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Introducing a New Conference by TVB  
See page 54.

# RadioWorld®

Vol 20, No 19

Radio's Best Read Newspaper

September 18, 1996

## Marketing Fords and Toothpaste

by Lynn Meadows

**SAN ANTONIO** Clear Channel Communications Inc. owns and operates 94 radio and 18 television stations in the United States and 49 radio stations in Australia and New Zealand.

L. Lowry Mays, a man with a bachelor's degree in Petroleum Engineering and a master's degree in business administration from Harvard University, is the president and CEO of this major group.



L. Lowry Mays

Mays talked with RW about his career, his company and issues of the day.

**RW:** How does a man with a degree in Petroleum Engineering get into radio?

**Mays:** That was three lives ago. What you need to do is figure out how I got from investment banking into radio.

I went into the oil business prior to going into the Air Force when I graduated from school.

I went back to graduate school in business and at that juncture, I looked at the different career opportunities and selected investment banking instead of the petroleum engineering business. That led me into the broadcasting business by virtue of the fact that I had a client who wanted to finance a radio station and that's how I got involved in broadcasting.

continued on page 6 ►

## Radio Should Look Ahead

Gary Shapiro was named president of the Consumer Electronics Manufacturers Association (CEMA) in October 1995. More than 300 U.S. consumer electronics manufacturers strong, CEMA is involved in a variety of market research, government affairs and engineering projects as well as the Consumer Electronics Shows.

In a one-on-one with RW Editor in Chief Lucia Cobo and Correspondent Alan Haber, Gary Shapiro discussed RDS, DAB and the many challenges and opportunities facing the radio industry.

**RW:** Explain to us how CEMA has broken the chicken-and-egg syndrome with RDS.

**Shapiro:** RDS was something other portions of the world, specifically Europe, came to before we did in the United States. They came to it first because they had greater political control of broadcasters. They could say this is how it shall be ... And now, as you know, RDS is commonplace in Europe.

We saw that happening and actually had an excellent coming together and eventually solved some of the hurdles of the broadcasters and equipment manufacturers and eventually agreed upon a standard. I think broadcasters now accept RDS as being positive.

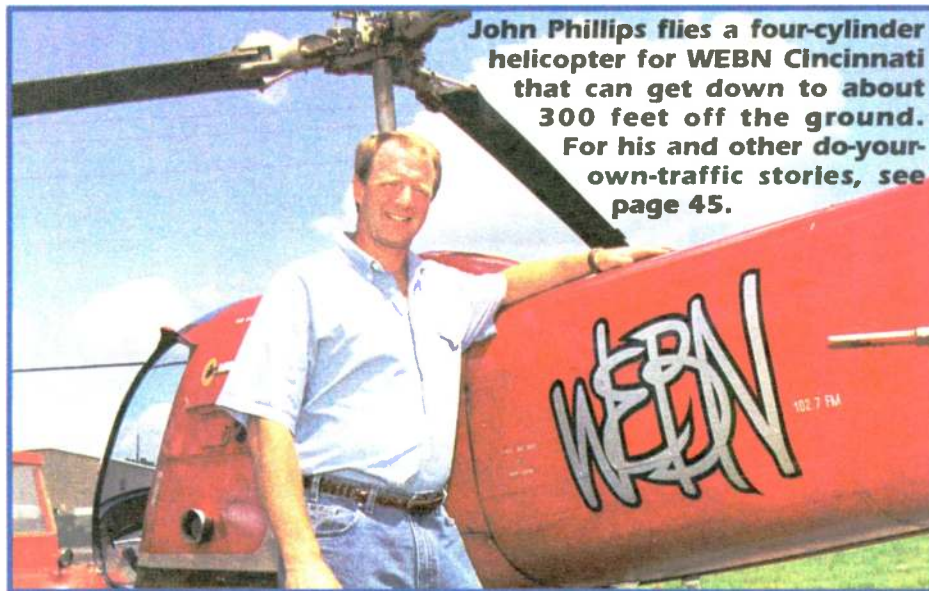
We broke the chicken-and-egg cycle when we said "Something has to happen so broadcasters will start (using RDS)" and we started a campaign to hit the top 25 media markets. We started this campaign a year-and-a-half ago — we give the RDS product away to the broadcaster in return for a significant amount of advertising time promoting RDS.

The way we judged the campaign a success is by the fact that there isn't a day that goes by that I don't get a phone call

or a letter or something like that from a radio broadcaster who is now aware of the campaign, wanting us still to do the program even though they are outside of our 25 markets.

So the campaign has essentially met our objectives, within the top 25 markets we have at least X percentage of the population covered. It varies, with anywhere from 30 to almost 100 percent in some markets. And we have officially ended

continued on page 14 ►



John Phillips flies a four-cylinder helicopter for WEBN Cincinnati that can get down to about 300 feet off the ground. For his and other do-your-own-traffic stories, see page 45.

Honestly...

### What are the options?



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## SBE Moves Aggressively With Times

by Bob Rusk

**INDIANAPOLIS** Radio engineering has not lost its hair, but it is turning gray.

Industry leaders agree that the profession is aging, with fewer young people choosing this once revered career path. The younger generation is instead opting to enter the fields of telecommunications, satellite and other emerging technologies.

The Society of Broadcast Engineers (SBE) is clearly concerned about this but does not think the reason for the change is a mystery.

**Not sexy anymore**

"There is a simple answer," explained SBE President Terrence Baun. "Broadcasting has been around for a long time. It is not considered a 'sexy' cutting edge technology anymore. I think a lot of

continued on page 19 ►

Circle (111) On Reader Service Card

World Radio History



# NEWSWATCH

## Don't Forget Regulatory Fees

**WASHINGTON** Do not forget that regulatory fee payments must be received by Sept. 20 to avoid a 25 percent late penalty. The payments must be accompanied by FCC Form 159 titled "FCC Remittance Advice."

The fees are listed below:

AM Class A License	\$1,250
AM Class B License	\$690
AM Class C License	\$280
AM Class D License	\$345
AM Broadcast Auxiliary	\$35
CP for New AM Station	\$140
FM Class C, C1, C2, B	\$1,250

FM Class A, B1 or C3	\$830
FM Broadcast Auxiliary	\$35
CP for New FM Station	\$690

The payments may be made by check, money order, Visa, Mastercard or wire transfer.

## Chancellor Buys Again

**DALLAS** Chancellor Broadcasting Company has signed a definitive agreement to acquire 12 radio stations from Colfax Communications for \$365 million in cash plus net working capital.

The acquisition, expected to close in the first quarter of 1997, will include eight

FM and four AM radio stations in four of the top-28 markets.

The stations include WGMS-FM, WBIG-FM and WTEM(AM) in Washington D.C.; KQQL(FM) and WBOB-FM in Minneapolis-St. Paul; KOOL-FM, KYOT-FM, KZON(FM), KOY(AM) and KISO(AM) in Phoenix and WMIL(FM) and WOKY(AM) in Milwaukee.

## Digital Engineering Workshop

**ARLINGTON, Va.** The Electronic Industries Association and Institute of Electrical & Electronics Engineers will sponsor the eighth annual Digital Audio

& Video Workshop at the Holiday Inn Select in Philadelphia Oct. 1-4.

More than 30 speakers will discuss how the industries of broadcasting, computers, telecommunications, consumer electronics and cable are converging on the digital audio and video engineering world.

Experts will examine how digital television will bring changes to all aspects of television broadcasting from the studio to the home receiver. Attendees will hear how a model HDTV station is operating.

Fees vary from \$100-625 depending on the number of sessions and membership. Contact Maxine Stone at the EIA at (703) 907-7660 or mstone@eia.org to register for the workshop.

