Editor
- John Bisset**
Thomas R. McGinley Technical Advisors
- Stevan B. Dana** Publisher/CEO
- Carmel King** ext. 157 Chief Operating Officer
- Robert "Skip" Tash** ext. 160 Associate Publisher
- Marlene Lane** ext. 128 Editorial Director
- Alan Carter** ext. 111 Editor in Chief (International)
- T. Carter Ross** ext. 137 Editor (International)
- Christine Joaquim** ext. 138 Managing Editor (International)
- Rogelio Ocampo** ext. 121 Latin America Managing Editor
- Marguerite Clark** European Editor
- Linda Sultan** ext. 141 Editorial Assistant
- Stephanie Muller** ext. 130 Editorial Assistant

Contributors: W.C. Alexander, James Careless, Harry Cole, Troy Conner, Ty Ford, Alan Haber, Harold Hallikainen, Lee Harris, Mel Lambert, Mark Lapidus, Dee McVicker, Lynn Meadows, John Montone, Rich Rarey, Bob Rusk, Tom Vernon.

Radio World (ISSN: 0274-8541) is published bi-weekly by IMAS Publishing (USA), Inc., P.O. Box 1214, Falls Church, VA 22041. Phone: (703) 998-7600, Fax: (703) 998-2966. Periodicals postage rates are paid at Falls Church VA 22046 and additional mailing offices. POSTMASTER: Send address changes to Radio World, P.O. Box 1214, Falls Church VA 22041. REPRINTS: Reprints of all articles in this issue are available. Call or write Giselle Hirtenfeld, P.O. Box 1214, Falls Church, VA 22041; (703) 998-7600; Fax: (703) 998-2966. Copyright 1998 by IMAS Publishing (USA), Inc. All rights reserved.

—PRINTED IN THE USA—

Next Issue of Radio World
May 15, 1998

a few seconds then stops. I eject the cassette, reposition or replace the paper, and repeat the sequence until the paper comes out clean.

I hardly ever have to open a DAT machine now except for some other failure. We never have a case of digital tearing due to tape skew unless the pinch roller has so many hours on it that it needs replacing

Bob Burkhardt
WBAA-AM-FM, Purdue University
West Lafayette, Ind.

Walden

Dear RW,
I thought the article on the cover of the March 18 RW was stunning. The picture of Glynn Walden, with the Westinghouse circle-W behind him, was excellent. The interview was good, showed the interviewers understood the subject matter, the history and the politics. It all hung together very well. A class piece.

From all of us who design AM arrays and want IBOC to succeed ... thanks.

Glen Clark
Clark Communications
Cranberry Twp., Pa

Dear RW,
Two quick takes on current events in the industry: First, I can't think of anyone more qualified and dedicated to this business to lead us into the new age of digital than Glynn Walden. It is clear that his motives go beyond the potential profit for his company, and rest with getting a system that will provide broadcasters and the public with digital radio of the best quality.

Second, licensing so called "micro-stations" will do nothing more than bring back the horrible interference on the AM dial that has been greatly

reduced by the NRSC initiative. And, allowing this low-power stuff on FM will bring the problems to that band as well. It is foolish to assume that these new broadcasters will join the NAB as solid citizens. They will spend all their time trying to get more power, thus creating more interference.

Hal Widsten
KWED(AM)
Seguin, Texas

Automation system solution

Dear RW,
Thanks for the excellent article on low-cost automation systems for small-budget stations (RW, Dec. 10). I missed it originally, but a colleague alerted me to the article (never throw out those old RWs!). I've been looking for an automation system for an educational installation that has virtually no budget.

I called BSI, makers of WaveStation, to ask some follow-up questions. Ron Burley helped me figure a way to run his product on the cheap. What a great product! RW to the rescue!

Ron Grandia
San Jose, Calif

Write to Us

RADIO WORLD
READERS FORUM

P.O. Box 1214
Falls Church, VA 22041

radioworld@imaspub.com

DRE, USADR Stake Their Claims

► DAB, continued from page 1
Lucent PAC audio coding. Attendees could see the output of the USADR IBOC exciter on oscilloscopes at 96 kilobits per second for FM and at 48 kbps for AM. USADR also showed a videotape, made while driving around the Washington, D.C. area, of an over-the-air transmission of the waveform for 87.7 MHz in preparation for upcoming FM characterization tests.

Digital Radio Express played compact discs through its prototype FM setup, which fed a Ford car radio for demonstration. DRE President Norm Miller called the setup a "pseudo-FM transmission site," with a DRE exciter box added to process the standard FM analog signal into a digital format. To demonstrate the effect of urban canyons, DRE used a real-time multipath emulator.

DRE officials said they planned to begin field-testing their prototype FM system in San Francisco shortly.

In the spotlight

USADR and DRE engineers faced broadcasters together for the first time during an NAB session.

The fireworks were strong as executives for both companies battled for the attention of broadcasters.

Glynn Walden of USADR began with a bold statement about the future of radio. "Digital radio is going to happen with or without us. We need IBOC in this country."

Taking a jab at DRE, Walden said that anyone can design a system to work outside the existing radio infrastructure, but it is harder to design one that will work with existing stations.

USADR plans a hybrid mode that will be compatible with both the current analog service and an all-digital mode. The company said that this would allow broadcasters to turn off analog services

so that more digital power and data can be provided.

Laying out the USADR testing schedule, Walden said the company plans to test both proposed AM and FM IBOC systems on 16 radio stations in eight cities during the first quarter of 1999.

An overview of USADR's IBOC testing includes: compatibility, immunity to interference, channel impairments and quality enhancements. SCA testing is necessary to determine any impact the IBOC system will have on subcarrier performance.

Also, the USADR IBOC system places digital energy in the upper and lower sidebands. Testing will determine any potential effects to the first adjacent channels AM or FM analog signal.

"We expect this system to perform better than analog," said Walden.

Critical tests

Field tests are critical, Walden said, because lab tests do not show all the potential problems that could occur. "Field testing has to be more than driving around and listening to the signal," he said.

One of those tests will look at the "point of failure," or when the IBOC systems begin to blend with analog. Once the POFs are known, USADR can generate a digital coverage map for each of the 16 test stations.

The FM tests will compare the proposed IBOC system to CD quality and to current analog FM reception. The analog AM reception will be compared to current analog AM receivers. The field tests are expected to take about a year to complete.

Xetron is a subcontractor working with USADR on exciters. Xetron's David Hartup said field testing of waveforms would begin later this year.

The other IBOC proponent, DRE, has come on the scene only recently, and its executives are trying to get the DRE system noticed and accepted by broadcasters and industry leaders.

As part of that plan, DRE is working with the DAB subcommittee of the National Radio Systems Committee, sponsored by NAB and EIA. DAB subcommittee members meeting here discussed goals and what kinds of tests DRE should perform, in an advisory capacity.

Having participated in such tests in the past, USADR has declined to participate in another round of tests. "We have no intention of changing our schedule," Walden said.

When asked about the effect of both DRE and USADR testing on separate tracks, DRE Director of Engineering Derek Kumar replied, "If USADR is not fully participating in the process, do we bend the NRSC process?"

Kumar said DRE is working with the NRSC on developing core "gated" tests to quickly determine the feasibility of its IBOC systems and to minimize costs. Channel-specific tests are to be determined.

DRE plans to begin field tests of the FM system in San Francisco shortly after NAB98. Results are expected by late summer.

Kumar knocked USADR several times, saying, "USADR is not the only company doing IBOC research."

Kumar said DRE's proposed FM IBOC system includes a state-of-the-art audio codec, high-efficiency multicarrier modulation and redundant upper and lower sideband information. DRE plans to use the new MPEG-2 AAC compression algorithm.

Kumar said DRE's system can run with 128 kbps of audio and the USADR system cannot. USADR said it looked at that scheme, which uses 8-QPSK modulation, but rejected it in favor of 4-QPSK, which USADR said is less subject to bit errors.

The DRE FM system is in the hardware stage, whereas AM is not. Kumar said the DRE AM system is based on the FM system hardware. DRE's goal is to have a functioning AM IBOC DAB receiver by the end of the second quarter.

NRSC Kills Its HSSC Group

► NRSC, continued from page 3

"If there isn't a standard, it's primarily because existing subcarrier people don't want to see a standard, but lacking that, if Federal Highways was prepared to cooperate as opposed to compete, I think we could have gotten a standard," said Gaskill.

The Federal Highway Department selected the MITRE system as the U.S. standard for mobile traffic applications like the Intelligent Transportation System. According to the letter, both the Society of Automotive Engineers and the IEEE were expected to review NRSC test results and choose STIC as their standard.

FM Net, a new trade association, has formed to "promote the proliferation of HSSC systems meeting a common standard and related technology into both mobile and stationary uses."

"It's a shame that it had to come to this," said Jim Marshall, vice president, engineering for Radio Dynamics Corp. and the inventor of STIC. "The standardization is going to move forward regardless. It will just happen in other areas."

DAB consensus

Meanwhile, the DAB Subcommittee appeared to enjoy more consensus than in its previous life. The subcommittee heard from two working groups at its meeting. The Goals and Objective Working Group has a little more "wordsmithing" to do, Wilson said. Members are trying to come up with a revised set of objectives for the subcommittee.

The Test Plan Working Group reported that it is close to completing an outline of the "core tests." These are a series of initial tests that IBOC proponents will have to pass to prove compatibility with existing broadcast stations.

Andy Laird of Heritage Media, chairman of the Test Plan Working Group, said he hoped the tests would be ready for approval at the mid-May subcommittee meeting. The group studied the original lab tests and selected what it deems to be important for the IBOC systems.

Digital Radio Express is assisting with the development of the tests. Unlike the last round of DAB testing, proponents will conduct the tests themselves and report the results to the subcommittee.

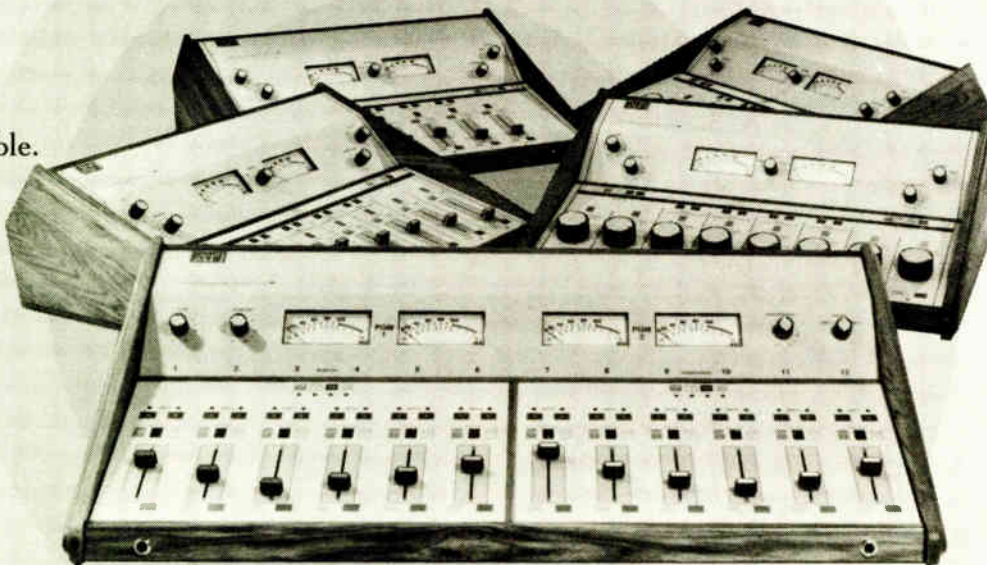
NRSC members also heard a report from its RBDS Subcommittee, given by Wilson. A letter ballot vote for accepting the new RDS standard was due to be finished on April 9. The subcommittee was waiting for written permission from its European counterparts to use their RDS standard in the U.S. RBDS standard.

On Target.

Performance, value, and reliability through innovative technology.

5 models available.

- BC6DSL
- BC6DSR
- BC8DSL
- BC8DSR
- BC12DSL



Vanguard Series™ STEREO BROADCAST CONSOLES

ATI AUDIO TECHNOLOGIES INCORPORATED

<http://www.ATiguys.com>

Call or write for free detailed brochure.

328 W. Maple Ave. Horsham, PA 19044, USA
(215) 443-0330 FAX: (215) 443-0394

Kennard on Public Service

► WRAP, continued from page 1 broadcaster public interest obligations. Kennard has said he will conduct a Notice of Inquiry on the topic of public service, pulling back from previous plans to hold a full-blown rule making.

McCain said, "The dueling Clinton-Gore commissions might avoid total redundancy if it appeared that their collective energy was producing new ideas." He said it is not the job of the FCC job to develop new public service obligations unless directed by Congress.

Of the public interest inquiry, Kennard said he hoped broadcasters take part in the process so that it does not become something the FCC does "to" the industry.

Minority ownership

Kennard challenged broadcasters to submit ideas for increasing minority ownership, one of the goals he has stressed since becoming chairman five months ago. He spoke of the entrepreneurial spirit of African-American radio group owner Cathy Hughes, who used to make ends meet by living in her first station, WOL(AM) in Washington, D.C.

One of the first questions broadcasters asked Kennard was whether the commission was serious about the possibility of forming a new class of low-power radio service. Kennard drew a sharp distinction between so-called pirates and people who don't have a lot of money but nevertheless want to own a station.

Kennard said the FCC would continue to prosecute illegal operators. But at the same time, the agency was developing a public record by inviting the public to file comments, due April 27, on two petitions for rule making to create a low-power service. Kennard wants to see if low-power is the way to create opportunity for different kinds of people to get into radio ownership.

\$7 billion in public service

To push back regulators' talk of increasing public service obligations, NAB highlighted broadcasters community service efforts in the past year. Fritts said, "As excited as we are to roll out digital, the loan of the (TV) digital spectrum has brought with it challenges from some in Washington who think broadcasting is getting a 'free ride.' ... The fundamental flaw in Washington's way of thinking is the assumption that the FCC, or Congress, or the White House, can dictate to local stations how to best serve their local communities without destroying our unique system of free over-the-air broadcasting."

Broadcasters contributed nearly \$7 billion worth in local public service efforts last year. A nationwide community service census commissioned by the NAB found that radio and TV stations donate airtime valued at \$4.6 billion for public service announcements, \$2 billion for charitable causes and \$148.4 million for political debates and convention coverage.

Also during the show, the Ad Council announced that the dollar figure of Ad Council PSAs that TV stations aired increased 42 percent in 1997 from the year before, to \$129.6 million. The dollar figure of Ad Council PSAs that radio stations

aired increased 6 percent in 1997, to about \$574 million.

Fritts announced an initiative between NAB Education Foundation and Bonneville International Corp. The national effort encourages public service by broadcasters.

Limbaugh honored

In an afternoon of accolades and amusement, Rush Limbaugh was inducted into the NAB Broadcasting Hall of Fame during the Radio Luncheon.

Limbaugh said, "I'm continually

stunned by the wonderful things that keep happening to me from the moment of my birth."

Limbaugh said it was KUDL in Kansas City, Mo., that turned Limbaugh to talk radio as a way of fulfilling the station's community service requirement. "It's where I developed the whole format of coupling music and talk and not doing guests," he said.

Limbaugh described the rough going of his early days. "When I started in 1988, everybody was concluding it couldn't be done," he said. Limbaugh thanked Bruce Marr, formerly at KBFK, Sacramento, Calif., where the national show was launched, and his

syndicator, Ed McLaughlin.

The winners of the NAB Radio Crystal Awards for community service were announced during the luncheon. Of the 10 winners, NAB Radio Board Chairman Howard Anderson said, "These stations showed a sense of caring for community by being there not only during crises, but each and every day."

The 10 Crystal Award winners are KDWB-FM, Minneapolis; KUZZ-AM-FM, Bakersfield, Calif.; KVFD(AM), Fort Dodge, Iowa; KWSN(AM), Sioux Falls, S.D.; WKVI-AM-FM in Knox, Ind.; WLEN(FM) Adrian, Mich.; WUSY(FM), Chattanooga, Tenn.; KIRO(AM), Seattle; WIBC(AM), Indianapolis; WUSL(FM), Philadelphia.

The winners were selected from among 44 finalists.



William Kennard

LISTEN.

VECTOR
POTS CODEC
 15 KHZ TWO-WAY AUDIO
 ON ONE STANDARD PHONE LINE.

COMING SOON.

Comrex Corporation, 65 Nonset Path, Acton, MA 01720
 Tel: (800) 237-1776 Fax: (978) 635-0401 Fax-on-demand: (978) 264-9973
 Email: info@comrex.com www.comrex.com

Jesus, 'Pirates' and the FCC

► LPR, continued from page 1

crowded to support a new service. Proponents favor a less expensive way of getting into radio ownership in the age of big groups and consolidation.

Broadcasters attending a highly-charged session on pirate radio were less than sympathetic to claims that pirates have a legal right to the airwaves.

"Jesus said the poor will always be with us," one Massachusetts broadcaster told the attorney representing Free Radio Berkeley. "If Jesus were here today, he'd say, 'Those who want to buy radio stations will always be with us.'" The broadcaster said it would be impractical for everyone who wants to buy a station to

actually receive one.

Low-power hero Stephen Dunifer, founder of Free Radio Berkeley, was in Las Vegas during the convention and organized the protest outside of the LVCC. He was, however, on the minds of radio managers here. Attendees cheered and clapped when a Massachusetts broadcaster said, "If Dunifer wants to be on the air, have him apply for a job as a disc jockey."

Dunifer attorney Louis Hiken said those who favor FCC creation of a new class of low-power service, or "micro broadcasters," have a legitimate right to be on the air. Citing the numerous calls and "hits" on the FCC Web site about micro-power

issues, Hiken said that "disenfranchised people," cut out of radio ownership by large corporations, need a voice.

Many industry observers worry about the spectrum management and interference issues involved in such a proposal. Telecom attorney John Fiorini said interference caused by some of the illegal operators "doesn't give us much comfort these people will suddenly live within the rules" if a new low-power service is created.

Hiken, speaking for a group of micro radio broadcasters, said the group has submitted a low-power proposal to the FCC of a maximum of 50 W power stations on "any unused frequency in the FM band." He said it was not a formal petition for rule making.

Hiken said he was unaware of reported cases of on-air cursing or of illegal operators interfering with existing broadcast-

ers. That, he said, was not how a typical micro power broadcaster works.

Fiorini said Hiken's view is naive. "No broadcaster I've talked to fears economic competition" in the event a new class of low-power station is created. "It's about preserving the integrity of signals," he said.

Interference

Several broadcasters related stories of interference problems from illegal operators.

One attendee from Florida said his area contains 22 illegal operators. He disputed Hiken's claim that most low-power proponents are small operators with a political message. Some in his area, he said, are operating at 100 W and their signal is "splattering and interfering with each other and adjacent channels." He said at least one has used profanity on the air.

Richard Lee, chief of the FCC Compliance and Information Bureau, replied that those stations are under investigation and promised action soon.

An engineer from Cleveland reported six pirates in his area; one of those, he said, "lacerated" the signal of a non-commercial radio station before the FCC forced the illegal station off the air.

Addressing Hiken, the Cleveland engineer said it's time for low-power proponents to go through proper channels to get a new service. Until that happens, he said, "Get the hell off the air!"

FCC action

The FCC has stepped up enforcement action against illegal operators. The commission has begun the process to hold hearings against five unlicensed FM operators. The commission said the five continued to operate illegally despite warnings and each face \$11,000 fines.

The FCC identified the operators as Joseph Ptak, San Marcos, Texas; Lewis Arnold, Chewellah, Wash.; Keith Perry, Leander, Texas; Mark Rabenold, Oroville, Wash.; and Jerry Szoka, Cleveland.

They face hearings before an administrative law judge and must answer why a "cease and desist" order should not be issued against them.

The FCC shut down 67 illegal operators in the first quarter of this year, Lee said. A total of 97 stations were shut down in 1997.

The FCC pursues four options against illegal operators, FCC General Counsel Christopher Wright said. The commission can impose a fine, ask for an injunction, and seize equipment or pursue criminal prosecution. Ninety percent of illegal operators shut down their stations voluntarily after the FCC first approaches them, said Wright.

Lee has begun a strategy of meeting those who may be considering operating an illegal station before they do it. Right before the NAB show, the FCC official attended a micro power conference attended by about 100 people in Philadelphia. After what he termed a "grueling" two hours of explaining the law, he said some people told him afterwards they changed their mind and would not operate illegally after hearing him.

The protest in front of the Las Vegas Convention Center involved about 20 micro-power supporters mobilized by Dunifer. Before the protest, organizers had said they would put an illegal station on the air during the show as well. Lee said the FCC did not detect the operation of an unlicensed station in Las Vegas.

We're not nuts!

We offer the same great products, service and support to customers of all sizes.

Prophet Systems has enjoyed phenomenal growth in recent years. We hear the competition may be hinting that we don't offer the same great service to small and midsize organizations that is enjoyed by our large super groups. It's simply not true. Could it be they are jealous of our great product line, tech support and WAN?

Radio is our life. Your business is important. Give us a call. You won't regret it.

'nuff said!!



Sales: (800) 658-4403

Support: (308) 284-8450

Sales & Support Fax: (308) 284-4181

E-mail: sales@prophetsys.com



Zephyr Is Everywhere

Look around. Everyday, there are more signs that Zephyr is everywhere. So, if you've ever thought about remote broadcasts or linking up with other studios, there's never been a better time to act than now. Zephyr has quickly become the standard, with many thousands already in use.

Zephyr is number one among radio stations and studios. It is the best sounding, lowest cost way to send high-quality audio over ISDN. Once programmed, anyone can Auto Dial ISDN calls. Not sure what to do next? Press the help button for simple instructions.

Zephyr is full-duplex for two-way transmission. And you don't have to worry about what codec is on the other side — with Layer 3, Layer 2, and G.722, Zephyr can adapt to any place you want to send your audio. With Zephyr, the whole country—even the world—is your studio. Just look for the signs...



- The ideal solution for remote mixing and broadcasts, ad hoc networks, recording sessions, voiceovers, distribution of commercials, backup to satellite and microwave links, and many other applications.
- Designed by Telos specifically for broadcast audio applications over ISDN.
- Optional AES/EBU digital audio input/output module with sample rate conversion.
- Clean, uncluttered front panel for simple operation. Full metering, call duration timer, headphone jack, and mic/line inputs.
- Built-in input protection limiter. When your talent screams, your audio doesn't distort.
- Zephyr has an integrated ISDN terminal adapter designed for the non-technical operator. You can even place a standard voice-grade call to a Plain Old Telephone Service (POTS) telephone.

Telos Zephyr: The Best Way to Hear from There™



Telos Systems • 2101 Superior Avenue • Cleveland, OH 44114 • Tel: +1.216.241.7225 • Fax: +1.216.241.4103
E-Mail: • info@telos-systems.com • <http://www.telos-systems.com>

Telos Systems, the Telos logo, Zephyr, and The Best Way To Hear From There are trademarks of TLS Corp. Other trademarks are the property of their respective holders.

EASY PATCH

The Analog/Digital patch bays for today and tomorrow...from Neutrik®

Two choices to "wire up" Easy Patch for fast termination.



Heavy duty cable bar

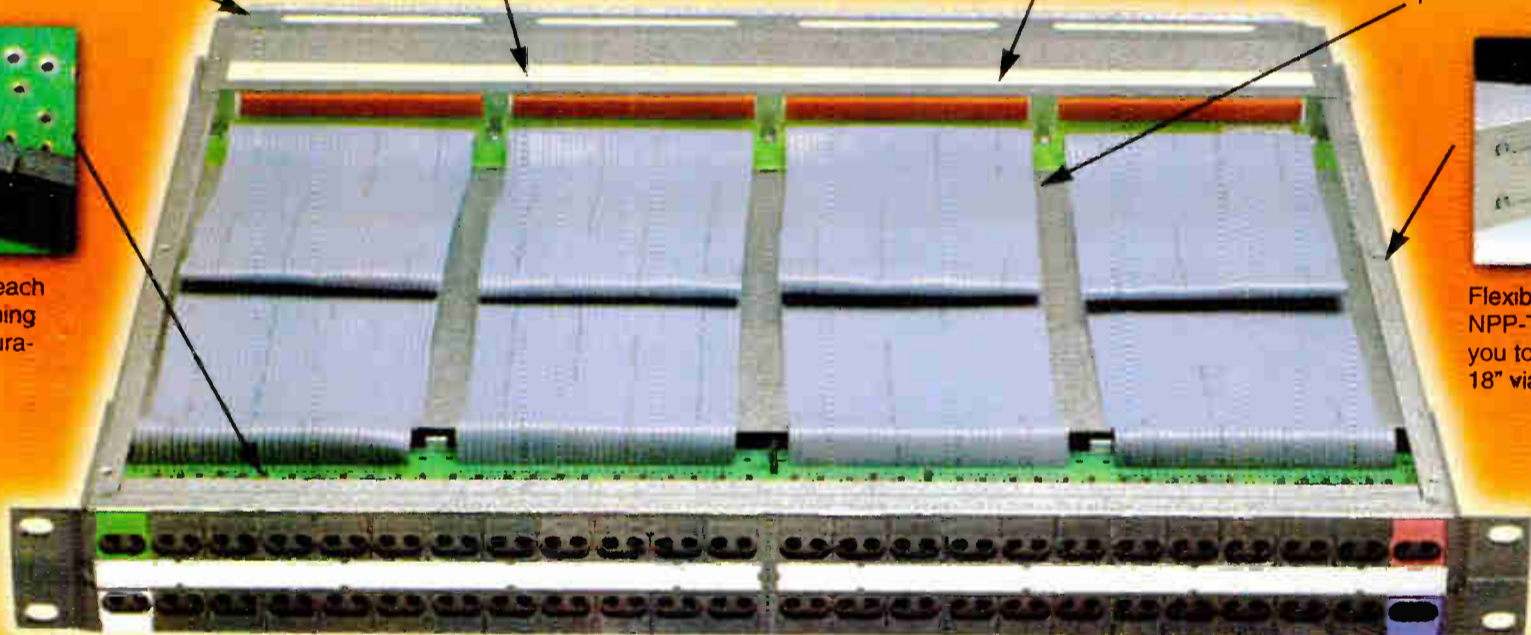
Elco/Edac connections

Spring loaded terminal blocks

Metal shielding between ribbon cables top and bottom



Jumpers behind each jack allows switching into 1 of 6 configurations, even after installation.



Flexible rack depth: NPP-TT/TB-14 allows you to go from 14" to 18" via built-in slider.

The Easy Patch series of easy to use patchbays eliminates signal degradation and offers excellent crosstalk performance required in today's broadcast facilities, mobile trucks, recording studios and audio installations.

Their analog/digital signal capability, reduced wiring time and quality workmanship are unmatched by competitors' patchbays.

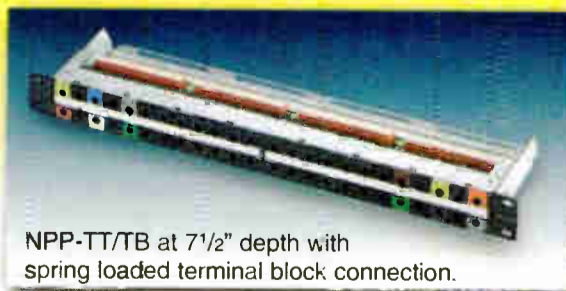
The Easy Patch gives you features and options no other patchbay provides:

- Galvanized, heavy duty metal housing.
- Flexible depth from 14" to 18".
- Hard gold plated contacts designed specifically for A/D signals.
- Six jumper switching configurations.
- Ten color coded ID tabs - optional.

You asked for innovation, productivity and value in a patch bay series and Neutrik listened.

Demo Easy Patch for yourself. Call **732-901-9488** and ask for our NEW product guide and the name of your nearest Neutrik representative.

Neutrik... your one stop source for all your audio connector needs...today and tomorrow.



NPP-TT/TB at 7 1/2" depth with spring loaded terminal block connection.



 **NEUTRIK USA**
CONNECTING THE WORLD

195 Lehigh Avenue, Lakewood, NJ 08701-4527
Phone: 732-901-9488 Fax: 732-901-9608
E-Mail: neutrikusa@aol.com Web Site: www.neutrikusa.com

World Radio History

Circle (211) On Reader Service Card

Auditronics, BE Create Alliance

by Paul J. McLane

Broadcast Electronics Inc. and Auditronics Inc. will work together in a "strategic alliance" to develop and market digital products. The announcement brings together two well-known names in the radio supply business.

The companies announced the news at NAB '98.

BE is a manufacturer of a range of studio and transmission products, including AudioVAULT hard-disk audio management systems and the AudioPOINT digital routing switcher. Auditronics is a prominent console manufacturer, whose offerings include NuStar digital consoles.

Stovall Kendrick, president of Auditronics, said the alliance means both companies can offer broader lines of digital products, with full interface of the digital radio chain from start to finish. He said the companies anticipate "a lot of joint development."

"We think it will be a good partnership," Kendrick said.

With this deal, BE discontinues its existing MixTrak and AirTrak console lines.

The main impact from a customer perspective, according to a BE spokeswoman, is that BE's direct sales force in the United States now can offer Auditronics boards. Existing dealer relationships for both companies, she said, are not affected.

No sale

BE President Jack Nevin said, "This collaboration at the product level gives our customers a greater voice in the design and definition of a more robust digital broadcast studio."

Kendrick said, "The international and domestic sales forces (of BE) will all have access to Auditronics products, and we in turn hope to be able to promote their products along with our console sales."

Prior to the opening of the show, other exhibitors had speculated that BE would announce a purchase of Auditronics.

Kendrick said the parties had discussed several options, but that a sale was not seriously considered. "What makes the most sense to us right now is an alliance," he said.

Asked the same question, Nevin said, "You cover all the various options. At this point it was thought that this was the best way to proceed going into the show. That's not to say that we won't change our minds, or they won't change their minds ... at some point."

Justice Scrutiny of Radio Widens

Chancellor/SFX Deal Is Scrubbed; Justice OK's CBS/ARS, Capstar/SFX Settlements

by Leslie Stimson

WASHINGTON Justice Department investigators are reviewing radio deals in smaller markets as consolidation continues to make itself felt in the industry, from big cities to smaller population centers.

The industry is watching to see how DOJ proceeds, now that several of the most notable proposed deals have either been dropped or been approved with modifications.

At the end of March, Chancellor Media agreed to abandon its bid to pur-

chase four stations owned by SFX Broadcasting in New York state. Meanwhile, settlements with Justice were reached in the Capstar/SFX and CBS/American Radio Systems deals.

What's next? Charles Biggio, acting deputy assistant to the attorney general in the DOJ antitrust division, said, "No market is below our radar screen. We don't just ignore a deal just because it's in a small market."

Justice lawyers look at several factors when evaluating a proposed deal for anti-competitive practices: the nature of the

market, who the advertisers are, the demographic coverage of the merged firm and the remaining competitors in a market. "Simply relying on market (advertising share) doesn't necessarily answer the questions we need answered," Biggio said.

The DOJ also continues to review proposed joint sales agreements and local marketing agreements and treats them as mergers.

Justice has reviewed several hundred proposed transactions since passage of the Telecommunications Act. Radio industry leaders have argued that consolidation will not produce radio ad rate

See DOJ, page 14 ▶

While broadcast and video production environments have changed over the years, your need for a Shure mixer has remained.

First the Shure M67 and then the Shure M267 became industry standards, taking their place in the most demanding broadcast applications and setting new levels of ruggedness, reliability, and versatility.

Now there's the Shure M367. Since its recent introduction, the M367 has found its way into the hands — and hearts — of audio professionals.

Just as versatile and reliable as its predecessors, the M367 includes a list of impressive new features — like low-noise circuitry making it quiet enough for digital formats, input peak LEDs, 12- and 48-volt phantom power to handle a wide variety of condenser microphones, two XLR outputs, an easy-access side battery compartment, a headphone monitor circuit with monitor in function, and a detachable power cord.

Your audio needs may continue to change, but there is one product you can always count on: your Shure mixer.

For the Shure M367 Dealer Nearest You, Call 1-800-25-SHURE.

New Faithful



Shure M367 Professional Mixer

The Sound of Professionals...Worldwide.

SHURE

ACAMBA: AM Lost in LPFM Frenzy

by Leslie Stimson

CENTRAL CITY, Ky. American Community AM Broadcasters Association President Bryan Smeathers wants to know why the FCC has not acted on ACAMBA's proposal to allow some AM stations to use FM translators to boost their nighttime signal.

The proposal, filed last August, is pending, according to an FCC source in the Mass Media Bureau. He gave no indication of whether the proposal would be acted upon.

In a letter mailed to FCC Chairman Bill Kennard, Smeathers stated, "ACAMBA's proposal would allow day-

time AM stations the ability to provide their communities with the same great programming and service at night as they do during the day. In many communities this would allow local high school basketball games and the like to be broadcast for the first time."

An aide for Kennard told Smeathers she would look into the matter.

The FCC has allowed some AM stations in certain instances to use FM translators and boosters to rebroadcast AM signals to overcome interference problems. In an *RW* story on this topic last fall, an FCC employee said those stations, in Alaska, received waivers to use FM translators because

the small number of stations in that state greatly reduced potential interference problems on the FM band. He said the Alaska environment was different from spectrum use in the rest of the nation.

ACAMBA has proposed limiting AM stations that would use FM translators to stations with nighttime power no greater than 500 W and limit translator location to outside the 0.5mV/m contour of the AM station.

Smeathers estimates 650 AM stations would benefit from the proposal, if approved. "A lot of AM stations have no authority to operate at night ... others have authority but have to go

down to ridiculously low levels ... like a CB radio."

The NAB opposes the proposal because of interference concerns.

Although the FCC is considering several proposals to create a new class of lower-power radio stations, Smeathers is miffed. "Why look at creating another service when you have one here (AM) that's begging for improvements?"

ACAMBA claims about 190 member stations.

FCC Seeks 14 Percent Budget Hike

WASHINGTON Saying the implementation of the Telecom Act still dominates FCC time and resources, Chairman Bill Kennard submitted a budget request for fiscal year 1999 of nearly \$213 million to Congress. That represents \$26 million more than FY 1998 funding level, with no increase in full-time positions (2,105).

About half of the 14 percent increase would go toward "mandatory, uncontrollable salary and benefit increases" and increased rent for the new building the agency still hasn't moved into. The budget also calls for the commission to collect \$172.5 million in regulatory fees in fiscal year 1999, an increase of \$10 million over 1998.

In an effort to speed up licensing procedures during the coming fiscal year, the FCC intends to process applications to build digital TV stations which conform to their original allotment sites within five days of receiving those requests.

For radio, the volume of radio sales applications received at the commission has increased dramatically since passage of the Telecom Act, with 2,300 transfer applications in 1995, to 3,700 in 1996 and more than 4,100 in 1997.

"During the first three months of 1998, radio sales applications have continued to come to the FCC at a higher rate than even in 1997," Kennard stated.

Adding to the workload, this is a mid-term election year. Commission employees expect to receive about 1,000 phone calls during the next six months, from broadcasters, political candidates and their media buyers.

Beefing up the FCC's computer systems to handle the year 2,000 transition is another goal of Kennard's.

The commission needs to upgrade and replace many of its computer systems to handle application processing, fees collection and public comment filing systems as the millennium approaches.

It will be several weeks before the FCC learns how much of its request is approved.

— Leslie Stimson

HIGH-QUALITY AUDIO IS ONLY A PHONE CALL AWAY

Comrex HotLine now on sale at BSW

Wideband Two-Way Audio over Standard Telephone Lines

Take the Comrex HotLine codec on remotes for easy and reliable audio transmission with up to 10 kHz bandwidth over standard telephone lines. The Hotline also offers program and cueback on one phone line, auto or manual dialing/answering, and professional I/Os in portable and rack-mount versions.

With the Hotline, quality remotes are only a phone call away!

And right now the Hotline is only a phone call away at BSW.

BSW Offers You More Value!

- Lower equipment prices
- Comprehensive inventory representing over 200 manufacturers
- Knowledgeable sales representatives
- Fast, customized delivery
- Integrity, support and lasting commitment to you

Fax: 1.800.231.7055
<http://www.bswusa.com>

BSW
BROADCAST SUPPLY WORLDWIDE

7012 27th Street West
Tacoma, WA 98466 USA

Call Today
1.800.426.8434

HE **DARED** TO GO THERE.



Justice Department Reviews Radio Deals

► DOJ, continued from page 11

hikes. But in at least one case, station managers have written memos in which they boast of killing their competition and raising their ad rates if a proposed deal goes through.

The war is won'

That was apparently the case in Chancellor Media's now-defunct bid to buy the four SFX Broadcasting stations on Long Island in New York state. According to information released by the DOJ, Chancellor managers had stated in internal documents that the proposed acquisition "will result in less competitive undercutting," and that "rates will

increase as a result of the removal of competitive pressures." Of the deal, Chancellor sales executives wrote then, "The war is won."

The anecdote came to light when the deal, the first radio pact challenged in court by the Justice Department since passage of the Telecom Act, was abandoned March 31. Chancellor agreed to drop its \$54 million bid to purchase the Long Island stations.

Chancellor attorney Edward Henneberry said, "It made more sense to move on rather than risk the SFX deal," in which SFX would be acquired by Capstar.

Chancellor also agreed to end the local marketing agreement under which it was operating the stations pending their acquisition.

When the lawsuit was filed last fall (RW, Nov. 26), the DOJ said that, if approved, the deal would allow Chancellor to garner 65 percent of the radio advertising in the Long Island market and dominate a broad advertising demographic: adults age 25-54. Both Chancellor and SFX disputed those assessments.

Of the settlement, Biggio said, "It's everything we could have hoped for. It was unnecessary to go forward with full litigation. ... We were trying to meet the demands of an industry that said we were unwilling to litigate in court. I think this case proves we were."

Two big settlements

At any given time, the DOJ is reviewing between 10 to 20 pending radio mergers. Asked if the DOJ is willing to go to court on one of these cases, Biggio replied, "If we believe a transaction is anticompetitive and the parties are not prepared to satisfy our concerns, we are prepared to take the case to court."

The four Long Island stations also figured in Capstar Broadcasting Partners' proposed \$2.1 billion buy of SFX.

The DOJ, Capstar Broadcasting Partners and SFX reached a settlement in

which Capstar can move forward with the acquisition of SFX, and Capstar must spin off 11 stations.

Hicks, Muse, Tate & Furst owns all the stock in Capstar and a significant portion of Chancellor stock. Because of this common ownership, Justice stated in its settlement announcement, "the market positions of Capstar and Chancellor must be analyzed together in assessing the competitive impact of the Capstar/SFX transaction."

The DOJ filed suit last year to block Capstar's acquisition of SFX, saying if the proposed deal went through, Hicks, Muse and Chancellor would control radio stations accounting for about 74 percent of radio advertising in Greenville, 43 percent in Houston, 57 percent in Jackson, 44 percent in Pittsburgh and 65 percent in Suffolk County of Long Island.

If approved by the Federal District Court in the Eastern District of New York, the settlement resolves the lawsuit filed by the DOJ.

In another settlement, CBS Corp. agreed to divest seven stations to obtain Justice approval of its \$1.6 billion purchase of American Radio Systems.

Justice said if the deal had gone through as proposed, CBS would have controlled 59 percent of radio ad revenues and control of three of the city's top five billing stations in Boston. In St. Louis, said the DOJ, CBS would have controlled four of the top seven stations and 49 percent of radio ad revenues. In Baltimore, CBS would have owned 10 stations and accounted for approximately 46 percent of the city's radio ad revenues.

The proposed settlement reduces CBS' share of radio ad revenues to no more than 40 percent in those three cities and, if approved by the court, resolves the lawsuit filed by the DOJ.

Including the above lawsuits, the DOJ has filed eight cases to restructure radio deals since passage of the Telecom Act. Three additional deals have been restructured or abandoned without going to court.

New SBE Objective: Grow Broadcast Engineers

by Paul J. McLane

LAS VEGAS Where will the next generation of broadcast engineers come from?

The Society of Broadcast Engineers (SBE) is worried about it. SBE announced a program at NAB '98 to educate young people about technical career opportunities in the industry.

It is a pressing question. Radio groups say qualified engineers and technicians are being tempted away from the industry by the better pay, hours and working conditions in industries like computers, consumer electronics and non-broadcast wireless RF. The demands of DTV will require even more expertise in the television engineering community than in the past. It is not limited to just the station side of the business. Equipment manufacturers struggle to find sales people who are as technically qualified as their customers.

A youth membership program has been under study by SBE since last fall.

The board of directors approved its creation at its semi-annual meeting during the NAB convention here.

"Many radio and television stations have found it increasingly difficult to find enough qualified broadcast engineers to fill the needs they have," SBE President Ed Miller said.

SBE will initiate a program for youth interested in the technical side of broadcasting. It will target students at high school stations, amateur radio clubs and career clubs in particular. The society said it will use a combination of educational information and contact with broadcast engineers in the field.

Each of the 103 SBE chapters will be asked to hold at least one "Student Night" chapter meeting each year, to show students a broadcast facility and help them to learn about the field. Miller said the program should lead to increased opportunities for internships and mentor relationships.

A college scholarship may be developed later.

BUSINESS DIGEST

Report business news to: Radio World
P.O. Box 1214, Falls Church, VA 22041
or FAX: (703) 998-2966

SFX EVP/CEO Named Capstar COO

AUSTIN, Texas D. Geoffrey Armstrong has been named Chief Operating Officer of Capstar Broadcasting Corp. effective Sept. 1. Armstrong is executive vice president and chief operating officer of SFX Broadcasting, which Capstar intends to purchase.

GulfStar Communications President John Cullen is serving as interim chief operating officer of Capstar. Former Capstar CEO Steven Dinetz resigned to become a consultant to Capstar's controlling shareholder, Hicks, Muse, Tate & Furst.

Capstar Spinning Off Assets for SFX Buy

AUSTIN, Texas Capstar announced a series of asset sale transactions. When completed, they will satisfy federal station ownership requirements relating to the pending acquisition of SFX.

The aggregate value of the sale of 13 stations is about \$165 million. The stations are being sold to Heftel Broadcasting Corp., Cox Radio, Clear Channel Communications and a company controlled by Frank Washington of Sacramento, Calif.

The deals are subject to regulatory approval and expected to be completed by mid-year, simultaneously with the completion of the SFX acquisition.

Triathlon Cash Flow Up 92 Percent

SAN DIEGO Net revenues for Triathlon Broadcasting increased 77 percent to \$33.6 million compared to \$14.7 million the previous year.

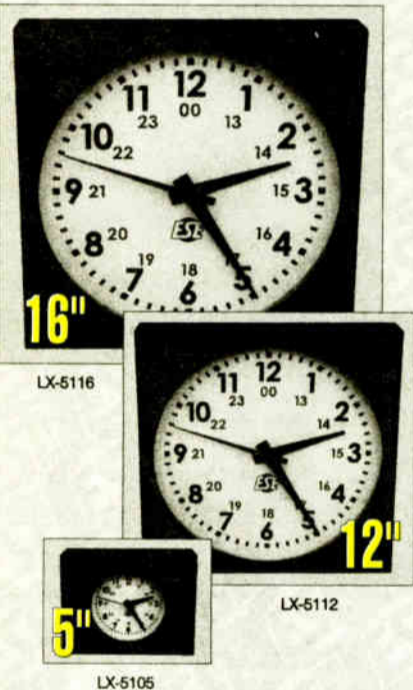
Similarly, 1997 broadcast cash flow (net revenues less station operating expenses) grew 92 percent to \$10.2 million vs. \$5.3 million in 1996. Triathlon President and Chief Executive Officer Norman Feurer credited "impressive gains" at Midwest stations for the increase.

Emmis Posts 15 Percent Cash Flow Growth

INDIANAPOLIS Emmis Broadcasting Corp. had a record broadcast cash flow (net revenue minus station operating expenses) of \$58.2 million for its fiscal year. That represents more than 15 percent growth over the previous fiscal year. Emmis Chairman and CEO Jeff Smulyan said the recent purchase of six TV stations brings Emmis to nearly \$650 million of acquisitions in the past year.

ANALOG CLOCKS

"5100" Series



The LX-"5100" Series can read Time Code (ESE, SMPTE/EBU & ASCII), as well as operate as Stand-Alone or Impulse Clocks. These clocks are loaded with many features, here's just a few...

FEATURES:

- Self-setting time code readers
- 5", 12" & 16" models
- Sweep & Step second hand modes
- Lighted Dial and Rack Mount options
- Time Zone Offset
- 3 Year Warranty

ESE

www.e-se-web.com

310-322-2136 • FAX 310-322-8127
142 SIERRA ST., EL SEGUNDO, CA 90245 USA

Circle (82) On Reader Service Card

"One of the most important steps KTU has ever taken is the Omnia.fm processor. Now, our sound has the best of both worlds: clarity and amazing loudness. The Omnia really brings out the beat for a station that's called 'The Beat of New York'. And I love to crank it up."

*Frankie Blue, Programming Director
WKTU 103.5 FM, New York City, NY*

Frankie dared to go where his competition isn't. Yet.

The all-digital Omnia.fm processor from Cutting Edge delivers all the clarity and precision of digital, with the fullness and depth of analog. *Positively no grunge.* And awesome loudness that works with everything from Top 40 to Mozart to Rap.

Demo the Omnia in your station for 60 days*. We think everyone will agree that the Omnia makes your station sound better than ever. If not, you have a money-back guarantee from Cutting Edge. Call 216.241.3343 or your Omnia dealer. Because this is where you want to go. Frankie Blue is already there.



**Omnia. The promise of digital...
delivered.**



CUTTINGEDGE

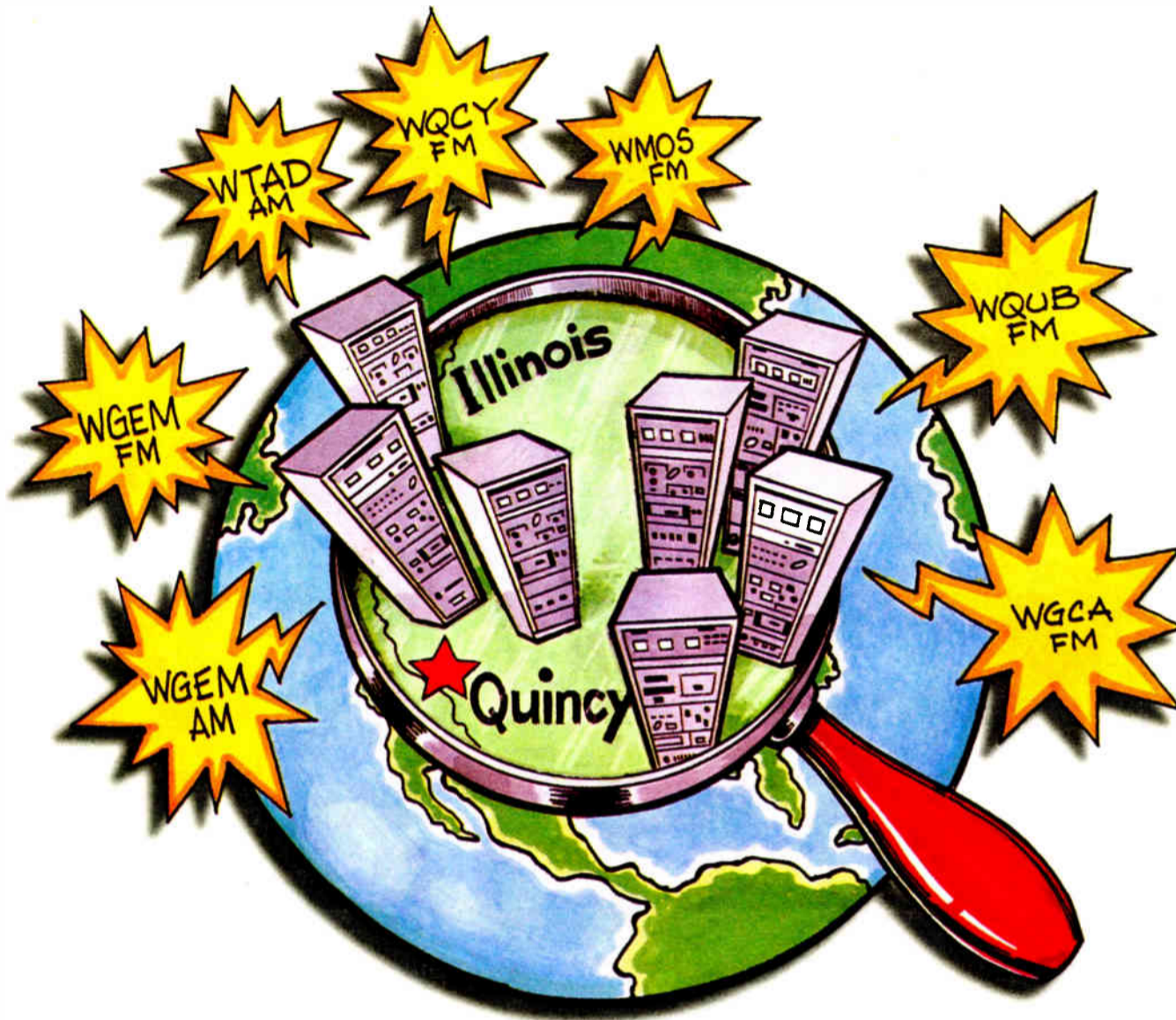
2101 SUPERIOR AVENUE CLEVELAND OH 44114
TEL: 216.241.3343 FAX: 216.241.4103
E-MAIL: INFO@NOGRUNGE.COM
WWW.NOGRUNGE.COM

* Demo requests must be submitted as a purchase order. Terms are available from the Omnia dealer listed below.

Audio Broadcast Group 3685 Roger B. Chaffee Blvd. Grand Rapids, MI 49507 Tel: 616.452.1596 Fax: 616.452.1652 www.support@abg.com
Bradley Broadcast Sales 12401 Twinbrook Parkway Rockville, MD 20852 Tel: 800.732.7665 Fax: 301.230.6526 www.info@bradleybroadcast.com
BSW Broadcast Supply 7012 27th Street West Tacoma, WA 98466 Tel: 800.426.8434 Fax: 800.231.7055 www.info@bswusa.com
Crouse-Kimzey Company P.O. Box 155999 Fort Worth, TX 76155 Tel: 800.433.2105 Fax: 972.623.2800 www.sales@proaudio.com
Radio Communications Unlimited 5509 Barrington Boulevard, TN 37363 Tel/Fax: 423.396.3743

Circle (108) On Reader Service Card

100% Market Share.



Radio Transmitter Manufacturing Capital Chooses Harris.

Broadcasters understand the significance of 100% market share. It's often pursued and rarely achieved. It means that you know your customer's needs... Your quality standards are extremely high...And, you are ahead of the competition by leaps and bounds.

Quincy, Illinois is the world capital for radio broadcast transmitter manufacturing. It's also a place where you can go across town to check out a company's quality standards and demo new products before making a buying decision.

With this convenience easily at hand, all radio broadcasters in Quincy have chosen Harris transmitters—hands down. In addition, nineteen other Harris transmitters are the choice in the local Hannibal, MO and Keokuk, IA areas.

All of Harris' transmitters are manufactured under strict ISO 9001 quality control standards which means we take great pride in the products we deliver to our customers. In addition to this,

we support all of our product lines with a 24-hour service number so you can call anytime day or night. We are a total solutions supplier who can update or completely renovate your radio studio facility from beginning to end—or supply anything in between.

This is what you get when you deal with a company that has been in the

radio broadcast industry for over 75 years—longer than any other U.S. radio transmitter manufacturer.

When it comes to choosing the best quality, value, and service, it all boils down to one simple fact that Quincy engineers have come to realize: There's a big difference between ordinary and **extraordinary** which can also be the difference between 0 and **100%** market share.

Most recent world firsts in radio broadcast
• 1987: Harris introduces Digital Amplitude Modulation technology used in DX series medium wave broadcast transmitters.
• 1991: Harris demonstrates prototype digital FM exciter
• 1993: Harris introduces DIGIT, world's first digital FM exciter
• 1994: Harris introduces AES3 input module which allows DIGIT to directly accept digital studio standard audio
• 1996: Harris introduces Platinum Z FM transmitter and DIGIT CD digital FM exciter
• 1997: Harris introduces world's first <u>uncompressed</u> digital 950 MHz STL

HARRIS CORPORATION BROADCAST DIVISION

U.S. and Canada:
TEL:+ 1 217 222-8200
FAX:+1 217 224-1439
Elsewhere
TEL:+1 217 222-8290
FAX:+1 217 224-2764

<http://www.broadcast.harris.com>



A new world of broadcast solutions

©1998 Harris Corp.

GUEST COMMENTARY

Into the Future With MPEG-2 AAC

by Steve Church

The author is president of Telos Systems, the company chosen by Digital Radio Express to provide MPEG-2 Advanced Audio Coding for DRE's proposed in-band, on-channel DAB systems.

The broadcast world has been transformed by the introduction of perceptual audio coding techniques. Radio stations routinely use ISDN codecs for remote origination. Hard-disk storage systems are replacing analog tape rapidly. More than 250 stations simulcast their programming on the Internet. Such satellite services as DirecTV and Dish Network use perceptual coding for the stereo audio that accompanies video channels and to deliver audio-only programs to homes. Almost all of these applications rely upon techniques developed under the MPEG (Moving Pictures Expert Group) umbrella.

Not content to rest on past accomplishment, the MPEG Audio Subgroup continues to advance. Last year, a new audio coding system, MPEG-2 Advanced Audio Coding, was endorsed. As the most powerful of any of the MPEG audio compression methods, it is likely to find its way into a wide variety of applications for broadcasting.

A new IBOC DAB contender, Digital Radio Express, has announced its prototype AM and FM systems for digital radio broadcasting. Free to choose the most powerful audio coding system, DRE proposes to use AAC at bitrates ranging from 48 kilobits per second (for AM) to 128 kbps (for CD-quality FM). Because AAC requires only half of the bitrate of the MPEG Layer 2 scheme used in the earlier IBOC systems, more transmission reliability can be attained, while still providing the fidelity necessary to satisfy demanding listeners and motivate receiver purchases.

Demystifying MPEG

About a decade ago, when the CD had just been introduced, the first proposals for audio coding were greeted with suspicion and disbelief. Almost everyone was convinced that digital compression was unnecessary, given the vast storage capacity of compact discs. There was widespread agreement that it would not be possible to satisfy "golden ear" listeners while deleting 80 percent or more of the digital audio data.

MPEG was developed in this environment. Since 1988, this group has been working on the standardization of high-quality low-bitrate audio coding. Two standards have been completed: MPEG-1 (coding of mono and stereo signals at sampling rates of 32, 44.1 and 48 kHz) and MPEG-2 (coding of 5+1 multichannel sound signals and low-bitrate coding of mono and stereo audio at sampling rates of 16, 22.05 and 24 kHz). Today almost all agree not only that audio bitrate reduction is effective and useful, but that the MPEG process has been successful at picking the "best stuff" and encouraging compatibility across a wide variety of equipment.

The MPEG process is open and competitive. A committee of industry representatives and researchers meet to determine goals for target bitrates, quality levels, application areas, etc. Then all interested organizations that hope to have

something to contribute are invited to submit their best work. A careful, double-blind listening test series is conducted to determine which of the entrants' technologies delivers the highest performance.

The subjective listening evaluations are done at various volunteer organizations around the world that have access to both experienced and naive test subjects. Broadcasters are the most common participants, with recent test series being conducted at the BBC, the CBC, NHK, Radio France, and so forth. Finally, results are tabulated, a report is drafted and a standard is issued.

In 1992, this process resulted in the

selection of three related audio coding methods, each targeted to different bitrates and applications. These are the famous "layers." Layers 2 and 3 have found wide application in broadcasting. Layer 2 is the method used for satellite television audio and for many hard-disk storage systems; both layers are used for transmission of audio over ISDN links. Layer 2 is used for European Eureka 147 terrestrial digital broadcasting and Layer 3 will be used in the WorldSpace satellite DAB system.

Generally, Layer 2 is targeted to applications with per-mono-channel bitrates of 128 kbps and greater, and Layer 3 to low-bitrate applications.

Layer 2 is a collaborative invention of the Institut Für Rundfunktechnik (IRT), Centre Commun d'Etudes de Télédiffusion et Télécommunication (CCETT), Philips, and Matsushita. Layer 3 was developed primarily at the Fraunhofer Institute (FhG), but also includes components developed jointly with AT&T.

Acoustic masking

All of the MPEG codecs rely upon the celebrated "acoustic masking principle," an amazing property of the human aural perception system. When a tone — called a "masker" — is presented at a particular frequency, we are unable to perceive audio at nearby frequencies which are sufficiently low in volume. So it is not necessary to use precious bits to encode these inaudible, masked frequencies. In

See MPEG, page 20 ▶

"I Won the Marconi with Scott"



"I do like to give credit where credit is due and acknowledge Scott Studios as a major player in my daily broadcasting battle. The time I now have to devote to preparation, and the ease of operation of the Scott System, has helped me increase show professionalism."

Bill O'Brian - KRKT, Albany, Oregon
Marconi Small Market Personality of the Year - 1997

"We Won the Marconi with Scott"

The 1996 winner of the Marconi Major Market Air Personality of the Year Award *also* uses Scott Studios' touchscreen digital audio system! Still another Scott Studios user won the Country Music Association "Station of the Year" award in 1997! The Scott System can help *your* stations sound better!

Mac Hudson & Irv Harrigan - KILT FM, Houston, Texas
Marconi Major Market Personality of the Year - 1996



"Scott has Improved our Product"



"We were very eager to 'go digital' last Fall, and compared different systems. Our decision to go with the Scott System was one we *all* felt good about. I'm confident knowing the comfort level of our different departments who use the system is high. Our Scott System has improved our efficiency and the quality of our product."

Michelle Mercer, PD - KPWR FM, Los Angeles

Tom Koza, Chief Engineer, top rated afternoon personalities "The Baka Boys" surround Program Director Michelle Mercer

More Stations got Scott Systems in the past 12 months than bought most other systems in the past 4 years!

Most managers, air personalities, program directors *and* engineers prefer the Scott System. That's why *more* radio stations get Scott Studios' than any other digital audio system!

It's a fact: over 1,700 radio stations have 3,800 Scott digital workstations, including *major* groups like CBS, Chancellor, Disney/ABC, Clear Channel, Emmis, Citadel and many more.

Scott Systems are best due to:

- the friendliest user interface;
- uncompressed digital audio;
- 3 products—Good, Better & Best.



Scott Studios Corp.
 13375 Stemmons Freeway, Suite 400
 Dallas, Texas 75234 USA
 (972) 620-2211 FAX: (972) 620-8811
 8 0 0 7 2 6 8 8 7 7
(800) SCOTT-77

"David-II" ...FM Simplified



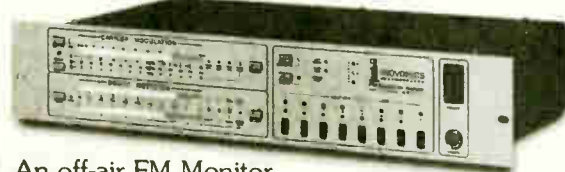
Common sense tells you that even a "giant" of an FM audio processor can't guarantee market dominance. Day after day, hundreds of "David-II" users prove that a strong-yet-clean, non-fatiguing sound is an ideal companion to creative programming.

Inovonics' "David-II" combines rock-solid PWM audio processing with true digital synthesis of the FM composite baseband signal. Elegant in its simplicity, "David-II" more than holds its own against the more complex and far more expensive FM processing alternatives.

But don't take our word for it, your preferred broadcast equipment supplier can arrange a demo at your own station. Phone, fax or check our website for complete technical details.

Model 716 - "DAVID-II"

A Best-Value FM Mod-Monitor



An off-air FM Monitor of remarkable value. First-class features and outstanding performance have made the Model 530 a favorite the world over. Check these product highlights:

- Accurate, high-resolution bargraph metering of carrier deviation and demodulated program audio: pilot, subcarrier and residuals. Meter also displays signal strength and multipath distortion to aid antenna alignment.
- Pushbutton tuning with 8 station presets for "comparative market evaluations."
- Rear-panel outputs for composite MPX and balanced program audio: plus remote peak flasher, carrier-loss and program-loss alarms.

MODEL 530 - FM MODULATION MONITOR

Shortwave Success



Coverage and clarity. More than in any other segment of our industry, these factors are vital in international shortwave broadcasting. Forget major-market catch-phrases like "transparency" and "competitive loudness," you've got to be heard and understood. Your reception fringe area is your market, and intelligibility without distortion is your key to success.

Developed to implement the U.S. "NRSC" transmission standard, Inovonics' Model 222 is now available in several different versions to satisfy the regional needs of every shortwave broadcaster. Asymmetrical limiting, a sharp low-pass filtering function and "adaptive" pre-emphasis yield a program signal shaped for maximum "reach."

Contact your local distributor, or write, fax or call us for full details on this surprisingly inexpensive answer to shortwave transmission improvement.

MODEL 222

RDS/RBDS "Mini-Encoder"



With this simple, dirt cheap" encoder, your station can begin transmitting the more important radio-data IDs, service flags and text messages.

Use any PC to quickly and easily enter your station's call letters or "street name," format identifier, translator frequencies and scrolling ads or promos. Menu-driven software transfers this information to the encoder's own non-volatile memory.

This nifty little encoder installs in minutes, locks to any stereo generator and works in to any FM transmitter.

Don't let your station be skipped-over by the new generation of "smart" radios! At just \$390 there's no excuse for waiting to put RDS to work for you right now.

MODEL 701

FM "Relay" Receiver



A professional FM receiver for re-broadcast "translator" service, and for similar demanding off-air pickup applications.

- DIP-switch-programmable synthesized tuning.
- Composite MPX and balanced stereo program outputs.
- Selectable IF bandwidth.
- Carrier-loss and program-loss alarm outputs.
- Accurate front-panel metering of MPX and program audio levels, plus signal strength and multipath distortion.
- Auto-mute and auto-blend features.
- Remote control of front-panel selectable functions.

MODEL 630 - FM "RELAY" RECEIVER

FM Subcarrier Monitor/Demod



Accurate measurement of SCA, RDS and the new high-speed data subcarriers. This precision monitor/demod is the ideal companion to any FM Mod-Monitor. Check these features:

- Dual-conversion design with precise digital tuning. Covers 54kHz to 99kHz in 1kHz steps.
- Displays subcarrier injection level in percent and in kHz-of-deviation.
- Demodulates audio SCAs, shows subcarrier deviation and audio level. Balanced SCA program output.
- Optional RDS decoder plug-in comes with software for complete radio-data analysis.

MODEL 540
FM SUBCARRIER MONITOR/DEMOM

Telephone Line "Eliminator"



7 DIAL-UP
DEVICES
CAN SHARE
ONE CENTRAL-OFFICE LINE

Inovonics' PBX is a cost-saving alternative to the multiple telephone lines otherwise needed for modems, alarms and other dial-up apparatus installed at remote equipment sites. The PBX allows as many as seven devices to share a single central-office line, for outgoing calls and with selective incoming access as well.

The PBX finds immediate application with the expanding use of unattended remote equipment:

- Broadcast Transmitters/Translators
- Cellular/2-Way Radio Facilities
- Microwave Relays
- Geophysical Monitors
- Pumping Stations
- Security Systems

PBX

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

Inovonics

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

www.inovon.com



Inovonics

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

www.inovon.com



Circle (186) On Reader Service Card

World Radio History

XLRs Make the Radio Connection

*Readers Have Strong Feelings
When It Comes to Their Connectors*

The XLR connector may be small and unassuming, but readers found Steve Lampen's article about them in our Jan. 21 issue fascinating. Here are some of their comments:

XLR research

Dear RW,

Kudos on the excellent article. I checked a few sources for the origin of the XLR connector and came up with this from Benson & Whitaker's "Television and Audio Handbook."

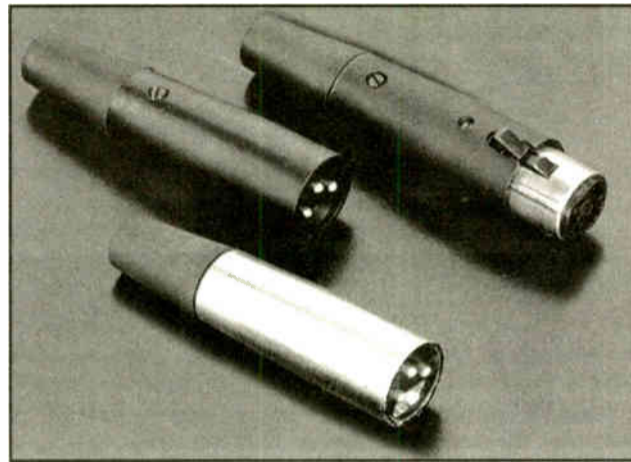
In Section 4.2.6, the XLR connector is discussed and its technical definition is said to be described in the Electrotechnical Commission Publication 268-12 (1975) under "Circular Connector for Broadcast and Similar Use." I have never seen this document. But even more mystical are the three different pin counts that I have run across.

According to the ECP 268-12 which is excerpted in the handbook, the pin count for the purpose of the patent office is as follows:

- Pin 1: Cable shield and/or signal ground

In Section 24 he describes the following pin count conventions: The Westrex pin count (as per Western Electric — prior to Judge Green) which is:

- Pin 1: "High" side of signal
- Pin 2: "Low" side of signal or signal ground
- Pin 3: Cable shield, or signal ground



Switchcraft offers a variety of XLR connectors.

And the RCA pin count, which is:

- Pin 1: Cable shield, or signal ground

plant and its equipment was built in Camden, N.J., so I learned the RCA pin count convention. However I had the opportunity to work on a Bogen PA system amplifier that had a "home brew" balanced-to-unbalanced matching transformer on the microphone circuit.

When I went to repair the XLR connector on the matchbox, you can imagine my surprise when I discovered that it had been wired according to the Westrex pin count configuration! Until I checked Tremain's book, I didn't know there was a Westrex pin count.

What is now more confusing, having researched Benson & Whitaker's book, is that the original patent specs define yet a third type of pin count!

So the moral of my story — if there is one — is: don't assume that an unfamiliar cable, patch cord, matchbox, etc. adheres to the any one pin count.

One word of caution, however: never apply an Ohm meter to the pins of a microphone. Either look at its schematic or take the microphone apart and examine the wiring.

Bob Schroeder
Trenton, N.J.

RW Technical Editor Al Peterson offers the following: According to Mike Sokol's book "The Acoustic Musician's Guide to Sound Reinforcement and Live Recording" (1998, Prentice Hall), the U.S. wiring convention for XLR connectors as established by the AES is:

- Pin 1: ground or shield
- Pin 2: Hot (+)
- Pin 3: Cold (-)

A cable with pins 2 and 3 swapped at one end will still work, but that source will be out of phase with others in the mix.

By the way, here is a simple memory trick engineers use to determine signal flow in a tangle of XLR cables: follow the direction of the pins. This is why low-Z mics generally have recessed male connectors while mixer inputs have female jacks. Passing this tip along to non-technical folks may someday save a remote.

This rule is often broken, so keep a fistful of "gender-changers" (male/male and female/female adapters) nearby.

Explaining the origin

Dear RW,

Your article on the standard mic connectors, XLR and the AF series was informative. I found it interesting that you had no explanation for the origin of XLR. Ten years ago I wrote for another trade publication. In a Q/A column, we were asked the origin of the term "BNC connector."

See XLR, page 21 ▶

In the late 1950s, Electro-Voice decided to use a connector similar to the XLR series but slightly larger in diameter and not completely circular, with a flattened section.

— John Reiser

- Pin 2: "Low" side of signal, or signal ground
- Pin 3: "High" side of signal

However, if you read Howard Tremain's "Audio Cyclopaedia," there are two more standards that are defined!

- Pin 2: "High" side of signal
- Pin 3: "Low" side of signal or signal ground

The first television plant I ever worked at was New Jersey Public Television in Trenton. This was a 100-percent RCA

CD-Recordable for the Broadcast Professional by

MICROBOARDS Technology, Inc.

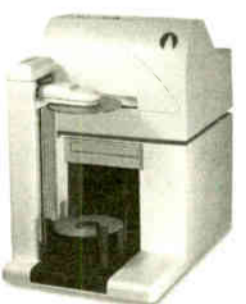
AudioWrite 2040 PRO
Professional Audio CD System

Seamless CD-R Premastering System for Hard Disk Editing.



Desktop CD-R Publisher

Record and print 50 CD-R's. Supported by Sonic Foundries New CD Architect.



World Wide distributor of high quality CD-R media

Dealer Inquiries Welcome!


DSR 8000

Standardize CD Duplication of up to 160 discs/hour in network configuration. DAT options available



CD Master

Creates and duplicates audio CDs without a computer, featuring track extraction capability.



Headquarters
(800) 646-8881
Fax (612) 470-1805

East Coast
(888) 215-3966
Fax (610) 495-5437

United Kingdom
44-1386-834-438

MICROBOARDS Technology, Inc.
Web www.microboards.com




Nautel
Model FM10

Powerful Efficient Digital

**SOLID STATE
FM TRANSMITTERS
FROM 4kW to 10kW
COMBINED 20kW**

- Solid state modular FM transmitters with Direct Digital Synthesis exciter
- AES/EBU direct digital input via electrical or optical connection
- Optional A to D interface for conventional composite input, field upgradable to digital
- Low power consumption, cool reliable operation with 65% overall efficiency
- patented single stage combiner permits safe on-air module service
- Transmitter specialists available for technical support 24 hours every day



NAUTEL
RR #1 Tantallon, NS,
Canada B0J 3J0
Ph: (902) 823-2233
Fax: (902) 823-3183
201 Target Ind. Circle,
Bangor, ME, USA 04401
Ph: (207) 947-8200
Fax: (207) 947-3693

An Argument for MPEG-2 AAC

► MPEG, continued from page 17
perceptual coders, a filter bank divides the audio into multiple bands. When audio in a particular band falls below the masking threshold, few or no bits are devoted to encoding that signal, resulting in a conservation of bits that can then be

newest audio coding method selected by MPEG, having become an international standard in April, 1997. MPEG-2 AAC is a fully state-of-the-art audio compression tool kit that provides performance superior to any known approach at bitrates greater than 64 kbps, and excellent per-

nificant improvements would be possible if backward compatibility to the earlier MPEG layers could be abandoned. This was confirmed in listening tests conducted by the BBC and Deutsche Telecom early in 1994. The idea was to start with a "fresh piece of paper," and take the best

work from the world's leading audio coding laboratories. FhG, Dolby, Sony and AT&T (not to be confused with the former AT&T division Lucent, which continues to promote the PAC technology) were the primary collaborators.

The hoped-for result was "ITU-R indistinguishable quality" at 64 kbps per mono channel. This was a fairly daunting requirement, because it requires that *no* test item fall below the "perceptible, but not annoying" threshold in controlled listening tests. The test items include the most difficult-to-encode audio known to researchers — isolated pitch pipe, harpsichord and glockenspiel recordings, among others. The thinking is that if a coding system passes this requirement, it will almost certainly perform well with normal program material. Pop or western classical music is tremendously easier to encode.

Flexibility is a major feature of AAC, which supports a wide range of sampling rates (8 to 96 kHz) and bitrates (16 to 576

do MPEG-1 Layer 2 at 192 kbps or Layer 3 at 128 kbps. Therefore the goal of high audio quality at 64 kbps per channel for MPEG-2 AAC has been achieved. Both AAC Main Profile and Low Complexity Profile provide quality at 96 kbps that is comparable to MPEG-1 Layer 2 at 192 kbps, and therefore give a 2 to 1 compression advantage. In addition, AAC Main Profile at 96 kbps gives better results than MPEG-1 Layer 3 at 128 kbps."

AAC is the first codec system to fulfill the ITU-R/European Broadcasting Union (EBU) requirements for "indistinguishable quality" at 128 kbps/stereo. AAC has approximately 100-percent more coding power than Layer 2, and 30-percent more power than the former MPEG performance leader, Layer 3.

The full report is available at www.tnt.uni-hannover.de/project/mpeg/audio/public/w2006.html

IBOC DAB

In-band, on-channel digital audio broadcasting systems aim to provide digital quality to radio listeners without requiring new spectrum to be allocated by the FCC. The digital signals are placed like saddlebags around the existing analog transmissions in such a way as to not interfere or be interfered with, while remaining essentially within the current assigned channel bandwidth.

Among the challenges facing IBOC designers is choosing the most efficient and effective encoding schemes for the low bitrates necessary, while still providing appropriate fidelity. FM reception conditions in a moving vehicle are hardly ideal — and an effective DAB system

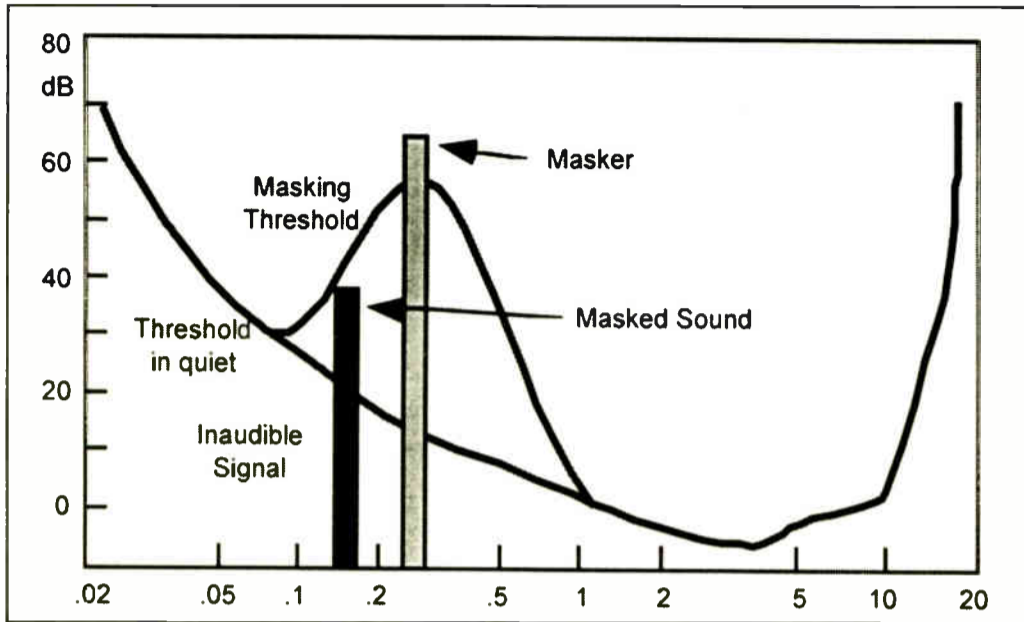


Figure 1: Masking Effects in the Frequency Domain. A masking signal inhibits audibility of signals adjacent in frequency and below the threshold.

used for the bands where they are needed.

formance relative to the alternatives at bitrates reaching as low as 16 kbps.

AAC

The MPEG-2 AAC system is the

The development of AAC began when researchers became convinced that sig-

RELIABILITY WITH LIFETIME WARRANTY

EDUCATIONAL CIRCULAR SERIES

Model	Bays	Power	Gain	Price
MP-1	1	600W	-3.3	\$250
MP-2	2	800W	0	\$680
MP-3	3	800W	1.4	\$980
MP-4	4	800W	3.3	\$1,280
MP-2-4	4	2,000W	3.3	\$1,820
MP-3-5	5	3,000W	4.1	\$2,270
MP-3-6	6	3,000W	5.2	\$2,740

LOW POWER CIRCULAR SERIES

Model	Bays	Power	Gain	Price
GP-1	1	2,000W	-3.1	\$350
GP-2	2	4,000W	0	\$1,350
GP-3	3	6,000W	1.5	\$1,900
GP-4	4	6,000W	3.4	\$2,600
GP-5	5	6,000W	4.3	\$3,150
GP-6	6	6,000W	5.5	\$3,700

MEDIUM POWER CIRCULAR SERIES

Model	Bays	Power	Gain	Price
SGP-1	1	4,000W	-3.3	\$690
SGP-2	2	8,000W	0	\$2,690
SGP-3	3	10,000W	1.4	\$3,595
SGP-4	4	10,000W	3.3	\$4,500
SGP-5	5	10,000W	4.1	\$5,300
SGP-6	6	10,000W	5.2	\$6,100

The antenna array is designed for frequency. For powers up to please, make the purchase of the specific configuration.

OMB also Manufactures:
 FM transmitters
 TV transmitters
 FM and TV Links
 TV antennas
 Medium power FM antennas

OMB America
 3100 NW 72 Ave #112
 Miami, Florida 33122
 Phone: 305-477-0974
 Fax: 305-477-0511
 Toll free: 888-OMB4USA



Flexibility is a major feature of AAC, which supports a wide range of sampling rates (8 to 96 kHz) and bitrates (16 to 576 kbps), and from one to 48 audio channels.

kbps), and from one to 48 audio channels.

Compared to the previous layers, AAC takes advantage of such new tools as temporal noise shaping, backward adaptive linear prediction and enhanced joint stereo coding techniques. Because of its modular approach, an implementer may pick-and-choose among the components to produce a system with appropriate performance-to-complexity ratios. Three default "profiles" have been defined, using different combinations of the available modules:

•*Main Profile.* Provides the highest quality for applications where the amount of RAM and processor cycles needed is not constrained.

•*Low-complexity Profile.* The prediction module is deleted and the temporal noise-shaping tool is reduced in complexity.

•*Sample-rate Scaleable (SRS) Profile.* Allows the least complex decoder.

Better fidelity

The "Report on the MPEG-2 AAC Stereo Verification Tests" has just been published by the MPEG Audio Subgroup, describing the results of tests conducted late last year at NHK in Japan. The results were impressive for AAC, as outlined in the report conclusion:

"Overall, all AAC profiles at 128 kbps give significantly better performance than

needs to be robust in the face of all the well-known real-world problems: fast and slow fading, multipath, interference from adjacent FM stations and other signals, etc. Designers facing these problems must make careful choices with an eye to each of the critical trade-offs.

An important tool is the audio coding technology. If a more powerful method can be used, fewer transmitted bits are required, and more energy can be given over to providing diversity, redundancy, error-correction and other improvements required for reliable broadcast reception.

Early DAB systems for FM IBOC proposed to use Layer 2 at 256 kbps. The modulation (modem) technology had to be able to handle the quite-high bitrate. This apparently proved to be too much: According to the final report on DAB testing conducted by the NAB and EIA (RW, March 4), the IBOC systems using this approach were found to be unsatisfactory for real-world use.

Digital Radio Express, using the power of AAC, addresses the bitrate problem, while offering the advantages of the open standards-based MPEG technology.

Because AAC will be used in numerous products, chip vendors will be able to achieve higher volumes than for proprietary decoders. Because of its ubiquity and wide support from multiple organizations

See MPEG, page 29 ►

Users Speak Out on XLR Origins

► XLR, continued from page 19

When I researched the information, there were two answers: 1) Bayonet Connector or 2) it was named for its inventor — Bayonet Neill-Concelman. I concluded that column with the statement: "Can this possibly mean that at some time in electronics history there also was a Xanothopolous Louis Richardson?"

*Michael Muderick
Muderick Media
Havertown, Pa.*

The ABCs of the XLR

Dear RW,

I have a theory as to what XLR stands for. I can't remember for the life of me where I learned it, but it works. Each letter denotes the corresponding pin on a three-pin connector. Pin 1 "X" denotes the ground connection. Pin 2 "L" denotes the "live" or "hot" connection. Pin 3 "R" denotes the "return" connection. This is not carved in stone anywhere to my knowledge; but it can sure help a budding engineer remember how to properly wire an XLR connector.

*Curt Yengst
Zero House Productions
Middlesex, N.J.*

All types

Dear RW,

Having been involved in broadcasting and recording for over 50 years, I really enjoyed your article in *Radio World* on the XLR connectors. I still have a quantity of the early Cannon XLR connectors from the early 1950s with the spring strain relief and a tapered rubber plug and fiber washer to secure the cable by tightening a threaded cap. The insert was held in with a small binder-head screw.

The first broadcast stations where I worked used Amphenol brand connectors with two or three hollow pins, but used female connectors on the cable from the microphones and male connectors on the wall plates. The connectors had spring strain relief assemblies with threaded locking rings to secure the connectors together.

WBAA-FM at Purdue University used large Hubbel three-pin twist locking connectors for its microphones — connectors more suitable for high-current power circuits. WUOM(FM) at the University of Michigan used the large Cannon P connectors. In the late 1950s, Electro-Voice decided to use a connector similar to the XLR series but slightly larger in diameter and not completely circular, with a flattened section. I believe the EV 665, 666 and 667 series of dynamic microphones used this connector, which did not catch on with the rest of the industry. Several years ago, I was able to obtain a few of these connectors to use with some old EV microphones through (then) Harris-Allied in Richmond, Ind.

*John Reiser
Secretary, Washington Section
Audio Engineering Society*

The installation

Dear RW,

Just read your fine article, "Who Put the X in the XLR?" In 25 years in this business, I've installed lots of XLRs and agree that the Neutrik NC3 series are the best. We had a sample of their solderless style which worked great, too ... until you slid the shell in place when it becomes a three-way short. Seems that the wire needs to be trimmed just right, or the cut end sticking through the ID slot will touch the shell. It took a while to figure that out, since the problem went away when the connector was opened to be buzzed out with a meter.

You failed to mention the Amphenol XLRs which were chrome-plated plastic like the bumpers on a model car. I ran into them at a college radio station. Also between the Cannon P series and the XLR there was a UA style used by CBS for years. It was a three-pin, very similar to the XLR but had a flat top above pins 1 and 2. When I worked there in the mid-70s it was the "approved" CBS audio connector, but we were using gold-plated Cannon XLRs everywhere because the old Electro-Voice and RCA microphones with UAs were history.

The only improvement I would like to see in XLRs is one I suggested to two AMP engineers who stopped into a TV station in Philadelphia where I worked asking about typical connectors used in television. I suggested they make an XLR line based on their circular connectors, which had the pins and sockets crimped

on the wire and pushed in from behind. Since soldering is the biggest pain in XLR installation, crimp connections which could be extracted from the shell would be really neat. I guess when AMP figured the cost of the crimp tool and the small market, it wasn't worth the investment.

*Gary Schultz
Engineering Director
Arkansas Educational Television
Network
Conway, Ark.*

FCC Eases Paper Load

WASHINGTON By June, broadcasters and the general public may be able to file comments or look at other commission documents through the Internet. That would replace the current system of buying copies from the FCC contractor or actually going to the commission public reference room to look at documents.

By making it easier to submit comments, the FCC expects greater and more diverse public input. Electronic filing will be cheaper than the current paper filing system.

The changes are part of the commission's goal to ease paperwork burdens for its employees and the public. In an order adopted on April 2, the commission simplified the broadcast equipment authorization process and took a step toward electronic filing of equipment authorizations. The number of equipment authorization applications will be cut from 3,500 to about 1,800, the FCC said.

Equipment authorization ensures radio transmitters and other equipment meet standards to minimize interference. The process is based on a written application and test results submitted by the manufacturer or other responsible party.

The commission reduced from five to three the number of different equipment authorization procedures: Certification, in which applications are sent to the FCC, and two manufacturer self-authorization programs: Declaration of Conformity and Verification. The Notification program was eliminated, and the Type Acceptance program was combined in the Certification program.

Specifically, the commission relaxed from Certification to the Declaration of Conformity self-approval procedure for Part 15 TV interface devices, radio receivers (except scanning receivers) and Cable System Terminal Devices. The FCC also changed approval procedures from the Notification requirement to the Verification requirement for a series of delineated transmitters, including Part 101 point-to-point microwave transmitters, Part 74 Auxiliary Broadcast aural relays and boosters and Part 78 Cable TV Relay fixed transmitters.

The commission plans to begin another rule making in the future further streamlining the equipment authorization process by allowing parties other than the FCC to certify equipment and by implementing mutual recognition agreements on testing and approval to promote international trade of telecom products.

The equipment authorization changes will become effective 90 days after publication in the Federal Register.

As planned, the commission has proposed the simplification of broadcast applications in order to allow electronic filing for application and reporting forms (RW, Feb. 4).

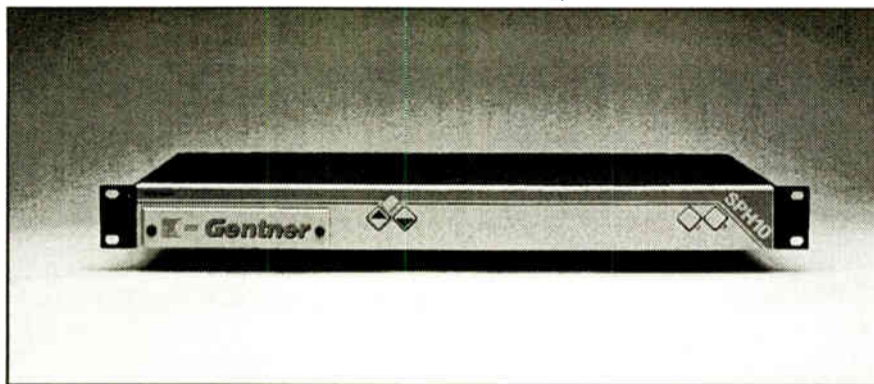
The commission proposed simplifying 16 broadcast forms, including assignment and transfer forms, and applications for new commercial stations and modifications to licensed facilities. Revising and shortening forms and replacing exhibits with certifications was also proposed.

— Leslie Stimson

FEATURES/BENEFITS

- The world's most affordable analog hybrid
- Newest analog hybrid technology ensures the best audio quality
- Audio filtering and equalization makes callers sound the very best they can be
- Balanced input and output
- Balanced and unbalanced mix output for recording both sides of the conversation
- Built-in monitor amp allows handsfree monitoring of calls without a headset
- Simple to install and operate
- Automatically accepts all worldwide voltages
- Worldwide compliant including FCC, CSA and CE

The Worlds Most Popular Analog Hybrid... Has Been Replaced!



Gentner SPH-10 Analog Telephone Hybrid

Please call today for ABG pricing

It's not easy outdoing yourself. But the Gentner SPH-10 has done just that. Replacing the broadcast standard SPH-3A with better performance, for the same great price:

\$499.00 list

ABG
Audio Broadcast Group Inc.

MAIN/MIDWEST OFFICE

Voice: 800-999-9281

Fax: 616-452-1652

E-mail: support@abg.com

SOUTHEAST OFFICES

Voice: 800-369-7623

Fax: 919-934-8120

E-mail: cindy_edwards@abg.com

Voice: 800-951-7443

Fax: 803-951-3123

E-mail: jgeorge@abg.com

SOUTHWEST OFFICE

Voice: 800-858-9008

Fax: 805-273-3321

E-mail: tmezey@abg.com

FOR INFORMATION ANYTIME

VISIT OUR WEBSITE

www.abg.com

AM Hybrid IBOC DAB System

David C. Hartup, Daniel M. Alley, Don R. Goldston

The authors work for Xetron Corp. This is the third part of a paper that describes the current state of the USA Digital Radio AM Hybrid In-Band On-Channel Digital Audio Broadcasting system. RW prints the paper as a service to the industry.



A computer simulation has been developed to model the operation of the AM Hybrid IBOC system. The simulation was written such that system parameters can be easily changed to allow rapid trade-off studies. The simulation includes all functions except the forward error correction (FEC) and the PAC audio encoding algorithm. Proposed FEC algorithms have been simulated separately and are being incorporated into the overall system simulation.

System simulation and results

Figure 5 shows a block diagram of the transmitter and channel simulation. In an OFDM system the data is sent in frames, with each frame consisting of one symbol per digital carrier. The simulation has been programmed to allow training frames, or known information, to be transmitted to allow the receiver to rapidly synchronize and to follow rapid changes in the channel. The simulation generates normal and training frames of data using a random bit generator. The

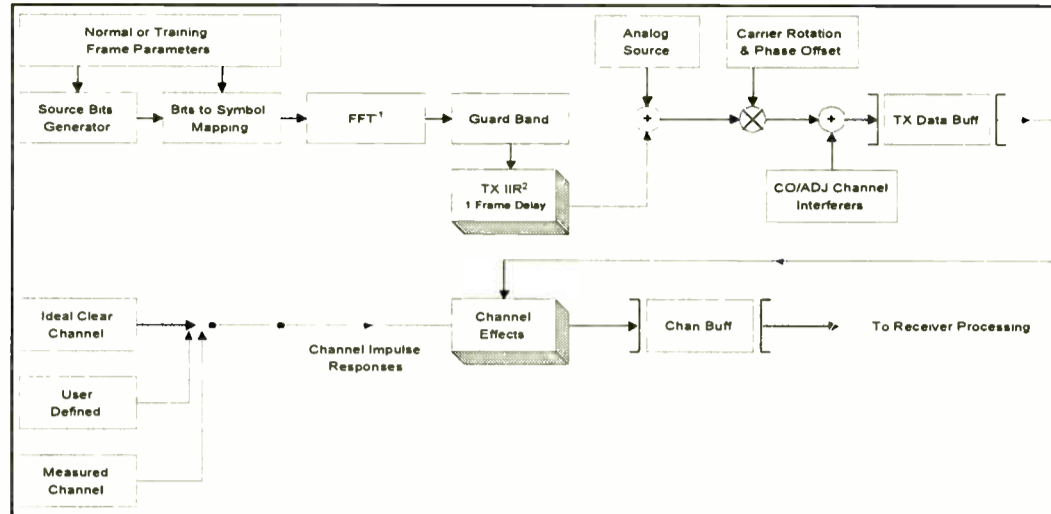


Figure 5: Block Diagram of the AM Hybrid IBOC Transmitter and Channel Simulation

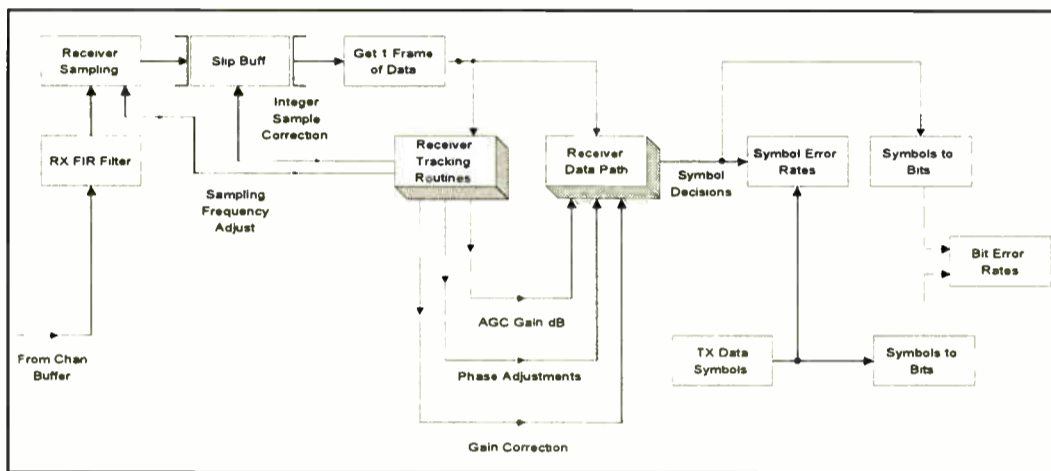


Figure 6: Block Diagram of the Receiver Simulation

bits are mapped into symbols, or constellation points, and these are input to an inverse FFT.

The simulation generates symbols for the 62 digital carriers, and an additional 66 FFT bins are filled with zeros for a total of 128 FFT points. At the inverse FFT output, a temporal guard band is added to each data frame. The temporal

guard band protects against intersymbol interference. The guard band consists of a cyclic continuation of the 128 time-domain samples. Four samples are added to the beginning of a frame and three samples are added to the end of a frame.

The sampling frequency used in the simulation is 59.535/1024 MHz and was chosen such that all clocks for the AM and FM hardware implementations could be derived from integer division of a single frequency. The sample time is approximately 17.2 μ s, leading to a guard band of slightly less than 120.4 μ s.

Following generation of the guard band, the in-phase portion of the data is filtered by highpass filter. The purpose of the filter is to reduce sidelobes from the digital data that overlap the analog spectrum. The filter is implemented as a forward/backward IIR, which provides high frequency selectivity and linear phase. The quadrature-phase data is delayed by one frame to account for the delay of the in-phase data. Next, the analog signal is added to the in-phase portion of the digital data.