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# Tower Crashes into Parked Cars

by Bob Rusk

**NASHVILLE, Tenn.** A summer storm with heavy rain and winds reportedly gusting to 100 mph blew down a nearby 500-foot tower, taking three radio stations off the air and damaging several parked cars.

WGFX(FM) and WKDF(FM) were silent for several hours following the crash in July, while WKDA(AM) was off the air for two days.

"I got a call Sunday evening informing me that we were off the air," said WKDA co-owner Teddy Bart, who has been in the market for 25 years.

"Because of the storm, that didn't surprise me. But then I was told that the tower had come down. After getting over the initial shock, I drove over to the site. Towers just aren't supposed to fall. Nobody else around here can remember something like this happening."

## No injuries

Part of the tower, which had stood next to the WKDF studios, collapsed atop the truck belonging to the chief engineer.

"I'll give you a piece of advice," said truck-owner and chief engineer David Hodge. "always buy a Chevy pickup. Once the tower was picked up off of it, I started the engine and drove the truck around the parking lot. It's not totaled. All I have to do is replace the bed,

hood, windshield and a fender."

Amazingly, the roof of the cab was not touched and the tires did not go flat. The brunt of the damage was done to a compact car that was hit twice and totaled, according to Hodge.

"The parking lot was full. We had a group of contest winners that we had tak-

to be given away in a station contest was also damaged.

"We were in the process of registering people for it which made for an interesting addition to the giveaway," said Hodge. The truck is now back from the repair shop looking like new and the station still plans to give it away.



The Chevy pickup drove away from this tower collapse — The new Nissan and the Escort weren't so lucky.

en to a Lollapalooza concert," explained Hodge. There were no injuries, fortunately, but Hodge estimated that "about 14 insurance claims" were filed.

In addition, a brand new Nissan pickup

Hodge said the tower was erected in the 1970s when WKDF owned WKDA. Back then, both stations used it.

In the early 1980s, another tower was built for WKDF, but the station used the

fallen tower as an auxiliary site.

In addition to some whip antennas, the downed tower held the STL dishes for WKDF and WGFX, both owned by Dick Broadcasting.

WKDF was off the air about four hours, while the Marti equipment was hooked up as a temporary way of getting the signal to the main tower. WGFX was off for nearly six hours.

## Pole found

It was more of a challenge getting WKDA back up, though.

"We had a hard time locating a 60 foot telephone pole. We called all over, but they were already taken," said Hodge, who also reported that the storm took out the tops of street lights and damaged the clock tower at the Nashville train station.

Finally, after locating a pole, WKDA was put back on the air, with a longwire strung between the pole and a "big old tree limb that's about 12 inches in diameter."

Bart, who purchased WKDA last November with partner Karlen Evins, was leasing space on the WKDF tower.

"The reason we bought the station was to create programming," said Bart. "This incident was especially damaging to us; it's put a kink in our progress."

"We're doing everything we can to relocate on someone else's tower, build our own or hopefully Dick Broadcasting will construct a new tower."

Said Hodge, "We have to get something built so we'll have the STL link back like it should be. I'm taking bids (on a new tower) right now." ☺

# FCC Approves Fox, ABC, PBS Free Air-time Ideas

**WASHINGTON** If the electorate is uninformed on Election Day Nov. 5, it will not be because of Fox, PBS or ABC.

The Federal Communications Commission ruled that proposals from the three networks to offer free air time to major presidential candidates are exempt from the equal opportunities requirements of Section 315 of the Communications Act.

With regulatory barriers aside, Fox can follow through on its proposal to offer a one-hour election eve program splitting time evenly among the candidates selected for inclusion in debates by the Commission on Presidential Debates.

Fox also proposed airing 10 segments of 60 seconds each in which the candidates will address issue-oriented questions.

PBS proposed to rotate a two-and-a-half minute slot of air time among all the major presidential candidates. The air time would be scheduled at the same time each week night and candidates would be able to talk about whatever they wanted.

ABC proposed a one-hour prime-time special during the final week of the campaign. Billed as a "live unrestrict-

ed event," the ABC hour would allow major presidential candidates to appear without interruptions or questions from any third party.

A spokesperson for ABC Radio Networks said, "ABC Radio Networks will simulcast whatever ABC television decides to do or to air."

The commission determined that the proposals from Fox, PBS and ABC should be deemed "on-the-spot coverage of bona fide news event" programming and be exempt from the requirement that stations afford equal opportunities to all legally qualified opponents.

Specifically, the FCC said each proposal satisfied the two-part test for exemption as a bona fide news event: one, the format of the program reasonably fits within the news event exemption category and two, the decision to carry a particular event was the result of a good faith news judgment and not based on partisan purposes.

The commission also noted that the proposals are fully consistent with congressional intent to encourage greater coverage of political news.

The three proposals involve coverage of the presidential election only and do not directly implicate other elections. ☺

**ABC Radio will simulcast whatever ABC television decides to air.**

# NEURAL WHAT?

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# Still Looking for DAB Answers

**WASHINGTON** Our front page interview with Gary Shapiro from the Consumer Electronics Manufacturing Association raises some very tough questions for broadcasters.

I don't know if I completely agree that radio is now the inferior-sounding audio medium. In my car, a nicely processed FM station still resounds with clear and deep notes. However, it is true that an over-processed one makes me reach for the tapes (no CD player yet). The way radio sounds has a lot to do with the receivers, and those come from CEMA member companies.

But still, eventually, radio needs the promise of a digital future to retain that prominence and utility in people's lives it enjoys now.

Gary Shapiro warns broadcasters: "People do want quality sound, and radio has become an inferior medium. That has to be addressed by the broadcasting industry. ... It is an inferior-sounding medium. It's an inescapable fact which many radio broadcasters want to avoid but you have to look five and 10 years out and say if this an inferior-sounding medium, how do we deal with it?"

The question is becoming more pressing as more and more countries sign on to DAB, specifically Eureka-147.

The Brits are forging ahead with DAB. The U.K. National DAB Forum launched "News Briefing" this summer, a four-color newsletter designed to inform on the progress of DAB around the world. And inform it does!

The eight-page brochure details worldwide progress of DAB and includes a country-by-country breakdown of the goings-on.

From the portion dealing with pilot projects around the world, I thought I would share this snippet of information, so that you too can get a feel for what is being said about us in the U.K.-DAB circle:

"Test results presented in Las Vegas

during April 1996 this year showed IBOC's poor performance. Franc Kozamernik of the EBU immediately offered a solution — adopt a variant of the Eureka-147 standard with Time Division Multiple Access (TDMA) working. This



move overcomes many of the U.S. broadcasters reservations and will emulate traditional AM and FM channelization while remaining compatible with the rest of the world. The acceptance of Eureka-147 in the United States would satisfy those critics who believe that access to the U.S. market holds the key to

rapid mass receiver development and production."

Of course, the newsletter fails to mention that TDMA is still a theoretical solution to DAB, and it fails to address the issue of spectrum availability in the United States.

What is very interesting, however, is that the U.S. market is still perceived as the "key" to receiver deployment.

What does that mean for us? I don't know. But I sure wish that the testing process had not been so fractionalized as of late and that the USADR IBOC systems had gone through the field tests, along with the other proponents.

The rate of global deployment is picking up pace, and even though we have to do what is best for the U.S. market, I think broadcasters should begin to feel a little bit of pressure to move forward on this technology.

Gary Shapiro made some controversial comments on the subject in his interview, most notably when asked about TDMA.

Shapiro: "That is like saying we really should make the cars go slower because those guys who are making all this money with horse-drawn buggies, that is a very valuable industry and we should protect it. To say that we should protect AM or FM or the existing status quo is unacceptable from a public policy point of view."

I don't know if he was trying to be controversial or if he really feels that the existing broadcast structure should not be exported to the digital radio age, but either way, his approach is sure to raise some eyebrows (if not hackles, too) along the way.

Grundig and Blaupunkt expect to roll out DAB receivers this fall in Europe. Others are slated to follow.

However, if you read our article on DAB awareness by consumers in Germany, you know that they are as aware of DAB over there as our consumers are of RDS.

## 'New Music of Your Life' Available

Jones Satellite Networks will represent "The New Music of Your Life" 24-hour format to national advertisers and will secure affiliation agreements for the network.

Wink Martindale and Chuck Southcott, hosts of "The New Music of Your Life," recently met with JSN at its headquarters in Colorado. The format is an adult pop standards version built on five decades of classics with music from Nat "King" Cole, Frank Sinatra, Neil Diamond, Barbra Streisand, Peggy Lee, Linda Rondstadt, Harry Connick Jr. and Glenn Miller.

"The New Music of Your Life" is presented by Wink Martindale, a top-rated radio personality and television game host, Chuck Southcott, a well-known Los Angeles radio personality for more than 25 years and Gary Owens, host of more than 12,000 radio shows and 40-year radio veteran.

JSN has more than 1,200 affiliates to its networks.



Pictured left to right are Phil Barry, vice president and operations manager/JSN; Chuck Southcott, Music of Your Life; Debbie Stark, marketing manager/JSN; Wink Martindale, Music of Your Life, and Eric Hauenstein, vice president and general manager/JSN.

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## 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 74103.2435@compuserve.com or MCI Mailbox #302-7776). All letters received become the property of Radio World, to be used at our discretion and as space permits.

### Thanks for the word

Dear RW,

Thanks for the Aug. 7, "Christian Radio Sites Warming Up Internet." I read the selection with great interest.

First Alan Haber mentioned several Web sites for Christian radio. Later in his article, he highlighted some stations (not necessarily Christian) that are using RealAudio to allow web-surfers to become listeners.

KHCB-FM at 105.7 MHz in Houston was not mentioned, but we have both distinctives. We are the first nonprofit Christian station to make its audio available to Internet users.

Response has been enthusiastic. We have gotten e-mail response from all over (places as diverse as Switzerland, Japan, New Zealand, North Ireland, Israel and Hong Kong, as well as many, many listeners here in the good ol' United States).

Although music doesn't sound too good at the 14.4 kbps modem rate that we are currently supporting, the spoken word is clear. And because we feel that nothing is more valuable than the word of God, we

are happy with the arrangement.

Please check out our site at [www.khcb.org](http://www.khcb.org) and see what you think.

Dan Wales  
KHCB-AM-FM  
Galveston (Houston), TX

### Wrong impression

Dear RW,

I am writing in reference to the lead article and editorial in the July 24 issue of RW that addresses the placement of PCS towers in the vicinity of AM stations. Both pieces leave the reader with the impression that AM stations are left unprotected and defenseless against the whims of the cellular and PCS industries. In my practice with MLJ, I have been involved with many cases on behalf of both cellular and PCS clients.

To say that cellular and PCS operators do not recognize or respect their obligations to nearby AM stations is simply and demonstrably not accurate.

Unfortunately, it is accurate to say that the two sides often do not understand each other's requirements, and that problems created by locating cellular or PCS towers near AM stations have been blown out of proportion.

Reradiation of an AM station signal by another tower is well understood, and has been for many years. With modern computer modeling techniques, these situations can be easily and accurately evaluated. There need be no magic or mystery involved.

It has been our experience that many, if not most cellular or PCS towers do not require detuning. They are often electrically short at AM frequencies, and are frequently located in areas where they receive little radiation from the AM station. In those cases, they are simply not capable of significant reradiation. Where detuning is necessary, the methods are well known, easy and relatively inexpensive to implement.

With regard to the required measurements, and with all due respect to Mr. Nott, a full proof in these cases is simply not justified.

(Those of you who regularly follow AM regulatory matters may recall that MLJ is one of five consulting firms sponsoring a Petition for Rulemaking that would, among other things, do away with full proofs even at an AM station initial licensing stage. If we can dispense with full proof at the station "turn-on," then certainly a full proof in a reradiation case is gross overkill.)

Ultimately, the cellular or PCS operator's obligation is not to insure that the AM station is within the rules, but, rather, to be certain that the tower has not had an impact on the operation of the AM station. Often, even before and after partial proofs, or other measurements on the station, may not be the best evidence. The erection of the cellular or PCS tower may not have been the only change that took place at the station or in its environs. In many cases, the best evidence that the tower is not a significant reradiator would be measurements made at the tower itself, or in its immediate area.

## NAB Radio: Up Front And Center

The 1996 NAB Radio Show takes place next month in Los Angeles as part of World Media Expo. You should be there because some of the most pressing issues you say you face today are up front and center.

At RW we often survey our readers to learn what's on your mind. Recently you told us of utmost concern were such top-

ics as deregulation, job security, the impact of large corporate broadcasters on small owners. The very same issues in which the Radio Show will delve.

"I've been laid off twice since 1993" because of consolidation, one reader told us. "Relaxed ownership rules," stated another, are "creating monopolies." A third writer decried the decrease in "variety and excellence" brought about by mergers and duopolies.

Centralized control, loss of job openings, fewer opportunities for entrepreneurs, future competition from direct satellite, elimination of technical departments ... these themes run throughout your responses.

We aren't surprised. The top 50 owners now operate 1,187 stations and, perhaps more important, account for revenues of more than \$5 billion in an ad marketplace of \$10.5 billion, according to BIA statistics we just reported.

The headlines only reinforce the concerns of radio people. Westinghouse-Infinity. EZ-American Radio Systems. Deals small and large make the news. Managers, engineers, disc jockeys and others struggle to keep track of who owns whom.

Not everyone, however, sees the industry in the same light. Some of you suggested that the marketplace is too competitive.

"Too many stations," one reader wrote, compete for "only so many ad dollars." Several respondents identified the abundance of stations as their most pressing issue.

These revealing and sometimes contradictory comments reinforce the importance for broadcasters to keep up.

Session topics at the Radio Show include: "Where Have All the Engineers Gone?", "The Merger Train is Coming! Are You On Board or Left Behind?", and "How to Keep Your Job in a Duopoly, Triopoly Or More!"

Attend the Radio Show. Take an active role in your industry community.

It's your future.

—RW

# Radio World

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Next Issue of Radio World  
October 2, 1996

Here again, there is no magic involved, merely an understanding of the process.

We do not believe that a change in regulation is warranted. Our experience is that most PCS and cellular operators understand the requirements and behave accordingly. If any change is needed, it is for better communication and coordination between the AM stations and the PCS/cellular operators.

We consistently have found that adequate prior coordination and proposing solutions that are reasonable for each situation nearly always averts confrontation and allows both parties to get on about their respective businesses.

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### Sinking hum

Dear RW,

I read with great interest "Sinking Hum for Quiet Recordings" by Bruce and Jenny Bartlett (RW, July 24). They make a number of helpful hints. But they also make a mistake in regard to cable. They state that, to shield from 60 Hz and its harmonics, "foil shielding has the most coverage, so it is the best choice for permanent wiring."

It should be realized that no standard shield material, spiral-serve, braid or foil has much effect on interference below 1000 Hz. Braid shielding is effective from 1000 Hz to 50 MHz at which frequency the effectiveness begins to fall off

and is ineffective around 400 MHz. Foil lacks the mass and is only moderately effective up to 50 MHz at which time it is superior to braid shields up into the gigahertz range. This is why many broadband cables, such as digital video cables, have high braid coverage and foil shield combined.

Below 1000 Hz the most common protectant is steel conduit. Aluminum conduit almost has no effectiveness. Flexible conduit can give up to 18 dB reduction at 60 Hz. Solid conduit can provide 20 to 27 dB of 60 Hz noise reduction depending on the thickness of the conduit and the workmanship of the joints.