The signal from the desired and interfering stations passes through a data buffer and is processed by a model of the AM channel. Three types of channels can be chosen. The ideal channel is useful for many system testing purposes and it increases the speed of the simulation. A user-defined channel can be chosen when it is desired to analyze system performance under controlled conditions. In this type of channel, the simulation operator specifies the channel fluctuation as a function of frequency and time throughout the simulation. The third type of channel allows the system performance to be analyzed using examples of actual channels.

For the user-defined and measured data channel modes, the channel is modeled as an FIR filter with up to 128 taps. It has been found that accurate results can be obtained using only 13 taps, leading to a faster simulation run time.

See IBOC, page 27

RDS/RBDS "Mini-Encoder"

With this simple, "dirt cheap" encoder, your station can begin transmitting



the more important radio-data IDs, service flags and text messages.

Use any PC to quickly and easily enter your station's call letters or "street name," format identifier, translator frequencies and scrolling ads or promos. Menu-driven software transfers this information to the encoder's own non-volatile memory.

This nifty little encoder installs in minutes, locks to any stereo generator and works in to any FM transmitter.

Don't let your station be skipped-over by the new generation of "smart" radios! At just \$390 there's no excuse for waiting to put RDS to work for you right now.

MODEL 701 — \$390

Inovonics, Inc.

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

www.inovon.com



Circle (83) On Reader Service Card

Time-Temp Thing:

SINE SYSTEMS
Innovative Solutions

Hearing the current time and temperature is important to your radio audience. The Time-Temp Thing makes this possible on satellite and automated stations. It can speak the time, the temperature, or both. It even automatically changes the way it speaks the information so it doesn't sound like a machine. A contact-closure is all it needs to make it speak and an EOM contact is provided.

Voice: 615-228-3500
Fax: 615-227-2367
Fax-On-Demand: 615-227-2393
Web: www.sinesys.com



Circle (109) On Reader Service Card

Routine Cleaning for DAT Machines

Jeff Johnson

The second in a multipart primer on how to service your station digital audio tape machines.

In the March 18 issue, we discussed the basics of DAT, inspected the cassette itself, and prepared to open the machine.

When your machine is opened up, consider how to access the head drum, tape guides and rollers, the capstan and pinch roller. Some decks require removal of the loading mechanism. The shop manual will guide you here.

Clean and inspect the pinch roller. Tape wear indentation or fine cracks in the rubber are obvious reasons for replacement.

Capstan inspection

Inspect the capstan. It probably will have black magnetic coating stuck to it. Swab it clean. You may have to scrape the capstan to loosen all of the accumulation. Do this with a chisel point cut on the end of the plastic handle of a swab, a chisel point diddle stick, or your little fingernail.

Turn the capstan as required to clean it completely. If you find it difficult to turn the capstan, put your mechanism into play position. You will no doubt discover the gears or pulleys that do this. Push on the pinch roller with your finger to turn the capstan a bit and resume scraping and swabbing. This is the most difficult part of cleaning a mechanism. Don't be confused by reflections mirrored in the capstan, which may appear to be dirt.

Wipe the guides and rollers. With the swab, rotate each roller, checking for free movement.

Clean the drum and heads with the alcohol and a fresh, clean swab. Wipe in the direction of head travel *only*. Do not wipe up or down. Be certain not to snag the foam tip on the head; bits of the swab can tear loose.

Loading mechanism

Play a tape with the mechanism exposed. The means of doing this vary. The Sony DAT units with which I am familiar do not need the loading mechanism removed prior to cleaning, but the entire mechanism must be supported 2 to 3 inches higher in the chassis.

The Panasonic SV series does not require raising the mechanism, but the loading sled must be removed. Leave it electrically connected or the machine will not receive the open and closed signals and will not play. All of the Panasonic machines have locating pins on the deck proper to position the cassette, so a tape can be played without the sled.

Open the tape cassette and set it in position on the hubs and positioning pins. Hold it down with your fingers on the outer edges or place a one-pound roll of solder horizontally on the cassette with the spool flanges flattened a bit to keep it from rolling off.

Press play; the tape will load and play. Check for position and operation of the tension regulator (discussed in the following section). Perform forward cue and reverse cue, and watch that the tape does not move out of the tape path and that it maintains adequate tension. Fast forward and reverse the tape, and observe the tape

on braking. It should stop with little slack. If you see slack, the brakes need renewal.

On machines with error rate display, look for error rates of less than 20 with a known good tape.

Reassemble the machine completely. Record a cut or two. Playback should be perfect. Take the tape to other machines for play. If playback is good on the origination machine but not elsewhere, you have a skew alignment problem. Don't freak! The alignment is adjustable and will ascertain that all of your machines are compatible. We will discuss skew alignment in the next installment.

According to the shop manuals I have

read, tape heads last only 1,500 hours. In practice, I never have encountered a head assembly in which head wear was too excessive for the unit to function.

Other culprits

The DAT machines at my station have many, many more hours than 1,500. Other problems have always been the culprits. Bad skew alignment, improper tape tension and other faults too often are mistaken for bad heads. If your machine is clean and properly aligned, and the tape tension is correct, your heads, no matter how old, probably will do the job!

A DAT cassette is rated by some sources not to deteriorate prior to 50


passes. For a cassette used to record and play a show every weekday, that only takes five weeks! Realistically, limit the tape life to 100 to 150 passes. More passes will produce higher error rates, shedding and plugged heads.

The Panasonic machines, among others, allow the monitoring of digital error rates. Panasonic considers anything less than 1,000 acceptable. I like to see fewer than 10 with a fresh tape. Older tapes will exhibit 50 to 100. Anything higher indicates a worn-out tape, dirty heads, bad tension or other less-likely problems, in either the recording or playback machine.

If your error rates are higher than the "good" range of less than 50, play a known good tape. If error rates remain too high, your heads probably are dirty or

See DAT, page 30 ▶

SATISFY YOUR TASTE FOR THE BEST




Known throughout the world as the best performing, most reliable FM transmitters available, Continental's 816R Series combines superior design and audio quality with exceptional workmanship to give broadcasters an unmatched, field-proven record.

The 816R Series comes in power levels from 10 to 70 kW. Available as an option is an internal control and monitoring unit which tracks trends, stores data and provides an exact visual replica of the transmitter's control panel.

STANDARD FEATURES

- Solid-State IPA
- Internal Harmonic Filter
- Automatic Power Level Control
- Automatic Filament Voltage Regulation
- Exclusive "Soft-Start™" Protection Circuit
- Broadband Quarter Wave Cavity
- Totally Self-Contained In a Single Cabinet

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



Continental Electronics Corporation

P.O. BOX 270879 • DALLAS, TEXAS 75227-0879 • 214-381-7161 • FAX: 214-381-3250

800-733-5011

Visit our web site — <http://www.contelec.com>

9.97.115

KEYBOARD CONNECTION

Ergonomics and Alphabet Soup

Barry Mishkind

Have you ever looked at a picture of the typical radio station control room in the 1950s? One thing is certain, the design layout almost certainly did not put operator convenience first.

At some typical stations of the time, the DJ might wear a lavalier microphone as he moved among as many as six turntables. Tape decks often were mounted in racks at the back of the room. At times, the DJ might have wished for roller skates as he moved from disc to tape. Some readers may remember developing the skill of talking into a

boom-mounted mic, simultaneously reaching for the pots and switches and "slip-cueing" discs.

Studios today are much better designed, with key equipment placed within easy reach from the announce position, often backed up with remote starts on the console. Some studios can be a real pleasure to operate.

On the other hand, computer installations all too often seem to hark back to the 1950s era. A box is bought and plopped on a desk, with little thought to the operating conditions for the users. As users find themselves spending more time at the computer, little aches and

pains start to intrude. All this resulted in a whole new set of acronyms to the workplace: RSI, CTS and NSS. It's alphabet soup describing some increasingly common office ailments.

Wrist rests, mouse controls of different shapes and sizes, sliding mouse trays and a whole array of "ergonomically correct" keyboards are among the products that reduce worker pain and discomfort.

Prevent problems

Let's start with the set-up of the basic equipment. Simply buying the latest "ergo-(fill in the product)" may not accomplish your goals.

For example, to reduce repetitive stress injuries (RSI) you can purchase keyboards that tilt, split, re-map, have adjustable tension, and/or contain specially programmed "speed keys."

Yet, according to a study by the National Institute for Occupational Safety and Health, using both conventional keyboards as well as three of the alternative design keyboards, computer keyboard design was "not a significant factor for user comfort."

Worse, what can ease one person's pains may cause difficulties for another. Some users end up with such tendinitis that eventually they can neither type nor hold a pen. On the other hand, paying attention to the basics can help avoid RSI and reduce posture and tension problems like neck and shoulder stress (NSS) even under long, intensive computer use.

What can ease one person's pains may cause difficulties for another.

Many experts suggest to start with how the computer itself is set up. When seated, the user's head should be in line with the body, with the line-of-sight lined up right at the top of the screen. This prevents the user from working with a "bowed" head or twisted neck, which can quickly lead to NSS and even "crimp" blood vessels over time, leading to headaches or worse long-term problems.

One common trap: the typical bifocal user tends to lean toward the screen while tilting his or her head up. This is among the worst things you can do, because it is hard on the neck muscles and leads to the problems mentioned above.

Chair care

When it comes to chairs, one size definitely does not fit all. And the chair should not be that broken chair that came out of the control room. A quality chair with as much adjustability as possible should help the user to sit with a straight back. The keyboard should be mounted, not just tossed on the table top, so as to allow both the arms and legs to form a 90-degree angle while working. The hands, then, will be parallel to the keyboard, without undue stress on the wrist, as you reach to the keys.

You would not put a start button for a music source so far away from the announcer that he has to get up and move to reach it. So why shouldn't components like the mouse be any different? Find room for the mouse in a location that minimizes the motion needed to reach the pointing device.

Now that you are seated comfortably and viewing the monitor with ease, it is time for a break.

Take a break!

A break even before starting work? Yes, indeed. Stephanie Brown, author and concert pianist, recommends a "warm up" before extended keyboard activity.

"People who would not dream of
See KEYBOARD, page 28 ►

GET IT ALL.

ONE SOURCE

ONE CALL

FINALLY. COMPLETELY INTEGRATED RADIO OPERATIONS.

The perfect digital radio operation. Now it's a reality with Computer Concepts' complete line of integrated radio products.

With traffic and reporting, integrated music scheduling and complete studio products, Computer Concepts has the integrated digital product line for your station operations.

MAESTRO is the brain for all operations — music and commercials, announcer text with daily schedules, all on screen with instant access to all of your audio inventory.

VOICETRACKER combines your music, commercials and pre-recorded voice segments to create a live sounding automated program.

V.T. (NEW!) Sure to be the leading traffic system in the world. Now manage and report all traffic operations for up to 128 different stations from one location.

NEWSROOM captures text and audio from wire services and network feeds for creation of newscast. Write, edit, package or play audio and text. Plus link actualities to copy.

CutMaster integrated multi-track editing with powerful realtime effects editing.

Get real digital operations with just one call, Computer Concepts.

Computer Concepts Corporation

8375 Melrose Drive • Lenexa, KS 66214

Toll Free 1-800-255-6350 • Phone 913-541-0900 • Fax 913-541-0169

DBMAX

FIVE BAND DIGITAL



PRODUCTION LIMITER & OPTIMIZER

MAINTAINING LEVELS WITHOUT SACRIFICING RESOLUTION IS A DIFFICULT TASK IN A MIXED ANALOG AND DIGITAL PRODUCTION ENVIRONMENT. NOW ONE MACHINE LET'S YOU DO IT. THE DBMAX IS QUITE SIMPLY THE MOST EXTENSIVE DYNAMICS SHAPING TOOL YOU'VE EVER TRIED. SOME USERS CALL IT A FINALIZER™ ON STEROIDS.

OPTIMIZE LEVEL

The DBMax lets you work with both analog PPM's and digital meters. Dial in the type of level measurement you need to comply to, and the DBMax will get rid of your overs. Optimize: 5-band compression can make you very loud. Limit: Sample accurate, distortion cancelled limiter. Multi-slope: Mid level boost with the rest untouched.

OPTIMIZE QUALITY

The DBMax DSP engine uses precision calculations at a full processing rate to keep aliasing distortion low and audio bandwidth high.

Bandwidth: Processing at 48kHz sampling for 24kHz audio. Resolution: Processing of all the 24 bits of an AES/EBU signal. AD/DA converters: 24 bit resolution with analog pre-scaling.

The 5-band limiting and compression functions of the DBMax are supported by a variety of additional DSP plug-ins. At the same time you may use e.g. AGC, EQ, Soft Clipper, 5 band Expander+Compressor+Limiter all at 48kHz sampling:



INPUT
HP and LP filters.
Sample Rate Converter.
Delay 0.5-400ms.

INSERTS
Use up to three of these: AGC, Dynamic EQ, MS Decoder, MS Encoder, Normalizer, Parametric EQ, Stereo Enhancer, 90 Degree Mono Generator.

DYNAMICS
Expander, Compressor and Limiter (simultaneously). 1-5 bands with selectable crossover points and slopes.

OUTPUT
Final Limiter with adjustable Soft Clip.
Dither 8-24 bits.

FROM CLIENT TO CLIENT



With the DBMax it's easy to move from client to client or to target the mix for a VTR and a DAT.

Use your favorite Preset and load different Setup's to maintain full resolution under every condition.



FIRST SHOWING

Also try out your mix under varying and realistic broadcast conditions.

Emulate the sound at the listener and adjust it while you can.

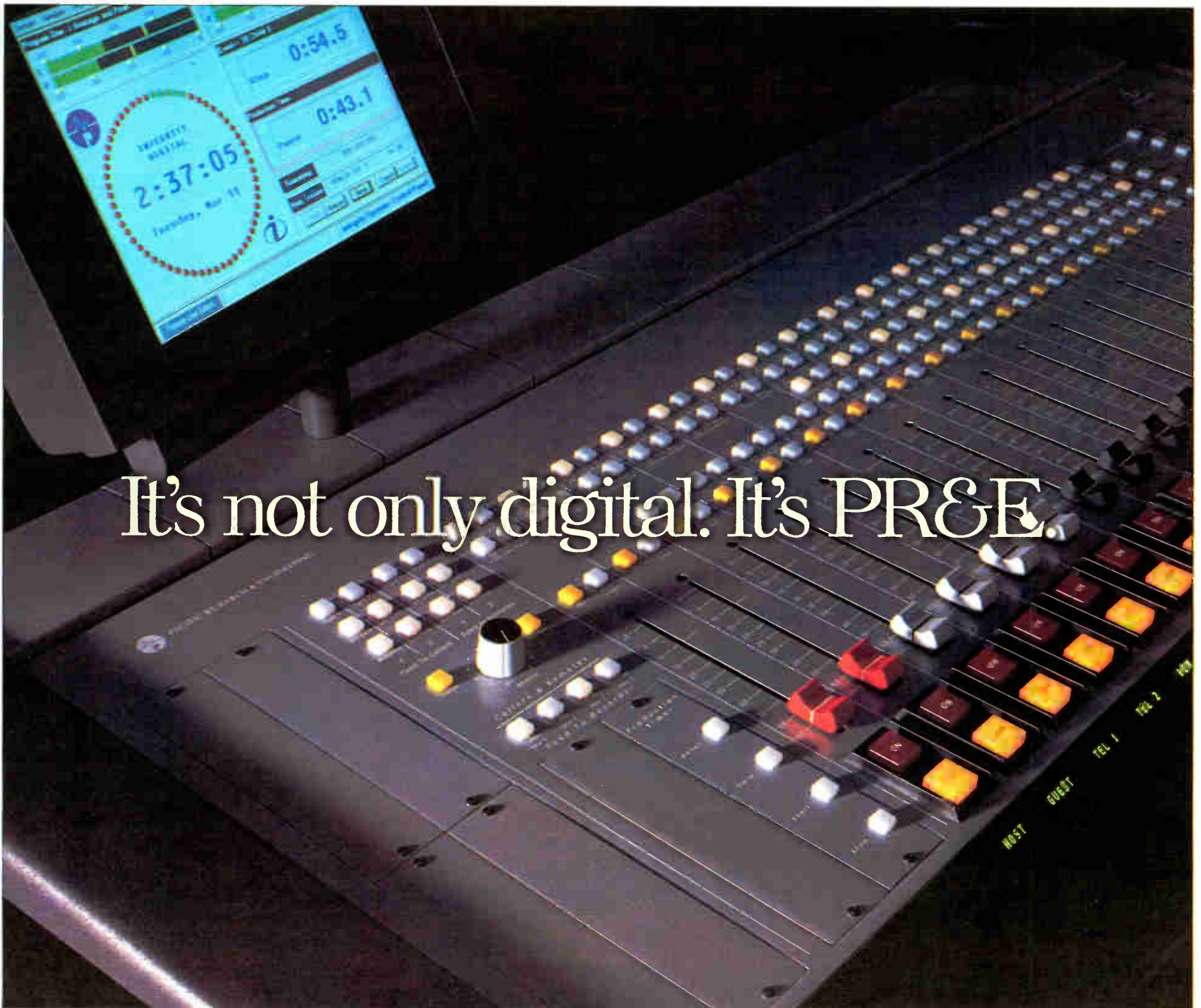


t.c. electronic
ULTIMATE SOUND MACHINES



TC ELECTRONIC INC., 790-H HAMPSHIRE ROAD, WESTLAKE VILLAGE, CA 91351, USA · PHONE: (805) 373 1828 · FAX: (805) 379 2648
EMAIL: INFOUS@TCELECTRONIC.COM · HTTP://WWW.TCELECTRONIC.COM
TC ELECTRONIC A/S, SINDALSVEJ 34, DK-8240 RISSKOV, DENMARK · PHONE: + 45 8621 7599 · FAX: + 45 8621 7598

Circle (161) On Reader Service Card



It's not only digital. It's PR&E.

Now you can get digital technology and PR&E reliability in the same console. Integrity.™ It's the first digital on-air board that also speaks fluent analog. All 16 inputs can handle analog signals. Ten can also accept digital inputs at any sample rate. So you can deal with the hodge-podge of equipment in real-world studios. A unique architecture also guarantees a level of reliability other digital consoles can't match. So you can rest assured your signal will stay on the air.

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 (187) On Reader Service Card

World Radio History

► ABG continued from page 28 with the breakup of AT&T. T1 was devised to multiplex 24 telephone conversations onto two pairs of wires, a transmit pair and a receive pair, using pulse code modulation. A voice signal is sampled 8,000 times per second using an 8-bit digital word length. (Note, 8 kHz sampling gives a 4 kHz frequency response.) The 8-bit word multiplied by 8 kHz sampling produces a 64 kilobit-per-second "time slot," also called a DS-0. Twenty-four DS-0s are multiplexed along with 8 kbps for framing to create the T1, a 1.544 Mbps bi-directional circuit.

Repeaters are employed about every 6,000 feet to regenerate the digital signal; hence noise and distortion do not affect the signal as long as there are no bit errors.

Error control

Two methods of error control are employed by the phone system, Alternate Mark Inversion (AMI) and Bit Eight Zero Suppression (B8ZS). AMI is a method of bipolar signaling in which a digital "one" is alternately represented by a positive or negative voltage with respect to the digital "zero."

AMI eliminates the effect of capacitance in the circuit and allows for DC power to be sent on the line. It also allows for timing to be extracted from the bit stream, provided that there are no more than 15 zeros in a row. B8ZS will substitute a digital one in case of a long string of digital zeros to insure that the repeaters do not jitter and lose sync. The multiplexer manufacturers may employ other methods of error mitigation designed to prevent audio pops and dropouts.

Sixteen-bit digital audio sampled at 32 kHz equals 512 kbps. Adding 64 kbps for error mitigation gives 576 kbps (nine time slots) for 15 kHz monaural audio. Thus, 15 kHz stereo audio requires 18 of the 24 time slots available in one direction on a T1, leaving six slots for other uses.

APT-X (4:1) data-compressed stereo audio uses four time slots. MPEG compressed stereo audio occupies from one to six time slots depending on the degree of data compression.

It is possible to transmit stereo MPEG compressed audio on one 64 kbps channel of a T1 if the 1/4-second delay or marginal audio quality is not an issue. A modem or voice channel requires one time slot.

Asynchronous RS232 uses one or two time slots; synchronous RS232 one slot. RS449 or V.35 can occupy one to 24 time slots depending on the data rate required. LAN connection is a particularly appropriate utilization of T1 technology allowing distant studios to access digital audio inventory and/or office network servers.

Reliability

T1 is versatile. It can be configured and easily reconfigured to suit the program needs for a particular application. It is inherently bi-directional. T1 is reliable. Most problems with T1 occur during set-up and testing of the circuit. Once up and running, T1 is very stable. The T1 tariff guarantees 99.9985 percent reliability (about four minutes of down-time per year).

Of course, this cannot take into account physical destruction of the connection. The only certain way to insure against this type of failure is to set up an alternate path.

The cost of T1 depends on the length of the circuit, but is generally decreasing as the telephone companies move toward all-digital services. The monthly cost is negotiable due to competition, and you can usually realize better rates through long-term contracts.

T1 does not necessarily need to be on copper or fiber. It is common for a wireless T1 circuit to be set up as a subcarrier on a video RF STL. Increasingly popular are T1 connections utilizing spread-spectrum technology in the 2.4 GHz band. As broadcast engineers continue to discover new applications, the versatile T1 circuit is fast becoming the transmission method of choice for a wide variety of signals.



What is your experience with T1 technology at your radio station? Tell us. E-mail to radioworld@imaspub.com

MPEG AAC Moves Forward

► MPEG, continued from page 20 around the world, as well as its built-in extendibility, encoder improvements are likely to come to AAC promptly as the state of the art advances.

Applications to come

Among early adopters, the Japanese government has specified AAC as its chosen multichannel audio format for digital television. AAC's power is also likely to lead it into applications where available bitrate is severely constrained — the Internet, for instance. With Sony as a contributor and supporter, one can imagine that consumer products eventu-

ally will include this standard.

The MPEG-4 process is now underway. While there will be some new audio technologies embodied in the next standard, there will be no new audio coding method specified for bitrates at or greater than 64 kbps, and AAC is expected to be carried forward into the foreseeable future. AAC's modular approach should keep it on top for some years, before clever inventors once again discover insurmountable limitations and MPEG audio moves forward to the next "next big thing."



RW welcomes other points of view.

Industrial Strength

Digital Audio Delivery

Digital Audio Delivery systems are now recognized as a must for every broadcast facility. But few systems provide the features, flexibility or reliability required to maintain profitability in this demanding and fault critical application, nor the support mechanism to maintain them.

The ENCO DAD^{PRO32} Digital Audio Delivery System is simply the most powerful On-Air & Production system available. Based on the already widely accepted and mature DAD^{PRO} product, but now optimized for the Windows NT[®] operating system, DAD^{PRO32} is unique in its uncomplicated user interfaces and adaptability to any format, yet harnesses the power and reliability of proven technology.

- Intuitive On-Screen User Interfaces that are immediately familiar to operators. Optional Touchscreen makes Live Assist operation quick and easy.
- Complete On-Air flexibility for Live Assist, Automated, or Satellite Programmed operations, with transparent transitions between modes. Seamless Segues and Voice Tracking provide a continuously "Live" image.
- Powerful Production and Call Processing capabilities, including Graphic Cut & Paste Assembly Editing. Automatic Recording features are included for catching network feeds.
- Interfaces to all Music and Traffic Scheduling and Billing systems.

- Features full 32-Bit Processing and True Multitasking capabilities. Many third party programs, such as Multitrack Editors, Wire Capture systems and Word Processors may be directly embedded into DAD, or operated on the same Workstation.
- Inherent support of Global Wide Area Networking, for sharing of data between multiple facilities. Ancillary products are available for Store Forward operations and remote management of unmanned downlink sites.
- Operates on commonly available "off-the-shelf" computer hardware and network architecture, utilizing any of a wide variety of redundancy configurations.
- DAD is an outright purchase, and there are no monthly licensing fees. Free software upgrades are provided for the first year. ENCO technical support is legendary as the best in the business.





Call Your DAD Dealer or ENCO For Complete Information or Demo

Check Out The ENCO Web Page At: www.enco.com



ENCO
SYSTEMS, INC.

24555 Hallwood Court, Farmington Hills, MI 48335 USA
Tel: 800-362-6797 or 248-476-5711
Fax: 248-476-5712 • www.enco.com

Service Your Station DAT Machines

► DAT, continued from page 23

your tape tension too low. Remember, not all machines display error rates. Also, the definition of "too high" will vary; I do not like rates greater than 50, but keep in mind that Panasonic considers rates less than 1,000 to be OK!

Test the tension arm

Watch the tension arm during play. It should move back and forth slowly at about the rotation rate of the supply hub. The motion probably will be slight, but the arm should be approximately in the center of its range. Push the arm with the plastic handle of the cleaning swab to the left to increase the braking action. The drum should begin to stall at the end of travel. If not, the tension is too loose. If the arm barely presses into the tape during play or the drum stalls, the tension is too tight.

High error rates greater than 50 are often attributed to bad heads. Heads can be the problem, of course, but I have nearly always found the problem to be old tape, improper tension or dirty heads. A machine with new tape and thousands of hours on the heads can display error rates of less than 10 consistently.

When viewing the signal (RF) from the heads on playback with a scope, you will find the waveform to be roughly rectangular for each head as it plays an individual track. The playback signal is not continuous, but with two heads and a

tape wrap of 90 percent, the RF will have a duty cycle of 50 percent.

We will discuss connections to the scope next time, but look for a series of equally spaced rectangular traces. You will notice shorter gaps within each head's signal. The leading and trailing portions are the ATF (Automatic Track Finding) signals and the section containing the timing and numbering information. The central block is the actual digital audio. The timing and numbering can be modified independently of the audio, as stated.

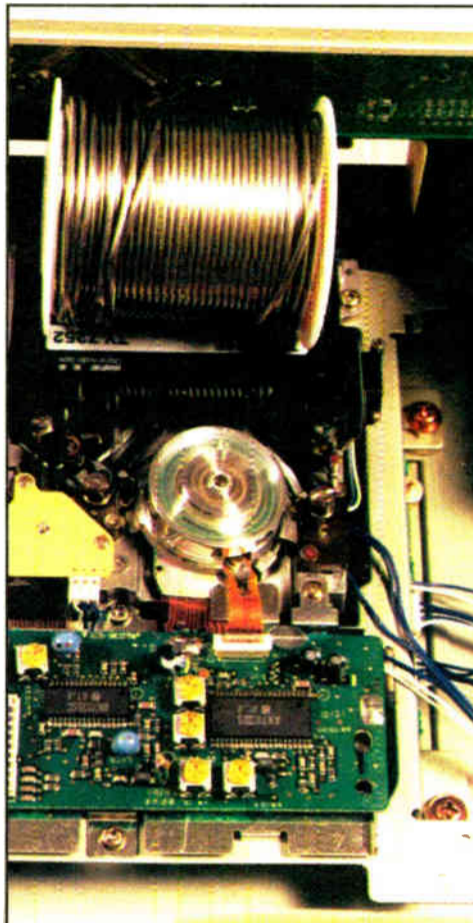
The digital audio signal from each head is redundant. A machine can play perfectly well with only one head functional. Because each head's signal as recorded is compared on playback for the Automatic Track Finding function, both must have been recorded for tracking to be functional.

Clean with a foam swab and 99-percent isopropyl alcohol. Let the alcohol evaporate before testing further. Alcohol in the windings of the head can make the head malfunction temporarily. The heads are not encapsulated as are familiar linear audio heads.

Sometimes, after a cleaning, the head's output disappears from the scope. After a few minutes the signal reappears. Wet head windings must be the culprit.

DAT technology achieves track alignment on playback by means of ATF.

Tracking and alignment functions are



Place a roll of solder on the cassette to hold it securely in place during testing.

critical due to the minute track dimensions involved. The playback head must follow the path of the recorded track perfectly. This is accomplished in part by matching the physical path of the tape past the drum heads with that of the recording machine. This is skew alignment.

The tape on playback also must move at exactly the same speed and place the heads in the same relative linear position on the tape as occurred during recording. This is the ATF function.

Without a separate track for tracking, DAT places information in the headers at each end of the track. How can the machine determine correct tracking by this means? How does it know one track from another?

The ATF signal is different on an "A" head track than it is on a "B" head track. Together there are four different ATF signals: "A" odd and even, and "B" odd and even.

The ATF is a servo function of capstan speed that nulls the unwanted ATF signals known to be on adjoining tracks. In this way, DAT accomplishes dynamic positioning of the rotary play heads with the tracks recorded on the tape.

Timing of the switching between the heads is critical. The Phase Generation function is another alignment function that may need adjustment. Next time we'll look at a quick-and-dirty fix.

■ ■ ■

Jeff Johnson is network engineer at WVXU(FM), Cincinnati, and the eight station WVXU Network. Contact him at Jeff.Johnson@goodnews.net

Caveman Art.



Early Days Come Alive at Museum

Bob Rusk

An Edison light bulb from 1915 shines through the window of a storefront on Railroad Ave. That old bulb might be quite a conversation piece anywhere else, but here it simply helps to illuminate what most people come to see: hundreds of antique radios.

The collection includes rare Atwater Kents and Crosleys, Scotts and De Forests. In all, about 800 sets fill the shelves at the Bellingham Antique Radio Museum near Seattle.

Love affair

The museum is owned by Jonathan Winter, who has had a "life-long love affair with radio." He has been a serious collector for more than 25 years. Even as a child, Winter said, "the garbage man would give me relics. I would take them apart and build fantastic one-tube radios and crystal sets."

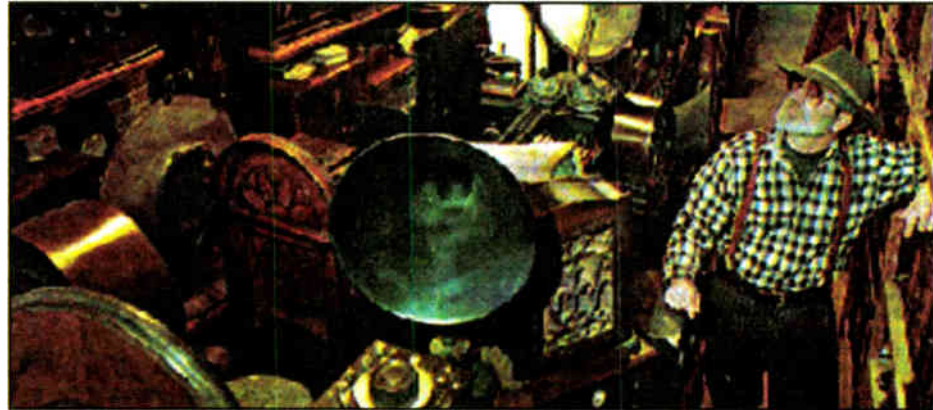
Winter opened the museum 10 years ago as a way of showing people, especially children, that "today's digital world does not invite discovery in quite the same way. Gone are the days when a child could take apart an old discarded radio and discover the magic of springs, gears, wires and tubes."

Unlike many museum proprietors who put "Hands Off" signs next to the displays, Winter encourages visitors to touch the radios and twist the dials.

"I want people to enjoy the collection," he said.

Virtually all of the radios work, rebuilt to the original specifications, and can be powered up. While most of the sets are AM receivers, there are some FM and short-wave sets dating from the earliest days of radio up to the early 1940s.

Winter's favorite pieces in the museum include a 1936 custom-built Scott receiver, which came from the New York apartment of an AT&T executive. "It's a



Jonathan Winter is surrounded by his collection of antique radios.

beautiful art deco radio," Winter said with a smile.

Among other pieces are the RCA Radiola Senior (a one-tube set) and the Radiola Junior (a crystal set). Both were manufactured in 1922. A two-stage amplifier, the Radiola RA, was designed to be used with either set.

On another shelf is a classic Atwater

Kent V, an antique radio lover's delight. Not many were made and very few can be found today. This model was introduced in 1923, but did not sell well and production ceased. One sold for a mind-boggling \$9,000 a few years ago, according to Winter. "If you find one, buy it," he advised. "It's like money in the bank!"

The De Forest Model BC-14 recalls the name of radio pioneer Lee De Forest. This crystal receiver, built in 1918, was

commissioned by the U.S. Army Signal Corps. The radio included a battery that activated a buzzer, used to adjust the crystal for maximum sensitivity.

Being surrounded by all of these old radios is quite a contrast to Winter's career. The now-retired Winter, 53, once was immersed in modern technology, designing and building home satellite

television receiving systems. He started a company here in 1974; he says it sold many of the first satellite systems in western Washington.

On the Web

If you cannot make the trip to see Winter and his radios in Bellingham, you can visit the museum on the Web. Log on at <http://www.antique-radio.org> and you can read about and see photographs of many of the radios in Winter's collection. There is also a section of research material.

One entry in the "Overview of Broadcasting" traces the "true birth" of radio back to 1907, when Lee De Forest constructed the first means of modulating an arc transmitter with voice impulses and began sound broadcasting from atop the 12-story Terminal Building at 42nd St. and Park Ave. in New York.

Radio people today are familiar with AM stations at 50 kW. They learn on the Web site that most early stations operated with just 100 to 500 W in the early days. With so little energy being radiated, the ratio of static to signal was extremely high. As a result, it was common for the static to drown out the broadcast programming.

Station engineers had little choice but to grin and bear it, the Web site tells us, until the day Powel Crosley, Jr. increased the power of AM outlet WLW in Cincinnati to an unheard of 500 kW. WLW was the first super-power station in the world; today, this consistently top-rated, Jacor-owned station operates with 50kW.

See MUSEUM, page 32 ▶

Audio Art.

The Key to your success is the R-60 console manufactured by the broadcast industry artists at Audioarts® Engineering.

The R-60 has a totally modular design that's already being used in many successful stations all around the world.

It's the perfect console for medium format buyers determined not to compromise on quality and performance. The Audioarts® Engineering reliability that you've come to expect is a big part of the picture too.

But don't let this beauty fool you, it truly is a masterpiece—at starving artist prices.

Contact Harris Broadcast to learn how you can make this console a part of your collection.



1-800-622-0022
FAX: 765-966-0623

<http://www.broadcast.harris.com>



HARRIS



You Must Remember This

What better way to promote a radio station than to build a promotional radio, with the call letters of your station prominently displayed?

That was the idea behind this AM novelty radio, which promoted WIBG in Philadelphia. The top of the microphone radio was made of metal and contained a speaker; the radio chassis was mounted into the base.

The call letters stood for "I Believe in God." The station later switched to a rock 'n' roll format.

Collector Bill Overbeck provided RW with this picture and description. Overbeck, president of the Delaware Valley Historic Radio Club, has made every effort to ensure accuracy. Contact him via e-mail at billoradio@aol.com or through RW.



Hands-on Museum

► MUSEUM, continued from page 31

In addition to reading about it, you can sample the sounds of early radio on this fascinating Web site, thanks to RealAudio. Choose from classic shows including "Amos 'n' Andy," "The Lone Ranger" and "Sergeant Preston of the Yukon."

News events

Then there are the news actualities, covering such noteworthy events as the Battle of Iwo Jima, the 1926 Jack Dempsey/Gene Tunney boxing match and even comedian Eddie Cantor commenting on the 1929 stock market crash. One of the most historically important clips is an address by President Franklin Delano Roosevelt, announcing that the United States would enter World War II:

"No matter how long it may take us to overcome this premeditated invasion, the American people and their righteous might will win through to excellent victory." With those strong words, Roosevelt declared war on Japan. The day before, Dec. 7, 1941, Japan had carried out a surprise attack on Pearl Harbor, Hawaii, crippling the American Pacific Fleet.

Winter said that more than 100 people tune in these broadcasts each day and "take a nostalgic journey into a

Sample the sounds of early radio on the Web site.

not-too-distant past" by logging onto the Web site. "I spend full days at the museum, working toward my vision" of attracting even more visitors.

"As we move into the 21st century, more and more people are interested in what the museum has to offer," Winter said. "It is my wish to see the museum become a permanent fixture, to be used by everyone interested in the history of radio."

■ ■ ■

This is one of a series of occasional articles about museums and radio.

NAB Side Trip

Looking for a fun side-trip when you go to the NAB Radio Show in Seattle this October? You can visit the Bellingham Antique Radio Museum, at 1315 Railroad Ave. in downtown Bellingham. Bellingham is a two-hour drive north of Seattle on Interstate 5.

You will know you are close to the museum when you tune in 94.5 FM on your car radio and hear old shows. The museum operates a station that covers about two blocks. The museum is open to the public, free of charge, Wednesday through Saturday, 11 a.m. to 4 p.m. Phone number: (360) 671-4663

25 Years Strong!

Inovonics
continues to meet the
everyday needs of
broadcasters the world over
with sensible, top-quality
audio-broadcasting products
at down-to-earth prices.

Audio Processing and Air-Chain

A broad range of great-sounding processors for every AM, FM, TV and Short-wave need. From our time-honored, programmable 5-band to a very basic multi-purpose unit, feedforward-PWM technology yields a strong, clean sound that won't wear-out your listeners.

The legendary "DAVID-II" FM Processor/Generator persists in surprising users with its major-market performance at a budget price. Both the "DAVID-II" and our basic FM Stereo-Gen-only utilize digital synthesis for unassailable specs.

Instrumentation, Radiodata, Etc.

Inovonics' full-featured, off air FM Mod-Monitor gives accurate total-mod, pilot and program audio readings; a companion unit measures SCA and high-speed data subcarriers.

And our FM "Relay Receiver" is sensitive, selective and, most of all, professional. It's ideal for FM translator and other demanding off-air pickup applications.

A selection of RDS/RBDS products includes an easy-to-use PROM-based Encoder, and a "dirt cheap" Mini-Encoder that fits any station's budget. A professional Decoder-Reader works with any mod-monitor to qualify and display all data groups.

Inovonics, Inc

1305 Fair Avenue • Santa Cruz, CA 95060
Tel: (408) 458-0552 • Fax: (408) 458-0554

www.inovon.com





The New Wheatstone Bridge.

Engineers the world over know the first meaning of a wheatstone bridge: a divided bridge circuit used for the measurement of electrical resistance which was invented by Sir Charles Wheatstone.

The new Wheatstone Bridge means a strong link between Harris Broadcast and world-class Wheatstone products. Together, we provide a single-source for broadcast facility needs.

Both Harris and Wheatstone have unequalled commitments to quality, technical performance, and customer service. Each presents solutions to the ever-changing broadcast industry. With standard-setting attributes like these, this addition to the Harris product line seemed to be a natural enhancement to Harris' growing family of solutions.

Value-added services include:

- Facility consulting, budgeting, and planning
- System design and documentation
- Equipment supply and procurement
- Technical furniture design and fabrication

This means you won't be left with your drawbridge up. Not only will you have top-of-the-line consoles installed in your facility, but you'll also get all the service and technical support that you need for today's demanding broadcast environments.

Cross over to a new dimension in broadcast with the any of the following Wheatstone products:

- D-500 Digital Audio Console
- A-6000 Radio On-Air Console
- SP-8 Broadcast Console
- TV-1000 Live TV Audio Console
- A-500 On-Air Broadcast Console
- A-300 On-Air Broadcast Console

**HARRIS CORPORATION
BROADCAST DIVISION**

TEL: 1-800-622-0022

FAX: 765-966-0623

<http://www.broadcast.harris.com>



A new world of broadcast solutions

©1998 Harris Corporation

Plug into the smartest audio workstation ever created.

The new AUDICY® was designed from the ground up to do what no other broadcast audio workstation has done: plug directly into the creative mind. Unlike complex workstations, it treats the editing process like an "inspiration with a deadline." If you've ever watched an editor sit down and try to read a manual under pressure, you'll understand why the new AUDICY is a study in "see it, get it, do it."

The clean, uncluttered control surface was specifically designed to look smart, feel good, and be instantly productive. The screen interface combines simplicity with a brilliant use of "virtual hardware" graphics. And to keep pace with the endless rush of ideas and deadlines, AUDICY offers unrivaled speed and power. With RAM-based editing and mixing, you edit in real time—by ear—working on up to 24 tracks. Access to audio is instantaneous, even when using the complete suite of built-in effects including compression, EQ, and reverb. AUDICY even lets video people plug into advanced audio production with flexible SMPTE features. All of which means that creative minds can spend less time learning, more time creating, and still get on-air, on time. The genius of AUDICY is in making power simple.

Introducing AUDICY



orban®

A Harman International Company

ATU ABCs for the Expanded Band

W.C. Alexander

This is the 12th in a series of articles about constructing an expanded-band AM transmission facility. The previous part appeared in RW April 15.

This time we will look at connecting and tuning the antenna system. While many expanded-band stations will choose to diplex into existing-band antenna systems, many others will use separate antennas. We will start by examining this type of antenna installation and move on to diplexer tuneup in future installments.

complex self-impedance of the tower to 50 ohms non-reactive so that the transmission line will be terminated properly. Let us also assume, to start, that we are dealing with an insulated-base tower and not a folded unipole or skirted tower.

What is the tower's self-impedance? Good question.

Towers are built in the real world, not on paper or in virtual reality, so the physical environment in which each is built affects its self-impedance. The long and short of it is that you must measure the self-impedance of the tower at its driving point — the tower base

good amount of adjustment range should have been provided, however, allowing for R values from 0.5 to 1.5 times predicted, and X values of ± 30 ohms.



Once the base resistance and reactance of the tower at the operating frequency are known, simply recalculate the leg reactance values of the ATU tee- or L-network to match these values to 50 ohms non-reactive.

One additional step I like to take is to measure the base impedance of the tow-

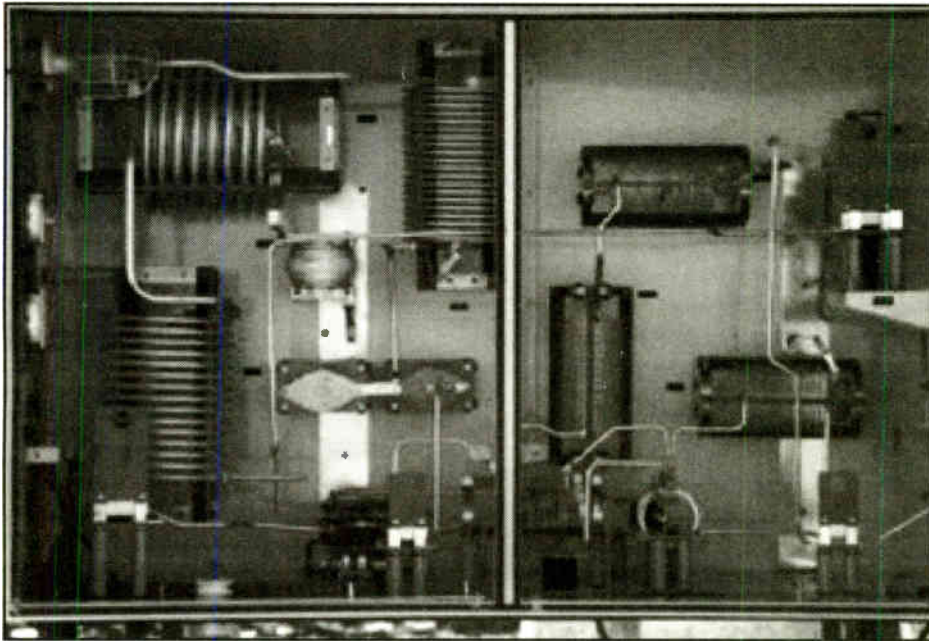
er at the sideband frequencies (i.e. ± 10 kHz) and calculate the load that will be seen by the transmission line on those frequencies.

Sometimes, the VSWR at the sideband frequencies will be very asymmetrical, and this will degrade the performance of the system. Quite often, the match at the sideband frequencies can be balanced to produce a much smoother impedance curve by changing the phase shift of the matching network. Experiment with the phase shift to see if an optimal network phase shift can be achieved, then set the network reactances accordingly.

Perfect world

In a perfect world, we would be able to measure the base resistance and reactance, set the ATU network

See ATU, page 42 ▶



An Antenna Tuning Unit From Kintronic Laboratories Inc.

The antenna tuning unit (ATU) matches the impedance of the antenna itself to the transmission line feeding it. Because all expanded-band stations are new installations, let us assume that all use 50-ohm coaxial transmission line and not any of the variations of open-feeder.

The job of the ATU is to transform the

— to get an accurate measurement. The resistance measured at this point will become the licensed base resistance and will be used along with the base current ammeter to determine operating power.

The ATU itself was, in all likelihood, designed with assumed or predicted values of base resistance and reactance. A

The Wizard™ has gone STEREO!

The new **DIGITAL FMSA-1** gives The Wizard System unmatched stereo monitoring capabilities. . .



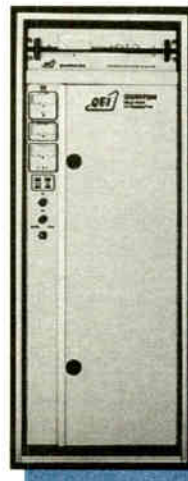
Superlative stereo performance. Linear-phase filters that reveal the true performance of your audio processing. The stability of digital stereo demodulation. The sophisticated graphical presentation of The Wizard. And—with the RS-232 port—operation on site or off.

Contact Belar today for more details on what should be *your next modulation monitor*

BELAR ELECTRONICS LABORATORY, INC.
119 LANCASTER AVENUE • P.O. BOX 76 • DEVON, PA 19333-0076 USA
(610) 687-5550 • FAX (610) 687-2686
Call, write or FAX for more information on Belar AM, FM, Stereo, SCA, and TV monitors.