### Correction

Some towers that are under 200 feet tall do require lighting. The July 24 issue of RW incorrectly reported that lighting is not required on any tower under 200 feet tall.

The Federal Aviation Administration may require lighting on structures shorter than 200 feet if the structure is found by the FAA to exceed obstruction standards. Tower owners uncertain whether their tower requires lighting should contact the FAA to be sure.



# Mays Is Clear on Group Goals

► continued from page 1

**RW:** What was your first station?

**Mays:** It was what is now KAJA(FM), a country station in San Antonio.

**RW:** How would you define the Clear Channel philosophy of radio?

**Mays:** I would say our culture is that we are really in the business of selling our customer's products and not in the advertising business. We're not in the entertainment business. We're not in the ratings business or the engineering business. We're in the business of selling Fords or toothpaste or tamales or whatever our customers want to move.

We have always focused on that and if you continue to focus on that with your customers, then you can measure your importance to them. You can measure whether you are successful in moving products. We try to do that on a local level to where that success is measurable and creates a more stable business for us.

**RW:** Is there a secondary goal along with that?

**Mays:** To create shareholder value which should be the overriding goal of the company that has as many stockholders as we do. We work for the stockholders and our business is to increase stockholder value over a long period of time.

**RW:** How about your management style? Are general managers free to purchase new equipment or make major decisions?

**Mays:** Sure, as it relates to equipment, however, there is a central-

ized capital budgeting process just like there is a planning budgetary process presenting what revenues and expenses are likely to be during that period.

Separate and apart from that is the capital equipment budget and to that extent, the engineers provide their general managers with their wish lists and we have a person based out of Tulsa, Jim Smith, who is a vice president of the company, that is really in charge of radio engineering. He's actually the general manager of our Tulsa stations, but as a secondary duty, he is in charge of all engineering projects and all engineering purchases.

That capital budget is brought forward once a year and we decide — whether it is television or radio — exactly what is necessary to keep up to speed.

**RW:** I know that Clear Channel has a number of stations in Australia and New Zealand. What lessons can the U.S. radio industry learn from those countries and what can they learn from us?

**Mays:** They are pretty much the same. You know this business is the same whether it is in Australia or Hungary or Germany or the U.K. or whatever. The business is simply a means in which to sell our customers' products so that's the same no matter where in the world you are.

Any different management team can bring something to the party whether they be in New Zealand or whether they be in Houston, Texas.

With very small exceptions as it relates to certain expenses that revolve around government regulations and concession fees or

rights fees or license fees or whatever, the business, I find is the same whether you are speaking Czech in Prague or German in Berlin. The whole goal is to keep an audience and as many as you can in order to prevail upon those people to buy your customers' products.

**RW:** I'd like to get your opinion on a number of different topics starting with the threat of satellite radio. What are your thoughts on that?

**Mays:** I am concerned about that because radio is local and anything that undermines localism, I think, will ultimately fractionalize the audience and make it more difficult.

But having said that, we've always had national services and local radio has been able to compete with them over the years.

**RW:** How about digital audio broadcasting and specifically if the current version of IBOC (in-band, on-channel) causes unacceptable levels of interference, what should the next step be?

**Mays:** That's something that you should ask Alan Box or Michael Rau or other people who know more about that than I do.

When I was chairman of the National Association of Broadcasters several years ago, when asked the question of when that's going to be on the horizon, I always said five years and I'm still saying five years. In fact, it may have expanded to seven years now, but it just never seems to get any closer.

Of course, the radio industry's goals are to get in-band, on frequency. I'm in hopes they'll be able to get the kind of quality to be able to accomplish that.

When they do, I guess this whole industry will move and we'll have a different game at that time, because I think that the AM band will start to have some more competitiveness than it has today.

**RW:** A lot of the big players in radio are enjoying good profits and a lot more respect on Wall Street today which is great, but it seems that this comes at the expense of the stand-alone station owner or might even spell the end of the stand-alone station owner as we used to know him. What are your thoughts on that?

**Mays:** I don't think there is any possibility that an independent station owner would be at a disadvantage or go by the wayside.

I guess now, maybe the 10 largest groups own an average of 50 stations apiece. That's 500 stations out of 10,000.

Maybe that grows over the next three years to 100 stations a piece. There are a few of us that have 100 stations now — maybe

two or three of us. So maybe that grows to 1,000 stations in the top 10 groups.

There's a lot of radio stations out there and any thought that they would be controlled by 10 guys is preposterous to me. I just don't think it's going to happen.

**RW:** If you were in that position — if you owned a stand-alone station in the San Antonio market — what would you do?

**Mays:** I'd do one of two things. If I had fun running my station, I'd continue to run that station. If some guy offered me twice what I thought it was worth, I'd sell it. It's all business.

There are a lot of people here who are independent operators and we're very interested in buying stations in San Antonio. There are still 15 different owners. We're not making any progress in buying stations in San Antonio.

**RW:** Would you like to see the local ownership limits lifted?

**Mays:** Yes, I'm one of those who believe that you have more diversity with more concentration of ownership.

And I believe that if one person owns all of the radio stations in a given market — however difficult and preposterous that might sound — there is no such thing as a monopoly in terms of the traditional anti-trust position simply because there are too many alternatives whether it's television or newspaper or direct mail or cable.

There are too many ways to get to the consumer to where if one person owned all the radio stations, that would not in the true sense be a monopoly.

But I don't think that will ever happen, anyway, under any stretch of the imagination.

**RW:** For Clear Channel, coming up this year, what are the biggest challenges that you face? What are your goals for this coming year?

**Mays:** Our goals are to continue to get stronger in the 35 markets that we are presently in, in order that we can sell more Fords or more toothpaste or whatever. We want to become stronger in our markets to better serve our customers.

We think if we do that, then it will be more profitable for us and we can continue to create more shareholder value over the years.

**RW:** Is there a growth goal that you have or a point at which you will stop acquiring stations?

**Mays:** When prices reach a point where we can no longer achieve the rates of returns that we have in the past. We don't want to acquire stations to get big; we want to acquire stations to create shareholder value.

**RW:** The recent purchase of Tichenor and Heftel puts Clear Channel into a new and growing

type of market. How differently do you approach the Spanish language stations?

**Mays:** Well, I've never been in the Spanish-language business before, but I can tell you, as I mentioned a while ago, it doesn't seem to be any different to me than the English language.

It's all the same. In fact the television business is just like the radio business because that's just another medium to sell customer products.

**RW:** What is AM radio's best hope for survival and success?

**Mays:** DAB. I think that's the crux of it.

We have some very profitable AM radio stations. We have three clear-channel stations. We have numerous news/talk AM stations around the world and they are extremely profitable for us.

I guess with the exception of maybe CBS and Westinghouse and ABC, we have more profit coming from AM stations as a percentage of cash flow than anyone else.

So we're not one of those companies who are selling off their AM stations. We treat them on a marginal profit basis and we've been very successful in creating value.

**RW:** In talking with you, there is not a mention of public service or any of those kind of feel-good words that people used to call to mind in broadcasting from the '20's to the '50's and as late as the '70's and '80's. Why is that? Are those things that come into play?

**Mays:** It's an integral part of our business. The fact that we pay for our spectrum by doing public service is not lip service at all. Public service is a minute-by-minute, day-by-day activity of every one of our 130 different profit centers.

I think that by the consolidation of ownership, as I referred to earlier, I think you will get more diversity of programming and more audience and more of an opportunity to create meaningful ways of public service.

I think that the reason that perhaps we don't say that is a significant part of our business is that we take it for granted in terms of what we do for our communities.

In Louisville, Kentucky, we've raised three and a half million dollars every year for children in that community. It's called "Crusade for Children."

We do that because we've done it for the last 30 years and we think it's meaningful to that community and we do the same thing with every single station that we own in every single market that we are involved in.

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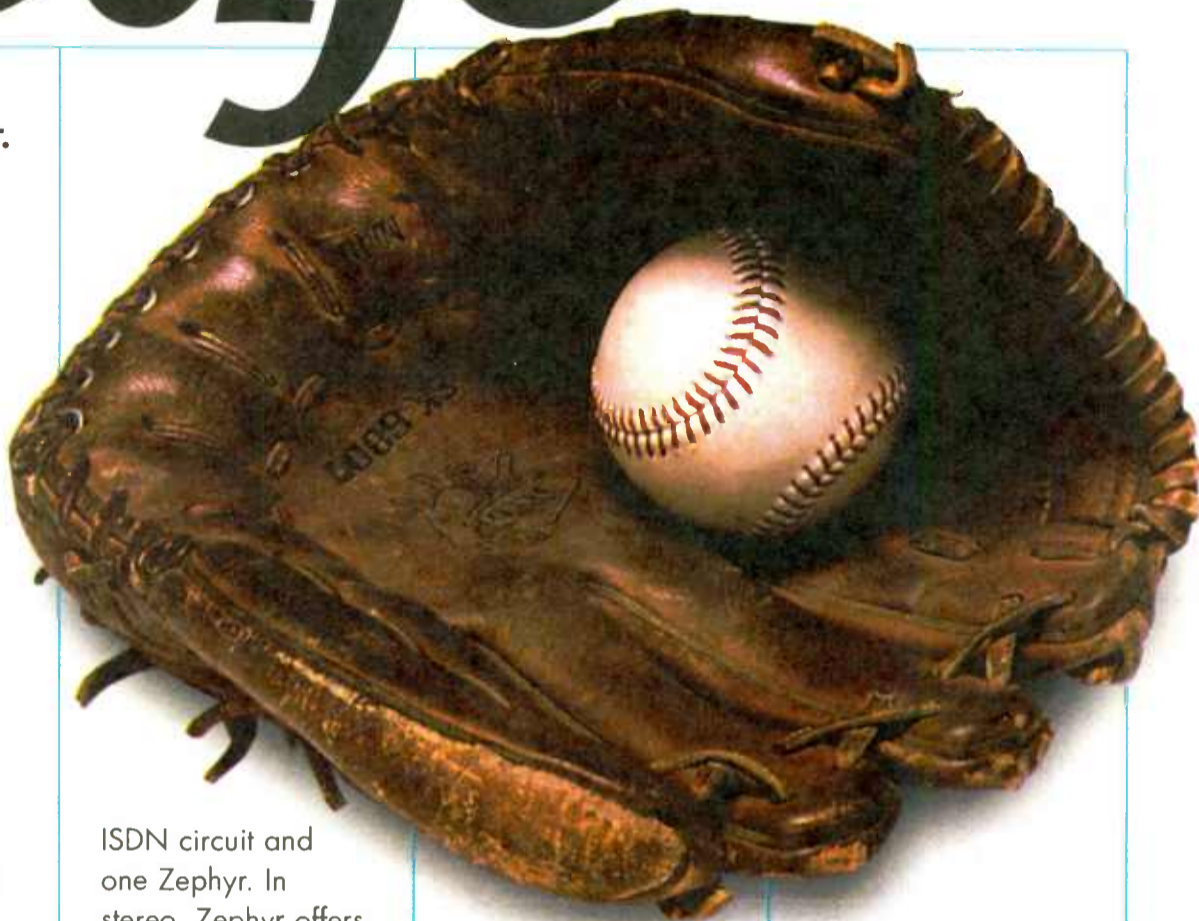
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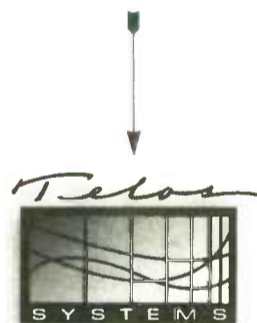
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# Inexpensive but Extensive Coverage

by James Careless

**CHICAGO** With the Republican and Democratic conventions both occurring in August, CBS News Radio was presented with an opportunity — and a major expense.

The opportunity was to provide extensive coverage for both CBS owned-and-operated (O&O) stations and affiliates of the conventions from gavel to gavel.

The expense, of course, was having to send a team of about 17 people first to San Diego (Aug. 12-16) and then to Chicago (Aug. 26-30) to provide all of the coverage and to do the job without breaking the bank.

"This year I wanted to see how cheaply we could do it," said Tony Brunton, director of special events for CBS News Radio.

"We're going out there to cover sort of a fait accompli," because both Dole and Clinton had their nominations sewn up long before the conventions began.

The task that really hit Brunton square between the eyes was that of setting up the famous CBS three-story broadcast booth.

Neither the San Diego nor the Chicago site was designed to allow the booth to fit.

In San Diego, "the hall did not lend itself to a political convention," said Brunton. "It's a dreadful place. The ceilings are low and in this case, they were so low that the booth that we normally work from, which is the middle tier of a three-tier booth that CBS stores every four years and trots out — it's like a big battleship that breaks down into pieces — they could only put two of those sections up."

And as Brunton described it, using rented booths would be like "being on one end of the runway at Kennedy looking over to the terminal ... some of the booths couldn't even see the podium." Plus the price tag was about \$20,000 for an 8-foot by 10-foot room.

Chicago was no better, said Brunton. Although the building was much more appealing — "this is a big, beautiful arena" — they could not put in the traditional network booths that occupy so much floor space. Instead, they were allocated sky boxes to accommodate CBS much like what was done in Madison Square Garden a few years back.

"We took a look at the cost of these sky boxes, and they charge you when they put wrap on the wall to protect them, even though you don't want that," said Brunton. "And it looked like the bill for these was going to run almost up to what San Diego charged."

Fed up with this, Brunton opted instead to take his crew out into the parking lot. Their home for both conventions was a 12-foot by 60-foot trailer that was converted into a three-studio mobile station, complete with editing and mixing equipment.

"We had one studio for our long form broadcasts. These were going on almost continuously during the convention," he said. "We have cutaways so the stations can get in and out."

The middle section had a booth used for

general spot type work where the on-site correspondents could talk to affiliate stations for one-on-ones. CBS News did 44 of these from San Diego alone.

"It's probably one of the most important things we're doing now," Brunton commented. "More and more stations want to be able to have their anchor — particularly the all-news stations — talk to our people."

"The third one is where we do the short reports on the hour and half-hour." Commenting on the overall situation, he observed, "it was cramped, but it's okay."

Production duties themselves were complicated by the fact that the trailer was not equipped with digital editing equip-

digital to analog cart. The analog cart was then played back on cue from New York by the coordinating producer in New York.

"We were using three analog cart machines. And we got used to the slight delay; (we learned how to) fire just in time to defeat the delay."

The cut-ins themselves were coordinated by the CBS computer system. In the case of the Republican

convention, Brunton said, "the computer knows that we're supposed to go at 31 for a report from San Diego." At the proper time, the computer switched.

"We missed one broadcast, to be honest. We had one extra guest in there (in San Diego) and, in all the hectic business, that one didn't go in the computer. So we were doing an extra one; the computer never put it to air."

Still, the CBS News Radio trailer studio did the trick for the network, allowing them to produce high quality convention coverage on a relatively meager budget. Also aiding the situation was Brunton's effort to tap the "synergy" of CBS News' TV coverage, "which is another way to say we steal their material."