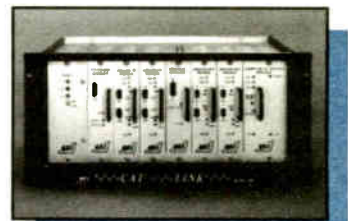
Meeting The Broadcaster's Present And Future Needs



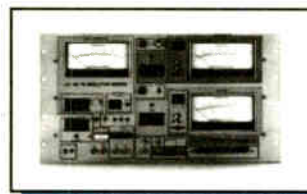
Solid-State and Single Tube Transmitters



Low Power Transmitters



Digital STL / TSL Systems



Modulation Monitors



Transportable Transmitter Sites

For More Information Call Us Toll-Free At (800) 334-9154

QEI Corporation
One Airport Drive, P.O. Box 805
Williamstown, NJ 08094
e-mail: qeisaes@qei-broadcast.com

Toll-free Sales (800) 334-9154
Fax (609) 629-1751
Emergency Service (609) 728-2020
Web Site: <http://www.qei-broadcast.com>

Products & Services Showcase

For more information on the products shown below, circle the appropriate Reader Service No.(s) on the enclosed Subscription/Reader Service card or contact the advertiser directly.

Composite Audio DA and Switcher!



The CDS-200 Composite DA/Switcher

APPLICATIONS

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

FEATURES

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



Broadcast Devices, Inc.
5 Crestview Avenue, Peekskill, NY 10566
broadcastdevices@worldnet.att.net

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

READER SERVICE NO. 26

Shively Labs

For Predictable Coverage!



- Superior Engineering
- Multi-Station Solutions
- Filters & Combiners
- Translators
- Detailed Pattern Studies
- **B-LINE** Coax
- **NEW** Lindenblad Antenna

FM & TV Antennas and Related RF Equipment

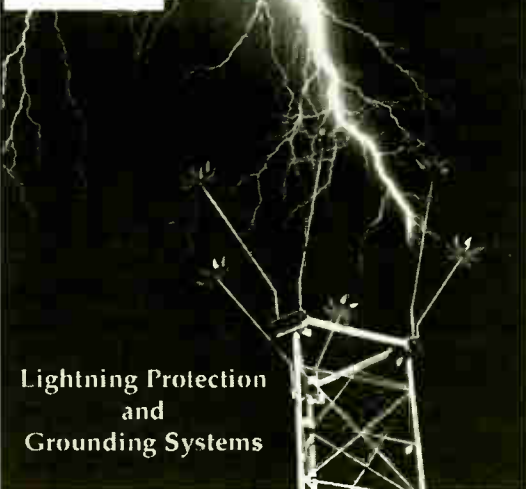
because ... it pays to be heard!

P.O. Box 389, Bridgton, ME 04009 USA
Tel.: (207) 647-3327 FAX: (207) 647-8273
1-888-SHIVELY e-mail: sales@shively.com
Web: www.shively.com

- An Employee-Owned Company -

READER SERVICE NO. 52

Protect Your Investment



Lightning Protection and Grounding Systems

A-3 Lightning Spur
Low Cost, High Efficiency Dissipator
ERI 812-925-6000

READER SERVICE NO. 78



If lightning strikes on your tower are causing equipment damage and lost air time - the cost of a Stati-Cat system may be recovered during your first lightning season.

AFFORDABLE - RUGGED LIGHTNING PROTECTION

The Stati-Cat Lightning Prevention System

provides a continuous, low-resistance discharge path for the static electric charge on tall structures. DISSIPATION POINTS ARE 1/8" STAINLESS STEEL RODS (not wires) ground to needle sharpness.

Cortana Corporation Inc.

Write or call toll free for a free brochure!
P.O. Box 2548, Farmington, N.M. 87499-2548
888-325-5336 FAX 505-326-2337

READER SERVICE NO. 77

Buy simplicity, reliability and service

EAS

Price \$1750.00

Equipment is in stock for immediate delivery!

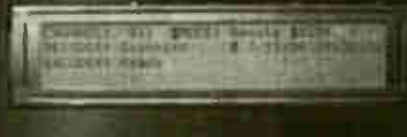
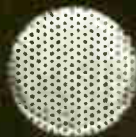
GORMAN-REDLICH MFG. CO.

257 W. Union St. Athens, Ohio 45701

Phone 740-593-3150

FAX 740-592-3898

Now available with optional DTMF control via a phone line.



- 5 two-way RS-232 inputs/outputs for computer, remote signboard & character generator
- 4 audio inputs on standard models (expandable to 6 audio inputs). All audio inputs & outputs are transformer isolated from encoder-decoder board.
- Automatic interruption of program audio for unattended operation.
- 4 line 40 character LCD display with LED backlighting
- 20 key keypad to program unit, set modulation level, set input levels
- Will handshake with automation equipment.
- 2 year warranty
- 2 minutes of digital audio storage (expandable to 4.5 minutes)
- 25 pin parallel printer port for external printer
- 52 terminals on the rear to interface with other equipment by removable plugs.

Web Site: www.gorman-redlich.com

◆ Also available: printers, weather radios, antennas for weather radios, crystal controlled synthesized FM digitally tuned radios, remote signboards, cables for interconnection, character generators.

READER SERVICE NO. 104

1000 HITS FOR ONLY \$495!

Don't waste time dubbing music!

Halland will dub your choice of 1,000 tracks for only \$495! "HitPick" software lets you pick the songs! We'll dub them to your drive in ONE DAY.

MPEG .WAV files compatible with Arrakis, BSI, Enco, Prophet, Pristine, Smarts, B.E. Audiovault, Register Data, Mediatouch, and others.

Music files can be dubbed to your hard drive, Iomega "Jaz", Syquest "SparQ" or 2.6GB M-O disc.



Let us take the hit!

800.425.5263 TEL: 626.963.6300
FAX: 626.963.2070 www.h-b-s.com



READER SERVICE NO. 103

Music on CD in stock!
Song lists on Internet
<http://www.h-b-s.com>



Take Control Via Telephone



List \$399.00

DC-8A Dial-up Remote Control

- Control, monitoring and programming via touch-tone telephone
- Control 8 relays and monitor 8 status/pager alert inputs
- Activate up to 3 pagers with the pager alert function
- Beep tones for input and relay status
- Relays retain prior state on power loss and restoration
- Configure relays for latching, interlocking or sustained closure as long as the associated key is pressed
- Auto answer with programmable access code, number of rings and defeatable CPC control (unit hangs up when caller hangs up)
- "Busy" input disables auto answer feature
- Built-in audio hybrid with front panel audio level controls allows you to send and receive audio while controlling the unit
- LEDs for DTMF detection, Off-hook status, ring signal and power
- All input and output connections via screw terminals

Check out our web site for product information, list pricing and a list of distributors!

Voice: 360 . 428 . 6099
Fax: 360 . 428 . 6719



Internet: www.broadcasttools.com E-mail: btli@broadcasttools.com

READER SERVICE NO. 73

Xetron Simulates AM Hybrid IBOC

► IBOC, continued from page 27
 symbol decisions are used to calculate the symbol error rate. The simulation also calculates the bit error rate for each carrier

performance. To generate an example, the simulation was programmed to use the channel information shown in Figure 2. Three system monitors from this simu-

dB as a function of time measured in receiver bauds. The negative of the AGC gain in dB is also plotted in this figure. Ideally, the two plots should be identical. As can be seen, the AGC follows the channel changes without any significant errors. The attenuation for each power line in Figure 2 can clearly be seen in Figure 9.

The carrier tracking and symbol tracking error monitors are shown in

the last fade. The system forward error correction is being designed to correct for the type of error patterns seen in the fades.

In addition to the monitors shown in Figures 9-11, the simulation also can generate monitors showing the equalizer magnitude and phase on a frame-by-frame basis, the bit error rate for each individual carrier, plots of the transmitted signal in the time and frequency domain, plots of the received signal in the time and frequency domain, constellation scatter plots for any digital carrier, equalizer magni-

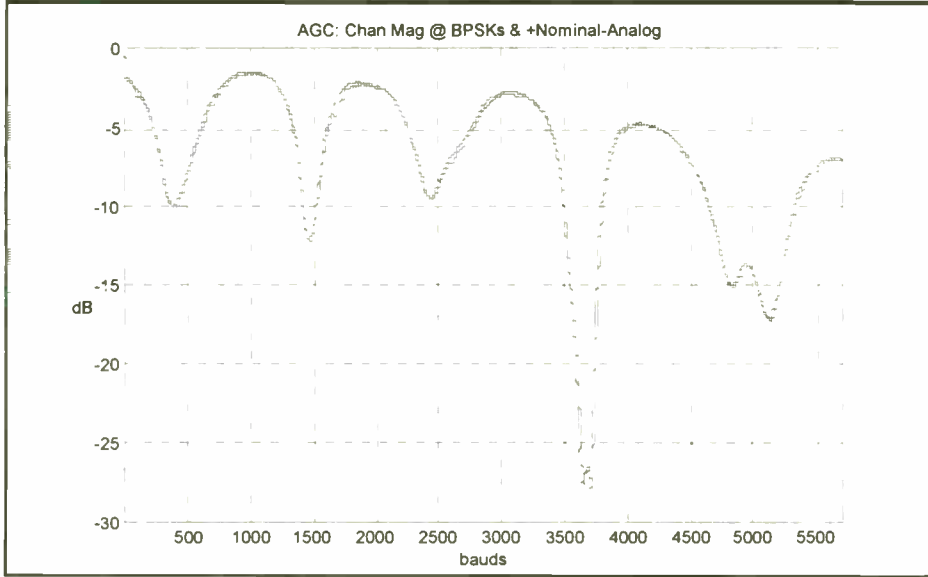


Figure 9: Simulation AGC Monitor

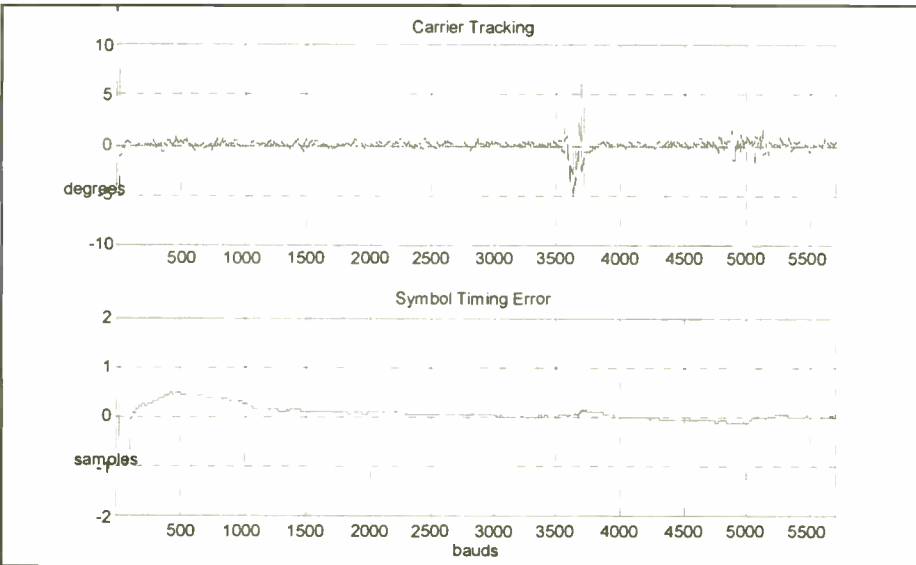


Figure 10: Simulation of Carrier Tracking and Symbol Tracking Monitor

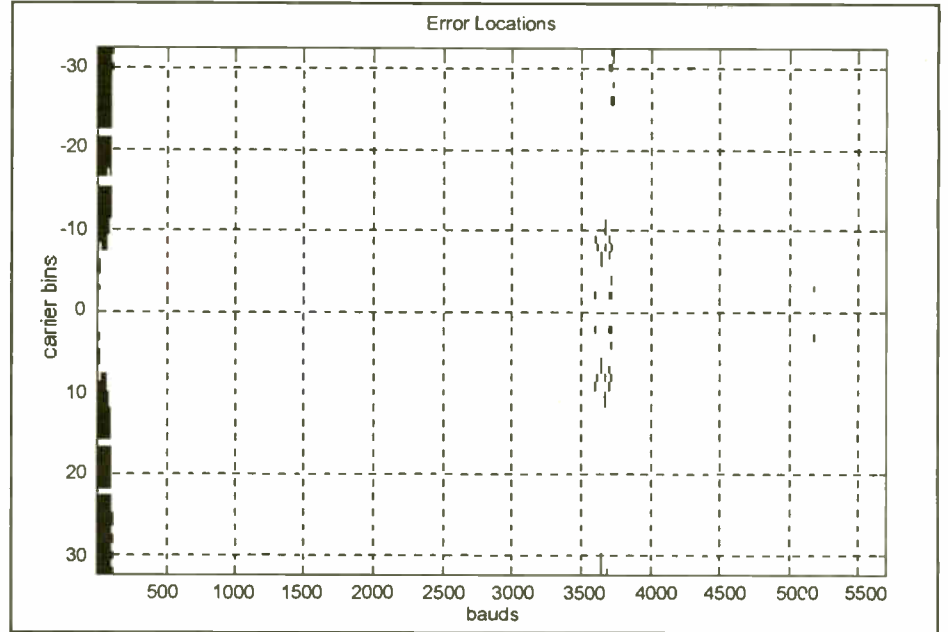


Figure 11: Simulation Error Location Monitor

er and the bit error rate for the system. The simulation outputs several monitors that can be used to analyze system

ation run are shown in Figures 9-11. The AGC monitor is shown in Figure 9. This figure shows the channel magnitude in

Figure 10. The carrier tracking has little error except at the location of the deepest fade. The symbol timing error (measured in samples, with 128 samples per symbol) has an initial transient during acquisition but then is very close to the ideal location for the remainder of the simulation. The symbol error location monitor, which shows the symbol error locations as a function of time and digital carrier bin, is shown in Figure 11.

As can be seen, there is an initial burst of errors during receiver acquisition. A small burst of errors occurs during the deepest fade and a few errors occur on

tude and phase history for the entire simulation, channel magnitude and phase history for the entire simulation, and indicators of the acquisition/lock state of the receiver.

References:

- [6] S. K. Wilson, R.E. Khayata and J. M. Cioffi, "16-QAM Modulation With Orthogonal Frequency-Division Multiplexing in a Rayleigh-fading Environment," *IEEE Proc. VTC 1994, vol. 3, pp. 1660-1664, Stockholm, Sweden, June 1994.*

ALTRONIC RESEARCH INC.
 Performance By Design

**MANUFACTURER
 OF RF COAXIAL LOAD RESISTORS.**

**DUMMY LOADS FROM 1 KW TO 1500KW,
 AVAILABLE IN AIR, WATER OR SELF
 CONTAINED HEAT EXCHANGERS.**

**HIGH POWER NON-REACTIVE CERMET
 RESISTORS FROM 1 OHM TO 20 MEGOHMS.**

ALTRONIC RESEARCH INC.

P.O. Box 249 • Yellville, Arkansas 72687 870-449-4093 • Fax: 870-449-6000
 E-mail: altronic@mtnhome.com Web Site: <http://www.altronic.com>

INSIGHT ON RULES

Research Rules at Your Library, on the Web

Harold Hallikainen

Many resources have proven useful in my experience researching FCC rules. Let me fill you in on a few secrets.

Consider yourself fortunate if you have a local library with a good government documents section. At my local library in California, the entire third floor is devoted to these documents.

You can find a lot of information in the "FCC Record" and its predecessors. When the FCC is making a decision or discussing an issue, the full text generally shows up here.

than one article on a page.

The Code of Federal Regulations contains all the regulations established by various federal agencies. The books are available in book form and on the Internet. Title 47 of the CFR deals with the FCC and telecommunications. A typical citation to the CFR might be 47 CFR 73.1400, where 47 is the title, 73 is the part, and 1400 is the section. The CFR generally includes a history of each rule (printed at the end of the section) in terms of references to the Federal Register.

Many documents of interest to broadcast stations appear on the Internet. Internet access generally can be divided into e-mail only (generally free) or full access (generally under \$20 per month). The most popular e-mail-only service is Juno (with 3.4 million users).

To run Juno and get full e-mail access to the Internet, you need only a

.. CLIP AND SAVE ..

Web Resources for Radio Broadcasters

- Free E-mail Program:** <http://www.juno.com> Order by phone at (800) 654-5866
- Free PDF Viewer:** <http://www.adobe.com> Displays and prints Portable Document Format files
- Free Microsoft Word Viewer:** <http://www.microsoft.com/msdownload/default.asp> Displays and prints Word documents
- Free RealAudio Player:** <http://www.realaudio.com> Plays RealAudio files
- Web to e-mail servers:** agora@broadcast.net message body = "help" for instructions, "send <http://hallikainen.com>" or other URL
- AM Band Expansion:** <http://www.fcc.gov/mmb/asd/decdoc/engrser.html#AMEXBAND> Fact Sheet, decisions, etc.
- Auction of Broadcast Licenses:** <http://www.fcc.gov/mmb/asd/decdoc/legalser.html#AUCTION> NPRM and News Release
- FCC Rules:** <http://hallikainen.com/FccRules> Find by index or Table of Contents. Returns PDF or hypertext with links to other rules, Federal Register and FCC documents
- <http://www.access.gpo.gov/nara/cfr/index.html> Find by CFR cite or text search. Returns PDF or plain text.
- <http://www.fcc.gov/mmb/asd/bickel/amfmrule.html> Find by Table of Contents. Returns plain text.
- FCC Contacts:** <http://www.fcc.gov/how2contact.html> Mailing, e-mail, phone and fax contacts at the FCC
- FCC Commenting:** <http://www.fcc.gov/mmb/prd/howto.html> How to comment in FCC proceedings
- FCC Daily Digest E-mail Subscription:** subscribe@info.fcc.gov Send message "subscribe digest (Your first name) (Your last name)" or "unsubscribe digest (Your first name) (Your last name) or "help"
- FCC Fax on Demand:** Phone (202) 418-2830 Call here to have a wide variety of documents faxed to you
- FCC Forms:** <http://www.fcc.gov/formpage.html> Many FCC forms are available here in PDF format. You can also get forms by calling (800) 418-3676
- FCC Mass Media Bureau:** <http://www.fcc.gov/mmb> The MMB Home Page
- FCC Phone Directory:** <http://www.fcc.gov/phone.html> Find phone numbers online or download a directory
- Main Studio Rule:** <http://www.fcc.gov/mmb/asd/decdoc/legalser.html#STUDIO> NPRM, waivers and violations
- Public Inspection File:** <http://www.fcc.gov/mmb/asd/decdoc/legalser.html#PIF> NPRM and decisions
- EAS:** <http://www.fcc.gov/cib/eas/Welcome.html> FCC's EAS Page with EAS Handbooks, Reports and Orders, etc.
- <http://www.broadcast.net/~hhallika/insite/insite88.html> RW article on EAS adoption
- <http://www.broadcast.net/~hhallika/insite/insite92.html> RW article on EAS being upheld

The Federal Register also is available in many libraries. This daily publication provides a detailed summary of the proceedings of various agencies, including the FCC. The Federal Register is now available on the Internet (www.gpo.gov).

The Federal Register generally is available on microfiche. If you need to go back as far as the early 1930s, the Federal Register is available on rolls of microfilm.

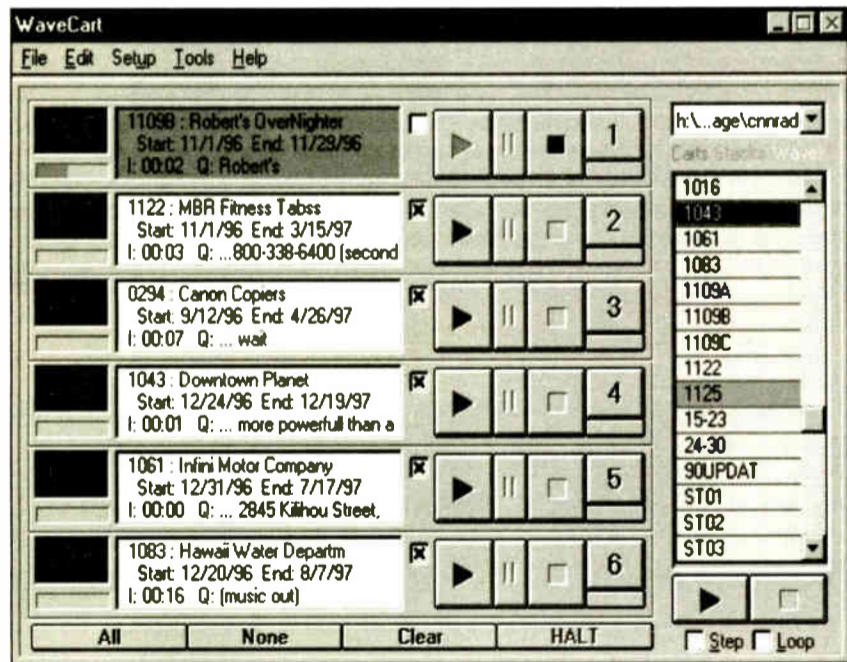
A typical citation of the FR would be 60 FR 55481, Nov. 1, 1995, where 60 is the volume of the Federal Register and 55481 is the page number. The date is the date of publication. There may be more

386 or higher computer with a 9,600 bps or faster modem, 4 MB of RAM, 15 MB of free hard-drive space, and Windows 3.1 or higher. You can download the software from www.juno.com or get a copy on disk by calling (800) 654-5866.

The download is free, but there is a charge of \$8.82 to a credit card to get the software by mail. Although Juno does not provide Web access other than to their advertisers, you can use Agora to get Web pages e-mailed to you.

Full Internet access, including e-mail and Web access, is available from See RULES, page 42

On-Screen Cart Machine



Yes... it's true. An easy-to-use on-screen digital cart machine that runs on a regular PC. WaveCart uses standard or compressed WAV files. Thanks to our exclusive RapidFire® technology, playback is instantaneous. Rotating cart & overlap capability. WaveCart comes with its own digital audio editor. Up to ten on-screen decks. Windows 3.1 or 95.

24 HOUR FREE TECH SUPPORT

888-BSIUSA1

Try Before You Buy.

Download the Actual Software!

www.bsiusa.com

Only **\$249**



Circle (7) On Reader Service Card

GET NEW

GET SIMPLE

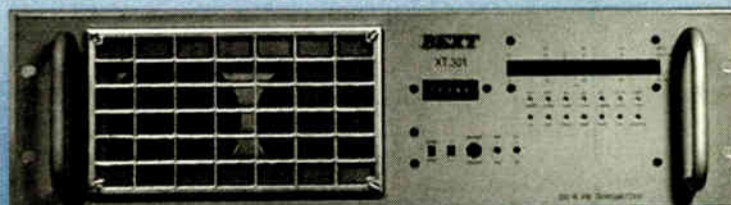
GET BEXT

You asked for it...

You got it!

Once again, at the Customers' request, BEXT has created an all new product.

XT301



Higher Power Stand Alone Transmitter

- Higher Efficiency
- Compact Size
- New Features
- More Affordable
- Built to Last
- Fully Solid State

A Simple, rugged exciter to meet your diverse needs in a not so simple world.

Call for your BEXT catalog with FM Antennas, Exciters, Amplifiers, Transmitters, Translators, Boosters, STL's, or view it on-line!

BEXT The Low Power Leader
619-239-8462 • FAX: 619-2398474
www.bext.com • mail@bext.com

Circle (33) On Reader Service Card

Here are three ways Eventide can help:

Consolidation brings market efficiencies, but also big headaches and challenges. It's essential for management to keep track of multiple stations. And keeping a legal record of what was said and when commercials aired is also more important than ever. Several groups have standardized on **Eventide Digital Audio Loggers**. Our economical VR204 records up to 550 hours on a tiny palm-sized cassette. VR204 records up to 4 channels simultaneously so you can keep tabs on the competition's spot loads, play lists and talent while you record your own stations. New!! Now Eventide loggers let you record/play in Hi-Fi for full "broadcast quality." Ideal for show replays, time zone delays, etc.

Eventide's **BD500 Broadcast Delay** makes talk shows run smoother and sound better, for less. The BD500's **multiple dump** feature divides the delay time into several "slices" so you're still safely in delay even right after dumping an offensive remark. It's the hassle-free talk solution... even when air talent is working without a producer. No other delay offers Eventide's high quality patented catch-up technology for clean audio combined with fast catch-up. And it's the only delay with optional digital inputs and outputs for new all-digital studios. Yet the BD500 costs thousands less than our previous model. See how much easier talk shows can be with Eventide's 4th generation BD500 Broadcast Delay.

Want to increase creativity without adding personnel? Add life to drive-time shows? Win new advertisers with better station-produced spots? An **Eventide Ultra-Harmonizer**® brand effects processor really does all that. Designed specifically for radio and production, the new DSP4000B Ultra-Harmonizer features radio effects designed by production whiz Jay Rose. Hundreds of comic voices, sound effects, reverbs, pitch changers and more are instantly accessible at the touch of a button. Plus, the DSP4000B has superb Timesqueeze® time compression /expansion capability. Shorten a 60 second national spot to allow for a local tag. Squeeze or stretch a music bed to fit the spot. The DSP4000B has optional digital I/O to interface easily with digital editors and consoles. It's the radio effects box designed to bring stations more business and more listeners.

The bottom line: Eventide broadcast products are potent tools for today's radio. To learn more, talk to your broadcast distributor, call Eventide direct at 201-641-1200, or see our website, www.eventide.com.

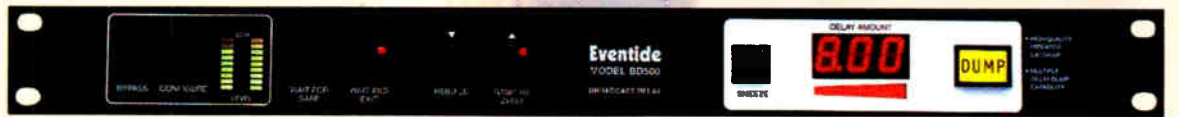
Eventide
the next step

One Alsan Way, Little Ferry, NJ 07643
Tel: 201-641-1200 Fax: 201-641-1640
Email: broadcast@eventide.com Web: www.eventide.com

BOTTOM



LINE



BROADCASTING



**Better
managed,
better
sounding
radio yields
better results.**

STOP . . . LOOK . . . & LISTEN TO THE FUTURE OF RADIO . . . ARRAKIS SYSTEMS INC.



Technology and Price Breakthrough

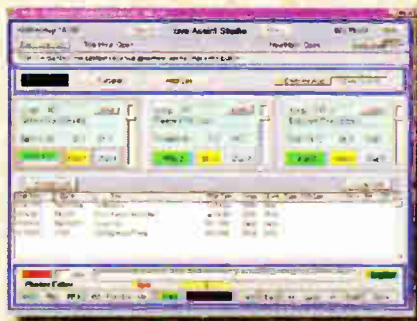
NEW-Your Complete Digital Solution!!!

Perfect Cart machine replacement: play, stop, pause, loop, link . . .
 Perfect for Live Assist: Jingle Box, Phoner Editor, & much more . . .
 Perfect for Automation: Voice Over Recorder, Segue Editor, & more . . .
 From the #1 manufacturer of Digital Workstations in Radio !!!

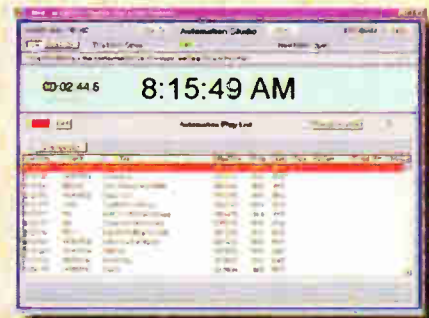
**Live On Air
\$495**



Live Assist \$1,995



**Hard Disk Automation
\$2,995**



(includes Live Assist software)

**Cart Machine Control
\$750**



Triple Play & Record



**Jingle Box Control
\$1,195**



Optional Front \$495

DL4 Digital Audio Engine

\$2,995 (24 hrs ~2,000 spots) \$5,295 (105 hrs ~ 2,000 songs)

The DL4 is a technology & price breakthrough !!! More reliable and 1/4 the price of comparable products, the DL4 is NOT a PC computer with sound card in it. The DL4 is in fact a digital audio appliance that is controlled by Arrakis LCD control panels, jingle boxes, and Windows 95 PC computers. If the PC fails; your audio library is still available !!! Expandable from 3 Plays & 1 Record to up to 96 Plays & 32 Records, the DL4 fits any size station's needs. You can even use your favorite PC based digital editor for production with the DL4 On Air !!! Call TODAY to find out how little it will cost for you to SAVE money and move into the 21st century !!!

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



Handy Radio Rule Resources

► **RULES**, continued from page 38
a variety of suppliers. Most local communities now have several Internet Service Providers. There are also several national ISPs, such as AOL and Earthlink.

The Agora program offers text-only Web access through e-mail. A few Agora servers are listed in the table below.

Most documents on the Web are in either plain text or hypertext markup language. These are easily handled by any Web browser or the Agora servers.

However, some documents are stored in Portable Document Format. You can download a free reader from www.adobe.com

Some documents are stored as

Microsoft Word documents. A free reader is available at www.microsoft.com/

Most documents on the Web are in either plain text or hypertext markup language.

msdownload/default.asp
Many FCC documents are available

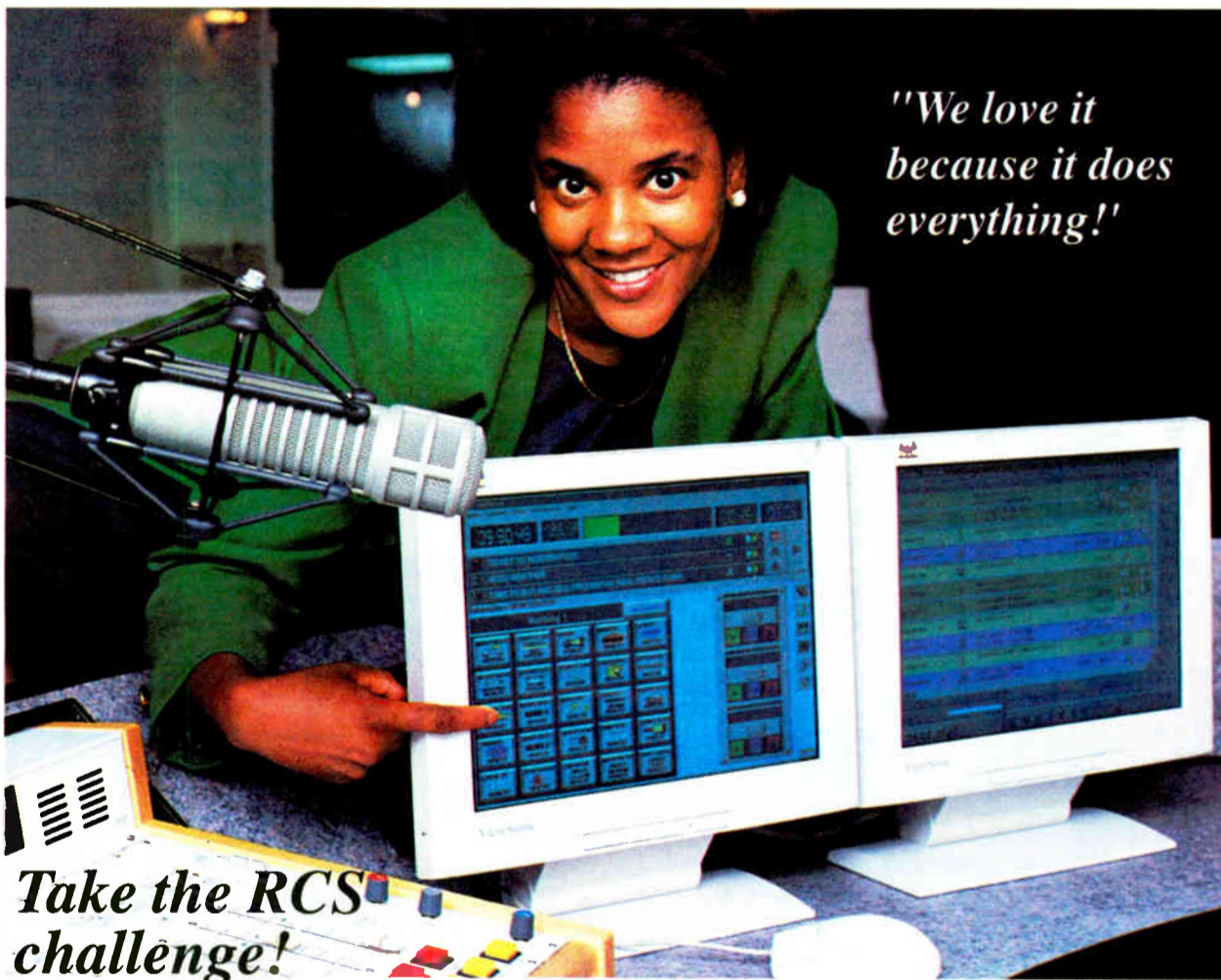
as either text or WordPerfect files. The text files do not include the footnotes. I have not yet found a free WordPerfect viewer. If you own a copy of WordPerfect, you can download FCC WP files and view or print them with excellent quality.

Finally, some interesting material is available as audio files. A free player is available at www.realaudio.com

Harold Hallikainen is president of Hallikainen & Friends, a firm specializing in electronic design and technical writing. He is also an avid contra dancer. He can be reached at (805) 541-0201; e-mail: harold@hallikainen.com; Web: <http://hallikainen.com>

MASTER CONTROL

The world's finest on-air system.



"We love it because it does everything!"

Take the RCS challenge!

Ask any software or hardware company how much combined **RADIO EXPERIENCE** is on their staff. We guarantee nobody comes close to the wide radio backgrounds of RCS people. We've been where you are...station ownership, management, engineering, programming, production, on-air. Experience in ALL facets of radio is curiously absent from other digital computer companies. Plus, RCS uses industry-standard components including Digigram audio cards. Rarely do you make such an important decision...Make this the right one. Get Master Control NT from RCS.

Want a free video?

Get your name and address in this box and fax to 914-723-2258. We'll rush you your video and more info on Master Control NT.

Name: _____
 Station: _____
 Address: _____
 City: _____ State: _____ Zip: _____
 Tel: _____ Fax: _____



Radio Computing Services, Inc.
 Two Overhill Road
 Scarsdale, New York 10583 USA
 Tel: 914-723-8567, Fax: 914-723-2258
 E-mail: info@rcsworks.com
www.rcsworks.com



Construct And Tune Antenna

► **ATU**, continued from page 35
leg reactances and have a matched load. In reality, some fine tuning still is necessary.

Insert the operating impedance bridge between the output of the transmission line and the input of the ATU network. Apply (low) power from the transmitter and measure the actual resistance and reactance at the transmission line output. If the resistance is higher or lower than the desired 50 ohms turn the transmitter off and make a small adjustment to the shunt leg of the ATU network. If there was some residual reactance, make a slight adjustment to the input leg of the ATU network. Turn the transmitter back on and check to see how you did.

Several iterations may be necessary to achieve 50 ohms with no reactance at the end of the transmission line.

With the ATU network properly adjusted, the transmitter should see a 50-ohm non-reactive load. In some installations, however, there may be some stray inductive reactances in the antenna switch tubing that will appear at the transmitter output terminals. It may be necessary to cancel this stray reactance with a capacitor. This will have to be determined on a case-by-case basis and the proper value of capacitor computed.

In some cases, it may be desirable to use an existing non-insulated tower as the radiator for an expanded-band station. In these cases, some means of creating a "virtual insulator" at the tower base must be used.

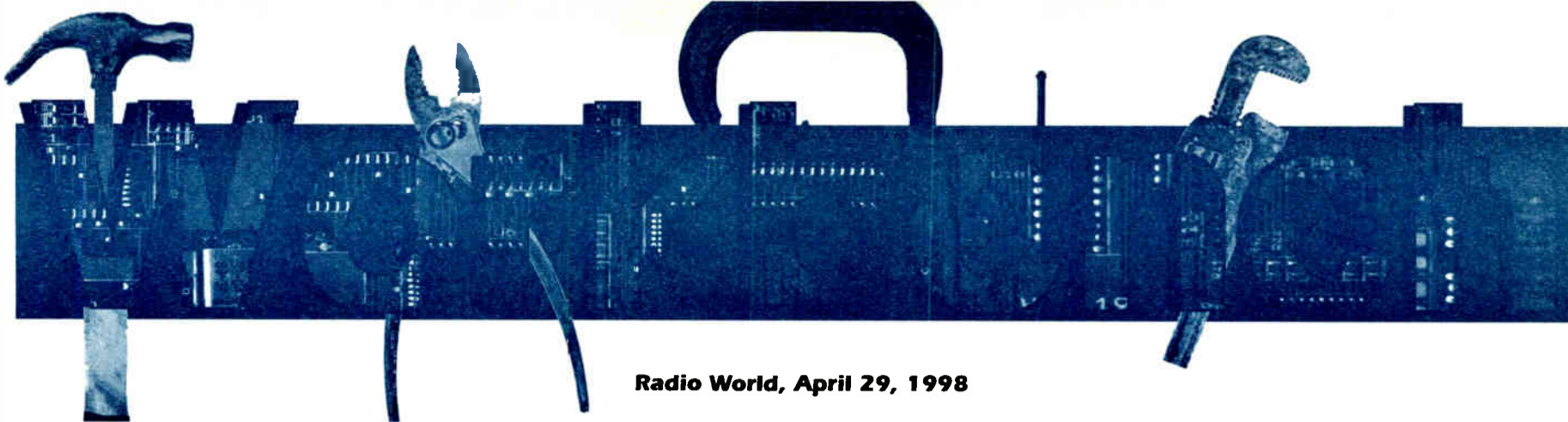
Since the FCC no longer permits "slant-wire" feeds to grounded towers, we have the option of jacking up the tower and putting an insulator beneath it or using a wire skirt. In almost every case, the skirt by far is the most economical route. In either case, the guy wires will have to be insulated and a ground system added.

A skirt consists of at least one wire per tower leg or face running up the tower and supported by insulators. Usually, three skirt wires are used on a triangular tower. The bottom ends of all the wires, which range from #6 to 3/8-inch copper- or aluminum-clad steel wires, are bonded together using a piece of wire that circles the tower and attaches to each of the skirt wires. This becomes the feed point for the skirt. Up on the tower, the wires are similarly bonded together and then bonded to the tower itself at a point that presents the most advantageous impedance at the tower base.

We'll continue this discussion next time.

What are your expanded-band experiences? Send an e-mail to Cris Alexander at cbceng@compuserve.com

The author is director of engineering for Crawford Broadcasting in Dallas.



Radio World, April 29, 1998

This Trouble Circuit Is No Trouble

John Bisset

Jim Wenstrom, who has engineered in the upper Northwest and Alaska, offered several tips for common broadcast products.

First, for owners of Harris FM-20K transmitters: If you get strange voltage readings during your checks of composite transmitter readings, do not make adjustments. Check the large wire-wound resistors inside the transmitter cabinet. These resistors range from 100 W to 160 W and in time may burn out and open up.

The transmitter stays on the air, so if you do not want to keep spares, you should be OK. Over a period of seven years, Jim has had one or the other go bad three different times. So he ordered some spares last time.

When inside your transmitter, check for continuity of the bleeder resistors — but not until you throw the breaker and discharge everything with the shorting stick. We all have heard the horror stories of HV interlock switches that did not short out the supply and bleeder resistors that did not bleed off the HVPS caps, only to nail the unsuspecting engineer.

On the AM side of things, Harris MW-1A owners may want to clip this one.

After approximately three years of service, Jim's MW-1A started to act strange. Distortion was increasing audibly, and on program peaks the rig would shift frequency. Frequency drift eventually put the station on the edge of compliance.

With an oscilloscope, Jim finally could detect an oscillation on the audio of about 30 kHz. Tracing the signal backward through the audio sections, Jim still found the signal at the input to the audio driver. However, the signal was absent at the output of the processing. Apparently something weird was being generated on the audio driver board.

A filter cap located at the input of the board checked out fine. Jim put to use the old axiom, "If one is good, two may be better," and he added another capacitor across the 0.002 mfd capacitor designated C-2.

The oscillation was reduced. He added a little more capacitance to see what would happen and finally settled on two 0.1 mfd 100 V caps across the 0.002 filter cap. The oscillation went away, as did the distortion and the frequency drift.

When you work in a large market, you get used to buying factory parts to repair equipment. Smaller market chiefs and contractors do not always have that luxury.

A struggling AM had two Tascam 32s that saw plenty of action. A problem developed with the switch bank that selected between the input, sync and repro.

On the Tascam 32, most of the panel switches are on one PC board, and the replacement from TEAC is in the \$100 range.

The problem with the original switch bank is that the contactors in the switch were made of very thin copper, and one portion of the 4PDT section switched 24 V. After about six months of heavy use, that section would burn out.

Looking through a surplus parts catalog, Jim found a series of switch banks manufactured by ALPS (the com-

pany that made the Tascam 32 switch bank). Though the company did not have the exact configuration as the original, it had something close, and each switch bank only cost \$1. Of the many styles available, Jim settled on the bank with three 4PDT switches (catalog number NISW-4).

Construction was similar to the original, with the same pinout. But the mounting dimensions were off just enough that the brackets would not fit the holes for the original switch bank, and this replacement switch bank was not interlocking. Considering the station saved nearly \$100, Jim's staff could live with the differences.

may occur when the generator starts or stops. It also converts the pulsing alarm into a steady signal. The delay from the averaging circuit is between three and five seconds.

The output of the opto-isolator can be tied to your remote control status channel. Critical component values are listed; otherwise, the circuit can be breadboarded using garden variety parts. Reach Joe at (703) 591-0110.

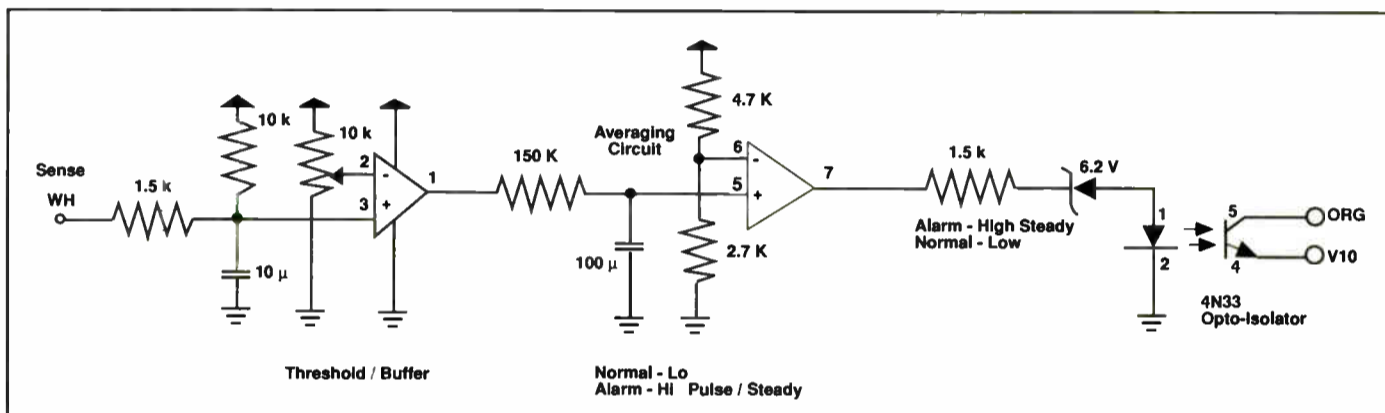


Figure 2. This averaging circuit lets you tie your generator fault status to your remote control.

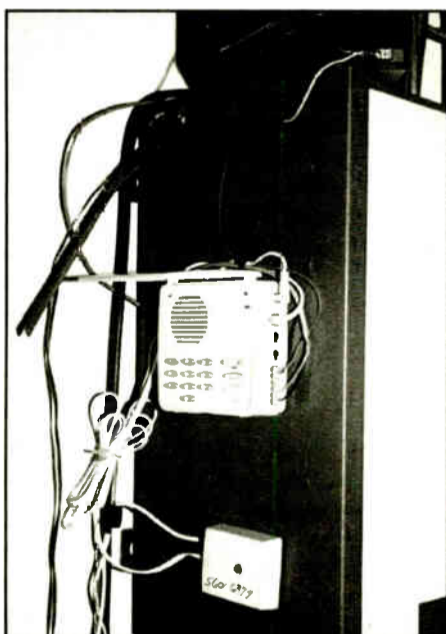


Figure 1. A Simple Project for Notification of Generator Testing or Operation.

Figure 1 shows an inexpensive way of monitoring your generator: a security auto dialer sold by Radio Shack (Cat No. 49-434A).

Whenever either of two alarm contacts are triggered, the dialer will call as many as three stored numbers automatically and play your recorded message. Tie the system into your generator, and you have a quick way of knowing, without being on site, that the weekly generator test has taken place.

At the top of the picture is a nicad battery tied into a wall wart trickle charger, which provides auxiliary power in case the generator does not fire. Thanks to George Wisely at Media General Cable for sharing this idea.

Listen...

Your Antenna Should
Reach All Of Your
Market With A
Clean Signal.
Ours Will.

Call: 530-621-2015
e-mail: sales@antennaconcepts.com



Products & Services Showcase

For more information on the products shown below, circle the appropriate Reader Service No.(s) on the enclosed Subscription/Reader Service card or contact the advertiser directly.

KINTRONIC *KTL* **LABS INC.**

FOR AM EXPANDED BAND OR IBOC / DAB SYSTEMS FOR THE 21st CENTURY



5-TOWER 50KW-U DA-2 DIRECTIONAL ANTENNA SYSTEM FOR KXTA LOS ANGELES, CA

KINTRONIC LABORATORIES INC.
 P.O. BOX 845 BRISTOL, TENNESSEE 37621-0845
 PHONE: (423) 878-3141 / FAX: (423) 878-4224
 EMAIL: KTL@KINTRONIC.COM
 WEB SITE: www.kintronic.com
 READER SERVICE NO. 51

REMEMBER THE CORTANA FOLDED UNIPOLE ANTENNA? WE STILL MAKE IT WITH THE SAME HIGH QUALITY MATERIALS AND WORKMANSHIP. IT FEATURES...

- **BROAD BANDWIDTH** for better sound,
- **GROUNDING ANTENNA** for lightning & static electricity,
- **ELIMINATES ISOCOUPERS** in VHF & UHF antenna lines,
- **BEST ANTENNA FOR DIRECTIONAL ARRAYS.**

ALSO

DETUNING SYSTEMS FOR ANYTHING THAT DISTORTS YOUR AM COVERAGE PATTERN: TOWERS, POWER LINES, TANKS OR ANY METAL STRUCTURE.

FOR INFORMATION CALL, FAX OR WRITE:

nott ltd.

4001 La Plata Hwy
 Farmington, NM 87401
 phone 505-327-5646 fax 505-325-1142

READER SERVICE NO. 25

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

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

THIS MONTH'S SPECIAL
GRAB BAG SALE

FOR EVERY \$2,000 PURCHASED FROM SCMS, YOU WILL RECEIVE \$100 IN FREE NEW MERCHANDISE AT RETAIL VALUE. ITEMS INCLUDE BROADCAST, HI-FI, HAM RADIO, AND COMPUTER EQUIPMENT. YOU MUST MENTION THIS AD AT TIME OF PURCHASE TO QUALIFY.

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

READER SERVICE NO. 50

SOUND GREAT — INSTANTLY!

AIRcorp 500PH Microphone Processor

- Eliminate flanging (hollow room) effect
- Eliminate bad room acoustics
- Hold absolute levels
- Correct voice symmetry
- Front panel input level select +4 to -50 dB
- Three section variable boost and cut equalization
- Compressor/Expander cross coupled for maximum punch
- Built-in earphone jack
- DE-ESSER designed to protect pre-emphasis curves
- Simultaneous mic level and line level outputs
- Internal 48 Vdc Phantom Supply

AIR corp **Call your dealer**
 or call 972-304-0455 or fax: 972-304-0550

READER SERVICE NO. 102

ECONCO

REBUILT POWER TUBES

Approximately One Half the Cost of New

3,000 Hour Unconditional Guarantee

Call for Our Price List

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

READER SERVICE NO. 24

Fits In Even "STINGY" Budgets!

The hot new "DELUX"™ quality built **SPACEWISE** system!

DOZENS SOLD!

BASIC SYSTEM \$1375!
FULL SYSTEM \$2840!

GENERAL FEATURES: Basic system consists of main counter top and two PC system pedestals ... then you add on what you need from there, such as racks and shelf wings or talk table wings for a full system.

USER FEATURES: Two PC system base pedestals ... heavy rack rail systems with easy access standard ... passive ventilation systems throughout ... adjustable shelves ... wiring block backplane ... customizing ... quick installation.

DURABILITY BUILT IN: Top counters are two ply 1 1/2" thick with quality name brand laminate with protective 1 1/2" solid wood trim raised on the outside perimeters. Plus ... generous vertical and horizontal solid wood trim and recessed kickboards.

SPACEWISE® Broadcast/Furniture
CALL 800-775-3660
 Visit our web catalog: www.spacewise.com
 "The Broadcasters Furniture Store"

READER SERVICE NO. 76

A Perfect AUTOGRAM Combination

Pacemaker RTV Mini Mix ?

Pacemaker 1032

Solution 20

Console Accesories All In ONE Package:
 Distribution Amp Card • 10 Watt Stereo Amp Card
 Relay Card • Microphone Processor Card

AUTOGram CORPORATION

Plano Texas
 1-800-327-6901 FAX (972) 423-6334
 E Mail: info@autogramcorp.com
www.autogramcorp.com

READER SERVICE NO. 101

MARKETPLACE

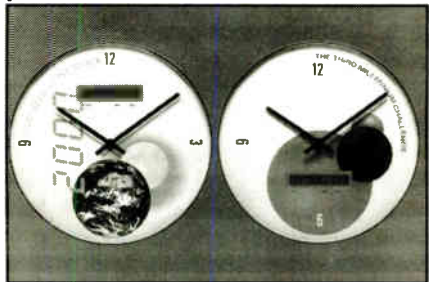
Products for the Radio Broadcast Professional

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

Branco Countdown Clock

The third millennium is fast approaching. For those keeping score, the countdown sits at less than 700 days until the turn of the century!

Join in the excitement of an event that happens only once every 40 generations with the Countdown Wall Clock from Branco International. This device not only keeps regular time but also displays a digital read-out of the hours, minutes and seconds until the year 2000. Put one in your air studio so the morning crew can count it down. And get ready for the arguments about whether the 21st century starts in 2000 or 2001.



For more information from Branco in New York, call (800) 528-7445; fax: (516) 544-4145; e-mail branco2000@hotmail.com; or circle Reader Service 86.

StarGuide 10BaseT Ethernet Module

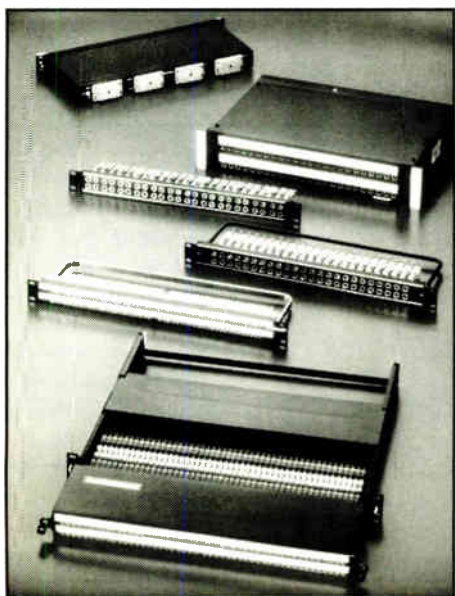
New technology from StarGuide Digital Networks allows broadcasters to deliver high-bandwidth digital audio programs to PCs worldwide cost effectively. This allows for the routing of information via satellite and terrestrial services directly to the PC. The new module enables the delivery of streaming audio data to local and remote LANs and PCs.

StarGuide's 10BaseT Ethernet module is designed to work with the StarGuide Multimedia Receiver.

For more information from StarGuide in California, call (619) 452-4920; fax (619) 452-3095; e-mail sales@starguidedigital.com; or circle Reader Service 112.

Switchcraft Audio Patch Panels

Take your pick from the variety of styles of the new Switchcraft TTP96 audio patch panel—available as a patch panel or patch kit, with EDAC connectors



and in a front-access version. All panels feature corrosion-resistant nickel-plated jacks with steel frames. The TTP96 is available with three jack configurations: full normal, half normal and open circuit.

For more information from Switchcraft in Illinois, call (773) 792-2700, ext. 243; or circle Reader Service 190.

IBM and PR&E Offer End-to-end Solutions

A joint agreement between IBM and Pacific Research & Engineering is aimed at serving radio broadcasters and audio content providers. The companies announced a deal to provide integrated, end-to-end solutions to help generate new revenue and cut costs.

PR&E plans to market several IBM services including eWave, a new StarTrax solution, designed for the complete management of radio stations. PR&E will also provide systems integration and worldwide data communications through IBM Global Services.

The eWave application features a digital library and modules for scheduling, traffic, invoicing, local insertion of ads and management reporting. The eWave also individually manages digital content distribution to hundreds of locations while creating detailed records of what played to air.

For more information, visit the Web site www.telecom-media.hosting.ibm.com/telmedia; or circle Reader Service 164.

Digital Microwave Solution

Intraplex and Glenayre Western Multiplex will work together to provide digital T1/E1 STL systems based on spread spectrum technology to broadcasters.

The solution will unite the Intraplex STL PLUS and Glenayre's LYNX.sc spread spectrum radio. The companies say this will provide an alternative to congested analog STL frequencies, conventional analog leased lines or public T1 circuits. LYNX.sc provides bi-directional channels for transmission and backhaul of uncompressed digital audio, plus voice and data over microwave links.

Easy installation, bandwidth efficiency and strong transmission reliability comparable to Intraplex STL links are highlights of this "plug and play" solution.

A unique form of digital microwave radio originally designed for military use, spread spectrum now is used for PCS, cellular and data communications networks.

In the last few years, radio stations have become aware of its applications for routing audio.

Due to the equipment's low-power density, it provides users with point-to-point wireless links without requiring an FCC license. This allows for the quick installation of spread spectrum radio, avoiding expensive frequency coordination.

For more information, contact Intraplex in Massachusetts at (978) 692-9000; fax: (978) 962-2200 or circle Reader Service 216.

HP Test & Measurement Catalog

It's 640 pages of Hewlett-Packard test and measurement products, systems and services: the 1998 edition of the Test & Measurement Catalog.

The textbook-style annual publication is free and provides a source for researching, planning, budgeting and pur-



chasing a broad range of test products and services, and also includes descriptions and tech specifications of standard products and systems.

For more information on Hewlett-Packard in California, call (800) 452-4844, ext. 5766; visit the Web site

www.hp.com/go/tmc98; or circle Reader Service 138.

Noble Rotary Potentiometers

Ideal for audio, automotive, telecommunications and industrial control applications, the new XVB93 Series of potentiometers from Noble U.S.A. is now on the market.

These 9 mm, panel-mount rotary potentiometers offer a low right-angle profile height of just 6.5 mm. The units are available in a variety of configurations, including single, dual or multiple resistive elements, offered with single or concentric shafts. Combinations include a rotary potentiometer with rotary or push-momentary switches, or with push-lock retractable shaft functions. Flatted, knurled and round shafts are available in a variety of lengths.

Boasting a resistance range of 10 kohms to 100 kohms, the potentiometers are available in Audio, Linear and Reverse Audio Tapers. Their power rating is 0.05 W, with a maximum rated voltage of 50V AC/10V DC.

For more information, contact Noble U.S.A. in Illinois at (847) 364-6038; fax: (847) 364-6045 or circle Reader Service 9.

Have You Heard?

The Difference Is In The Engineering.....

Ultra Tracker's Single-Lobe Elevation

Means Audibly Less Multipath.

The Trip From Last Place In The Book

To First Has Already Been Made

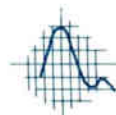
With Ultra Tracker.

The Ultra Tracker Prototype

Took Downward Radiation From

250 mW/cm² to 10.

Call: 530-621-2015
e-mail: sales@antennaconcepts.com



PSA Count Up; Ad Council Cheers

1997 Advertising Council Figures Show Dramatic Increase in Broadcast Support

Sharon Rae

Broadcasters' commitment to public service is alive and well, and the dramatic increase in the number of radio PSAs pleases Advertising Council Chairman Bob Wehling.

"As an industry, you should be proud," Wehling told radio and television broadcasters at the NAB '98 FCC Chairman's Breakfast. "In 1997, the Ad Council received \$996.2 million in donated media

time and space for its public service advertising campaigns, a 7 percent increase vs. 1996. Those numbers are a direct reflection of your willingness to work with the Ad Council to get these messages out to the people of local communities."

Wehling said radio and television accounted for



70 percent of that total donated media last year, with broadcast television increasing by 42 percent to almost \$130 million. Radio also reflected its tradition of a strong commitment to public service.

"Radio continues to be the Ad Council's number-one supporter, donating almost \$600 million last year," said Wehling. That dollar figure represents a 6 percent increase over the previous year.

"Add it all together and broadcasters are accounting for over \$700 million of messages that, according to our research, are very important to all of your listeners and viewers. I am confident that number will increase significantly in 1998."

Cable posted a significant 9 percent decrease in donated media support. Outdoor showed a 22 percent drop, while the Other/New Media category experienced a 106 percent increase.

The top five Ad Council campaigns in 1997 were "Coalition for America's Children," "Drunk Driving Prevention," "Crime Prevention," "Safety Belt Education" and "Talking with Kids About Tough Issues."

Wehling thanked broadcasters for their support over the past year, but encouraged the industry to try harder.

"A billion dollars in Ad Council support is only a fraction of where we need to get to in this country," he said. "I know with your efforts, which are increasing every day, we are going to achieve our objective of \$2 billion in support by the year 2000."

Harry Caray Dies at 83

D.C. Culbertson

When Harry Caray got behind the mic to call the St. Louis Cardinals' season baseball opener in April 1945, it was the first time he had ever announced a major league game. He must have made a good impression because he spent the next 60 years behind the mic as the voice of three major league teams, becoming one of the best-known, best-loved announcers in the business.

Harry Caray died in February at the age of 83.

According to various published reports and to family and co-workers who spoke to *RW*, Caray was born Harry Carabina. He grew up in St. Louis, beginning his broadcasting career in Joliet, Ill., in 1943, and then worked briefly at WKZO(AM) in Kalamazoo, Mich. It was in Joliet that he shortened his name, on the request of the station manager.

He returned to St. Louis in 1944, planning to join the armed forces, but was rejected due to poor eyesight.

Sponsored

Caray decided to look for another radio job. When he learned of an opening for a play-by-play announcer for the Cardinals on the 50,000 W station KMOX(AM), he went directly to the president of Griesindeck Brothers brewery, the games' sponsor, and persuaded him to give him the job.

Cardinals games were heard on three different stations in the St. Louis area. But in 1947, KMOX was awarded an exclusive contract to carry the games. The KMOX signal was powerful; Cardinals games were carried by 124 stations in 14 states, so Caray was virtually guaranteed a huge base of listeners.

Caray's original partner was Gabby Street, who was replaced by Jack Buck and Milo Hamilton after Street's death in 1951.

During the off-season, Caray kept busy announcing basketball games from St. Louis University and football from the University of Missouri.

Almost from the start, Caray had a colorful style of announcing that angered players and owners but endeared him to fans. He was quick to praise but equally quick to criticize. He developed a reputation for antics such as bringing a butterfly net to catch fly balls, announcing shirtless in hot weather, and for exclamations such as "Holy Cow!" And no diehard fan would have forgiven him if Caray forgot to sing "Take Me Out to the Ball Game" during the seventh-inning stretch.

Curt Smith's 1987 book "Voices of the Game" contains this Caray quote: "My whole philosophy has always been to broadcast the way a fan would broadcast ... I've often thought that if you gave the microphone to a fan, he'd sound a lot like me."

Despite his popularity, Caray was fired suddenly in 1969, "for reasons that have never been made completely clear," according to the KMOX Sports Director Tom Lengmyer. Caray went to Oakland, Calif., for one season to be the voice of the Athletics with Monte Moore on KNBR(AM).

He returned to the Midwest, this time ending up at Chicago's 50 kW WGN(AM), where he spent 11 years paired with Jimmy Piersall for broadcasts of White Sox games. In 1973, he began announcing the games on WFLD-TV as well.

In 1982, when the Chicago Tribune took over ownership of the Cubs, it hired Caray as the team's announcer. Although he did most of his announcing on WGN-TV, Caray was heard regularly on the companion radio station, doing the middle three innings of every game as well as a regular pre-game show.

See CARAY, page 60 ▶

Dobson to Focus on Republicans

John Montone

There are those who believe conservative talk radio helped Republicans gain a majority in the House of Representatives in 1994.

Only four years later, the bloom is off the rose for one conservative family radio broadcaster. Dr. James Dobson, president of the Colorado-based Focus



on the Family, has fired a broadside at the GOP.

Leave of absence

Dobson's daily 30-minute radio program on applying spiritual values and biblical teachings to child-rearing and other family issues is broadcast Monday through Friday by 2,900 radio stations. But Dobson is vowing to take a "leave of absence" from his electronic pulpit to enter the political fray. Paul Hetrick, vice president of Media Relations at Focus on the Family, said, "Dr. Dobson will take a series of two-to-five-day leaves to weigh in on individual congressional races."

See GOP, page 55 ▶

RADIO BUMPERS

No, it's not a Valentine's Day promo.

WWIB(FM) is out to "change the hearts of people" within its reach according to Assistant Program Director and Music Director Garrett "Michaels" Novak. And with 100,000 W and eight translators, WWIB reaches most of Wisconsin.

A sign of the times: Notice the station Web site address in the lower right corner of the sticker.

What message does your station bumper sticker convey? Send the sticker, and a 100-word explanation, to: RW Bumper Sticker, 5827 Columbia Pike, Third Floor, Falls



The call letters of this Christian music station stand for "Western Wisconsin's Inspirational Broadcaster, Inc."

Church, VA 22041. Stickers sent without explanation will not be considered for publication.

PROMO POWER

Beyond the Basics: Get a Clue

Mark Lapidus

A number of people have complained recently about radio becoming homogeneous and down-right dull.

One theory I recently heard holds that many program directors of today grew up listening to liner-card radio. My lunch companion said, "If all a PD heard as a kid itching to get into radio was, 'Here's another 10-in-a-row from the best mix of the '70s and '80s,' how much can you expect? That's what they think good radio is."

To say all radio is boring certainly is an

generating either cume, TSL or revenue.

Without proper planning, everything happens too late. Marketing campaigns are rushed, leaving no time for testing. Promotions are created, but not sold, because sales departments get them two weeks before airtime. Contests are improperly promoted because they are manufactured on the fly.

Constant freshening of all on-air elements remains a challenge for most stations. I cannot tell you how many times I've heard PDs say they can't freshen positioning statements, drops and promos

Don't tell me it doesn't sound live; that simply is an admission that you cannot do it correctly.

In the news

Finally, how does your station handle topicality and specials? When a Monica Lewinsky-type item appears, who is in charge of coming up with your on-air angle? This used to fall on the shoulders of the promotion director, but it seems to be a lost skill at many stations.

As for specials, do you only do special programming on weekends? Come on! Have some fun once in a while and do unusual, memorable shows.

Surprise your audience with something that generates an emotion. When Garth Brooks puts out his new CD, how about playing the whole thing throughout the day? When Jimmy Page and Robert Plant come to your town, play Led Zep and give away potted plants.

Form the Traveling Elvises from look-alikes in your audience and send them to offices on the King's birthday to deliver peanut butter sandwiches.

Creativity can make your station come alive. Make the effort and reap the rewards!

■■■

What is your most successful radio promotion idea? Tell us. Send e-mail to radioworld@imaspub.com

Mark Lapidus is president, Lapidus Media. For marketing and programming consultation, call (703) 383-1805; e-mail lapidus@erols.com



Elvis look-alikes get the 'Promo Power' stamp of approval.

overstatement. But as one travels around this huge country, it is amazing to note how few stations go beyond the basics.

Music research, perceptual studies, focus groups and software should create more time to go beyond the basics, but instead, creativity for many has moved to the back burner.

To offer a perfect example, I worked recently with a program director who spent more than two hours a day running one music log. On a Friday that meant he spent six hours getting the log right for the weekend and Monday.

Get a life

Don't get me wrong. It can be wonderful to have perfect daily music flow, but if you think listeners are hanging on every segue, it's time to get a life.

According to other consultant acquaintances of mine, there seem to be many who do not know how to configure music software properly. When the same big-voice positioning statements air over and over for months on end and the same listener calls are heard forever in rotation, you enter the dull zone.

Nobody said creating an exciting, dynamic, ever-changing radio station is easy. But those who have ever taken a job at such an animal know it can feel like moving from working in a factory to playing in a theme park.

If that description touched even a little bit of a nerve ending, let's go over a few elements to see if we can urge creativity back to life.

Most important, a station without an annual promotion and marketing plan never will reach full potential in

because they have not budgeted enough money for the station voice to cut them. This is crazy! Either budget enough money, or have one of your DJs be the fallback voice. You will never hear a listener complain about a promo cut by a voice other than the one the listener is used to hearing.

I have even been in situations where stations missed tie-ins with timely news events because they were waiting for Mr. Big Voice. Sometimes new material is not cut simply because nobody seems to have time to write the material.

Next, practice constant coaching and encouragement of talent. If you do not constantly tell your talent how great they are, why are they on your air staff? Positive reinforcement produces happy, creative people. Sure, they can improve and you can help them! But if it generally is felt that a particular talent does not have a bright future at your station, do them a favor and ask them to move on. Maybe somebody else can help them get to the next level.

At coaching sessions, find that element in each talent that you can nurture and get the public to remember. Can they be more than a generic DJ? If not, few listeners will even recall their name.

Generic DJs are what listeners expect. Fulfill this expectation and you will gain no ground. Exceed the expectation and watch your numbers rise.

Do you only let your jocks read liner cards? If so, and your station is not totally automated, you are wasting an enormous amount of time! Liner-card radio shifts can be done in minutes, leaving the rest of the day for appearances or other duties that can help you gain visibility.

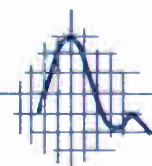
The Audible Difference...

Ultra Tracker

Antenna Concepts Is The
New Standard For
FM Environmental Safety,
Coupled With Unmatched
Signal Density.

ACI's Customer
Support Team Proves
The "Good Old Days"
Are More Than A
Distant Memory.

Visit our web site
www.antennaconcepts.com



ANTENNA CONCEPTS INC.

6601C Merchandise Way • Diamond Springs, CA 95619
(530) 621-2015 • Fax: (530) 622-3274
e-mail: sales@antennaconcepts.com • www.antennaconcepts.com

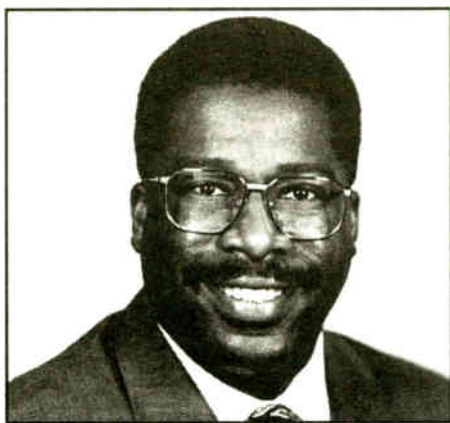
AMAT

Gospel Radio Grows in Popularity

Mark Stevens

On the face of it, the driving force behind the growth of gospel radio is the music. Hit songs create big name acts, attracting big record companies, who spend big dollars to sell more music. The cycle further establishes the market.

Recent figures suggest that the gospel market is broad-based, well-heeled and attracting more attention every day. A recent Interop Research report culls figures from such sources as Arbitron and ARIA to illustrate the recent growth of both the amount of gospel-programmed stations and the



Bruce Demps

surge in listenership for those stations.

A look behind the scenes at such stations show that beliefs and broadcasting can be good friends — and good business. Examples of growth figures for gospel cite a 41 percent increase in gospel music sales in one year, now over \$500 million annually. To serve that growing listener base, the number of gospel stations has increased 154 percent since 1993 and now stands at 463, or 45 percent of all Christian radio in the United States, according to figures from the Recording Industry Association of America, Arbitron and Simmons.

And while recordings like the
See GOSPEL, page 61 ▶

STATION SNAPSHOT

L.A. Station: Show Must Go On

Dee McVicker

How in the world does an independent station compete with the celestial likes of Imus, Stern, Dr. Laura and other big-name stars of Los Angeles radio? That was the question the folks at KGIL(AM) asked themselves as they got ready to pull the plug on a news format that had fared okay for several years but was quickly headed for ratings meltdown. Large mergers had tipped the hat in favor of a few stations and stolen the center stage in Los Angeles news/talk.

They needed something fresh, new, exciting. But what?

Buoyant Beatles format

Scanning the dial they realized superstar stations had begun popping up in Los Angeles like celebrities on Oscars night, and not just where news/talk was concerned.

According to Saul Levine of Mount Wilson FM Broadcasters, the owner of KGIL and its sister station KKGQ-FM in Los Angeles as well as XBACH(AM) heard in San Diego and KKHI-AM-FM near San Francisco, large group owners have effectively edged independents like himself out of some of the more traditional big-cume formats by saturating the market with two stations playing the same format, one a dominant seller in the market, the other a decoy.

"We are the last of the independent broadcasters in L.A.," Levine said.

Levine's FM in Los Angeles airs a well-established classical format, as do his other stations in San Diego and San Francisco. But, for his AM at 1260 on the Los Angeles dial, which became one of the pioneers to move onto the expanded band in December, Levine was looking for something a little more, well, Hollywood.

He began thinking Beatles. Then show tunes. And, finally, a music of your life/show tunes hybrid. "I do not believe in the format of the month, but we have experimented," Levine admitted.

The all-Beatles format was a transition format until the station could get together the play list for a show tunes format. However, fanatical Beatles fans besieged the station with calls begging KGIL to continue with the format, even though the fans had been warned the format was only temporary.

"We stayed with it for a while, and it was interesting. The audience went up to a cume of 70,000 to 80,000 a week. But it was never enough to make a good (quarter-hour) showing," Levine said.

Could the AM stereo station get a
See KGIL, page 59 ▶

The Digital Console for your Next Studio

Logitek's new line of digital consoles is truly different -- consoles ready for the digital age.

Logitek's digital consoles with 32-bit internal processing, 20-bit A/D, D/A converters, along with sample rate converters, to connect & mix all your analog & digital sources.

Logitek's consoles have a unique ergonomic profile which allows for a more open studio look & closer, easier to read computer monitors.

Logitek consoles, the console for your next studio. Call today for your information kit.



ROC-10 starting at under \$10,000

Logitek digital with a better difference!

3320 Bering Drive, Houston, TX, 77057 USA Voice: North America 800.231.5870
Fax: 713.782.7597 Others 713.782.4592 e-mail: info@logitekaudio.com

Visit our home page at www.logitekaudio.com for more information

EVERY GREAT DECISION STARTS HERE

Today in radio you need to make great decisions, safe ones and cost effective ones. You can get started right here... the Broadcast Electronics web site... **www.bdcast.com.** From complete studio systems to rack-ready equipment, transmitters and programming. All from the world's leader in radio broadcast technology.

If you need to make the right decision, stop right here and log on to BE.

Need Solutions?

www.bdcast.com

or (217) 224-9600

The BE emblem is a registered trademark of Broadcast Electronics, Inc.



Circle (183) On Reader Service Card
World Radio History

www.bdcast.com



- Transmitters
- Exciters
- STL
- Digital Audio Systems
- Consoles
- Service



**Solutions for
Tomorrow's Radio**

◆ STATION SERVICES ◆

Programs and Services for Radio Stations

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

Non-traditional Seminar

Break through revenue barriers at your station. Attend the sixth annual "New Business Development Seminar & Roundtable" July 15 to 17. The seminar is aimed at new business development specialists, sales managers, account executives, GMs and group heads.

Breakthrough marketing promises attendees will learn to target non-traditional decision makers, how to secure an initial appointment and how to make the first sales call productive.

In addition to its annual conference, Breakthrough marketing provides sales and business development resources through other products and services, including a monthly sales-tip fax and consulting services via the Internet.

For information from Breakthrough marketing, contact Heidi Koster in Washington at (425) 747-0647; fax (425) 747-1442; or circle Reader Service 62.

Country Jones

Jones Radio Network puts another notch in its country music belt, entering into a partnership with WSIX-FM to produce and distribute "Nashville Nights."

The five-hour, five-nights-a-week program is consulted by Rusty Wallace Programming Consultants Inc., which

serves country stations owned by Capstar, CBS and Cox, among other groups. Rusty Walker is an award-winning consultant and station programmer.



JONES RADIO NETWORK™

Jones Radio Network also distributes "The Crook and Chase Country Countdown," "The Crook and Chase CenterStage Specials," "The Jimmy Carter Entertainment Reports" and "Outdoor Life Radio."

For information from Jones Radio Network contact Phil Barry in Colorado at (303) 784-8752; fax (303) 799-0551; or circle Reader Service 88.

Total Radio

Hands off!

Broadcast Programming is rolling out its Total Radio service, which includes a hands-free, voicetracked digital format service.

Dayparts and voicetracked music formats are sent via satellite to the digital system hard drive at a station. Total Radio formats are designed to run with

the AudioVAULT digital studio system from Broadcast Electronics. BP President and General Manager Edie Hilliard said Total Radio eventually will be able to run on other digital systems.

The service originates at BP headquarters in Seattle.

"With our direct digital delivery and format coordination, we are providing the first truly hands-free local-programming solution," said Klam Daniels, director of the Total Radio service.

For information from Broadcast Programming contact Dave Newton in Seattle at (800) 426-9082; or circle Reader Service 114.

Sports Talk in Cyberspace

One-on-One Sports Inc. is branching into cybersports, giving Internet users 24-hour access to One-on-One Sports Radio



Network programming.

The network linked up with Audionet, agreeing to offer text and graphics from One-on-One's information database, Statszone. Affiliates that have an agreement with Audionet can broadcast the network feed.

Additionally, the new site (www.lon1sports.com) will contain links to the One-on-One audio archives, which include interviews with major sports figures.

For information from One-on-One Sports Inc., contact Carolyn Phillips in Chicago at (847) 509-1661; or circle Reader Service 140.

'Bleeding Edge' Production Music

Could your station use a dose of new production music? Try "Bleeding Edge Concepts" on for size, which **The Music Bakery** describes as "a crazed convergence of ultra-contemporary



dance beats, raw metal and futuristic techno styles."

Other new categories include "Acoustic Underscores," "Classic Westerns" and "Corporate Promotions."

The Music Bakery now packages its production music in categorized CDs, such as "U.S. Historical," "Smooth Contemporary Jazz," "Geographical" and "Latin and World Music."

With so many choices, maybe you would be more comfortable listening before you purchase.

With MusicSearch Software, you can listen to any track. If your favorite tracks are contained on separate CDs, you can personalize, or "custom-bake," your own collection of tracks on a CD.

For information from The Music Bakery in Texas, call (800) 229-0313; or circle Reader Service 166.

Put Your Station on the Web

Major-market stations are selecting **Radio Data Group** for Web site development. Has your station considered RDG?

RDG is a radio-exclusive Internet services company, which recently affiliated itself with KZLA(AM) in Los Angeles; WLUP-FM and WMVP(AM) in Chicago; WMGK(FM) in Philadelphia; WEGQ(FM) and WBMX(FM) in Boston; and WWZZ(FM) in Washington.



Radio's Internet Experts

The new sign-ons are the byproduct of a joint marketing agreement between MJI Broadcasting and RDG.

RDG provides user-friendly software for Web site maintenance and a traffic and billing system for radio Web sites.

For information from RDG in Virginia, contact Michael Rau at (703) 748-2800; fax (703) 748-2133; or circle Reader Service 192.

An Italian House Party

Frank Sinatra, Jerry Vale, Perry Como, Dean Martin. They're all Italian, and they can all be heard on "Don Giovanni's Italian Carousel."

The weekly "Carousel" is available on a barter basis and can be auditioned every Wednesday, from 2 to 3 p.m. (EST).

Complementing the music on the program are celebrity interviews as well as Italian recipes read from Filippo Berio's cookbook.

For information from "Don Giovanni's Italian Carousel" in New York, contact Don Giovanni at (607) 772-2893; fax (607) 771-6275; or circle Reader Service 218.

Facility Consultation Package

Are you thinking about changes to your broadcast studio facilities? Whether you already have a project in mind or are just wondering about what one would involve, you don't have to find all the answers yourself.

RDA Systems, Inc. is in the sole business of helping broadcasters plan, design and build studio facilities. With this experience, it has created a Facility Consultation Package (FCP) designed to help clients define the cost and scope of their studio project.

At a cost of usually \$5,000 or less, the FCP gives you independent, expert information that you can use to make decisions. You receive a total project cost estimate, preliminary floor space plan and a project schedule. (An extra option is an evaluation of potential facilities). This small investment allows you to proceed with confidence in planning your project's timing, scope and funding.

For information from RDA Systems, contact Rich Waller in St. Louis, (314) 391-6955; or circle Reader Service 11.

RW Online

www.rwonline.com

a new website from the publisher of

Radio World

supported by



HARRIS



CUTTING EDGE



MUSICAM USA

A new addition to the Radio World family, featuring: the RW Newsroom, a comprehensive Products & Services Directory, a calendar of industry events, Broadcast Organization listings, Radio World subscription information, and exclusive on-line commentary on current industry issues.



ANOTHER PRODUCTION OF THE IMAS PUBLISHING GROUP

Arbitron Eyes Europe and Beyond

S.D. Yana Davis

Arbitron, the 35-year-old media audience-ratings firm, is looking to capture business in the United Kingdom, Europe and Australia, according to company officials.

"We do not have international ventures currently," said Jay Guyther, Arbitron vice president for international business development. "But we are focused on winning the RAJAR contract in the United Kingdom. It is our first overseas venture. We expect tenders for the bids to go out soon."

Audience ratings

RAJAR is Radio Joint Audience Research Ltd., a London-based organization that handles audience ratings both for commercial and BBC stations throughout the United Kingdom.

Noting that commercial broadcasting is relatively new in Europe, Guyther said "RAJAR requires face-to-face recruiting" of diary-keepers, unlike the United States, where Arbitron diaries are delivered and returned by mail.

To that end, he said, Arbitron recently acquired a British firm, Continental Research, which has a "large force of trained face-to-face researchers" available.

Guyther said Continental Research already helped Arbitron conduct methodology tests in the United Kingdom. Continental also tested some aspects of diary placement and keeping. "It has been very successful so far."

Arbitron tracks listenership by having recruited listeners record their daily listening habits in a diary during quarterly ratings periods.

The RAJAR contract is expected to be awarded in July, with audience ratings to begin in early 1999, Guyther said.

New business

Arbitron also is interested in picking up new business in Australia. Guyther said the Federal Australian Broadcasting Association would ask for bids on a contract soon, but those bids would be "by invitation only."

Guyther spoke to Australian broadcasters this winter, hoping that Arbitron would be among those invited to bid.

In addition, Guyther said, Arbitron has had initial talks with broadcasters in Berlin and some tentative contacts with new commercial stations in Eastern and Central Europe, as the company seeks to expand its business beyond the United States.

"Berliner broadcasters feel they could use their own market report," said Thom Mocarsky, vice president for communications at Arbitron. Currently, ratings are conducted on a state-by-state basis in Germany.

Mocarsky said any Arbitron ratings system instituted in Berlin would "supplement but not replace" the present ratings system.

Not looking to replace

Both Guyther and Mocarsky emphasized that, except in cases such as the United Kingdom and Australia, where industry consortiums award exclusive contracts, Arbitron is looking to "supplement" rather than replace existing rating systems such as the French Médiamétrie or the German state-based system.

Whether the company wins contracts abroad, Guyther said Arbitron will seize the opportunity to market proprietary

computer software to analyze audience numbers for broadcasters, advertisers and other research firms that may be interested.

"Our software allows analysis of data generated by other firms," Guyther said, making it a marketable product even if Arbitron does not win the RAJAR or other national contracts.

But Guyther pointed to Arbitron having an advantage in offering audience research services abroad. "It is the only thing we do, the only thing we have done for the past 35 years. The Arbitron brand name is very valuable."

Either scenario — winning country-wide contracts or simply providing supplementary and software services —

would be a boon for U.S.-based advertising agencies looking to place commercials overseas, Guyther said, because Arbitron can "provide audience data in the form they are used to seeing."

Overseas markets promise Arbitron an opportunity to field-test a new product, as well, Mocarsky said.

Portable meter

"Our personal portable (ratings) meter is about the size of a pager or small cellular phone. We announced its development in 1992, and now it is ready to come out," Mocarsky said.

The device, carried or worn by a diary-keeper, detects any broadcast signal

and reports the behavior to a centralized bank of computers.

"It works with an inaudible code embedded in the broadcast signal," said Mocarsky. "Whenever it hears a broadcast signal, it records and time stamps it."

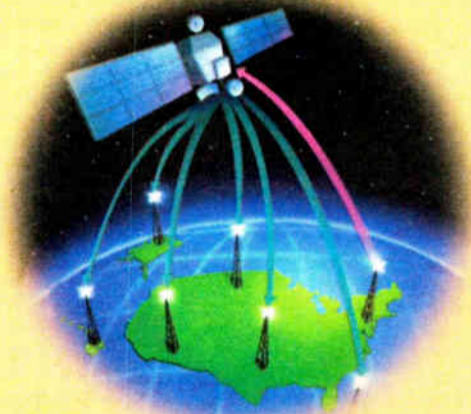
Data can later be sorted, processed and analyzed for a more thorough, and accurate, record of listening and viewing behavior.

"Our intention is to field test the personal portable meter in 1998. The field test will tell us what kind of information we can get. We can then develop the data to build a ratings system using this (device)," Mocarsky said.

Mocarsky said Arbitron hopes to field-test the product in the United Kingdom, assuming that Arbitron wins the RAJAR contract. The initial tests, however, will be for debugging the system rather than

See ARBITRON, page 60 ►

BEAM



IT DOWN!

NPR Satellite Services can help you beam your signal to your affiliates across the country quickly, easily and affordably.

NPR Satellite Services offers you:

- Full-time service providing 24-hour satellite space for high quality, low cost distribution;
- Occasional service for live promotional events, concerts & regional and national sports networks;
- Transportable uplinking services that we can bring to your door; and
- A large footprint that covers all 50 states, plus areas of the Caribbean to allow for your network expansion.

Your broadcast is important to us, the *radio-only experts*, so we work with you to come up with the complete satellite services package that works for you. We're...



NPR Satellite Services®
Link Up With Us

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

“WE CHOSE DALET” The Wo



Paul Sanchez and Jim McGivern at Emmis New York
(Hot 97, Kiss FM, CD101.9)

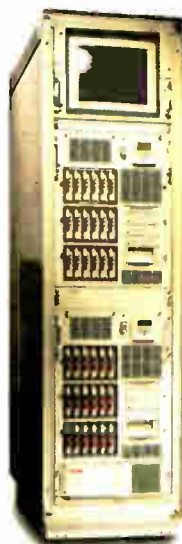
Leading broadcasters all over the world

rely on Dalet. Dalet has more

installations than any other system.

Reliability

Dalet has the proven expertise to assure that your station stays on the air. Choose from a wide range of security options (RAID array, mirrored servers, local backup) to meet your specific requirements. Dalet's digital audio system has been running on Windows and networks for eight years, at hundreds of sites – from stand-alones to hundred-plus workstation networks. It works for them, it can work for you.



Full Redundancy
Servers

“Dalet has improved the way we do business. It's easier to maintain, and has changed the capabilities of the radio station. But as far as the on air product is concerned, we really didn't want to change the way it sounded. We had very good sounding radio stations before. This has been maintained using the system. And as time goes on, we're getting better at maximizing the use of the system.”

Jim McGivern,
Chief Engineer, Emmis New York
(Hot 97, Kiss FM, CD 101.9)

Cost Efficiency

Whether you are a large or small market station, Dalet offers a completely integrated suite of software which allows the entire staff to work together. All departments – traffic, production, programming, news and on-air – have simultaneous access to all audio, copy and logs. With modular software options, the Dalet system can meet your specific budget requirements – growing with your business needs. Standard hardware also means cost savings. The system is not proprietary, and will grow with the industry. Finally, with Dalet's easy-to-use interface your staff will be operational in no time.

Partnership with long-term leaders
in the computer industry helps us remain
at the forefront of technological innovation.



World Radio History

Broadcasting Solutions for

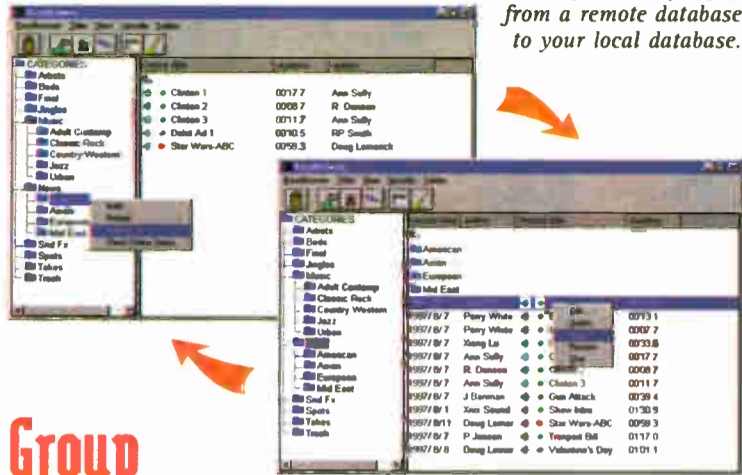
- Cart Replacement
- Live Assist
- Satellite Automation
- Multitrack Editing
- Music Automation
- Text and Audio for News
- Traffic
- WEB Publishing
- Archiving
- Group Connectivity

The World Standard

- Windows 95 or NT
- Full Redundancy
- Standard PC Networks
- ISDN and Internet Transfers
- Wide Area Networks
- Unlimited Storage/Users
- Client Server Architecture
- 24 Hour Technical Support
- Modular Control Panels

World Standard in Digital Audio

Local Station



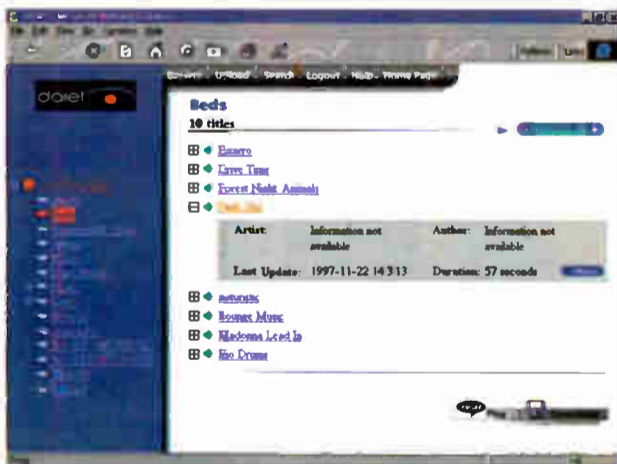
Drag and drop a file from a remote database to your local database.

Group Connectivity

Consolidation can generate huge productivity gains, provided groups have the right tools. Dalet is continuously developing new solutions to meet the evolving needs of our clients. With TeamRadio – Dalet's traffic and billing software – the business of over 1000 radio stations can be linked together. Intranet applications allow stations within a group to access each other's orders and audio remotely. The production work done by one station can be used by another, only minutes later.



Dalet On Air Workstation



Exchange Files through an Intranet Audio Server

Unprecedented Support

Dalet is a service-driven company. With more than 70 engineers, we guarantee your station stays on the air. Dalet's support experts are on call, 24 hours a day. Clients have on-line support over the Internet. We can also provide on-site visits to upgrade an existing system.

"Support on any of these systems, I think, is imperative..."

Dalet support has been excellent."

Jim McGivern

Free Demo At Your Office

Call us to set up a date. We'll bring the demo to you or make arrangements for you to visit an installation that best fits your needs.

Call (212) 825-3322
or visit
www.dalet.com

Circle (2) On Reader Service Card

THE
WORLD
STANDARD

dalet

Fuhrman: Off the Beat, on the Air

Bob Rusk

An hour before he goes on the air, Mark Fuhrman is combing the streets of Spokane, Wash., hoping to crack the case of a serial killer who authorities suspect has already taken six lives. Fuhrman, the former Los Angeles police detective and prosecution witness in the O.J. Simpson trial, is no longer a cop. He is pursuing this case as a talk show host, searching for material to use on his radio show.

Evidence

Asked what he hopes to find, Fuhrman replied, "I don't know. We are just out looking around in some of the areas where bodies have been found." Anything that is uncovered will be turned over to the Spokane police department, Fuhrman said.

Fuhrman acknowledges he is controversial and invites his critics to call in.

His partner in the search is Mike Fitzsimmons, veteran host at KXLY(AM). Every Thursday from 3 to 6 p.m., Fuhrman joins Fitzsimmons for a three-hour discussion of crime. No evidence was found today, so they decide to talk about the serial murderer another week. The topic on their show today will be conspiracy, including a look at a high-profile murder investigation in Colorado.

It was Fitzsimmons, a graduate of Gonzaga University School of Law in Spokane, who came up with the idea to put Fuhrman on the air. "I've always wanted to do a show that examines crime

investigations," Fitzsimmons said. "Mark has a tremendous amount of credibility when it comes to these kinds of issues. We work off of each other pretty well."

Fuhrman, who had previously appeared as a guest on the Fitzsimmons show, was persuaded to join him as a co-host one day a week. Fuhrman drives in from his farm in Sandpoint, Idaho, about 80 miles away. With his other commitments, including a tour to promote a new book, he is unable to do the show more than one day a week.

Although the show is heard only on KXLY, the station and Fuhrman are interested in syndicating it nationally. "I'd entertain that, of course," Fuhrman said. "I wouldn't change (the format of) the show. It would be the same microphone."

KXLY operations manager Brian Paul added, however, that there have been "no serious inquirers yet" about syndication. "The Crime Show," which debuted in January, has gotten some national exposure on television and in newspapers.

"The show has brought a lot of attention to our station," Paul said. "In all honesty, we were not sure which way it was going to go. But the feedback has been very positive, particularly in the way we are using Mark. He is not an expert in everything, but is an expert in the field of crime and investigation."

When KXLY announced that Fuhrman would join Fitzsimmons as co-host, the station did hear from some "alarmed" listeners, Paul said. "So we had Mark on the air one day and let everyone have a shot at him on the topic of his past. The following day I went on the air, and listeners came at me. What we found, which was extremely surprising, was the majority of callers did not have a problem with putting

Mark on the air to deal with crime topics. The majority of people find him interesting to listen to."

Fuhrman, who was born in Tacoma, Wash., moved back to the Northwest after leaving the Los Angeles police force in disgrace. A key figure in the Simpson

himself as Kevin said that he carried a concealed weapon for "personal and family protection."

Fuhrman came to Kevin's defense when Fitzsimmons asked if the caller was paranoid. "I carried a gun all the time, with my family and without my family," interrupted Fuhrman. Saying that acting responsibly is the key, he added, "You've got to know when to be Marvin Milktoast or Dirty Harry."



Mark Fuhrman (right) With Mike Fitzsimmons (seated) and Promotions and Marketing Director Mike Ellis

murder trial, Fuhrman found the bloody glove that became an important piece of evidence.

Fuhrman's credibility was demolished when he testified that he had not used racial slurs. Taped interviews with an aspiring screenwriter proved otherwise, resulting in Fuhrman being convicted of perjury.

Fuhrman acknowledges that he is a controversial voice on the air, and invites his critics to call in with their opinions. "When someone is angry, it does not bother me at all," he said. "It becomes a lively show."

At other times, Fuhrman and Fitzsimmons disagree, which makes for even livelier conversation. On a recent show the topic was personal security, and a caller who identified

Don't expect Fuhrman to come to the defense of the infrequent caller who still wants to talk about the Simpson case, though. "Haven't we given this murder enough time?" is his usual response. When callers insist on pressing the issue with an opinion of "what really happened," Fuhrman has a quick comeback: "Go ahead. But make no doubt about it. I will probably make you out to be wrong."

But even that kind of exchange, Fuhrman said, is "a lot of fun."

"I really like talk radio," he said, "because America gets to speak. People feel connected. That's a powerful exchange."

■ ■ ■

Bob Rusk is a frequent contributor to RW.