And it also showed that, when it comes to special events, broadcasters need not be held hostage to the plans of political parties. If the floor space is inadequate, too expensive or both, then it is possible to "pick up your marbles," take them to the parking lot and still do the job. ☺



Governor John Engel of Michigan and Mary Matalin chat in Chicago.

ment. To make up for this, "all the editing was done back here in New York on a digital system ... We had two edit rooms running flat out digital and they would go

## Matalin Finds Mic on Talk Show Row

**SAN DIEGO** Not everyone from CBS News found themselves out in the parking lot at convention time. "The Mary Matalin Show" radio talk show found itself on "Talk Show Row" during the Republican convention.

Located in what TMMS producer Ann Klenk called "a beautiful corridor," Matalin found herself lined up with other talk show hosts like vendors at a craft show.

"We were in a row — my gosh — there must have been about 30 hosts from all over the country," said Klenk.

Still, despite the fact that they had no booths and just a "long table and about four chairs," Klenk had no complaints about the accommodations at the RNC.

"You just sat there," she said. "It was kind of like watching the parade."

Actually, the Talk Show Row format proved to be highly useful when it came to passing around guests. So, too, did the support of the Republican Party.

"It was very organized," said Klenk. "The RNC really acted almost like a booker. (They) would supply us with guests — very high calibre guests that were interesting and informative."

"It was a lot of fun."

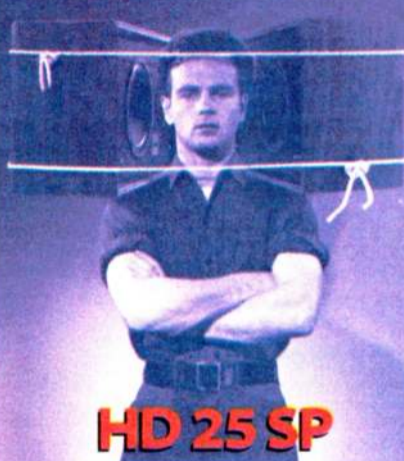
Unfortunately, at the Democratic convention, Klenk and her host did not have the same fine accommodations. They were working in an arena, which forced them up to a sky box — the same sky boxes that convinced Tony Brunton to keep his staff parked in a trailer the second time around. ☺

—James Careless

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**TELOS COMFORT:** Telos Systems donated a complete Telos ONE-x-Six Talk Show System to the Miami Children's Hospital to help make the hospital's new closed-circuit station fully interactive.

Hero Productions in Miami built the state-of-the-art equipped station that is run by patients and trained volunteers. For two hours, three evenings a week to start, the station will offer welcome entertainment and encourage interactive play through call-ins, games, story-telling and contests.

The Telos gear lets a DJ screen and juggle as many as six calls at once at the touch of a button. A Telos Switch Console is used to place outgoing calls, put callers on hold or on the air and to conference.

Radio Lollipop is an international not-for-profit organization that has brought the magic of radio to more than 17 major children's hospitals around the world since it was launched in England in 1979. The Miami Children's Hospital is the first Radio Lollipop in the United States.

**OVERBOOKED:** Approximately 15,000 media representatives were expected to cover the Democratic National Convention held in Chicago in August. Even before the first speaker

spoke, it appeared that all available slots for satellite uplink trucks and satellite transmission facilities were 100 percent booked.

With a crunch for uplink space and facilities at the convention facility, satellite service providers SpaceCom Systems and Keystone Communications implemented a direct digital fiber link from the United Center to the SpaceCom Chicago International Teleport uplink facility south of the city.

Media companies were able to use the multichannel fiber link to connect reporters on the convention floor with their uplink trucks parked in the suburbs. In addition to the direct fiber connection, the Keystone/SpaceCom service enabled users to transmit video and audio both ways between the United Center and the Chicago International Teleport.

**AIRWORKS MEDIA SHOPS:** AirWorks Media Inc., the Edmonton, Alberta, company that makes the TuneBuilder automated music editing program, acquired the key assets of SOC Associates, the parent company of The Synclavier Company.

Under the terms of the purchase, AirWorks Media will obtain numerous patents, trademarks, software code and the rights to use the name "Synclavier."

AirWorks will also obtain three software programs never formally introduced by The Synclavier Co. — S/Link, Autoconform and EditView. AirWorks has also acquired a group of creative software developers who will now be part of the AirWorks product development team.

AirWorks expects the purchase will strengthen its position as a developer of automated software tools for audio production and post production applications.

**SUMMIT RELOCATES:** Summit Audio relocated its separate corporate and manufacturing facilities into one building in Soquel, California.

Summit enjoyed record sales this past quarter of its tube-based outboard gear and just recently hired four more people to handle production control, final testing and mechanical assembly.

Summit Audio is known for the DCL-200 Vacuum Tube Compressor/Limiter; TLA-100A Vacuum Tube Compressor/Limiter; the TPA-200B Dual Channel, Vacuum Tube Mic. Line and Hi-Z Preamp and the EQP-200A Dual-Channel Vacuum Tube Program Equalizer.

"This allows us to streamline our manufacturing process by keeping the entire company under one roof," said Summit Audio President Michael Papp.

**WODS/WBZ UPGRADES:** Ward-Beck Systems sold four custom Renaissance MKIII 24-channel radio

consoles to WBZ(AM)-WODS(FM) in Boston.

The purchase brings the total number of Renaissance units at the CBS/Westinghouse facility to 10. The first six were delivered in early 1995.

Ward-Beck Managing Director and Owner Eugene Johnson said that since the introduction of the first Renaissance consoles in February 1994, the number of units in the field is close to 100.

**PLANET 1 DEBUTS:** COMSAT Personal Communications (CPC) of Bethesda, Maryland, took a step toward offering global satellite communications to consumers by placing the world's first personal satellite communications (PSC) call using its PLANET 1 service.

COMSAT officials in Malaysia placed the call with the NEC- and COMSAT-developed PLANET 1 phone through the Inmarsat-3 satellite operating over the Indian Ocean region. The call was received in Germany by the CPC vice president and general manager.

The PLANET 1 service coverage area will initially include the Middle East, Africa, Russia, Western Australia and Asia. COMSAT expects to offer service in this initial coverage area by the fourth quarter of 1996.

Four additional Inmarsat-3 satellites are scheduled to be launched by October 1997 including one operational spare. Worldwide PLANET 1 service is expected to be available at that time.

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# Liddle Celebrates 50 Years on AM

by Jerry Woods

**SPOKANE, Wash.** The year was 1946 when Bob Liddle first walked into the studios of country radio station KHQ(AM) in Spokane. He was planning to enroll in broadcasting at Washington State University when he made his visit to KHQ to ask the program director what it would take to get into radio.

The program director told Liddle to sit down and gave him an audition. Fifty years later, Liddle is still going strong.

Liddle spent 10 years in Spokane before moving to Portland radio station KXL(AM) where he became a popular personality. When asked if he had ever thought of quitting, Liddle said that everyone in radio thinks of quitting once in a while.

He said one of the big factors that kept him in radio was his five kids. He once left KHQ and got work with a building company. He found the work lonely, and he hated being on the road away from his wife and kids.

After a month, Liddle went to the KGA(AM) studios in Spokane where fortunately a friend of his was just leaving. He was offered the job.

In 1961, Liddle moved into his current position with KIXI(AM) in Seattle where he plays nostalgia hits of the '40s, '50s and '60s.

It is not only the music that keeps Liddle in radio. He said it is the people he touches that count. He enjoys the one-on-one contact he gets with listeners.

"I still get cards from some of the same people after 30 years. The main thing about staying in this business is that you like people and people like you," explained Liddle. He said he has gotten several calls and letters through the years from listeners who have been in the hospital and written to say that his show helped them make it through.

"Of course, it's not really me that pulls them through, but it's a great feeling

hearing that from listeners," said Liddle. "When people know who you are, and they continue to call and write to you — sometimes for years — that's a good feeling."

A lot has changed in the past 50 years. Liddle said when he started in radio, the music he plays now was what was in. He said it is kind of a shock when you hear someone say a song that came out in 1983 is "really old."

"Really old, is something from the 1920s or '30s," said Liddle.

Liddle said he believes that nostalgia hits will always remain popular. He said he does not think there will be nostalgia formats for alternative rock groups of the 1980s and '90s.

"People look back to songs written in the teens by people like Cole Porter, Irving Berlin and Gershwin. Those songs weren't performed until the '30s and '40s, but they have lasting power. People can say, 'That's our song. We fell in love to that song.' I don't think you can really



Bob Liddle

say that about something some rock artist is screaming at you that you can barely understand."

Major government deregulation is the another big change that has affected radio during his career.

When he started in the Seattle market, there were only seven or eight stations altogether and the FCC limited owners to one apiece.

Now there are over 50 stations in the market and controlling interests are constantly changing. Liddle said his company owns five stations in the Seattle area.

Liddle said less regulation means stations are putting less focus on community service.

But Liddle did say that not all of the changes are bad. He said that the one good thing about having so many different stations is that there is something for everyone.

After spending 50 years in radio, Liddle had some advice to share with those new to the business. He said that a broad education is very important, but in the end if you can be glib and ad lib well, there will be a job for you.

"Deep voices and speaking clearly used to be a necessity for radio, but what people want has changed," Liddle reflected.

How much longer for the man who started in radio when he was 25? "I'll be in this business as long as I can — another few years at least." ☺

## License Debate Still Rages for NRB

**NEW YORK** While the Radio Music License Committee (RMLC) agreed to terms of a new five-year ASCAP blanket license agreement, the National Religious Broadcasters Music License Committee (NRBMLC) prepared to meet ASCAP in court.

The RMLC and the American Society of Composers, Authors and Publishers came to terms on blanket and per program licenses in August after negotiating more than a year.

The new agreement states that the current blanket license rate of 1.615 percent will remain in effect from 1996 through 2000.

The RMLC/ASCAP license terms include an increase in deductions permitted that will bring license costs down for

many stations and allow some stations to use the itemized deductions in the license.

There is also a new simplified flat fee for stations whose revenues are \$150,000 per year or less which affects about 2,000 stations.

greatly reduced rates for stations that operate under the new license.

According to the RMLC, stations that play music in more than 10 percent of their yearly reported hours will pay approximately 50 percent less for those additional music hours.

### The NRBMLC raised more than \$1.2 million to fight ASCAP in court.

The new agreement includes a major change in the ASCAP per program license that will permit significantly more use of ASCAP feature music at

Music reporting penalties have also been revised with allowances made for the occasional clerical mistake. Plus, new plain language contract revisions of both blanket and per program licenses are being worked on by ASCAP and the RMLC.

"I am very pleased that we could reach an agreement which provides benefits to both the Radio Industry and ASCAP. In addition, we were able to avoid costly litigation," RMLC Chairman Dick Harris said in a press release.

The NRBMLC is not so lucky, however. Angry with ASCAP for what it considers the organization's continued refusal to offer a fair per-program license, the NRBMLC planned to have its day in court with ASCAP on Sept. 16.

The NRBMLC put together a 400 station group for the proceeding and raised more than \$1.2 million to fight ASCAP in court. The Department of Justice established that court — the Rate Court — in 1950 to settle disputes between ASCAP and music licensees.

"In its entire 50 year history, no broadcast group has successfully argued in Rate Court except the powerful independent TV industry, that spent \$15 million over 10 years to win a landmark case in 1994," NRBMLC Executive Director Russ Hauth said in a statement.

The case is being contested, said the NRBMLC, on behalf of the hundreds of religious, classical and specialty-format stations that use little or no copyrighted music in their formats. ☺

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# Disc Jockeys Adopt Proposal Day

by Richard W. O'Donnell

**PORT RICHEY, Fla.** Love and marriage are making a comeback on the radio — on Proposal Day, which falls on Sept. 22, this year.

"Disc jockeys around the nation have adopted Proposal Day," said John M. O'Loughlin. The Richardson, Texas, insurance company clerk established the celebration five years ago after the woman of his dreams got tired of waiting for his proposal and married another guy.

Why Sept. 22?

"The date can change from year to year," said O'Loughlin. "It's the day of the autumnal equinox ... when the daylight hours and nighttime are on an even keel. Each has about the same amount of time. Sunshine and moonlight are in balance. It's the perfect time for a proposal."

Both men and women can pop the question on Proposal Day.

"Right after Labor Day," said O'Loughlin. "I start getting letters and phone calls. Most are from people who want to know the rules and regulations governing Proposal Day. It's simple enough: A man or a woman can propose to the person he or she loves. Some will be accepted. Others will be refused. You have to live with the other person's decision."

## High-profile rejection

"I heard from newspapers and I heard from TV shows," he said. "but I noticed that a lot of radio disc jockeys were interested in featuring Proposal Day on their shows. And it works."

A listener will call in, and say they want to propose to a certain person. That person will be contacted, the question will be asked, and the proposal will be made.

**'Sunshine and moonlight are in balance. It's the perfect time for a proposal.'**

"Of course, if it's a rejection, almost everybody in town will know you have been turned down."

O'Loughlin said radio personalities in New Jersey, Alabama, Nebraska and Vancouver, among others, have contacted him.

"In the beginning, I kept a list of the radio people who called," said O'Loughlin, "but, over the years, there were so many of them, I just stopped trying to keep track of them. In many cases, they would drop me a note and ask for information, and I'd mail them off a publicity release I had prepared."

O'Loughlin said Coen Reef and Elaine Downey, two famous British voices, called him from London this year, and said they plan to feature Proposal Day on their show "The Big Breakfast."

In another instance, O'Loughlin was contacted by a female DJ in Kentucky who wanted to feature Proposal Day on her show.

"Little did she suspect her steady boyfriend had decided to call the show

and propose marriage to her. She thought only her listeners would call the show. Happily, she said yes, when the proposal was made."

O'Loughlin has no idea how many marriages have taken place because of Proposal Day.

"I would like to think quite a few of them. But I really have no way of knowing. My guess would be in the thousands, but, mind you, that is only a guess."

## Romance on the air

Vintage radio's most famous adventure in matrimony was an ABC show called "Bride and Groom." During its daily run from 1946 to 1951, approximately 1,250

happy couples tied the marital knot.

The show's host was radio veteran Johnny Nelson, who interviewed the happy couples. If you wanted to get married radio-style, you had to send in a letter. A panel of judges selected the best letters. The actual weddings took place in a small chapel, not far from the studio and its audiences, prior to air time.

On the show, after the nuptials, the new couple would tell how they met and relate stories about their disputes, reconciliations and high points on their journey to the altar. Nelson did a great job, considering that he had to keep the gushing couples under control while the commercials were airing.



John M. O'Loughlin

Singer John Reddy was also on hand to sing the couple's favorite song. Each pair continued on page 22 ▶

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# CEMA: Radio Should Look Sharp

► continued from page 1

the program, but the requests keep pouring in, and they're starting to come in from some strange places — outside of the United States, even.

**RW:** You put on a little over 300 stations, during the program, but there are still well over 6000 FM stations to go. How did you break the chicken-and-egg theory when to some it might seem that 300 is a drop in the bucket, compared to 6000-plus FM stations that have yet to put it on? Plus then you have the other side of the coin, which is the AM people, that are still not part of the equation.

**Shapiro:** Look at the stations that are on ... these are major stations in major markets. They become much more significant given that we are in the top media markets in the country, and given the level of interest and given that we have said no to a lot of stations lately.

Now, whether they are going to cough up the couple thousand dollars nessecary to go into RDS remains to be seen, but their interest level has been heightened. It is a multiplication factor.