Checklist for Dealing With the Tabloids

With Mark Fuhrman taking to the airwaves, it was inevitable that tabloid TV shows would show up in town to report on it. The task of dealing with the likes of "American Journal" and "Extra" was dropped in the lap of KXLY Promotion and Marketing Director Mike Ellis.

"Mark and I talk about all requests from the media," Ellis said. "I tell him what the request is, and he asks about the purpose of the interview. What is the agenda? Do they want another O.J. interview? If that's the case, Mark wants nothing to do with it. He is willing to talk about crime, his obvious expertise, the radio show and his book-writing career."

Ellis offers the following tips to radio stations that might find themselves handling interview requests from the tabloids when "controversial,

national celebrities" join the air staff:

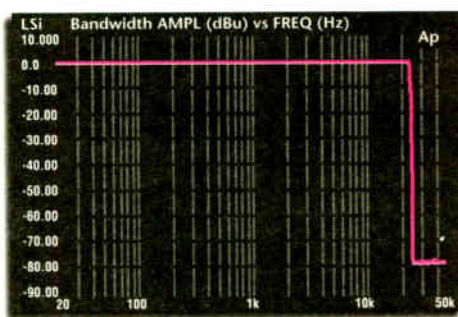
✓ Put one person in charge of handling all media coordination.

✓ Treat tabloid reporters and producers like children. Give them boundaries and enforce the fact that there will be consequences if they cross them.

✓ Let them know how much time they will have for interviews and to be in the studio.

✓ Over-communicate with them. Reconfirm and then reconfirm again. Stress what your celebrity is willing to do, and not willing to do.

✓ Stand firm. "Even after I had said 'no' to a tabloid producer several times, he told me I had said 'yes' about an issue," Ellis said. "Realize that they have a job to do, but so do you. Be assertive without being rude. Protect your station and the celebrity's interests."



How much would you pay for this response?

>100dB S/N • 2.5 mile line driver • Ground/Lightning isolation
90-day satisfaction guarantee. 3 year parts and labor warranty.
2 channels for less than \$1,650.

www.kci-dfw.com

Knight's Communications Inc., 2219 West Broadway,
Fort Worth, Texas 76102 800-880-5061



Dobson Criticizes GOP

► GOP continued from page 46

Asked whether Dobson would be changing his focus from the family to politics, Hetrick said, "He will be complementing, not changing his focus," and in doing so, "Dobson will become more overtly critical of the Republican Party."

Dobson made his intentions known in a February speech before the Council for National Policy in Phoenix. Adopting the language of the civil rights movement of the 1960s, Dobson said cultural conservatives who have been electing Republicans to public office for the past two decades are tired of being relegated to "the back of the bus."

Discussing a recent party event he had

outlined those issues he believes are most "passionately supported by the conservative Christian community."

After listing those issues, Dobson wrote, "Finally, I would suggest that you ask the Speaker to quit insulting the pro-family and pro-moral community with his words and actions."

Dobson ended the letter with the following reminder: "This is late February ... in the final year of the 105th Congress, and there is very little to show for the confidence placed in Republicans by the 43 percent of its constituency who gave them power in 1994. And the clock is ticking."

Paul Hetrick said the 43 percent figure represents voters who in 1994, "identified

themselves as evangelical pro-family conservatives," without whom Hetrick said there would be no Republican Congress.

Even if those numbers hold in 1998, it is unclear how much influence Dobson has over them. For one thing, he cannot insert politics into his daily "Focus on the Family" broadcasts because "Focus" is a 501 C3 non-profit organization. When Dobson goes out on the stump, Hetrick said, he has to do so as a private citizen and pay his own way.

On the radio Dobson can talk about abortion, but he cannot urge listeners to contact their representative or to vote someone out of office. "He is very careful and circumspect about adhering to those rules," Hetrick said.

However, radio will play a major role as Dobson attempts to have greater influence on the GOP agenda. Hetrick said Ollie North and Michael Reagan have hosted

Dobson on their talk shows. Chuck Colson, the Watergate-convict-turned-evangelical Christian, has promoted Dobson's Phoenix speech on his five-minute radio segment.

In addition, many of the stations that air "Focus on the Family" have broadcast Dobson's Phoenix speech. Hetrick said these include stations owned by Bott Broadcasting, American Family Radio and Salem Communications. He predicts Dobson's political crusade will continue to receive such coverage.

Whether Dobson carries the same clout in 1998 that conservative talk heavy-hitters did in 1994 remains to be seen and heard.

John Montone is a radio reporter for 1010 WINS(AM), New York. Send him e-mail at jfmontone@worldnet.att.net

Dobson said his listeners see a moral free-fall in America.

attended, Dobson said, "Republicans seemed to be saying, 'We cannot have power if we stand on principal. Please, don't take away our power.'"

Pausing for effect like the skilled broadcaster he is, Dobson asked, "What good is it to have power if you don't use it for good?" His audience applauded.

"Good," in Dobson's view, means cutting off funding for Planned Parenthood, abolishing the National Endowment for the Arts, allowing prayer in public schools and prohibiting homosexuals from serving in the nation's armed services. Dobson said he was not trying to level threats against the GOP, but he added, "If I go, I will do everything I can to take as many people with me as possible."

Taking the pulse

Dobson obviously understands the prominence his radio show has brought him. He talked of the daily "Pulse Report" he receives.

"It tells me how many people have called and what they're saying," he said. "I get their comments. I have instant feedback from them. I know what they are thinking. I know what they are feeling. I know their hearts. I read their letters. I talk to them on the telephone."

Dobson said his listeners "see a moral free-fall, and it contradicts everything they stand for."

Dobson linked the elected Republican of whom he is most critical, New Jersey Governor Christine Todd Whitman, to another well-known radio broadcaster. Ripping the pro-choice Whitman as "pro-condom distribution and pro-homosexual," Dobson said, "She even named a truck stop for Howard Stern on the New Jersey Turnpike, which is the only thing she has done that I agree with. Naming a toilet for Howard Stern is the only logical thing she has done."

Dobson followed up his Phoenix speech with a much-publicized trip to Washington, D.C., during which he met with conservative Republican house members in March. Before the meeting, Dobson wrote letters to some GOP representatives in which he

you're seeing double

You say that you are seeing only only ONE Rane DA 216? Look closer.

Every DA 216 gives you double the distribution power of its predecessor - the FDA 28 - running circles around it. And it doesn't cost a penny more! The DA 216 can be configured in an amazing number of ways. You want 1 input to 16 outputs? No problem! 1 stereo input to 8 stereo outputs? You've got it! 2 mixed inputs to 16 outputs? It's yours! 2 independent inputs to dual 8 mono outputs? Whatever you want! The DA 216 features two pre-



distribution screwdriver-adjustable master level controls, with 16 screwdriver-adjustable output level controls. Terminal strips on the rear handle the connections, with balanced line level outputs while inputs are switchable between mic and line. 15 volt phantom power is switchable when the mic inputs are selected.

Whenever you need a distribution amp, get twice as much with the Rane DA 216. Give us a call. We'll tell you all about it.

The All-New
Rane
DA 216
DISTRIBUTION AMPLIFIER

Bradley
BROADCAST & PRO AUDIO

Our Service Makes The Difference

7313-G Grove Road, Frederick MD 21704 • Toll Free: 800-732-7665
Tel: 301-682-8700 • Fax: 301-682-8377
<http://www.bradleybroadcast.com> • E-Mail: info@bradleybroadcast.com

PERSONALITY PROFILE

Morning Milestone in Detroit

Randy Stine

They keep asking themselves where the time has gone. February brought the 20th anniversary of "J.J. and the Morning Crew" on Detroit morning radio.

Although Jim Johnson and partner George Baier have changed stations several times over the years, they have remained inseparable through some remarkable changes in the radio industry. "Hey, he has outlasted two of my three marriages," Johnson said of Baier.

Staying together

In a city where morning shows have come and gone, these two have survived. Through the growth of automation and computers in radio, and the lifting of ownership limits, nothing has deterred them from their goal to stay together in the Motor City.

"We are both from Detroit and love it here," Johnson said. "We never have thought much about going anywhere else."

Earvin "Magic" Johnson was just a freshman up the road in East Lansing at Michigan State University, and Bob Seger was still Detroit's best-kept musical secret, when "J.J. and the Morning Crew" first aired in February of 1978.

Johnson was program director at rock station WWWW-FM while Baier was doing mornings at the station with Steve Dahl. When Dahl left for Chicago, Johnson filled in on the morning show until a permanent replacement could be found. That never happened.

The two immediately established an on-air chemistry. "It was really by accident this happened at all," Baier said. Plenty of good things have happened by accident. The show mixes straight-man Johnson's sense of good will with the tilted perspective and voice characterizations of Baier.

Over the past two decades, the duo has



Jim Johnson, left, and George Baier of Detroit's 'J.J. and the Morning Crew'

made stops at WRIF(FM), WLLZ(FM), and their current home WCSX(FM). They have been at the classic rock station since March 1993. They are joined on the air by news person Lynne Woodison, comedian Ed Kelley and producer Mark Blackwell.

Changes

They have seen the industry transform from one in which mom-and-pop operators could still hope to own a station in a major market, to one in which only the mega broadcaster might dare to tread.

"When we worked at WLLZ(FM), we had four different owners in about five years," said Johnson, indicating that they survived a massive swapping of radio stations in the mid-1980s.

Back then, it seemed, many an owner bought a station for a quick turnaround and a quick buck. "I think that today, companies seem to be hanging on to stations longer and showing their support by putting money into the product," Johnson said. "That's different from what we saw in the '80s."

How do they view the latest ownership deregulation? "It can be bad or good,"

Baier said. "It depends on your situation and your ability to adapt." WCSX(FM) is owned by Greater Media.

Johnson said working for a major group owner with multiple stations in

town has definite advantages. "Greater Media has three stations here," he said. "If one is struggling, you can be more patient with the weak sister if the other two are doing well." All three have rock formats.

Johnson does not think deregulation has been all good for air personalities. "Your chances of moving station to station in one market have been cut back. As an on-air type you tend to have your options limited."

Competition among stations is somewhat different these days, sometimes requiring a scorecard to know who is on whose side. Today, a company often will own two stations in the same format in the same city. Does that temper the competitive spirit at all? Baier thinks the jury is still out.

"On one hand, if you work at a station that owns another in a similar format, you can use the two to protect each other's flanks," he said. "On the other hand, you are in competition with each other for a piece of the same listener pie. It's really a double-edged sword."

See DETROIT, page 58

CBS and Chancellor Dominate Format Study

A recent Interep analysis suggests a strong connection between group ownership and format dominance. CBS leads listenership, with 27 percent of the listening share in the Top 10 metros. Chancellor is not far behind, claiming 25.2 percent. ABC and Emmis follow with 8.4 percent and 5.1 percent respectively.

CBS has the strongest share in the most popular format, news/talk, claiming 7.3 percent. CBS currently holds at least one news/talk property in each of the Top 10 metro areas. ABC takes the second place slot in the news/talk format, with 3.5 percent of the share.

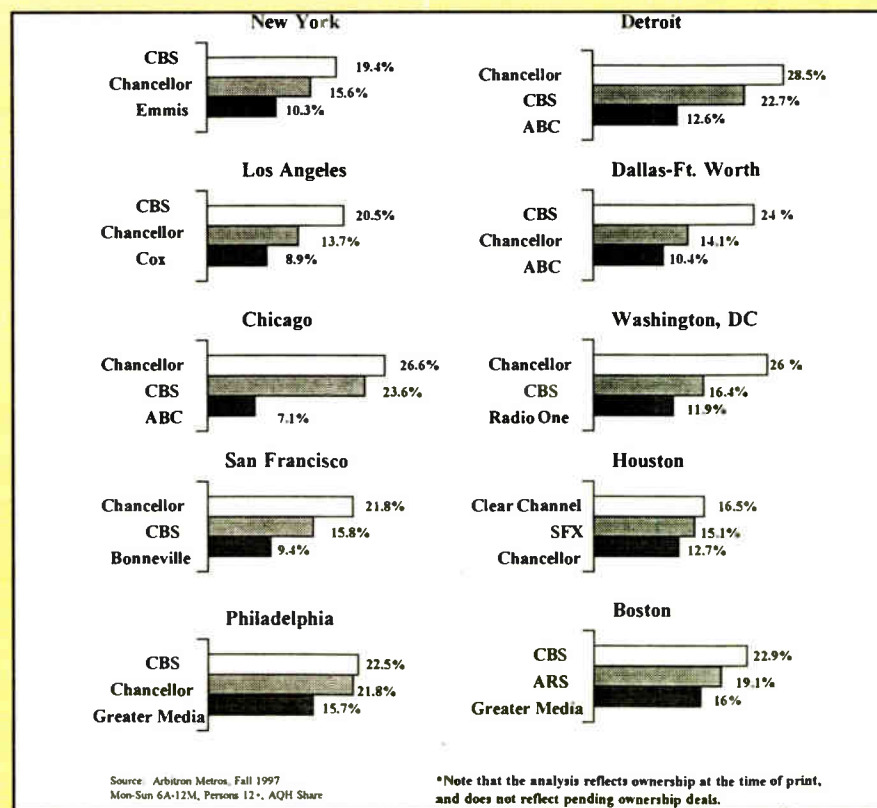
Chancellor asserts itself as the leading share holder in the second most popular format, urban, with 4.4 percent of the share. Chancellor owns properties in five of the Top 10 metros, with significantly strong shares in Chicago and

Detroit. Emmis takes second place with 1.1 percent, while Radio One ranks third with 0.9 percent of the share.

Chancellor also leads in the CHR format and adult contemporary formats, at 4.2 percent and 4.0 percent respectively. Chancellor's CHR stations include WKTU(FM) and WHTZ(FM) in New York, as well as properties in three other Top 10 metros.

Beyond the CBS and Chancellor stronghold, other groups have found dominance. Spanish Broadcasting System reigns over the Spanish format, holding a 3 percent market share. ABC leads in the rock/AOR format with 0.7 percent market share, with Chancellor coming in at a very close second with 0.6 percent.

— Stephanie Muller



Source: Arbitron Metros, Fall 1997
Mon-Sun 6A-12M, Persons 12+, AQH Share

*Note that the analysis reflects ownership at the time of print, and does not reflect pending ownership deals.

The BB-100 Travels

Postcard # 020

the BB100 shuts out more noise than any other studio that'll roll away into a closet afterwards. It even comes in color (strips extra).

Right here in BLACK & WHITE

Free BB

We're giving away a BB at NAB. To register, follow the contest link from www.acousticsystems.com

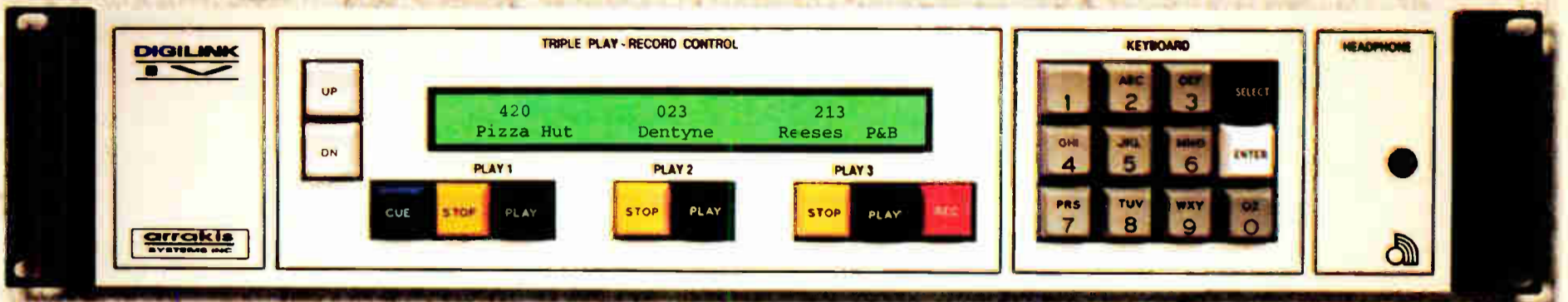
When you see this RADIO WORLD postcard, click on the zebras to access the entry form. We'll print it and bring it with us. Then come by booth 5749 to see if you've won one of these wild little animals.

ACOUSTIC SYSTEMS

(800) 749-1460

The science of silence

Triple Deck with Record Digital Cart Machine



Only \$3,499

Complete (with 24 hours of audio storage)

Easy to use Cart Machine-like control

Triple Play & simultaneous Record

Instant Cue and Play!!!

Easy to read LCD display

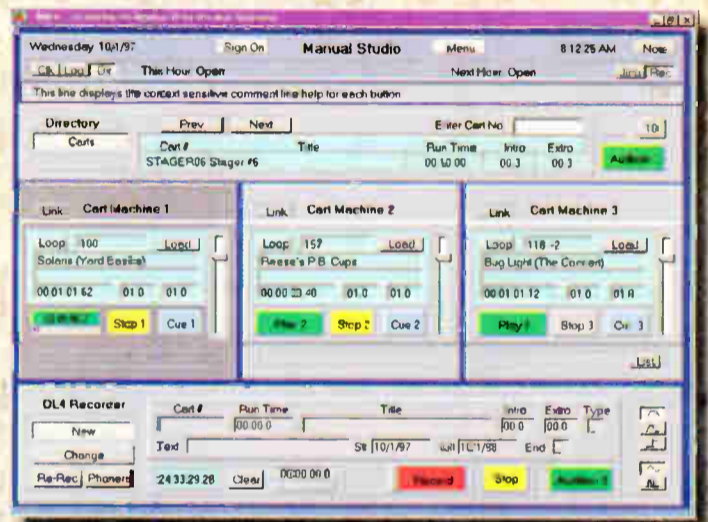
No PC computer required!!!

6 Play dual Record only \$7,995,

(expandable)

83 button Jingle Box option available

Windows 95 On Air Automation option



DL4-Live
Manual Cart machine software for
a Windows 95 compatible PC is
only \$495

You can replace your old, worn out Cart machines today with a digital audio workstation that is both reliable & as easy to use as a Cart machine. The simple triple deck display makes it easy to load 3 carts from the on board digital audio library into the three cart LCD display. You can begin or end cue 5 seconds of any cart and then play it On Air with the push of a button. The workstation even features console logic control so that your console can start playback just like your old cart machines.

Not a complex and often unreliable PC computer, the DL4 is an audio appliance that stores your audio library on hard disk with 3 playback outputs and a record input, simultaneously from one common library (expandable to 96 Play and 32 record events). Unlike fussy carts and cart machines, the DL4 needs no routine maintenance and the hard drive has a 20 year typical life.

For production, you can record your audio material directly into the DL4 (while On Air) or even produce it on your favorite PC editor (such as SAW™) and transfer it in perfect digital to the DL4 audio library!!! If you need Automation or sophisticated Live On Air, an optional Windows 95 software program gives you all of the bells and whistles, such as a Phoner Editor, Voice Over Editor, and much more.

Call today for details on the DL4 from Arrakis Systems, the #1 digital workstation manufacturer in Radio!!!



DJ Team Stays Together in Detroit

► DETROIT, continued from page 56

The competition for numbers in the morning ratings race have intensified throughout the last two decades.

Nationally syndicated morning shows have changed the landscape of morning radio forever. It was a young Howard Stern who eventually replaced Johnson and Baier at WWWW-FM in 1980, before the station went country.

"I have yet to see syndication work well in this city," said Baier. "Stern doesn't do much here — neither does Imus, for whatever reason. We defend well against outsiders by being so Detroit-oriented."

The two believe that local is still better when it comes to radio. "There is still

nothing like talking about Eight Mile Road here in Detroit," Baier said. He feels especially passionate about the subject. "People have a much easier time identifying with you when you talk about things close to home."

Competition

According to Johnson, however, the bar definitely has been raised. "When you have competition like that coming to town, you have to strive to improve the show," he said. "It is impossible to out-Howard a Howard Stern. What you can do is magnify the fact you are here in the city."

Having started in the business by spin-

ning records in the so-called "old days," Johnson and Baier are both amazed at advances in technology. And while the

dawning of the compact disc and now the computerized studio have not exactly overwhelmed them — "Hey, you're still just pushing buttons. It's not brain

surgery," Baier said — they concede that it has made their lives simpler.

"(New technology) has made putting the show together a little easier. Editing bits is so much easier and faster," Johnson said. "We have a digital studio in so much that we play commercials,

Who knows, maybe someday we could be doing this job from an easy chair.

— George Baier

bits and parodies on computer. Next we will have a digital board, and who knows, maybe someday we could be doing this job from an easy chair."

Mostly gone are the days of splicing tape and grease pencils. But even with the improvements, Baier said, people must make it all work.

"You can put a computer in the studio, but it is hard to take a person out of it and still be able to compete. Nothing beats a warm body in there."

Evolution

Black T-shirts are no longer in vogue for these two 40-somethings. Today, you are just as likely to hear them talking on the air about family matters and trips to the doctor's office as all night drinking binges. "I think we have grown up with the audience," Johnson said. "We had our fun as kids and now have responsibilities like those who listen to us." The willingness to change has played a key role in surviving together.

As radio evolved, so did Johnson and Baier. "When we started here in the late '70s, there were three rock stations," Johnson said, "where today there are eight. There were maybe a half-dozen decent morning shows; now there are 14 or 15."

What lies ahead for "J.J. and the Morning Crew"? More of the same, Baier said. "We would like to do this until we drop, or at least until they kick us out. We will just roll with the punches." And deliver a few of their own each ratings period.



Randy Stine is the news director of WXIK(FM) in Lansing, Mich. Reach him at (517) 699-6397 or e-mail cstine@voyager.net

Jim Johnson and George Baier have refined their on-air sound for 20 years. Here's a list of equipment they currently use in the studio:

- A BMX-2 board, from Pacific Research and Engineering
- Two different mics: an Electro-Voice RE27 and a Shure SM-5B
- A Radio Systems DDS computer plays all the commercials and recorded bits
- Denon CD players
- A Studer A-810 reel to reel
- A 360 Systems Short/cut Editor for editing bits and calls

MediaTouch INTRODUCES OpLOG

Sunday Feb 1, 1998		This Hour: 11:07	On Hand: 20:18	OpLOG			
DONE	THE TOUCH LEGAL ID 00 00 00 REAL 23 46:20 RUN 00 04 07/22	Playing SND9000	MOVE	BEST MUSIC	RETRO LUNCH	RETRO CONTIN	GRANT (KRUST
AIR-1 03 23	SPICE GIRLS ISAY YOU'LL BE TH 00 00 00 REAL 23 48:25 RUN 03 55 1/7/22	Playing 22/F MHD2001	KILL 00:27	THE TOUCH	CLASSI CUT ID	LEGAL ID	HAN SOLO/B
START 00:00	LL BBY BROWN MY PEROGATIVE 00 03 51 REAL 23 52:20 RUN 04 46 2/7/22	Ready 20/F MHD0299	AUD 00:00	STATLE WALDO	LITTLE RASCAL	DAFFY/ DISPCA	FUDD/H WABBIT
START 00:00	RETRO CLASSIC ID 00 06 27 REAL 23 57:06 RUN 00 05 3/7/22	Ready SND6000	AUD 00:00	SAM/DI LIVIN'	BUGS/D	BUGS/W UP DOC	BUGS/W DOC
START 00:00	MR MISTER BROKEN WINGS 00 08 37 REAL 23 57:12 RUN 04 37 4/7/22	Ready 19/F MRT2007	AUD 00:00	APU/TH YOU FO	CHEIF WIGAM/	HOMER DOH	KRUSTY CRAP!
START 00:00	MAS SONG INTRO 00 13 14 REAL 00 01:49 RUN 00 06 5/7/22	Ready SND7000	AUD 00:00	KRUSTY	APU/TW	WILLY/ BUTTER	HOMER/ KEY
START 00:00	PERRY COME HOME FOR THE HOL 00 12 34 REAL 00 01:56 RUN 02 07 6/7/22	Ready 10/F MRS1500	AUD 00:00	ShowLogs	Load Log	Load Showlogs	UP
DEL	FADE	ROT	UP	DOWN	BREAK	INFO	Abou: Op2000 Pick N' Play Quit Op2000 DOWN

The transition of the world's "Digital Original" OpLOG® to Windows™ is done, fully functional and ready for delivery. The simplicity of AIR functionality and high operational reliability of MediaTouch OpLOG®, have been further enhanced with an impressive array of new live assist operational features.

To arrange an on site demo at your station:
Call 1-800-636-0123

MediaTouch
A DIVISION OF OMT TECHNOLOGIES INC.
"AMERICA'S DIGITAL ORIGINAL"
MediaTouch Digital Radio for the new millennium. NOW!

BROADCASTERS GENERAL STORE
2480 S.E. 52nd Street
Ocala, Florida 34480-7500
Tel: 1-352-622-7700
Fax: 1-352-629-7000

Watch our web site as details on OpLOG-2000 are released at www.omt.net

Windows 95 and Windows NT are trademarks of Microsoft Corporation.

KGIL(AM): A Diverse Mix

► KGIL, continued from page 48
good AQH by broadcasting show tunes continuously?

After seven months of playing Beatles music exclusively, and having given up on news/talk entirely, KGIL began in July 1997 with a play list of 70 of the more popular theater soundtracks.

The station played soundtracks in their entirety. Where intermissions had been in the playhouse or the movie theater, commercials were plugged in. In that respect it was a good match. But in another, it was not.

"We found that people would rather hear individual songs from productions. That cut the play list down because really there's only one good song for each musical. So we had to build up a library," KGIL Operations Manager Jim Roope said.

More than 20 stations nationally run show tune programs on the weekends, but KGIL was the first known station to try the format full time.

After buying nostalgic film scores from mail order and spending hundreds of dollars at a time at the local Tower Records on Sunset Boulevard, Roope and Levine began to piece together a play list. Many of the old-time film scores were purchased on CD, others that were on vinyl were good enough reproductions that they were able to master them on CD for the station library.

Roope improved his knowledge of film and the stage, something he thought he never would do as a radio man, and began to bone up on the difference between Broadway, off-Broadway, and way, way off-Broadway.

"We found things that were really obscure, things that ran maybe nine times and closed. We had a number of shows that were true one-nighters, (they) ... stunk so bad. We ran into a lot of problems like that," Roope said.

Its show tunes shows walk the fine line between what's hot and what's not; what's on the big screen and what's on the boards.

On the play list is James Horner's "Titanic" title song "My Heart Will Go On" recorded by vocalist Celine Dion. The song often is played back-to-back with the Broadway "Titanic" score by Tony Award-winner Maury Yeston. KGIL plays all the recent Broadway scores from productions such as "The Lion King" and "The Scarlet Pimpernel," as well as a few off-Broadway titles from shows like "Sideshow," a short-lived production. Then there are the staples: "The Pink Panther" theme; "The Lion King" movie soundtrack title "Circle of Life" composed by Hans Zimmer; the "Men In Black" theme song; and several old-time theme score favorites.

KGIL advertisers are a diverse mix, as well. "Anything that is entertainment is on, from the local Civic Light Opera company to the bigger ones, like the Shubert Theater. And then there are some car dealerships," Roope said.

Between the ads, the film scores and the big-name entertainers are the announcements by knowledgeable movie and theater buffs, many interns at the local performing arts colleges, telling of a new opening at The Pasadena Playhouse or the Ahmanson Theatre or giving out the stats on a show or actor.

Roope readily admitted that the format is still in progress. "There's something missing," he confided recently. And, indeed, there was. Ratings earlier this year confirmed his uneasiness. "We are showing a 100,000 (cumulative audience). But, again, what we found with the show tunes format is that people were listening about two hours a week, and that was not long enough to make a quarter-hour showing," reported Levine. The average age of the KGIL listener was 40-plus.

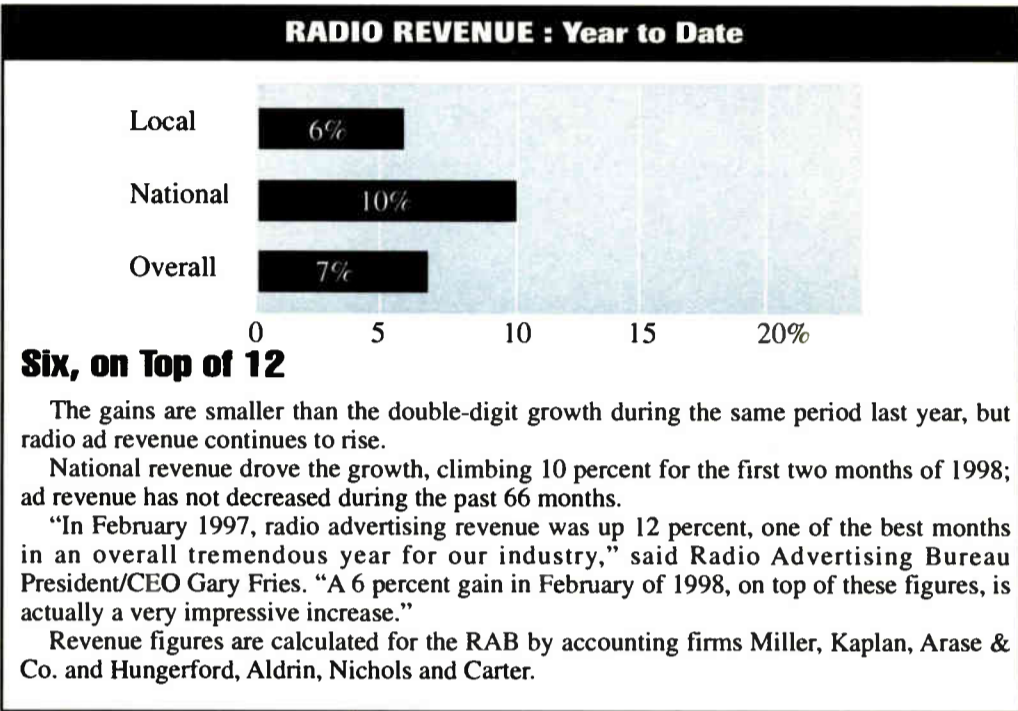
Still, Levine and Roope had faith that show tunes could make it in Los Angeles.

In March, they added that little "something missing" by changing to a hybrid format of show tunes/MOR. The station still plays all show tunes weekdays during morning and afternoon drive and all day weekends. The rest of the time it plays "music of your life" adult standards, 80 percent of which are based on popular show tunes, according to Levine. "What it is going to do is increase our

tune-in," Levine predicted.

It also helps that KGIL expanded-band coverage since December now includes all of Los Angeles and Orange counties as well as the coastline down to San Diego. As a 5kW directional on 1260, KGIL had been limited to half of Los Angeles proper.

Levine does not have illusions about KGIL reaching superstar station status, nor does he expect the hybrid KGIL format to grab center stage in the market. But he hopes to see a ratings boost as more people discover his show tunes/MOR format.



Schedule the best in "OLD-TIME RADIO" with

When Radio Was...

Hosted by Radio Hall of famer STAN FREBERG. Jack Benny, Burns & Allen, Suspense and hundreds more! Five shows per week - 54 minutes each

Now Radio Listeners Can "Watch" Their All-Time Favorite Hollywood Stars and Movies on...

RADIO MOVIE CLASSICS

With Host Jeffrey Lyons
1 Show per Week - 60 minutes

RADIO SUPER HEROES

With Host Kris Erik Stevens
The Greatest Kids' Shows in Radio!

1 Show per Week - 30 minutes

All shows are barter, no cash payment. For free cd demo, contact David West
Dick Brescia Associates
(201) 385-6566

HEARD ON 500 RADIO STATIONS!

Is Your News Feed Eating Away Your Profits?

United Press International's radio network is substantially less expensive than your current news feed!

How? For starters, UPI has no required packages. You pay for only the programming you need. With UPI you're never charged for special events coverage.

UPI offers news 24 hours a day, sports 16 times a day, and business all day long, including morning reports live from London, all without network commercials. We also have the industry's widest variety of one-minute features that are topical, timely and keep listeners interested.

Call now to find out how much you can save by gaining the UPI advantage.

UNITED PRESS INTERNATIONAL

(800) 503-9993

Broadcaster Caray Dies

► CARAY, continued from page 46

Caray was better-known and more highly regarded even than many Cubs players, whose performances often were disappointing. Always hopeful, Cubs fans have not been able to celebrate a pennant since 1945.

When Caray traveled, he was frequently mobbed by fans all over the country, many of whom were not Cubs supporters. But his bond with the Chicago fans was special. "When Harry came aboard," one man wrote in a special tribute section on the Cubs' web page, "he helped restore pride of the game itself to all the team supporters. They say (Cubs fans) are long suffering. But I must say, I never, ever felt

that way with Harry around."

Caray liked to boast that he never missed a game in his first 41 years. But in 1987, when he suffered a stroke, he missed the first two months of the season. There was some doubt he would return at all, but an outpouring of fan support brought him back into the broadcasting booth.

As he told Vine Line, the Cubs' official newspaper, in 1987: "I can't describe the effect it had on my entire being. The realization came down to, 'You gotta get well.'"

Caray was looking forward to the 1998 season, when he would be joined on a regular basis by his grandson Chip, who had worked for the Orlando Magic.

His son Skip also is a professional sportscaster, covering the Seattle Mariners.

On Valentine's Day, Caray collapsed. He died four days later of cardiac failure.

Last goodbye

According to Randy Echols, WGN's assistant program director, Caray's Feb. 27 funeral was "an amazing sequence of events ... there was this outpouring of upbeat emotion." A 25-foot-square area on the Walk of Fame near Wrigley Field was transformed into a fans' shrine, filled with flowers, beer and other items including a stuffed bear wearing Caray's trademark glasses.

Thousands of people lined up at Chicago's Holy Name Cathedral to pay respects. WGN broadcast the funeral in its entirety.

Antics notwithstanding, Caray was



Harry Caray

respected as a broadcaster. He was chosen as announcer for the 1964, 1967 and 1968 World Series, inducted into the Baseball Hall of Fame in 1989, and named Announcer of the Year by Sporting News seven times.

■ ■ ■

Dawn Culbertson is a frequent contributor to RW.

A World of Possibilities. . .

FM30 6 to 33 watts

FM250 50 to 275 watts

FM100 20 to 110 watts

FM500 100 to 550 watts

FM2000 400 to 2200 watts

FM1000 200 to 1100 watts

- ❑ Fully integrated, *solid-state* transmitters, exciters, translators, and satellators engineered to provide broadcasting *confidence*.
- ❑ Highly *efficient* and *reliable* power amplifiers *innovatively designed* to be lightweight and compact.
- ❑ *Custom configured* and *delivered within days!*

Give Us a Call When Your World Depends on Ours!

CROWN
broadcast
Innovative Technology for Broadcast Confidence

1718 W. Mishawaka Road, PO Box 1000, Elkhart, Indiana, U.S.A. 46515-1000
Phone: 800-294-8050 or 219-294-8050; Fax: 219-294-8222
Email: broadcast@crowntel.com; Internet: www.crownbroadcast.com

Arbitron Reaches Out

► ARBITRON, continued from page 51 providing diary information.

"There are a lot of things in the air," said Guyther. "The next three months will bring about some major movement" for Arbitron.

■ ■ ■

S.D. Yana Davis is a free-lance writer and marketing consultant in Knoxville, Tenn. Contact him via e-mail at yanajune@aol.com

The Arbitron Company: Facts & Figures

President: Stephen B. Morris
Parent Company: Ceridian Corp., Minneapolis, Minn.
Work force: 530 full-time, 175 part-time
Headquarters: New York City
Sales offices: Atlanta; Chicago; Columbia, Md.; Dallas; Los Angeles; and New York City
Research and Technology Center: Columbia, Md.
1996 Revenue: \$153.1 million

Founded in 1949, Arbitron has been a subsidiary of Ceridian Corp. (formerly Control Data) since 1960.

Arbitron Radio is the largest segment of The Arbitron Company, serving 2,300 radio stations. Founded in 1965, the Radio Station Services unit is headed by Pierre Bouvard.

Advertiser Agency Services, which is headed by Henry Laura, serves 3,500 advertisers and agencies.

In Europe, Continental Research, a unit of The Arbitron Company, conducts market research in the media, advertising, financial and telecommunications arenas.

Source: Thom Mocarisky, The Arbitron Company

Gospel Radio Enjoys Popularity

► **GOSPEL**, continued from page 48
soundtrack from "The Preacher's Wife" and hit-singles like "Stomp" have helped make the format more high-profile, there is a new sensibility at work in gospel radio today that applies many of the production tools and techniques used in other formats to deliver a product that blurs the line between secular and belief-based radio. Gospel radio is succeeding where it counts — with the listener.

Strongest in the Southeast, the on-air sound of black gospel radio is taking a page from the urban AC format.

At gospel-formatted WPGC(AM) in Washington, a quick scan of the programming would not give a casual listener much indication of the strong beliefs driving the station. This is not lost on station PD Matt Anderson, who feels fortunate to be able to do what he loves in a way that keeps with his Christian beliefs.

That WPGC(AM) was urban AC-formatted only 14 months ago shows a migration of the mindset that is helping Anderson and his counterparts around the country bring a new energy to the format. "The way I am programming is a mix of traditional black gospel and urban contemporary gospel," Anderson said. "With urban contemporary being a lot more rhythmic, a lot more synthesizers involved, the sound is slicker, more well-produced. And we mix the two, not one after the other, but in transitions, throughout the day."

Speaking good news

WPGC has managed to attract a completely Christian on-air staff to host its live 24-hour lineup. The latest addition is a gospel recording-artist/comedian, Broderick Rice, teamed with familiar local gospel radio talent Tracy Martin during morning drive. "You find a lot of secular stations (using recording/performing artists), but this is a first for gospel radio," Anderson said.

Anderson keeps his focus on the station's image, which he feels is "contemporary in approach" and employs "exciting, creative promos and drop-ins."

"I want the station to sound top 40," said Anderson, who works with music dayparting, song positioning and production and scheduling of hot promos to build the WPGC image. Upon Anderson's arrival last summer, he proceeded to trim the station's music library by half, filling out the new sound with product from ever-present record labels.

Lest anyone sense an absence of the aforementioned Christian beliefs in the mix, WPGC's PD is quick to correct. "Like any other business, we look for people who are committed to the product, or believe in the product. In our case, the product is not just the music, but the ministry in the music. So we look for people that know and believe in what we do."

While Anderson said the nation's capital can boast of some of the country's highest gospel music sales, the top gospel stations in the country are in Baltimore and Dallas, while gospel stations in cities like Jackson, Miss., Baton Rouge, La., Savannah, Ga. and Macon, Ga. are in the top 10 in their respective markets, with AQH shares of roughly 10 percent. Many of these stations are helped by larger than usual economies of scale as part of conglomerates like CBS (in the case of WPGC) and Clear Channel Communications properties like KWAM(AM) in Memphis.

WPGC's Anderson puts the gospel/Christian formats in perspective: "Black gospel has an 'urban' sound: more rhythmic, with an emotional appeal. Southern gospel is easily thought of as 'country gospel,' and contemporary Christian, perhaps not truly a gospel format, plays music in a 'pop/rock' vein."

AC gospel

Mike Kirtner is the president/GM of WCMI(AM) in Huntington, W.V. The southern gospel-formatted station is described by Kirtner as "basically, an adult contemporary presentation of gospel music, which in our case has replaced the 'traditional' country format as many country sta-

tions have moved to 'hot' country."

Think of it as country radio from the '70s. Many of the four-part harmony groups, the Statler Brothers and the Oak Ridge Boys are staples of southern gospel, mixed with similar-sounding contemporary groups."

Kirtner, like Anderson, sees the fortunes of the station growing. "We're not quite mainstream yet, but the music has seen growth over the past two years ... something like 20 percent. We are gaining more acceptance."

Consolidation has put Bruce Demps at the helm of four stations in Memphis, one of which is KWAM(AM), "The Light."

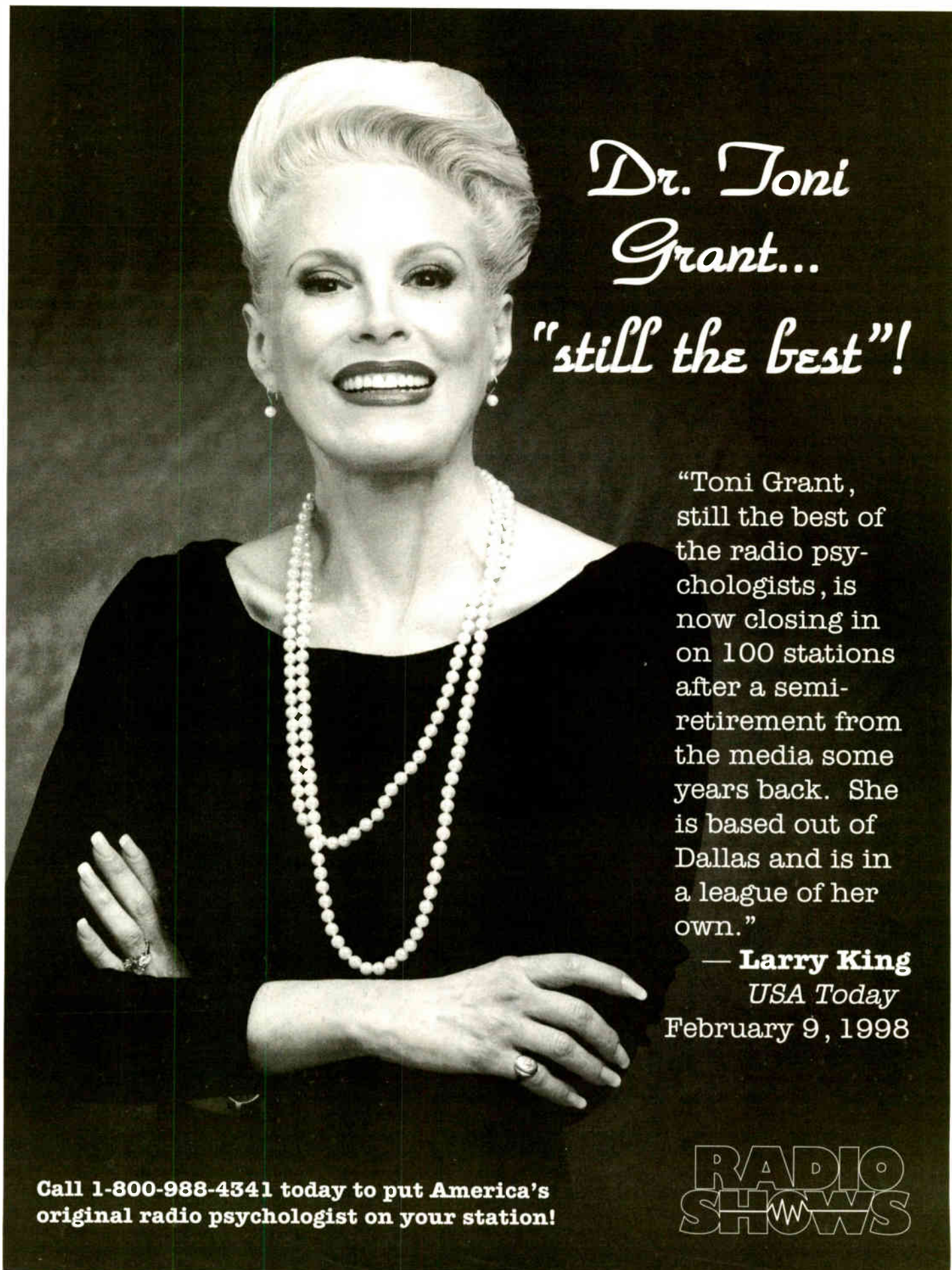
"I feel that gospel is finally getting its rightful place in the minds of major

advertisers and agencies as being a (format) that delivers results," Demps said. "That's why I think gospel music is exploding on both AM and now FM."

Like WPGC, Demps' gospel station is less than a year into the format. Demps positions the "contemporary gospel station" as an aggressive promotion vehicle targeting people under the age of 40. Demps draws on non-gospel stations in the group for presentation and marketing/promotion concepts that make the stations more visible in the market.

Demps said mixing a Christian message into a commercial medium requires maintaining respect for — and the respect of — the audience.

"We need to be careful who we allow to use our airways to promote their products and services."



Dr. Toni Grant...
"still the best"!

"Toni Grant, still the best of the radio psychologists, is now closing in on 100 stations after a semi-retirement from the media some years back. She is based out of Dallas and is in a league of her own."

— **Larry King**
USA Today
February 9, 1998

RADIO SHOWS

Call 1-800-988-4341 today to put America's original radio psychologist on your station!

Products & Services Showcase

For more information on the products shown below, circle the appropriate Reader Service No.(s) on the enclosed Subscription/Reader Service card or contact the advertiser directly.



Excalibur Electronics

CDA-1

Composite Distribution Amplifier



This 1 in, 3 out distribution amplifier allows you to distribute stereo composite and/or subcarrier signals as easily as audio.

- ◆ DC-100 kHz frequency response
- ◆ 90 dB signal/noise ratio
- ◆ +6 dB to -20 dB gain range
- ◆ Individual 20-turn output trimmers
- ◆ 1 3/4" rack mount enclosure

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

READER SERVICE NO. 75

Automating Programs? No Problem!



The NEW SUB-03a Subaudible Tone Decoder

You can use the Sub-03a to automate your network feeds or take the guess work out of when to cut away from networks. The decoder listens to your audio source and gives you dry contact closures from any service that sends subaudible tones, including satellite receivers, RPUs and POTS frequency extenders. The decoder's relay contacts interface easily with your automation system. The Sub-03a is a reliable and inexpensive problem solver. The Sub-03a can be ordered set for 50/75Hz operation. Rack mount option (as shown) available. List Price only \$329.00. Check our website for more info or to download the latest manuals.

The Sub-03a's features include:

- Interlocked, dry relay closure outputs for 25, 35 & combo.
- Balanced or unbal. audio input.
- Provides filtered, balanced out.
- Indicators for all three tones, audio level setting & power.
- Enable input lets you (or your automation) prevent closures.
- Uses standard 1/4" TRS (head phone style) jacks for all audio.
- Db-9 and screw terminal outs.

CircuitWerkes

3716 SW 3rd Place
Gainesville, Florida 32607
(352) 335-6555 / fax 352-380-0230
<http://www.circuitwerkes.com>

READER SERVICE NO. 49

A Variety of Programs

POWERLINE *Adult Contemporary*

MASTERCONTROL *All Talk*

COUNTRY CROSSROADS *Current Country*

THE BAPTIST HOUR *Traditional Christian Music*

The Media Technology Group of the SBC
Fort Worth, Texas 76116

1-800-266-1837 or 817-737-4011, ext. 249
FAX: 817-377-4372 • E-mail: young@rtvc.org
Web Address: www.nomb.net/mtg/rodio.htm

syndicators of public service programs

READER SERVICE NO. 23

HIT THE ROAD, JOCK!

Produce and run your show On Location **EXACTLY** the way you would from your studio!

THE MITS ROADSHOW SYSTEM

The first and only system that lets you use and control your multi-line phone system from your remote broadcast location. Includes full status and control of up to 15 lines. LCD "screener" call-data display. 5 ACTION KEYS for remote control functions and much more!



Take control of your phones! CALL:

Broadcast Telephone Systems



email: info@innovadev.com
web: www.innovadev.com

1-888-890-7424

Innovative Devices, Inc.

READER SERVICE NO. 22



ERI, SHPX series FM Antenna and λ Mounting System

READER SERVICE NO. 100



your single source for:

- FM Antennas and Filters
- λ Mounting System
- Towers & Poles
- Structural Analysis & Reinforcing
- Lightning Protection
- Grounding Systems
- Installation & Service

Call for special package price.



ELECTRONICS RESEARCH, INC.

812-925-6000 www.ERInc.com

FM TRANSMITTERS 10W \$950....25W \$1,100

Composite Input, Type N Output, Frequency Agile



PRICE
REDUCTION

CALL (toll free) 888-411-5174
FOR DETAILS

PTBK

READER SERVICE NO. 130

Attention Manufacturers!

Is your company or product featured in our pages? Distribute extra copies of Radio World articles to your customers

with Radio World's reprint service.

For rates and more information, call Michele Inderrieden at

800-336-3045
extension 159





NFCB Hires Pierson

Carol Pierson steps in as the new president and CEO of the National Federation of Community Broadcasters (NFCB). Pierson previously worked as the NFCB director of federation services and brings experience in public radio management and program production to her new position.

Pierson replaces Lynn Chadwick, who had headed up the NFCB since 1987.

Jones Radio Adds Staff

Bill Western and Larry Shipley join the full-time, on-air staff at Jones Radio Network Classic Hit Country. Western will work the morning shift while Shipley will man the overnights. Michael

Floe has also joined the Jones staff as the Soft Hits overnight air personality, while Geina Horton comes aboard as the afternoon host of the Rock Alternative Format. Steve Lewis has returned to Jones Radio Network as host of the U.S. Country morning show.



On the management and programming side, Eric Hauenstein has been upped to president and general manager while Tom

Watson has been named managing director of Jones Radio Programming Services. Phil Barry steps in as vice president of programming, relinquishing his operations responsibilities to Jim Murphy.

In marketing news, Debbie Stark has been named director of advertising sales.

Maupin Gerard Promoted at Indianapolis Cluster

Susquehanna Radio Corp., owner of Indianapolis radio stations WFMS(FM), WGRL(FM) and WGLD(FM), promoted Monte Maupin Gerard to vice president and market manager of the Indianapolis radio stations.

Maupin Gerard has been the general manager of WFMS since 1989 and vice president and general manager since 1992.

Davicom Appoints Jones

Davicom Technologies has appointed Elaine Jones as director of marketing and sales for the company's new U.S. subsidiary, Davicom Technologies Ltd. Her duties include the management of promotion and distribution of products in the United States.

Davicom Technologies Inc. of Quebec



Elaine Jones

is a manufacturer of telecommunications equipment, including remote control systems for broadcast transmitters, repeaters and other remote facilities; antennas and RF equipment for land-mobile and low-to medium-power FM applications; and a line of audio/video detection and switching products.

Schneider Joins BE

Broadcast Electronics has appointed John Schneider to its management team. Schneider will oversee International



John Schneider

Sales for Latin America, the Caribbean and Mexico. Schneider previously served as the owner and president of RF Specialties of Washington Inc. in Seattle.

What's Missing?

An Affordable Digital Console To Complete Your All Digital Air-Chain

DYNAMAX MX/D

Digital Audio Console

So your old on-air console needs to be replaced. Most of your air chain is digital and you know digital broadcasting is just around the corner. What do you do? The Dynamax MX/D Digital Console makes perfect sense. It offers pristine 24 bit internal processing to handle both digital and analog inputs and outputs with the familiarity and straight forward operation of analog consoles. A perfect blend of digital sonic quality, performance features and legendary Dynamax reliability, the MX/D is the right console to meet your current needs and take you well into the 21st Century!

Complete Digital On-Air Console Under \$10,000

- 8 faders controlling 16 total inputs
- Choice of analog or digital input modules
- 3 digital plus 3 analog outputs (stereo PROG and AUD plus mono)
- AES/EBU and S/PDIF digital inputs with sample rate conversion
- Independent A/B channel remote start and stop
- Solid steel construction with excellent RF immunity
- Built-in cue amp/speaker, headphone amp and count up timer

FIDELIPAC®
Broadcast Studio Equipment
Fidelipac Corporation Division of Amplifonix
2707 Black Lake Place, Philadelphia, PA 19154 . USA
TEL: 215-464-2000 . FAX: 215-464-1234

Studio Sessions

Radio World

Resource for Radio Production and Recording

April 29, 1998



The Agony of the Abused Voice.
See page 66.

B400 Board Good for Production

Keith Spencer-Allen

For broadcast production people who may have considered the Soundcraft B800 console but found it too elaborate for their needs, the B400 broadcast console is a choice to consider.

The B400 was launched in 1997 and is now in full production. It draws on the experience Soundcraft gained with the B800 air board, but it is more closely designed for radio production. It is also able to perform as an on-air mixer if needed.

The B400 comes in five versatile frame sizes to match the number of modules each holds, from 24 to 56. Soundcraft offers a selection of mono, stereo and stereo telco input modules, and either mono or stereo groups, each only a single module in width.

Versatile console

To complement the module selection, there are the three essential modules that provide the B400 with its Intercom/Talkback, Monitor and Master Stereo controls. This completes the console bus structure of eight audio groups, a stereo output, a separate mono output, three mono Aux and one stereo Aux.

There are a range of options, including transformers on the I/O and a choice of fader types. Additional tailoring of con-

sole audio and control functions can be done on a module-by-module basis by resetting internal jumpers. There are 15 possible changes that can be made on a

It is worth noting that LED indicators are on all console switches. The signal can be routed to any of the eight groups in pairs and/or the main stereo bus with



Soundcraft B400 Console

mono input module alone.

Soundcraft can supply a console set up to match customer needs, but the manual makes the board easy to reconfigure right at the station.

The Mono Input module offers both mic and line balanced inputs with a shared gain control. All phantom power and phase switching is provided, as well as a tone button that routes the output of the test/slate oscillator to that channel.

the stereo pan control being positioned at the bottom of the module.

Auxiliary sends

There are four Aux sends, all individually switchable for pre/post fader, with Aux 4 being stereo. Internal jumpers allow the auxiliaries to be set pre- or post-channel mute. The module also has a direct output that can be controlled by

See B400, page 68 ►

Sennheiser Scores at World Cafe

Tom Vernon

New microphones are welcome arrivals at the studios of the World Cafe. The endless parade of singer-songwriters that passes through the haunted house on Spruce Street affords many opportunities to experiment with state-of-the-art equipment.

Recently we checked out the new Sennheiser MD 425 dynamic microphone. Despite the rather modest price, we found it to be a surprisingly good performer.

The MD 425 comes with a quick-release clamp and instructions, all in a foam-lined black plastic case. Multicolored windscreens are available as an option.

Sing out

With a response of 40 Hz to 18 kHz, a supercardioid pickup pattern and lockable on/off switch, clearly this is a microphone designed for vocals. Wanting to do a thorough job, we tested the MD 425 both in the studio and on the road. We compared it to one of our standard vocal mics, the Shure Beta 58A.

The response is smooth and crisp. One vocalist said she preferred it to the Beta

58 because it did not over-accentuate the high end in her voice. But the MD 425 really showed its stuff on a road trip. During our new late-night show "Dystopia," bands are taped at a club in front of a rowdy Friday night crowd. We decided this was a good environment to test Sennheiser's claims about the mic's excellent feedback and noise rejection capabilities.

Even with the mic right at the monitor, there were no howls or squawks.

The supercardioid pattern of the 425 also works well when you are isolating vocals, even in harsh environments.

One act, Bardo Pond, is a very loud band. Yet with all the guitar amps cranked and even with monitor bleed-through, this mic isolated a perfect vocal without feeding back through the wedge (stage fold-back speaker).

The lead singer could hear herself perfectly, which is something you cannot take for granted in this environment. The on/off switch seems silly in the studio,



The Sennheiser MD 425 Dynamic Microphone

but really helps in a live setting when it comes time to isolate sounds in the monitors.

Yeah, but ...

While we were enthusiastic about the MD 425, there were a few minuses. In the studio, it did not sound as bright on male vocals as the Beta 58s. And it was difficult to make these vocals stand out in the mix.

Popping Ps were more of a problem with the 425 than with most of our other mics. A wind-screen might have helped solve this, but our demo didn't come with one.

If there is some magic to how a relatively inexpensive mic can work this well, Sennheiser isn't talking. A partial disassembly certainly did not reveal anything exotic.

Perhaps the best endorsements for the MD 425 don't come from us, but from the vocalists who asked us for info on the

See SENN, page 69 ►

NPR Maps a Battle Plan Of Action

Rich Rarey

When things change, do they really stay the same? Um, sort of.

The NPR engineering staff was invited to a meeting in mid-March, the subject of which was unknown. In this meeting, NPR Chief Operating Officer Peter Jablow



announced the NPR Engineering and Information Technology Division would be under the new leadership of Mike Starling, who would become acting vice-president of the division, and the division would be known simply as "Engineering."

Starling spoke to the assembled broadcast/recording technicians and shop engineers about the quality of aural product we produce and the increase of quality in the future. To illustrate, he turned a blank page on an easel to reveal the words, "Become one of the leading broadcast engineering organizations anywhere."

Watch this

"This," he said, "has been our goal. But I propose to take it further." With a bold stroke of his pen, he crossed out the words *one of*, then continued, "So that our goal will be to make NPR *the* leading broadcast engineering organization anywhere."

Strong, challenging words, we thought, but how is this to be accomplished?

We learned that our current vice-president, Donald R. Lockett, was to become the NPR Chief Technology Officer, and logically extend his talents into looking ahead into the misty techno-future for the benefit and security of NPR.

His VP position was officially defined in a five-page roll-out plan outline. In spite of the document containing the words "synergy," "technology assets," "revenue alliances" and "grow financial security," it was a clear testament to a

See NPR, page 65 ►

► NPR, continued from page 64
company that is looking to embrace what is ahead, and examine ways to build more listeners and strengthen its member stations.

We caught up with Don on his first day of CTO-ship, and wondered aloud where his office would take the company.

Make it fit

"Every day," he said, "we are bombarded with offers from high-technology companies that have software or hardware that offer alternatives to traditional media. Are they a threat, or an opportunity? Do they 'fit' with NPR?"

He said such proposals were funneled to the COO, or directed to NPR president Del Lewis' office in the past, and they did not have the means to study and filter them thoughtfully.

"Technology isn't driving the train, but at least we'll have an understanding of all the opportunities that come in," Lockett said.

There have been times in public broadcasting where opportunities were missed. For example, PBS decided years ago that it could not support congressional coverage; thus came about the opportunity for C-SPAN. Lockett noted, "Imagine if PBS today was receiving the stipend (from cable companies) that goes to C-SPAN."

What are the opportunities facing NPR? In two words, *ancillary distribution*: creation of an NPR programming "stream" that does not compete with any NPR member station's signals — doesn't even necessarily generate revenues —

but is self-sustaining and builds listeners.

These could include airline and airport entertainment services, DTV, cable-direct, video-piggybacking and the most intriguing, "Radio With Pictures," where viewers can watch, say, Bob Edwards in one section of the screen doing his thing during "Morning Edition," and see the latest stock, traffic, weather or annotated headlines in other screen quadrants.

Man with the plan

Don's Roll-Out Outline defines three key plans: Internal to NPR, Member Station Action, and External to the Industry.

The Internal plan calls for NPR to assess what it now has technically; to form a group represented by its technical bodies to evaluate how we can best use what we have; provide technical reference and research assistance to the rest of NPR and increase the NPR Internet presence through Netcasting. The internal plan, Lockett said, is to "leverage our technical assets for NPR's financial strength and security, as we wean ourselves from tax dollars."

For NPR member stations, a five-point action plan points up the strength of "digital." First, a working group from the membership will be formed to "build the case for public radio's digital future and funding for production as well as digital transmission and distribution technologies," as Lockett put it.

Second, the technology office will provide member stations assistance in reviewing their plans (and funding estimates) for digital conversion.

Third, the office actively will attempt to protect and preserve broadcast spectrum for use by member stations. The outline states, "The initial project will be the completion of a study to analyze potential interference to public radio stations from new DTV Channel 6 stations."

Lockett said protection for public broadcasters is extremely important. "We're competing (for listeners) with large conglomerates and need to maintain our justification for reserved spectrum, or risk losing it if we don't make a case. Also, in new spectrum allocations, public broadcasting was minimally considered in new spectrum sales," he said.

Fourth, the plan calls to "promote radio interests as the television conversion goes forward," through something called a Digital Strategic Planning Steering Committee.

Comprehension

The committee's immediate tasks include providing compensation to public stations for costs incurred as a result of tower/antenna displacements, and shifting the burden away from public radio stations when DTV Channel 6 interference occurs (current FCC rules place the burden on public radio stations).

Fifth, the NPR technology office is mandated to work with six broadcast industry groups "associated with developing technical standards for terrestrial Digital Audio Broadcasting (DAB) systems and high speed data subcarriers."

For the Industry Action Plan, one of the three points the technology office is to seek revenue alliances with satellite

radio broadcasters, especially in international markets, to the extent the NPR strategic plan allows. According to the plan, "The key to this proposition is the development of a 24-hour program service." This requires the Technology office to work with NPR's Programming units to create this service.

Second in the action plan is use of datacasting for NPR and its member stations to generate revenue. This would include — among other services — high-speed data subcarrier, RDS/RBDS, and Intelligent Transportation Systems (ITS).

Lastly, the plan would determine suitability of NPR content for real-time and non-real-time delivery using Ancillary Distribution Technology, such as Personal Radio, Auto PC, digital cable audio, ground-to-air and satellite-to-air audio services.

The outline is summarized this way: "Digital technology has brought about major changes in what broadcast companies may provide in products and services. NPR must provide content and technical services that enable the company to remain competitive and grow financial security."

Translated, it means "make great programming for *people*, that *sounds* expensive, but isn't."

Until next month, I remain,
Your ob'd't eng'r.



Rich Rarey is technical director of NPR's "Talk of the Nation," based in Washington. He can be reached at rrarey@npr.org



MAGER SYSTEMS

The Best in Sound Furniture

Designed, Fabricated, Delivered and Installed

21602 N. Central Ave., Suite 1

Phoenix, Arizona 85024

TEL: 602-780-0045

FAX: 602-780-9860



KMCG - San Diego

TIRED OF THE SAME OLD STUDIO FURNITURE?

For over 18 years Broadcasters nationwide have come to Mager Systems for our exquisitely designed studio furniture. Our unique construction, along with solid wood and quality materials, means your furniture is built to last. In fact, we've made the design and construction of studio furniture as much an art form as it is a business. Every installation is backed by a 10 year warranty. Our quality is affordable and can accommodate every budget from economy to showplace. Call today and discover why Mager Systems is the best in Sound Furniture.

AVONITE®

Mager Systems is very proud to offer Avonite Solid Surface. Avonite is a non-porous solid surface material with depth and richness of stone in an easy-to-care for composite surface. Avonite is available in over 60 natural looking colors. Highly stain and scratch resistant, it boasts durability with confidence of a full 10 year warranty.



KXGL - San Diego



KXGL - San Diego



KOOL - Phoenix

Circle (1) On Reader Service Card

Notes From California's 'V/O Guy'

Travis

My name's Travis ... just Travis. I go by the single name professionally. It's a long and not-very-interesting story.

I am a full-time voice-over announcer. I got here by way of being a radio personality, broadcast engineer, recording studio engineer, video and audio producer/director and writer. My background places me in a good position to share some notes on commercial production and voice-over announcing, which you will find interesting.

The real difference

One question that I get every now and then from advertising people is, "What is the real difference between agency-produced spots and spots produced by a radio station?" A common perception is that spots produced by outside agencies or production companies have a certain polished sound often lacking in station-produced spots.

The answer to that question is time.

When I record a spot for an advertising agency, it is not unusual for a 60-second spot to have over 30 man-hours placed into its production. My time as the voice-talent is seldom over 20 minutes, but remember: also at the session is a recording engineer, the producer/director, and often the writer.

Can a local radio station achieve the Hollywood Agency sound in its production? The answer is yes but time and budget constraints make such production difficult to achieve.

By the time the spot is completed, the writer may have spent several days with the client and account executive. The producer/director has taken an equivalent amount of time, some of which was spent choosing me as the voice. The engineer will spend a few hours editing out the bad stuff, then equalizing and processing the good stuff. The agency account executive and the client will spend days working out the direction of the campaign.

When I compare this scenario with my radio production days, it is easy to see why agency spots have that *agency sound*, when compared with most station-produced material.

Crank 'em out

Back in the good old radio days, it was rare when I spent more than a half an hour on a spot, serving as writer, talent, director and engineer. Regardless of the aptitude I might have had in those areas, the time spent on any of these tasks was less than 1/50th of what that is spent on a spot produced by an agency.

There are other factors that define the difference between radio- and agency-produced spots. The director can choose talent from a much wider range of individuals. The recording studio often has greater flexibility for sound design, the trade-off being its reduced efficiency compared to a single-task radio studio.

Sound effect and music libraries are much more extensive, and, often music is created just for the particular production.

Can a local radio station achieve the Hollywood Agency sound in its production? The answer is yes. It can be accomplished sometimes, but the reality is that time and budget constraints make such production difficult to achieve.

When I ran and engineered my recording studio, I assigned a "sleaze level" to my clients. Some clients were very quality conscious — low sleaze — they spent a long time on each spot and charged their client accordingly. I liked working with them because I could be proud of the work that was accomplished.

Other clients were fast and cheap — ergo, high sleaze. Their main concern was cost, and they offered their clients cheap commercials. I liked working with them also; although I was not particularly proud of the work, the sheer pace made the work a lot of fun.

The performance

I am sometimes asked by people working in radio if there is much difference in the performance aspects of voice-over work compared to radio station production. The answer is an emphatic yes.

The primary difference between agency work and radio station production is in the direction the talent receives. At

my old station, I had to direct myself. This has its good and bad aspects. On the plus side, it allowed me to create a production where I had total control of every element. The production would conform to my own vision of what the spot should sound like.

On the minus side was the fact that there was only one set of subjective ears to pass judgment on a piece while it was being produced.

As voice talent, my role in the total concept is reduced considerably, and my job becomes one of providing an interpretation of copy to satisfies the *director's* vision. I am no longer the boss of the production, but merely one of several individuals who contributes to the finished product.

It took me a while to get used to that idea — that I can only guide one small part of the production and adjust my performance to match someone else's creative concept. The loss of control took some getting used to.

What's more, in a typical year, I will work with dozens of different directors. Each will have his or her own style of directing. Some will be experienced, some will be green. Some will direct me in ways I agree with, while others will have concepts I will find difficult to understand. Very few will click with me. Others I won't get along with creatively at all. It happens.

Most directors consider me to be just one more VO talent that happened to be right for the particular piece they were producing. There are a few directors I have developed a friendship with who will never use me — if that sounds odd, so will this: I would not *want* to be in their productions because, creatively, we are on totally opposite poles.

Now do it like this ...

Part of the job of a voice-over announcer is to provide the performance the director is looking for.

Some directors, like many in the communications business, have real trouble communicating. Often the sound a director wants is difficult to describe in words, because he or she is looking for a certain feeling.

Other times I am asked to perform the impossible and warp time itself. Say the copy is long and I am having trouble

getting it to fit in 60 seconds. The director asks me, "Can you give it more of a laid-back sound? It's sounding a little rushed." I often pull this off, but I really couldn't tell you how.

Sometimes directors have no idea what they want. They only know that what they have just heard isn't it. Usually in these situations, the answer is to simply throw more energy into the performance, and simultaneously try something — *anything* — different. That often solves the director's perceived problem immediately.

Bad copy is another problem. Because the agency scripts often go through layers of approval processes, sometimes with legal ramifications, they often cannot be changed at the session.

But hey, that's another story for another time.

■■■

Travis is a California-based voice-over talent who occasionally posts his experiences, often on the Compuserve Broadcast Professional's Forum. He can be reached at Ttravis@compuserve.com

The Agony of the Abused Instrument

Alan R. Peterson

If you were to name the most important item in the radio production room, you would probably give up long before you got around to naming ... *your voice*.

When you think about it, all the digital gimmickry and production music



That 'Great Sound' you hear in your headphones may slowly be destroying your career.

CDs in the world will be of no help if you have no voice to record. You often hear pro announcers use the phrase "protect your instrument" when referring to efficient and conservative use of the voice. And indeed they are right: except for characters or a comic effect, a voice that is raspy or damaged means a short career in radio.

That movie voice

Many announcers aspire to the technical heights of Don LaFontaine, Hollywood's most recognizable movie trailer voice, or the growly rumble of CHR "liner guys" heard on hundreds of radio stations around the country. But unless those qualities already exist in the talent's voice, trying to emulate them only results in damage. Pushing the voice too low or deliberately turning on the growl often results in a raw throat at the end of the day.

The American Speech-Language-Hearing Association (ASHA), based in

Rockville, Md., has a number of publications and free brochures devoted to protecting voice and hearing. One titled "Conserve Your Voice: You Speak for America" is filled with information and suggestions for using the voice properly. Originally written for politicians and other elected or appointed officials, the information in this brochure is appropriate for any professional voice user.

The material provided here has been adapted from the brochure, with the permission of ASHA.

Lose the butt

It seems obvious that smoking would cause potential damage to the voice, but a number of announcers have the vocal characteristics they do today *because of* a lifetime of smoking. Young announcers just starting out often admire the "pipes" of some veterans, not knowing that the deep pitch and rattle in the voices they admire was caused by abuse.

Other potentially harmful activities include excessive throat clearing and using the voice box, throat and neck muscles inappropriately. Tensing neck and shoulder muscles before speaking only results in a tense voice and a sub-standard performance.

Some tension is necessary to project the voice properly, but it does not come from the neck. More on that later.

Keelhaul the growl

So what can the conscientious production person do? First, change the act. If it is not possible to do "The Growl" without suffering, don't growl.

In his publication "Is Your Voice Telling On You? How to Find and Use Your Natural Voice" (Second edition, 1997, Singular Publishing Group, San Diego, Calif.), Dr. Daniel R. Boone, former president of ASHA, said to "Pick your pitch." Adopting a pitch

See VOICE, page 68 ▶

SAS 16000D

Digital



Wired thing

YOU MOVE ME

The 16000D Digital Audio Routing System is the powerful new compact switcher from Sierra Automated Systems.

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!

The 16000D makes everything easy—with programmable salvo switching, PC software control,

scheduled event switching, universal serial ports for distributed control networks, and employs the full range of SAS remote control panels.

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

Wired thing... We think you'll love it. For more information about the SAS 16000D, please give us a call.



Sierra Automated Systems and Engineering Corp.

2112 No. Glenoaks Boulevard Burbank, Ca 91504
818 840 6749 Voice 818 840 6751 Fax
www.sasaudio.com

Consider the B400 Console

► B400, continued from page 64

reallocating the level control on Aux 1.

An Insert point immediately follows. Its position within the signal chain also is adjustable via internal jumpers.

The three-band EQ features swept high- and mid-bands and a fixed low frequency. Internal jumpers allow the high frequency to be set to bell or shelving modes. There is also a variable high-pass filter with action up to 500 Hz.

Cue modes

Just above the fader are the Cue and Channel On buttons. Cue has two modes: when pressed briefly it latches; if pressed and held, it has a momentary action with the cue signal being sent to the cue busses if the fader is down.

Depending on the arrangement of the internal jumpers, it is possible to start and stop external sources in either latching or pulse operation when the channel is in Line mode and the Cue is selected. Raising the fader then cancels the Cue status and the feed goes to wherever it is routed.

The faders are VCA type, and it is possible to mute the channel externally and note the status on an LED. To the right of each input fader is an LED bar graph meter that displays levels from "signal present" to "+12" at jumper-selectable points. This is an important feature that helps locate off-the-scale signal sources right at the channel input, rather than seeing it on the Master L/R meter and searching the entire mixer for the offending input.

The Stereo Input module is similar, but is a line-level input only, with the ability to feed either or both sides of the stereo image with one leg of the stereo input. The EQ is simplified with a fixed HF band and a fixed high-pass filter. The Stereo Telco module is almost identical, but adds telephone use features, such as a clean feed output with dedicated level

control and a talkback switch.

The Mono and Stereo group modules are virtually identical with routing to the main stereo bus, a stereo return section, four Aux sends, Insert, Mute switching and External mute and cue. The only difference is that the stereo module adds a stereo image control.

There are three essential modules on the B400, the first being the Stereo Master module.

The Stereo Master module indicates the power supply status and includes an on-air button that disables some of the features. It also includes the four Aux master level controls, an Insert point, a simple limiter with switched threshold frequencies, a mono output control and the main stereo output fader.

The Monitor module handles all the obvious monitoring functions, including the ability to bring in eight external sources and to pick up any of six jumper-selected internal sources. Headphone levels and splits for monitor and cue are set here, along with alternate monitoring arrangements and master controls for the Cue system.

Talkback

The remaining module for talkback and intercom is labeled "Communications" on this British-made console. This strip houses the oscillator features; including slate, EBU tone and oscillator routing. It also covers the talkback section with gain and routing, level controls for studio and guest headphones, and the studio monitor feeds.

A selection of different meter bridges is available for the B400. One features a small speaker, talkback mic and meter selector. Another bridge offers lower sightlines over the console for interview setups.

The rear panel of the mixer is densely

packed with XLR sockets and European EDAC connectors — so much so that there is no room for labeling. However, all connectors are clearly laid out, and access to all signal and control paths within the mixer is effortless.

Fan-cooled

As with the B800, the mixer is fan-cooled, taking air in through the front panel and exhausting it to the rear of the module. Now before you jump ahead and compare this fan to the noisy unit found in your computer, you should know these are slow-running low-displacement fans, virtually inaudible in a quiet room.

The B400 has a compact, neat feel to it with easy access to controls. It can be operated simply without any problems, but it has the flexibility to perform complex radio tasks.

What is significant is that the same mixer seems capable of handling both simple and complex tasks. If there seems to be something it is not capable of, there is probably an internal jumper to help sort things out. Even in the console planning stages, users can assemble their choice of modules to suit requirements. The flexibility of the control surface and its range of internal jumper settings make the B400 a versatile console.

The B400 may be too sophisticated for basic airshifts. On the basis of what this mixer offers, however, anyone looking for a versatile console capable of production and on-air tasks should check it out.

■■■

For information, contact Soundcraft in Tennessee at (615) 399-2199 or circle Reader Service 34.

Keith Spencer-Allen is a free-lance consultant, writer and recording engineer based near London and contributes to our sister publication *RW International*.

Protecting Your Voice

► VOICE, continued from page 66

that is comfortable and natural allows enough latitude to vary the pitch and inflection, offering a more lively pattern of speech.

Nobody said The Growl was desirable in every instance. Mason Adams became the voice of Smuckers preserves and jams with a homespun-type voice bordering on the tenor range. He once described his voice as sounding like a cracked clarinet. So it is possible to do a good job with the voice that was given you at birth.

Drink up

Boone also suggested keeping water handy. By keeping the throat and vocal folds moist, the voice stays strong.

And Boone means *water*: that cup of coffee intended to jump-start the production director's day is probably doing more bad than good. Caffeine may dehydrate the vocal folds, as would alcohol. A water squeeze-bottle is a good accessory in the production room.

The tendency to take antihistamines during hay fever season will do a lot to alleviate the ailment, but will also dry out the vocal folds. Boone recommends more water to compensate for the drying effects of the medicine.

Proper projection is a must, even for voice talent who "swallow" microphones. This is where Boone recommends the tension described earlier.

He said to tighten the stomach muscles, not the muscles in the neck and throat, to provide enough support underneath the voice.

This tightening is what gives singers the support needed for long sustained notes and wide dynamics. The tension exists even for soft, quiet passages.

Can't speak

Inevitably, a production announcer will come down with laryngitis. According to ASHA, the condition will go away in a day or two, don't ignore the problem.

In other words, you gain no benefit from coming to work if you have no voice. Whispering does not help either. Simply stay quiet until the condition improves.

ASHA suggests consulting a speech-language pathologist for vocal training if extensive or loud talking becomes a problem. Otherwise, vocal training with a singing coach or acting instructor can help establish the fundamentals for proper use of the voice for radio and for commercial production.

■■■

For information on other brochures, contact Amanda W. MacDonnell at ASHA in Maryland at (301) 897-5700, extension 259. Dr. Boone's suggestions were included in the ASHA brochure and are used here with his permission.

Software Recreates Sonic Spaces

Read G. Burgan

How would you like to produce your next recording project in any sound environment in the world? Now you can — well, almost — with the Sonic Foundry DirectX Acoustics Modeler Plug-In for Sound Forge 4.0.

The Acoustics Modeler Plug-In, or AMPI, is two programs in one: First, a digital audio processing tool that allows you to add the ambiance of real-life acoustical environments to an existing recording; second, a sampling tool that enables you to create your own library of acoustical environments.

AMPI's ample samples

Engineers from Sonic Foundry analyzed a number of real-life environments including churches, civic centers, auditoriums, recital halls, stairwells and even bridges. At each of these locations, they recorded accurate samples of the acoustics; in some cases from several different points inside the acoustic space, including front-

center and balcony.

They also created more esoteric samples including ribbon microphones, and even one amusingly called "Old High School Principal Microphone." All of these samples are



AMPI Can Recreate Any Sonic Space

contained on a CD along with the basic AMPI software.

Note these are not "samples" in the sense of *music* samples, such as the sound of a flute note or a drum hit. These samples are digital representations of the characteristics of the acoustic spaces themselves. Sonic Foundry calls these samples "acoustic signatures" or "impulse responses." The latter title actually reflects how

the samples are made.

To create the samples, an established test tone with impulse spikes at the beginning and end is played into the sample environment. Microphones capture the returning sound, which is digitally recorded. Later, AMPI compares the original test tone with the recording and creates a derivative impulse output file that becomes the basis for the new acoustic signature.

Well, that's the theory, at least. In practice, it actually works pretty well.

AMPI is easy to use. Install it and access it through the DirectX pull-down menu. Sonic Foundry includes a large library of sampled environments on the same CD that includes the AMPI software.

By clicking on Browse, you are given a choice of 19 categories including Bridges, Churches, Concert Halls and Microphones. Clicking on one of the categories provides a submenu with individual selections for that group of environments.

There are four on-screen Pages for See ACOUSTIC, page 69 ►

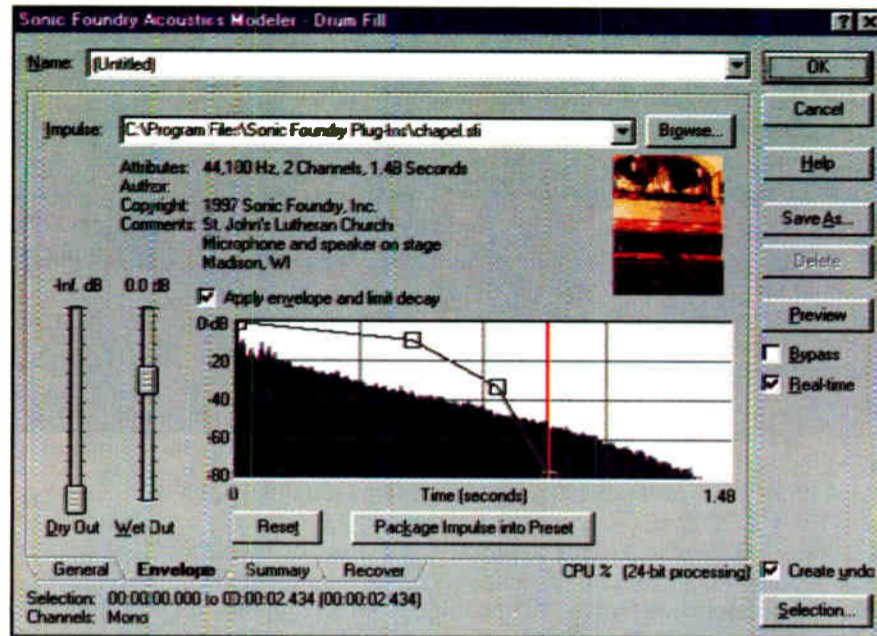
AMPI Offers Processing Sampling

► **ACOUSTIC**, continued from page 68 working with AMPI: General, Envelope, Summary and Recover.

The one you will likely use most often is the General page. Here is where to find controls for mixing dry and processed signals, adjusting the width of the processed signal, altering the amount of delay (plus or minus 500 ms) and settings for high and low shelf EQ.

The Envelope page allows you to custom-tailor the sample by creating a graphic envelope that essentially applies a fade to the impulse file. The Summary page contains information relating to the original impulse sample, and the Recover page allows you to create your own impulse file.

RAM stuttered at a setting of 5, but ran fine at 3. nal interview back at the studio and sound as if he is still in the locker room,



In this example, Acoustic Modeler recreates the sound of a chapel.

It is possible for a user to create his or her own sound impulse signature.

The only problem with this feature is that you must remember to set the quality back to 5 if you want the maximum quality applied during the actual processing of the file.

In use

AMPI worked beautifully for me. I had it up and running soon after loading the software.

If you have already done a lot of work with digital audio software, the on-screen controls will be intuitive.

Sonic Foundry has supplied an excellent library of sound samples. AMPI is a remarkable resource for adding the coloration of a "real" environment to an existing digital file.

AMPI also contains the tools to allow users to create their own library of sound samples. But if you are thinking of using it so your sports reporter can add comments to his origi-

don't count on it. Creating an original sample requires considerable equipment, much of it too sophisticated to make this a casual task.

To create the Sonic Foundry library of samples, engineers used a portable CD player, a 70 W car amplifier, a 12 VDC rechargeable battery pack, a custom-made omnidirectional speaker, a stereo microphone, portable DAT and appropriate mic and speaker stands. Not exactly the kind of remote kit your everyday reporter or producer would carry into the field.

The CD player is a must, because the

AMPI Recover feature needs to "hear" the special impulse tone included on the AMPI CD to derive the characteristics of the space.

Speaker and microphone placement is critical, as is the playback level of the test tone and the recording level on the recorder.

The bottom line: it is possible for a user to create his or her own sound impulse signature, but the procedure is involved and will take a serious commitment on the part of the user.

Thoughts

As a means of adding a sampled real-life acoustical environment to an existing recording, this plug-in is a winner. My suggestion to Sonic Foundry is that they consider adding more samples to their catalog.

The list is already generous, but I would like to see even more famous halls, like Washington's Kennedy Center and Lincoln Center in New York City.

When it comes to producing custom impulse samples, anyone buying this software should understand that this is not an easy procedure and will require a commitment in both equipment and time to produce quality samples.

The Acoustic Modeler DirectX Plug-In is priced at \$249 and requires Sound Forge 4.0. Sonic Foundry is at 745 Williamson Street, Madison, Wis., 53703. Visit the Web site at www.sfoundry.com

For information, contact Sonic Foundry at (800) 57-SONIC or circle Reader Service 60.

Read Burgan is a free-lance writer and a former public radio station manager. He can be reached at (906) 296-0652 or at rgb@up.net

After selecting a sampled environment, clicking on Preview lets you hear how your digital audio file sounds when that sound environment is applied. Depending on the power of your computer, adjusting any of the controls while in Preview mode should allow you to hear the changes as you adjust the parameters of the AMPI sample.

Sonic Foundry recommends a Pentium Pro in order to preview the sound in real time.

However, AMPI has a Quality/Speed setting with a range of 1 to 5 that will allow previewing on underpowered machines. My Pentium 166 with 32 MB

World Cafe Welcomes Arrival of Sennheiser

► **SENN**, continued from page 64 mic so they could purchase one of their own.

We also understand that this Sennheiser is the microphone of choice for at least one Grammy award-winning female vocalist. That can't be bad.

As always, special thanks to World Cafe Producer Joe Taylor Jr., and to intern Holly Johnson for putting the 425 through its paces both in the studio and on the road.

For information, contact Sennheiser in Connecticut at (860) 434-9190 or circle Reader Service 8.

Tom Vernon divides his time between consulting and completion of a Ph.D. Send e-mail to TLVernon@aol.com or call (717) 367-5595.



WXPN(FM) midday host Marilyn Russel voices a spot with the Sennheiser MD 425.

STATION/STUDIO SERVICES

630
Sound Effects
on CD - \$99

60 day money-back guarantee! Call Ghostwriters at 612-522-6256 or write to:
Ghostwriters
2412 Unity Ave N., Dept RW,
Minneapolis, MN 55422
For complete track listings, go to web site: <http://radio-mall.com>

READER SERVICE 127

1012 hit songs from 1980-1995
1229 hit songs from 1954-1969
545 hit songs from the 70's
819 Kickin' Country Hits
on CD for Only \$499 each
(per set plus shipping)
For complete track listings
NOW go to web site:
<http://radio-mall.com> or
Email: radiomall@aol.com or
Phone or FAX Ghostwriters at
612-559-6524
For radio broadcast only!

READER SERVICE 126

Radio Station Data Base
Only \$149!
Addresses, Formats, Phone, FAX
Market Size, Ratings & More!
Also: Group mailing to
GMs, PDs, SMs & CEs.

The Radio Mall
1-888-97-RADIO
TOLL FREE

READER SERVICE 125

The Mix
10 CD's of Buy-out Music,
Production & Sound Effects
Only \$495
60-day money-back guarantee!
Over 1200 tracks! 7 CD's with hundreds of :30
& :60 music beds. 2 CD's with hundreds of lasers,
stingers, whooshes, news & feature elements; &
1 CD with 300 genuine sound & cartoon effects.

For complete info NOW go to web site:
<http://radio-mall.com> or Email: radiomall@aol.com or
Phone or FAX Ghostwriters at: 612-559-6524

READER SERVICE 127

ATTENTION PROVIDERS!

Promote your services to Radio World's 18,000+ readers. Reach Radio Station and Recording Studio owners/managers and engineers with your message. For information on affordable advertising call Simone at 1-800-336-3045, extension 154.

◆ PRODUCT GUIDE ◆

Products for Radio Production

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

OC White Mic Stand

The popular OC White AudioMetrics microphone arm now is distributed exclusively through the Broadcast Division of Harris Corp.



The AudioMetrics arm has been designed with a counterbalance to accommodate mics up to eight pounds. It is available in black or beige and comes in a variety of mounting options, including a vertical riser that lifts the boom over consoles and equipment before angling toward the talent.

For information, contact Harris in Indiana at (765) 962-8596 or circle Reader Service 61.

New Audix Microphone

The new OM-2 from Audix Corp. is a dynamic hypercardioid microphone with a response of 50 Hz to 16 kHz.

The OM-2 has a spring-steel grille ball of high tensile strength, an electronically cut one-piece inner pop filter, a durable E-coat finish and a mic clip. The frequency response has added warmth in the lower mid-bass and a slight boost in the midrange, favoring voices when used on small or mid-sized PA systems.

Suggested price of the Audix OM-2 is \$149.

For information, contact Audix in

Frontier Tango Digital Converter

Frontier Design Group is shipping the Tango 20-bit external digital audio converter.

The Tango is a 1RU device providing



high-resolution D/A and A/D conversion and ADAT optical I/O. The unit has eight balanced outputs on quarter-inch TRS jacks and is available with four, eight or no inputs. All ins and outs can be individually set to +4 dBu professional or -10 dBV consumer levels.

The Tango creates a complete hard-disk recording system when combined with an ADAT-compatible card such as

Oregon at (503) 682-6933 or circle Reader Service 113.

New Professional Amplifiers From Crown

Two new amplifiers are available from Crown International — the CE 1000 and CE 2000.

Both amps feature fan-assisted cooling, can handle 2 ohm loads and are able to bridge stereo outputs into a mono signal. The company claims power ratings comparable to competing 4 and 8 ohm units in the same class, but with up to 50 percent less distortion.

The CE 1000 is rated for 560 W into 2 ohms, 450 W into 4 ohms and 275 into 8 ohms. The CE 2000 can handle 975 W into 2 ohms, 660 W into 4 ohms and 400 W into 8 ohms. All ratings are per-channel and both amplifiers provide 0.5 percent or less THD at rated power.

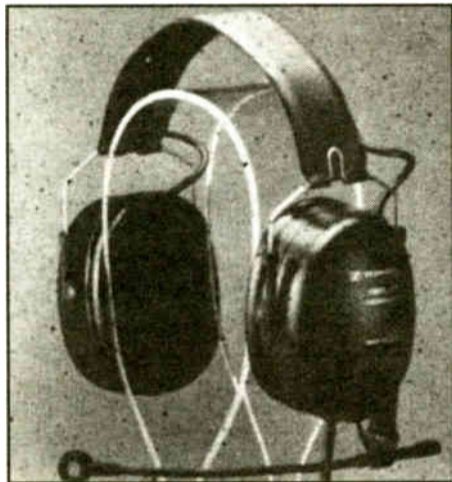
The suggested price of the Crown CE 1000 is \$700, with the CE 2000 priced at \$1,000.

For information, contact Crown International at (800) 342-6939; fax: (800) 294-4094 or circle Reader Service 87.

Sennheiser Noise-Canceling Headphones

Using a process called NoiseGard, the Sennheiser HMEC 200 and HMEC 222 headsets are suitable for remote sports broadcasts, where minimized background noise is desirable.

The combination headset/mic model



the Sonorus Studi/O, Korg 1212 or Alesis PCR.

The S/N is better than 98 dB and distortion is rated at 0.002 THD+N. Multiple units can be locked together via Word Clock ports or synchronized to an external source.

The front panel includes eight sets of level meters, switchable between input and output.

Suggested price of the Tango is from \$698 to \$898, depending on input configuration.

For information, contact Frontier Design Group in New Hampshire at (603) 448-6283 or circle Reader Service 35.

uses the NoiseGard active noise cancellation process to measure low-frequency sounds, then flips them 180 degrees in phase. The phase inversion process cancels the low frequency components inside the earcup and increases clarity in the headset.

The HMEC 200 and 222 sets come with an electret condenser mic with 200 to 8,000 Hz response. Total weight of the headset is 12.4 ounces.

For information, contact Sennheiser in Connecticut at (860) 434-9190 or circle Reader Service 139.

Improved Rane DJ Mixer

The Rane MP 24X is a small-scale mixer designed for dance club use and adaptable for voice booth recording and music mixing to tape or DAW.

Two mics can be connected to the MP 24X. Three-band EQ and a ducker circuit offer greater control over mic levels and quality. Each slide fader has four line/phono inputs, and an active crossfader uses VCA circuitry to glide between audio sources with reduced crosstalk figures.

Tape in/out jacks and a light control socket on the rear panel round out the features of the Rane MP 24X mixer.

For information, contact Rane Corporation in Washington State at (425) 355-6000 or circle Reader Service 165.

Neotek MicMAX Preamp

The Neotek MicMAX is a fully balanced 1RU stereo mic preamp similar to those used in Neotek Elite consoles.

Discrete transistors and high-voltage audiophile op-amps are used throughout. A subsonic filter is included that switches to a conventional high-pass filter. The power supply includes an output ground lift switch and also provides a phantom power output to condenser mics.

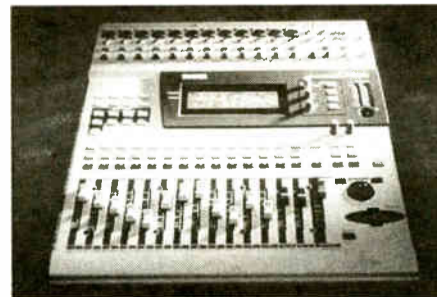
By using balanced circuitry throughout the preamp all the way to the output, signals up to +30 dBu can be realized with less than 0.001 percent THD.

Suggested price for the Neotek MicMAX is \$1,200.

For information, contact supplier Martinsound Inc., in California at (626) 281-3555 or circle Reader Service 191.

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 sta-

tus 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 217.

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 10.

Blossom DVD Mastering System

Blossom Technologies introduced Blossom DaVID, an intermodal DVD mastering system that runs under Windows NT 4.0.

The DaVID features multiple Pentium II processors, 256 MB RAM, an on-board DVD record and playback drive and 21 GB hard disk space. A real-time encoder subsystem performs MPEG II coding directly to the drive.

While primarily intended for DVD video authoring, the standard DaVID workstation includes two-channel Dolby Digital AC-3 audio and is capable of high-quality audio recording and authoring. For special applications, a six-channel Dolby Digital card is available, providing nine different encoding options for specialized audio effects.

Base price of the Blossom DaVID is \$59,999.

For information, contact Blossom Technologies in Florida at (305) 266-2800 or circle Reader Service 36.

Products & Services Showcase

For more information on the products shown below, circle the appropriate Reader Service No.(s) on the enclosed Subscription/Reader Service card or contact the advertiser directly.

Professional Audio Products
 HA-2B Dual Headphone Amplifier
 HDST-1 Headset Interface
 MA-210 Stereo Monitor Amplifier
 MP-2 Dual Microphone Preamplifier
 MX-6 6 Channel Line Level Audio Mixer
 SC-2 Stereo Corrector
 VP-2 Dual Extended Range VU/PPM Meter

Distribution Amplifiers
 ADA-204A Dual 1x4 Audio Distribution Amplifier
 CDA-104 1x4 Composite FM Distribution Amplifier
 DDA-104 1x4 AES/EBU Digital Audio Dist. Amplifier
 VDA-108 1x8 Video Distribution Amplifier
 VDA-204 Dual 1x4 Video Distribution Amplifier
 VDA-SVHS 1x4 SVHS Video Distribution Amplifier

Routing Switchers
 RS-41A 4x1 Stereo Audio Routing System
 RS-41D 4x1 RS-422/Time Code Data Routing System
 RS-41DA 4x1 AES/EBU Digital Audio Routing System
 RS-41S 4x1 SVHS Video Routing System
 RS-41V 4x1 Video Routing System
 RS-81A 8x1 Stereo Audio Routing System
 RS-81S 8x1 SVHS Video Routing System
 RS-81V 8x1 Video Routing System

Video Overlay Generator
 BG-2 Safe Border Generator

Phase 3

by Videoquip Research

Broadcast quality throughout.
 No compromises.

New for 1998

A2D-1 Audio Analog to Digital Converter
 D2A-1 Audio Digital to Analog Converter
 VP-2D AES/EBU Digital Audio Meter
 TCR-1 Time Code Reshaper/Distribution Amplifier
 RS-44V 4x4 Video Routing Switcher
 BBGEN-1 Black Burst/Colour Bars/Sync Generator
 VDA-SDI 1x8 SDI Video Distribution Amplifier



Audio Level Matching Systems
 ALA-8 8 Channel Audio Level Amplifier
 LM-2 Level Matching System,
 2 Ch. Bal.-Unbal., 2 Ch. Unbal.-Bal
 LM-2B Level Matching System,
 4 Channels Unbalanced to Balanced
 LM-2U Level Matching System,
 4 Channels Balanced to Unbalanced

Automation Devices
 M-4 Machine Control System
 M-4E Machine Control Expander
 RI-2 Main/Standby Audio/Video Interface
 SD-2 Dual Audio Silence Detector
 TD-2 25/35 Hz Tone Detector
 TTD-16 Telephone Touch Tone Decoder
 VSD-2 Dual Video Sync Detector

Modular Audio Products
 HM-1 Headphone Amplifier Module
 IM-1 Balanced Input Module
 OM-1 Balanced Output Module
 MM-1 Microphone Preamplifier Module
 MS-102 Microphone Splitter

Please call for a complete Phase 3 catalog, or browse our website

Videoquip Research Limited
 Phone: +1 (416) 293-1042
 Fax: +1 (416) 297-4757
 Internet: www.videoquip.com

Professional audio and video products. Desktop or rackmount. No AC adapters.

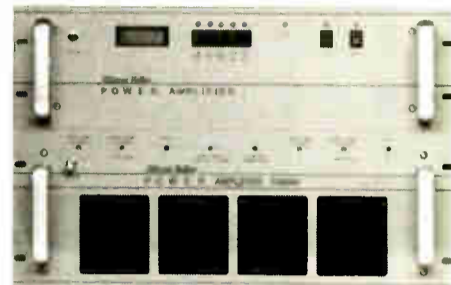
READER SERVICE NO. 129

Silicon Valley POWER AMPLIFIERS

The RF People

FM Broadcast Power Amplifiers

Designed for reliability, durability, & efficiency.



Models from 165 watts to 2.4 KW

Solid state. Frequency agile.
 VSWR foldback. Digital display.
 Remote operation. Easy installation.
 Full documentation. Modular construction.

1-800-986-9700

www.svpa.com e-mail: sales@svpa.com Fax 1-408-986-1438

READER SERVICE NO. 99

AUTOMATED FM ANTENNA PATTERN MEASUREMENTS

Signal problems? Using the Dept. of Defense Global Positioning System (GPS), and our hi-tech airplane, let us show you the signal your station is really transmitting. We measure each and every degree of your station's pattern. Your signal is your most important asset. Don't guess. Be sure you're getting the maximum possible coverage. Call us today for a free brochure or confidential consultation.

STEPHENS COMMUNICATIONS INC.
 Little Rock, AR. • (501) 821-5756
 Visit our web site:
<http://www.stephenscom.com>

READER SERVICE NO. 48

THE COST EFFECTIVE ALTERNATIVE TO MANUFACTURER SERVICE

SERVICE, REPAIR & CALIBRATION

- STL's • RPU's • TSL's
- Exciters • Optimods
- AM/FM Monitors
- Remote Control Systems

SPECIALIZING IN EQUIPMENT BY

- Belar • Marti
- Moseley
- McMartin
- TFT
- And others...

WE ALSO PROVIDE

Free, over-the-phone technical assistance
 STL loaner/rentals
 PCL 505 Certification



2198 Hubbard Lane, Grants Pass, OR 97527

(541) 471-2262

READER SERVICE NO. 74

EXPERIENCED EQUIPMENT

SAVE \$\$\$ ON GOOD QUALITY

Audio Processing, Consoles, Reel-to-Reel, STL, Test Gear...

All Professionally Reconditioned And Delivered with a Warranty!

FOR NEW AND EXPERIENCED - CALL DARRIN WARNER TODAY!

BROADCAST RICHMOND

Tel 765-966-6468 Fax 765-966-5505

PO Box 1423, Richmond, IN 47375

E-mail: broadcast@infocom.com

www.broadcast-richmond.com

Attention Advertisers!

Reach **18,000+** broadcasting professionals!

RADIO WORLD'S Product Showcase provides a perfect medium for test marketing your products and services.

It's an efficient, effective & affordable advertising option!

For more information, including rates and deadlines, fax

Christopher Rucas at
415-922-5597

or call

415-922-5595

"Portable Matchbox"

NEW!



It's PORTAMATCH, the Matchbox that runs on batteries!

Great for remotes, field recording, ENG, or anywhere you don't have AC power. Just add two 9-volt batteries and go!



"So cool it doesn't need a slogan."

HENRY ENGINEERING

TEL (626) 355-3656 FAX (626) 355-0077
 FAX-on-Demand Doc #125 (626) 355-4210
<http://www.henryeng.com>

READER SERVICE NO. 128

Milk Another Year Out of Old PC

Alan R. Peterson

As technical editor for *RW*, it stands to reason I should be among the first to jump on new technologies, learn about them, report them and eventually embrace them. Now that radio station computers run the show, I should also be among the throng acknowledging Windows 95 and NT and their collective benefit to humanity forevermore, amen, blah blah blah ...

Truth be known, I still feel an affinity to older machines and feel bad about pitching a perfectly functional device, just because it doesn't live up to the promise of the hour.

Come on, I know you are the same way. We all feel sentimental about old Volumaxes and Tapecaster decks, carefully stacking them in a pile in the basement rather than hauling them down to the scrapyard.

Fossil collector

You may remember my five-year-old 386 PC discussed in the March 18 *RW*. It was grossly underpowered the day I bought it: no co-processor, only 125 MB of drive space and a feeble 4 MB RAM. The video card never gave me the same color twice on bootup, and its only upgrade ever was a 4X CD drive. It was the runt of the PC litter, yet it has turned

in exemplary service.

My attachment to it made me miss the Golden Age of the 486, the dawn of the Pentium dynasty and the classic "1 + 1 = 1.999" problem that particular processor endured. My machine saw me through rudimentary audio editing, hours of MIDI-created production music, five years of *RW* columns and several hideous attempts at HTML Web page authoring.

The world advanced all around me while the "threebie" on my desk took care of business to my satisfaction. Not because I felt the "old ways" were the best, but because the machine was comfortable to work with and up to its tasks. There was no reason to scrap it.

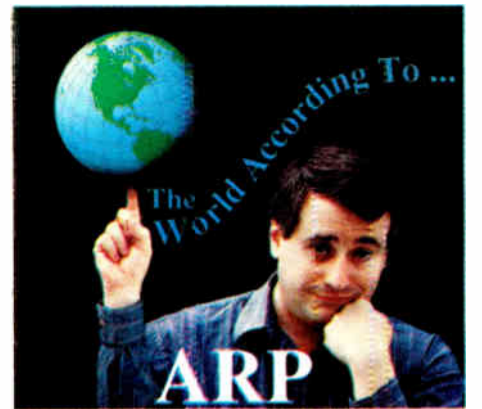
It took the supposed good intentions of my online service to bring my pal down.

Thanks for nothing

One day back in October, I was disconnecting from my Internet service provider, who shall remain anonymous — no plug from *me* after this debacle. The ISP decided to "push" its new Windows 95 software to me before the disconnect, not stopping to notice my 386 ran on version 3.1.

The push corrupted my disk drive and wiped out nearly all of Windows 3.1. I could no longer run Control Panel, a lot of my drivers got zapped and I couldn't even log on to my ISP to tell the maroons what they had done.

It is one thing to upgrade gear by choice or by obligation to stay on top of the technology. In my case, my PC was simply chugging along in a non-threaten-



that no longer wanted 386 machines. I did not feel justified in dropping too much money into it, as the same amount could be applied toward a machine that would put me in step with the rest of the universe.

But again, I felt bad about junking a working machine — one that functioned completely to my satisfaction and whose only sin was that it no longer fit in. The calendar said it was time to toss it, but I could not accept that. If Sears still carried parts for 1986-model refrigerators, why couldn't the computer industry still float some parts to keep a five-year-old PC in working order?

Eventually, I acquiesced and admitted I needed today's power to do today's work. I now have a new 233 Pentium with all the toys and enough RAM to all but park my car in. As for the old machine, one sympathetic dealer located an 8 MB RAM upgrade for me, while another discreetly sold me a new, shrink-wrapped copy of Windows for Workgroups 3.11 with warranty. I am still searching for an IDE controller card and new drive. The old soldier has earned it.

My new machine has assumed the awesome responsibilities once held by

There is nothing wrong with using what you like, and liking what you use.

ing, non-competitive way. Then my ISP took aim, fired, and said, "Now you *have* to get a new computer because *we* said so." Needless to say, I bailed off that service fairly quickly.

Okay, it wasn't the end of the world. All it needed was Windows 3.1 reinstalled and recovery of whatever data was damaged on the drive. And while I was at it, maybe a memory upgrade and new disk drive wouldn't hurt either.

Let me tell you, it is probably easier to find a Studebaker driver-side door handle today than it is a copy of Windows 3.1 or any parts for a 386.

The search begins

Three shops would not touch my PC. Thirty-pin RAM boards were not manufactured anymore and I was told, "Nobody carries them." At computer fairs and swaps, dealers told me they were "not allowed to sell Windows 3.1, because the whole world is now on Windows 95."

Forget even trying to find a drive under 1.2 GB anymore.

The point of diminishing returns had finally been realized. I was keeping my old computer on life-support in a world

my old threebie, now used for word processing and a couple of "hobby" MIDI projects. It remains a capable — if slow — audio editor, and can actually run SEK'D Samplitude with fairly good performance.

I almost liken it to Old Dobbin, the cliché retired farm workhorse living out his days under the chestnut tree, occasionally entertaining the grandkids on summer visits.

Hankie alert

Okay, it's sappy to describe a computer in such mushy terms. But it's no worse than sentimental attachments to old Gateway 80 consoles or that first Revox 77. Imagine someday feeling nostalgic for an Ursa Major reverb or Eumig FL-1000 cassette deck.

Does my attachment to this clunky junk make me sound like an old-line station owner, running on circa 1963 gear? Think about this: Can you honestly discern which machine I wrote this on? If it were done on the Pentium, did you just *read* it faster?

Upgrade because you have to and/or want to. But there is nothing wrong with using what you like, and liking what you use.

Quality
Selection
Service
Price

USED EQUIPMENT

Buying, Selling or Trading

When you call Harris used equipment department, you get the same great service that you've come to expect from the nation's leading supplier of broadcast equipment.

Harris has the largest inventory of used equipment worldwide.

Each piece of used equipment is thoroughly inspected by Harris' knowledgeable, factory-trained service staff (who have a combined experience of over 30 years) to insure that it meets factory specifications.

And, of course, all used equipment from Harris comes

with a warranty to insure your complete satisfaction.



Mike Smith
Used Equipment Specialist
Over 10 years of audio experience.

And with Harris' low prices, you can be sure to get the most value for your money.

Whether you're buying, trading, or selling, call Harris for quality, selection, service and price.

**HARRIS CORPORATION
BROADCAST DIVISION**
TEL: 800-300-0733
FAX: 765-962-8961

See a complete listing of our used equipment at
<http://www.broadcast.harris.com/usedeq/index.html>

HARRIS

A new world of broadcast solutions.

© 1998 Harris Corporation

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

ACOUSTIC FOAM

Sound Barrier · Diffusers · Bass Traps & More!

- ★ Consistent Pattern
- ★ Long-Lasting...Won't Crumble!
- ★ Thicknesses up to 12"
- ★ 10 Vivid Colors In 2 Styles
- ★ Super Flame Retardant
- ★ 60% Better Absorption
- ★ Best Value By Far!



Call For A Free Sample Kit!

USERS: James Taylor, Journey, Clint Black, Doane Perry (Jethro Tull), Dennis DeYoung/James Young/Todd Suchman (Sly), George Perry (Eric Clapton), Andrew Gold, Christopher Cross, Mike Wanchic (John Mellencamp), Ross Vonnelli, Shit Row, Mark Lindsay (Paul Revere & The Raiders), Norbert Shouli (D. Paton, Gallo Bros. K. Rogers, E. Rabbit, etc.), Mark Farmer (Grand Funk Railroad), Toshi Iseda, The Bellamy Bros., Wayman Tisdale, Nona Hendryx, John Baker (Re-Flex), Disney, Bose, Harpo Studios, LucasArts, Todd-AD, JBL, Qualcomm, Time Warner Cable, Shure, Pelton Acoustics (FutureDisc, K. Loggins, Skywalker Sound), Steven Klein, Fm, Sr. Eng. @ Criteria Studios (E. Clapton, Kenny G, Bee Gees, A. W. B.) & Studio Designer (Don Was, Babyface, Larrabee), Sear Sound (N. Merchant, S. Colvin), Castle Oaks Prod. (Titanic, Tremors, Wings, 21 Jump Street, S. Mendes, J. Feliciano), Discovery Channel, Boeing, Berklee College of Music, The Lincoln Center, Investor's Business Daily, ShowCo, Opryland, Music Bakery, Audix, Ensoniq, WhisperRoom, Hitachi, Toshiba, 20th Century Fox, Universal Studios, NPR, Warner Bros., Polygram, chef Wolfgang Puck, Fruit of the Loom Country Comfort Tour, Manley Audio Labs, Lucent Technologies, 3BTV, Electroplex, Azden, Macromedia, Adaptec, Martin-Logan, Crawford Post, Mormon Church TV, Pioneer, Cobra Golf, Carvin, MTX, Silver Dollar City, voices of McDonald's, Miller Brewing, Sports on Fox & more!



8851 North Hague Road ★ Indianapolis IN 46256-1284
317-842-2800 ★ Fax: 317-842-2780 ★ Orders: 1-800-95-WEDGE
Website: www.auralex.com ★ Email: auralex@auralex.com

Circle (234) 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.

S.W.R. FM Antennas

Great Antenna Great Price!



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.

3" HELIAX STANDARD COAXIAL CABLE

50-Ohm, unused, cut to length. Priced below market. Shipped instantly. Call Basic Wire & Cable (NANCY) 800-227-4292 FAX: 773-539-3500

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. J Mosher, 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 Kochoer, 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.

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.

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.

Ramco DC-8 in working cond, \$750 +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.

CASSETTES · CARTS · REELS

J & I AUDIO/VIDEO

A wholesaler in the Radio and Television market.

Now running SPECIALS on audio and video:

BASF CASSETTES-AMPEX R-Rs AUDIOPAK, FIDELIPAC & ITC CARTS DAT & THE NEW R-CD

For more information call Kris Elliot at 1-800-942-1711

or write to: J&I Audio/Video 20899 Kelvin Pl. Woodland Hills, CA 91367

Circle (233) On Reader Service Card

Urban 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.

HE HALL Electronics

www.halls.com



PHONE 804-984-4255 Complete Service for many Brands
FAX 804-984-3299 Call For Details

Digital Audio Workstations 200MHZ MMX Systems below \$2000

For Automation And Production

SAW32 & SAW32Plus
Cool Edit Pro
Sound Forge 4.0

BSI
WaveStation
WaveCart

Sound Cards
CardD
Event "Darla"

Circle (232) On Reader Service Card

CONSOLES continued...

Lightning Got You DOWN???
Get a Budget Conscious
6-18 Channel On Air Console
Next Day Delivery
(215) 464-2000

Sound Workshop 1280-B, 12 in & 8 out w/double EQ echo ea chnl, gd cond, \$1500. HL Swewll, 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**FINANCING****LOANS BY PHONE (800) 699-FLEX**

- We finance all types of Broadcasting Equipment
- Flexible Credit Criteria
- Flexible Payment Plans
- No Down Payment, No Payments For 90-Days Available

To apply or request additional information call Jeff Wetter.

FLEXLEASE, Inc.**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.

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.

WINDSCREENS

The Auralex **WINDJAMMER 2421**
AVAILABLE THROUGH MAJOR BROADCAST SUPPLIERS
★ Fits RE20, MD421, AKGs, ATs, big Neumanns, etc.
★ Cost up to 63% less than competing brands
★ Won't crumble like other brands
★ Sounds great & available in 6 vivid colors

1-800-95-WEDGE

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.

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.

RF Warning Signs

9"x 12" \$13.95
10"x 19" \$19.95
CAUTION
RF RADIATION
H. HALL Electronics (804) 984-4255

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/rack-mount 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.

Kohler 15 kW generator, 120/208 3 phase with transfer nat gas 2,850.00. Dave, 800-500-8055.

Want to Buy

Jazz record collections, 10" LP/12" LP be-bop, swing, dixie, highest prices paid. B Rose, Program Recdgs, 228 East 10th, NNYN 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.

CONSULTANTS**EVANS ASSOCIATES**

Consulting Communications Engineers

FCC Applications, Design, Field Engineering & Tower Detuning
Video/Data/Voice • Statewide Networks • Wide-Area Networks

EXPERTS IN:

TV • AM • FM • ITFS • MICROWAVE • PCS • FIBER

210 S. Main St., Thiensville, WI 53092 (414) 242-6000 FAX (414) 242-6045
Internet: http://www.evansassoc.com Member AFCCE

T. Z. Sawyer Technical Consultants
AM-FM-TV-LPTV

- FCC Applications & Exhibits
- Experimental Authorizations
- AM Directional Antennas
- High Power Antenna Arrays
- Frequency Studies
- Class Upgrades
- STL Applications
- Station Inspections

☎ 1-301-913-9287

FAX: (301) 913-5799 • 5272 River Rd, #460 • Bethesda, MD 20816

Consulting Communications Engineers EMC Test Lab

- FCC Applications and Field Engineering
- Frequency Searches and Coordination
- AM-FM-CATV-ITFS-LPTV
- EMC Test Lab-FCC and European (IEC)

OWL ENGINEERING, INC.

E-mail: Owleng19@skypoint.com 1-800-797-1338 Fax (612) 785-4631
8899 Hastings St NE, Minneapolis, MN 55449 (612) 785-4115 *Member AFCCE

MLJMoffet, Larson & Johnson, Inc.
Consulting Telecommunications Engineers

1110 North Glebe Rd, #800
Arlington, VA 22201

(703) 741-3500
FAX: (703) 741-0312

Member AFCCE

PC - SOFTWARE

AM FM TV Search Programs
Signal Mapping—STL Paths
RFHAZ—US Census PopCount
FAA Tower—Draw Tower

Doug Vernier
Engineering Consultant
1600 Picturesque Drive
Cedar Falls IA 50613

800-743-DOUG**DON'T GAMBLE WITH YOUR ADVERTISING DOLLARS!**

Advertise in Radio World and reach 18,000+ broadcast professionals.

Call Simone TODAY!

703-998-7600

MULLANEY ENGINEERING, INC.
Consulting Engineers
• Design & Optimization of AM Directional Arrays
• Analysis for New Allocation, Site Relocation, And Upgrades
• AM-FM TV LPTV Wireless Cable (MDS/MMDS/ITFS/OFS)
• Environmental Radiation Analysis
• Field Work
• Expert Testimony
9049 Shady Grove Court
Gaithersburg, MD 20877
Phone: (301) 921-0115
Fax: (301) 590-9757
email: mullengr@aol.com

E. HAROLD MUNN, JR. & ASSOCIATES, INC.

Broadcast Engineering Consultants

AM - FM - TV

WAYNE S. REESE PRESIDENT

Box 220, 100 Airport Rd.
Coldwater, MI 49036

517-278-7339**GRAHAM BROCK, INC.**

BROADCAST TECHNICAL CONSULTANTS
Full Service From Allocation to Operation AM/FM/TV/AUX Services;
Field Work; Antenna and Facilities Design

Over 35 years engineering and consulting experience

912-638-8028
202-393-5133
www.grahambrock.com

C.P. CROSSNO & ASSOCIATES CONSULTING ENGINEERS

P.O. BOX 180312
DALLAS, TX 75218

AM, FM & TV Broadcasting

ANTENNA DESIGN, ALLOCATIONS, FCC/FAA

CHARLES PAUL CROSSNO, P.E.

(214) 321-9140 MEMBER AFCCE

MUSEC HELPERSConsultants
Major Market Sound Without the Cost

23 Yrs Experience
All Formats
• Programming
• Promotions

Small/Medium Market Specialists
No job too small**417-886-2408****System One Communications**Broadcast Constructors & Consultants
Houston, Texas
888-625-5649**Complete Turnkey Construction**

Antenna Line Testing
AM Directional Field Work
AM and FM Applications
Tower Services
Studio Designs
Custom Studio Furniture

OnLine**Web Access**
RF Engineering Tools

CDS OnLine is the first Web-based RF Engineering System providing remote access to a host of FCC, FAA, USGS, and US Census databases. CDS OnLine offers a familiar look and feel to web users, instant graphical output, comprehensive help, and accessible technical assistance.

Up-to-date Databases.
No hidden or automatic charges.

Communications Data Services
800-441-0034

- DTV Study
- Master Frequency File Search
- FM Study
- Population Count
- Terrain Averages
- Within Study
- Terrain Profile
- Contours

www.commdata.com

MONITORS continued...

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.

RECEIVERS & TRANSCEIVERS

Want to Sell

Celwave MiniPlexer, 6 cavity 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.

SCA RECEIVERS—ALL TYPES

Will work to meet your receiver needs
Professional / Table / Portable
Field Strength Meters
Reading Service / Ethnic / Data

DAYTON INDUSTRIAL CORP.
2237 Industrial Boulevard
Sarasota, FL 34234-3119
Tel: 941-351-4454 FAX: 351-6081
E-Mail: SCARadio@aol.com

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 Chrysafts, 304-235-2292.

C. CRANE COMPANY

FREE CATALOG Radio Land

We offer exceptional radios and receiving antennas, as well as, an extensive variety of radio accessories

WEBSITE: CCRANE.COM

1-800-522-8863

Want to Buy

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.

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.

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 pre-amps, \$45; set of Ampex 8 trk eras/rec/play heads, BO. J Price Recording Studio, 214-321-6576.

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

IF YOU NEED PARTS FOR AMPRO-SCULLY CONSOLES call SEQUOIA ELECTRONICS
1-(408) 363-1648
FAX 1-(408) 363-0957

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, 313-348-6453.

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.

STUDER REVOX PARTS/SERVICE

Cassette-CD-Open reel
Capstan resurfacing, ALL BRANDS.
JM TECHNICAL ARTS
1515 Elm Hill Pike #203
Nashville, TN 37210 (615) 365-9030

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.

MCI JH-110A (2), 2 atrk 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

RENT IT HERE!
COMREX New HotLine ISDN Coders Frequency Extenders
TELOS Zephyr Digital Phone Hybrids
CCS MUSICAM Prima Coders
SHURE FP-410 Automatic Mixers
SCOOP REPORTER 7MHz single POT5 line codes

SILVER LAKE AUDIO • 516-763-1776 • FAX: 516-763-1750
inch, no pedestal, excellent condition, \$3000/BO. 516-725-9206.

ITC Reel-to-Reel Specialists. Complete stock of spare parts. Motor rebuilding and heads for both reel-to-reel and cart machines.

VIF INTERNATIONAL
PO Box 1555
Mtn View CA
94042 U.S.A.
USA & Canada: 1-800-848-4428
Elsewhere: 1-408-739-9740
FAX: 1-408-739-0809
VISA & Mastercard now accepted

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

Revox PR99. George Riggins, 562-598-7007.

Want to Buy

MCI JH110C 4 chnl amps for 1" & 1/2" guides for transport, cards & electr & 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 & minia-tures, 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 tapere-corders 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

Remotes from EUROPE?
WIRED FOR SOUND (London) offers...
EQUIPMENT • ENGINEERS • EXPERIENCE
...and Europe's largest Telos rental stock
Tel 01144-181-442-8900 Fax -8901 www.wiredforsound.co.uk

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.

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.

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

WE RENT
TELOS ZEPHYR
CCS "Prima" Coders
COMREX 3-line extender
Frank Grundstein Audio/Video Consultants 610-642-0978

Adtran ISU 2x64 ISDN inter-face 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@uofm.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.

WE RENT FOR LESS
Hotlines FM Exciters
Zephyrs STL's
Hexes FM Pow Amps
Audio Test Equipment
If we don't have it, we will get it!
SCMS, INC. (800) 438-6040
"You Know We Know Radio!"

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 head-sets, \$400. D Heidner, 406-388-4281.

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

Advertise!
Call your advertising representative
703-998-7600
for details & deadlines

DISTRIBUTOR DIRECTORY

The following distributors serving the broadcast industry would be glad to help you with any of your requirements.

"NOW EVERY STATION CAN AFFORD A QUALITY STUDIO FURNITURE SYSTEM!"

VISIT OUR CATALOG ON THE WEB...

www.spacewise.com

OR CALL 800-775-3660

SEVERAL QUALITY & VERY AFFORDABLE STUDIO FURNITURE SYSTEMS AND A FULL LINE OF ACCESSORIES!

SPACEWISE Broadcast/Furniture

"the broadcaster's furniture store..."

CORNELL-DUBILIER MICA CAPACITORS

FROM STOCK

JENNINGS VACUUM CAPACITORS

FROM STOCK

JENNINGS VACUUM RELAYS

SURCOM ASSOCIATES

2215 Faraday Ave., Suite A
Carlsbad, California 92008
(760) 438-4420 Fax: (760) 438-4759

...Some people get hooked on broadcast equipment big time...they think about it...dream about it...talk about it all the time...for example...us...

RADIO! The beat goes on!

CROUSE-KIMZEY OF ANNAPOLIS

tops in broadcast equipment

1-800-955-6800

ask for Kathleen

kkannapolis@worldnet.att.net

SATELLITE EQUIPMENT

Want to Sell

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

Want to Sell

SATELLITE SYSTEMS



Satellite Equipment for Radio

Off the air? Looking for reliable repair service?

Rely on us!

Satellite Systems is respected industry-wide for prompt, accurate service to radio stations and networks.

Whether you have a Dart 384 or Scientific Atlanta 7300/7325 we can repair your equipment.

Pre- and post-service technical support, along with a 6-month warranty.

Turn to the leader in repair, new equipment, used equipment and accessories. We can answer all your questions.

Celebrating 7 years of providing reliable repair service

SATELLITE SYSTEMS

615 East Brookside Street, Colorado Springs, CO 80906
Phone: (719) 634-6319 Fax: (719) 635-8151

Circle (231) 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.

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.

PRICED TO SELL...South Central Georgia AM/FM...serious inquiries only. Call 912-868-4959.

SCA RENTALS

Want to Sell

Full power Dallas SCA channels available immediately. M Vanhooser, 972-402-9673.

SCA Opportunity

K101, with the highest ERP (125kw) west of the Mississippi River, has SCA spectrum available in the San Francisco Bay Area. Please contact Doug Irwin at 415-356-5566 with inquiries.

SOFTWARE/DATABASES

Want to Sell

Windows NT4 workstation, \$135; Windows 95b, \$85. Microsoft Backoffice, \$395. All full versions. Bobt@caremedical.com, (360) 883-3453.

STATIONS

Start your own commercial radio station with only \$5,000 or less!

Yes it's possible & legal. Part 15 of FCC rules allows low power AM radio stations to operate without a license!! Cover an entire town & bill \$1500 a month!! It has been done!! Order the newsletter booklet that tells you all you need to know to get started for just \$29.99. Send check or money order payable to: WCTD AM 1670, 4 Canal St, Westerly RI 02891 or call 401-348-9222 for more info. FCC Inspected.

Want to Buy

Will pay cash and close quickly on Radio Stations at any stage of disrepair. 888-948-0521.

Non-Profit Organization seeking radio stations, cp's, dark or troubled stations; tax incentives/advantages, cash & terms. Call 208-734-6777 ask for Mike.

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

RF POWER



Svetlana

Se Hable Español
(760) 744-0500 • (888) 744-3500
Fax: (760) 744-1943
e-mail: rfp@rfparts.com



Circle (229) On Reader Service Card

REBUILT ELECTRON TUBES

Portiol List: 6623, 23791, TH150, 6425F, 6427, 8550, 6804, 6696, 6697, 5681, 5682, 5671, 7804, 3CX10,000H3, 3CX20,000H3, 4CX5000A, 4CX35,000C, CQ5-200
Worn out power tubes purchased

Vacuum Tube Industries, Inc.

1-800-528-5014
508-584-4500 X75

AMPEREX, EIMAC, RCA, SVETLANA 4CX250B, 4CX250R/7580W, 4-400C, 3-500ZG, 3CX3000A7, 807, 811, 833C. Westgate 800-213-4563. 33B

FOR THE BEST PRICE & 24 Hr service on transmitting tubes & sockets/parts, new & rebuilt call Goodrich Ent. at 402-493-1886 day or night, FAX 402-493-6821.



300B (See SV300B)
3CX300A1
3CX400A7
3CX2500A3
3CX2500F3
3CX2500H3
3CX3000A7
3CX3000F7
3CX4500F3
3CX6000A7/YU148
3CX10,000A3
3CX10,000A7

Quality Power Tubes

3CX10,000H3	4CPX800A	5CX1500B	SV572-3
3CX15,000A3	4CX1500A	572B	SV572-10
3CX15,000A7	4CX1600B	6550C (See SV6550C)	SV572-30
3CX15,000H3	4CX3500A	6AS7G	SV572-160
3CX20,000A7	4CX5000A	6BM8	SV6550C
3CW20,000A1	4CX5000R	6D22S	SV6L6GC
3CW20,000A7	4CX7500A	6L6GC (See SV6L6GC)	SV811-3
3CW20,000H3	4CX10,000D	6N1P	SV811-3A
3CW20,000H7	4CX12,000A	811A	SV811-10
3CW30,000H3	4CX15,000A	812A	SV811-10A
4CX250B	4CX15,000J	833A	TH5-4
4CX250BC	4CX20,000A	8161R	TH5-6
4CX250BT	4CX20,000B	8560AS	TH6-3
4CX250R	4CX20,000C	EF86	TH6-3A
4CX350A	4CW10,000A	EL34	YC130/9019
4CX350AC	4CPW10,000R	EL509	SK300A
4CX400A	4X150A	SV83	SK1300
4CX800A	5CX1500A	SV300B	SK1320

Watch this list GROW!
• Manufactured in Russia's largest power tube factory •
Generous warranty based on high quality • Honest prices based on quality at low cost • Shipment from USA stock

www.svetlana.com

Headquarters: 205-882-1344 Fax 205-880-8077 • Engineering: 650-233-0429 Fax 650-233-0439

Circle (230) On Reader Service Card

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 _____

Are you currently a subscriber to Radio World?
 Yes No

Signature _____ Date _____
Please check only one entry for each category:

- I. Type of Firm**
- D. Combination AM/FM station
 - F. Recording Studio
 - A. Commercial AM station
 - K. Syndicators/Station Providers
 - B. Commercial FM station
 - G. Audio for Video/TV Station
 - C. Educational FM station
 - H. Consultant/ind engineer
 - E. Network/group owner
 - I.Mfg, distributor or dealer
 - J.Other _____

- II. Job Function**
- A. Ownership
 - G. Sales
 - B. General management
 - E. News operations
 - C. Engineering
 - F. Other (specify)
 - D. Programming/production

Brokers, dealers, manufacturers and other organizations who are not legitimate end users can participate in the Broadcast Equipment Exchange on a paid basis. Line ad listings & display advertising are available on a per word or per inch basis.

WTS WTB Category: _____
Make: _____ Model: _____
Brief Description: _____
Price: _____

WTS WTB Category: _____
Make: _____ Model: _____
Brief Description: _____
Price: _____

WTS WTB Category: _____
Make: _____ Model: _____
Brief Description: _____
Price: _____

WTS WTB Category: _____
Make: _____ Model: _____
Brief Description: _____
Price: _____

WTS WTB Category: _____
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

BOOST YOUR SALES

Advertise in the Classified Section ~

You'll be impressed with the results!



TRANSMITTERS

ECONCO

Quality Rebuilt Tubes

Approximately 1/2 the Cost of New

Call for Our Price List

800-532-6626

916-662-7553

FAX 916-666-7760

Circle (228) On Reader Service Card

D & C Electronics Co.

NEW TUBES

We have the alternatives for all your needs, at the lowest prices, direct from OUR STOCK!!!

EIMAC, SVETLANA, PRO-TEK®, EEV and many others.
(352) 688-2374
PH: (800) 881-2374
FAX: (352) 683-9595

SE HABLA ESPAÑOL WE EXPORT
VISA/MASTERCARD ACCEPTED

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.

ADVERTISING SPACE IS AVAILABLE!

Call **703-998-7600** for more information!

TRANSMITTERS

Want to Sell

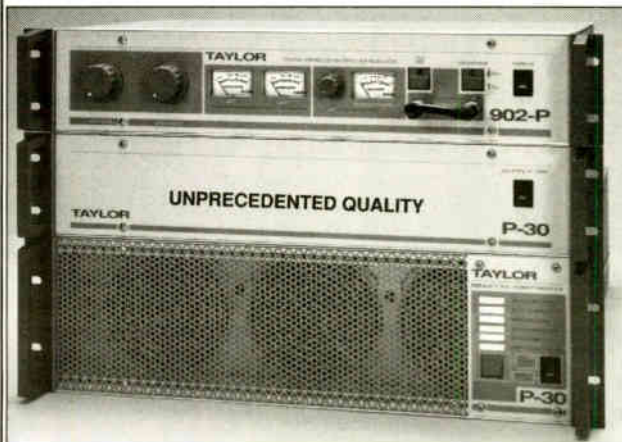
OFF THE AIR?
EMERGENCY BACK-UP RENTALS
FM Exciters - STL's -
FM Pwr Amps - Antennas -
Studio & Test Equipment
SCMS Inc (800) 438-6040
"You Know We Know Radio"

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.

INCREDIBLE TRANSMITTERS



TV TRANSMITTERS

1Watt	\$1,114
2Watt	\$1,664
4 Watt	\$2,138
20 Watt	\$3,880
40 Watt	\$5,046
100 Watt	\$6,206
200 Watt	\$9,874
400 Watt	\$13,171
800Watt	\$18,295
1KWatt	\$22,900
2KWatt	\$38,900

FM RADIO TRANSMITTERS Including Stereo Encoder

1Watt	\$1,138
30Watt	\$1,499
300Watt	\$3,174
600Watt	\$5,960
1KWatt	\$8,716
2KWatt	\$11,905
4KWatt	\$20,741

TAYLOR
The Transmitter People

Taylor Bros. (Oldham) Limited, Lee St. Oldham England. Tel: 0161 652 3221, Fax: 0161 626 1736

SERVICES

Tower Sales & Erection
Turnkey Site Development
Installation & Maintenance
AM/FM Broadcast, TV
Microwave Systems,
Antennas & Towers

TOWERCOMM
Communications Specialists

Ben Wall President
6017 Triangle Dr. Raleigh, NC 27613
(919) 781-3496
Gen Contractor #25891 Fax (919) 781-6454

UTAH TOWER CO.
COMMUNICATIONS CONSTRUCTION AND MAINTENANCE AM/FM CELLULAR, PCS, TV DIGITAL MICROWAVE ANTENNAS & TOWERS
SERVING THE WESTERN U.S.
FAX/PHONE (801) 687-3490
CELLULAR (801) 368-4805

FM Frequency Searches

\$250 APPLICATIONS AND ALLOCATIONS
Call Michael Celenza (516) 928-6506

QE1 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.

TRANSCOM CORP.

Serving the Broadcast Industry Since 1978

Fine Used AM & FM Transmitters and Also New Equipment

For the best deals on Celwave products, Andrew cable and Shively antennas.

- 100 W FM 1985 Harris FM100K
- 10 KW FM 1965 ITA 10,000B
- 20 KW FM 1977 RCA BTF 20E1
- 1 KW AM 1970 Collins 820D
- 2.5 KW AM 1975 McMartin BA2.5K
- 5 KW AM 1969 Harris BCH5H
- 5 KW AM 1979 Harris MW-5A
- 5 KW AM 1980 Harris MW-5A
- 5 KW AM 1980 Collins 828E-1
- 5 KW AM 1982 Continental 315F
- 5 KW AM 1982 Continental 315R-1
- 50 KW AM 1978 Continental 317C-1
- 50 KW AM 1981 Continental 317C-1
- 50 KW AM 1981 Harris MW-50B
- 50 KW AM 1982 Harris MW-50B

2655 Philmont Ave #200, Huntingdon Valley, PA 19006
800-441-8454 • 215-884-0888 • FAX No. 215-884-0738

VISIT OUR INTERNET SITE: WWW.TRCORP.COM
SEND YOUR E-MAIL REQUESTS TO TRANSCOM@TRCORP.COM

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.

BROADCAST EQUIPMENT

USED: FM/AM Transmitters, RPU's, STL's, FM Antennas, Consoles, Processing, etc. CONTINENTAL COMMUNICATIONS, 3300 Chippewa, St. Louis MO 63118. 1-800-664-4497 FAX: 314-664-9427.

RCA Ampliphase in gd cond, very reliable, \$36,000. J Bahr, 787-728-0364.

Circle (227) On Reader Service Card

Continental 831G 20 kW FM, (2) currently on-air, excellent condition, upgraded, available Summer 1998. JMS & Associates, 513-621-9292, Fax 513-651-9622.

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 short-wave 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.

Wanted: 2 kW - 5 kW frequency agile transmitter, Harris PT series or equivalent. JMS & Associates, 513-621-9292, Fax 513-651-9622.

For details on space availability contact Simone at **703-998-7600**

Radio World

5827 Columbia Pike, 3rd Floor Falls Church, VA 22041 • PHONE: 703-998-7600 • FAX: 703-998-2966

Select from these categories for best ad positioning:

- Acoustics
- Amplifiers
- Antennas & Towers & Cables
- Audio Production (Other)
- Business Opportunities
- Cart Machines
- CD Players
- Computers
- Consoles
- Disco-Pro Sound
- Financial/Leasing Services
- Limiters
- Microphones
- Miscellaneous
- Monitors
- Receivers & Transceivers
- Recorders
- Remote & Microwave
- Repair Services
- Satellite Equipment
- Software
- Stations
- Stereo Generators
- Tapes, Carts, Reels & CD's
- Tax Deductable
- Test Equipment
- Transmitter/Exciters
- Training Services
- Tubes
- Turntables
- Positions Wanted
- Help Wanted

Classified Advertising Rates Effective January 1, 1998

1-9 col inch (per inch)	\$75	3x	73	6x	70	13x	63
10-19 col inch (per inch)	\$70		68		65		58
Distributor Directory	\$115		113		110		99
Professional Card	\$80		78		76		68
Station/Studio Services	\$175						

\$2.00 per word \$16 additional

To compute ad costs: Multiply the number of ad inches (columns x inches) by the desired rate schedule for your per unit cost. Example: a 3" ad at the 1x rate is \$225, at the 3x rate \$219, at the 6x rate \$210, at the 12x rate \$189, etc.

EMPLOYMENT

HELP WANTED

Engineer Virgin Islands: Harris 10 kW FM transmitters, combiners, satellite, RF and computer literate. Send CVI, salary needs, etc to: Chairman, POB 85111, Hallandale FL 33008.

LAKE TAHOE - 18 MILES AWAY: Pilgrim Radio, a network of satellite-fed, commercial-free Christian radio stations and translators, is looking for a competent outdoor-type Chief Engineer with FCC general and/or SBE to share workload with Wyoming counterpart. Experience in digital automation, satellite audio, solar, and FCC filing process a plus. Helps to be able to operate Thiokol Snocat. We need a motivated, organized, careful and honest individual to fill this position by Spring. Post, fax, or e-mail cover letter and detailed resume including experience, education/training, dates of employment, salary history, and references to: General Manager, Pilgrim Radio, 6363 Highway 50 East, Carson City NV 89701. FAX: 702-883-5704. E-mail: knisfm@aol.com. EOE.

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.

POSITIONS WANTED

15 yr vet, AC/Oldies, seeks on-air program/music director position, excell 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 radiol 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.

ADVERTISER INDEX

This listing is provided for the convenience of our readers. Radio World assumes no liability for inaccuracy.

Page No.	Advertiser	Reader Service No.	Page No.	Advertiser	Reader Service No.
56	Acoustic Systems	54	30,31	Harris	58
44	Air Corp.	102	71	Henry Engineering	128
37	Altron Research	214	62	Innovative Devices, Inc.	22
43	Antenna Concepts	-	18	Inovonics	186
45	Antenna Concepts	-	22	Inovonics	83
47	Antenna Concepts	131	32	Inovonics	84
57	Arrakis	80	73	J & I Audio/Video	233
40,41	Arrakis	85	71	J Squared Technical Service	74
6	ATI	107	44	Kintronics Labs	51
21	Audio Broadcast Group (ABG)	57	54	Knights Communications Inc.	28
2	Audioarts Engineering	29	48	Logitek	157
73	Auralex	234	65	Mager Systems	1
44	Autogram Corporation	101	58	Media Touch	106
35	Belar	162	19	Microboards Technology	212
38	Bext	33	19	Nautel	5
55	Bradley Broadcast	209	27	Neutrik Canada	213
36	Broadcast Devices, Inc.	26	10	Neutrik USA	211
49	Broadcast Electronics	183	44	Nott Ltd.	25
71	Broadcast Richmond	-	51	NPR Satellite Systems	14
38	Broadcast Software Int'l (BSI)	7	20	OMB America	31
36	Broadcast Tools	73	34	Orban	136
12	BSW	30	26	PR&E	187
4	Burk Technology	81	8	Prophet Systems	159
62	Circuit Werkes	49	62	PTEK	130
3	Clark Communications	55	35	QEI	180
24	Computer Concepts Corp.	135	42	Radio Computing Service (RCS)	111
7	Comrex	133	61	Radio Shows	215
23	Continental Electronics	15	59	Radio Spirits	132
36	Cortana	77	76	RF Parts	229
60	Crown Broadcast	158	76	Satellite Systems	231
13,15	Cutting Edge	108	44	S.C.M.S., Inc.	50
52,53	Dalet	2	17	Scott Studios	160
44	Econco	24	36	Shively Labs	52
77	Econco	228	11	Shure Brothers, Inc.	4
36	Electronic Research Inc.	78	67	Sierra Automated Systems (SAS)	27
62	Electronic Research Inc.	100	71	Silicon Valley Power	99
29	Enco Systems	32	22	Sine Systems	109
14	ESE	82	44	Spacewise Broadcast Furniture	76
39	Eventide	59	71	Stephens Communications	48
62	Excalibur Electronics	75	76	Svetlana	230
63	Fidelipac	210	25	TC Electronic	161
69	Ghostwriters	126,127	9	Telos Systems	185
36	Gorman-Redlich Mfg. Co.	104	62	The Media Technology Group	23
36	Halland Broadcast Services	103	69	The Radio Mall	125
73	Hall Electronics	232	77	Transcom	227
1	Harris	3	59	UPI	184
16	Harris	134	71	Videoquip Research	129
28	Harris	6	79	Wheatstone	79
33	Harris	110	80	Wheatstone	105
72	Harris	53			

Production Director	Lisa Stafford	Ad Traffic Assistant/	
Production Manager	Lisa Hoagland	Classified Coordinator	Anastacia Stornetta
Publication Manager	Jennifer West	Ad Coordination Manager	Simone Mullins
Showcase Coordinator	Vicky Baron	Circulation Director	Sheryl Unangst
Ad Traffic Manager	Kathy Jackson	Circulation Manager	Robert Green
Desktop Management	James Cornett	Accounts Receivable	Steve Berto

Advertising Sales Representatives

U.S. East: Skip Tash	703-998-7600 ext 160 Fax: 703-998-2966
U.S. West: Dale Tucker	916-721-3410 Fax: 916-729-0810
U.S. Midwest: Sandra Harvey-Coleman	765-966-0669 Fax: 765-966-3289
Southwest Sales: Christopher Rucas	415-922-5595 Fax: 415-922-5597
Other Regions: Stevan B. Dana	703-998-7600 Fax: +1-703-998-2966
Latin America: Alan Carter	+1-703-998-7600 ext 111 Fax: +1-703-998-2966
UK, Ireland: Phil Guy	+44(0)1869-337508 Fax: +44(0)1869-337509
Europe, Africa, Middle East: Raffaella Calabrese	+39-2-7030-0310 Fax: +39-2-7030-0211
Asia/Pacific: Eiji Yoshikawa	+81-3-3327-2688 Fax: +81-3-3327-3010

Free Subscriptions are available upon request to professional broadcasting and audiovisual equipment users. For address changes, send current and new address to RW a month in advance at P.O. Box 1214, Falls Church, VA 22041. Unsolicited manuscripts are welcomed for review: send to the attention of the appropriate editor.

REGIONAL DIRECTOR OF ENGINEERING

Needed to oversee Capstar's West Coast technical operations. Ideal candidate has managed studio consolidations, transmitter moves, allocations studies experience and has a passion for radio.

Fax, e-mail or snail mail resume to:

Capstar Broadcasting Partners, Mark Stennett VP/Engineering, 600 Congress Ave #1400, Austin, TX 78701

stennett@capstarbroadcasting.com
Fax: 512-340-7890
No Phone Calls Please. EOE.

Radio World

Broadcast Equipment Exchange

Is read by over 18,000 Broadcast Equipment Users Every Month!
Sell Your Used Equipment Here.

Call or FAX Simone Mullins for Information on Affordable Advertising Rates.

PHONE 703-998-7600 FAX 703-998-2966



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 (105) On Reader Service Card