**RW:** The point about broadcasters expressing interest and consumers expressing interest is interesting, yet to kind of play devil's advocate, when you go to the store and ask for an RDS radio, they look at you like you are from another

country. I called a couple of Best Buys in the area on Friday to ask them if they had RDS radios. The first person I spoke to in each of the Best Buys in car and home audio had no clue what I was talking about, and then when I explained it finally, they said oh, we have that — it is called ID Logic.



CEMA President Gary Shapiro (center) shared his insights on radio's future with RW Editor in Chief Lucia Cobo and Chief Correspondent Alan Haber.

So, we know also that the stations around here that have RDS don't really do much with it beyond call letters and a basic message, which tends not to change sometimes for a long time. So, to the naked eye, it doesn't really look like it's succeeding.

**Shapiro:** There still is an education process that has to happen and it is a matter of time and of interest — but when I see Denon's product with RDS is the featured product in Home Theater Magazine a few months ago as the bestseller, and Denon can't keep up with demand, and you talk with other manufacturers about



CEMA President Gary Shapiro (center) shared his insights on radio's future with RW Editor in Chief Lucia Cobo and Chief Correspondent Alan Haber.

their interest in going to RDS it is very large.

Candidly, the challenges we face on the retail floor are not unique to RDS. With every new technology or product that comes along, until the salesman on the floor understands — to get them to understand is a challenge we face with every new technology whether it is stereo, television or compact disc ... eventually they'll understand it and start selling for it.

But from the manufacturers' viewpoint, RDS is a nice feature on a product. In our view, the broadcasters have so much more to gain from it than we do, and broadcasters are starting to determine that.

RDS is something where broadcasters actually pick up market share by using it as a marketing media for their own

station. Our view at this point is that we have done what we set out to do, and now the free market and the interest of broadcasters are the ones that will have to determine how this product gets accepted.

**RW:** Is CEMA planning any sort of consumer sign-up program to help build interest on the consumer side?

**Shapiro:** No. At this point the advertising is still running on the radio stations, but this will be a free market determination. We have a continuous consumer program for everything we do — RDS will be featured in press releases and the media programs we have, but we will not have a separately funded RDS program.

**RW:** Stations, particularly small market stations, that are having trouble keeping up a payroll, find buying new equipment of any type no matter how expensive or cheap is tough. Playing devil's advocate again, how do you get those smaller market stations that really have to come on board to make this a success, come on board?

**Shapiro:** It starts with the large (markets) and moves to the small in anything. That is the reality, except for the smaller niche guys who always want to be the technological leaders. It is easy for me to sit in the ivory tower of Washington and say wow, if you can't afford \$2000 you shouldn't be in business, but it will be a matter of competitive pressure, whether they want to distinguish themselves.

RDS is a new technology and, like many new technologies — take Bloomberg Financial Services, take the Web — the way you get revenue for the technologies is selling sponsorships around them. That is what RDS allows you to do, essentially, sell a new format of advertising.

**RW:** Taking a longer term view, is there a danger that RDS will be eclipsed by some of the high-speed delivery systems?

**Shapiro:** We face the same debate with virtually every new technology we deal with. It takes a long time for a market to switch. Very rarely is there a revolution where a day comes and everybody says "I'm gonna stop buying these products and start buying these new products."

The existing radio system is going to be around for a while until we transition to digital radio. In terms of other more lucrative uses of that data stream, clearly that's what some folks are looking at.

That is the beauty of the marketplace. If better things come along, if the marketplace will accept them remains to be seen. We don't determine which are the winners and losers in anything we do. What we do is we try to promote concepts, we try to create an environment for standard setting for testing and evaluation, and when an industry gets together, as radio broadcasters told us they wanted RDS promoted and as our own equipment manufacturers are willing to do, we make the marriage.

Radio has two great things going on right now as far as technology, RDS and digital radio. We give you guys stuff to write about. And not only that, we add a little controversy too, which I guess makes even better reading.

**RW:** Has the progress of DAB been slow in your view?

**Shapiro:** No, not at all. I think we were overly optimistic in setting deadlines, but I think that is essential to move any process along. In terms of new technology, I compare it to color TV or HDTV,

continued on next page ►



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# Technology Marches Forward

each of which has taken in the double digits of years.

Digital radio is going along swimmingly well. The only comparison where it is disappointing is to Europe where because of their less than democratic structure, they've managed to implement it quicker than we did here. I like our democratic institutions and I like the separation between broadcasters and government that we have, so that is a trade-off.

**RW:** Why do you think that people have viewed the progress as slow? From the other side of the coin, some people have viewed the progress as being slow.

**Shapiro:** I think some people have viewed the progress as too fast. We see in the broadcasting community a tremendous resistance to change.

Obviously, there are forward-thinking broadcasters who are involved in the process and there is an increasing awareness. Digital audio is of critical importance to consumers.

Digital transmission of sound, into consumer homes and RVs, is the fastest selling consumer electronic product in history: DBS. One of the reasons that consumers — and this is a surprise to the way — is the fact that you have 20 or 30 channels of music, CD-quality. People are using it that way, and in my own home, I have not turned on a radio the way I used to when we were eating dinner. What we have instead is the DSS, and we have it on an uninterrupted music channel.

Every manufacturer is telling us that their research reveals that that is incredibly popular with consumers.

**RW:** In-home listening went down substantially between 1981 and 1995. But it went up in the car. Radio listening at home fell 35 percent.

**Shapiro:** Even where it's gone up, let's say in the car, I know that one person in this room, I think two, still listen to Howard Stern. Now, you don't listen to Howard Stern for the music. Car listening is primarily for drive time. It is not only Howard Stern, it is the other guys across the country as well.

We had a meeting in this room last Monday with leaders of the audio industry and the question on the table was, "why is it that people are no longer taking music as seriously as they once were?"

They are not really into it where they would spend days and days fiddling with the stereo. Is there a lack of good music or is it that there is good music but we're just getting older and we like the old music? Or is it that radio doesn't have the fidelity that it used to so you're not getting exposed to the good music like you used to, so you're relying on the music you get from CD and DSS?

The question also is whether music is playing a central role in society like it used to play — a real interesting question. As we move to more talk formats on the radio, it seems that way. It goes to the very question of the future of radio.

And then there are these other questions about the Internet and how radio is exploiting that. Is it starting to become a commercial service in terms of what people want?

The bottom line is people will want digital radio. You don't have to sell it to

consumers. They understand CD-quality radio in two seconds.

Our mobile electronics show focuses on fidelity in the car heavily. People are buying these 10-CD changers, and these are really popular products. The segments are going so quickly I don't know how you can be in the radio industry, how you can be a broadcaster, and ignore the fact that people are putting huge amounts of money into CD changers in their car, or that every luxury car sold now has a CD player in it.

Yes, they used to have pre-recorded cassettes, but pre-recorded cassettes used to be inferior in quality to radio. I still think you can make the case that they're inferior

or in quality to radio. You cannot make the case that CD is inferior in quality to radio, you just cannot make it.

**RW:** Let's talk about quality for a second. The average consumer doesn't have a Lexus or a luxury car that when you close the doors and close the windows it is so silent you could hear a pin drop. What about those of us that have Geo Metros and other lower-price cars where you can hear the road noise?

And what about people who are at home and who listen to radio in shorter spurts and don't really sit there and listen to the (music) surveys like they used to 10, 20, 30 years ago — are those people

really the market for DAB?

**Shapiro:** That's a great question because there are two types of people I am talking about. One is the Lexus owner, the DSS purchasers, who buy CD players as part of the Lexus or they get it installed afterwards.

The truth is most of the after market for mobile electronics is aimed at the 18-35-year-old male of any demographic—more likely suburban and rural, who is not wealthy by any means and who goes all around the country to these sound challenges and sound-offs.

It is not the upscale person at all. It is the person who has a '76 Camaro who wants a great sound system. It is the get-the-girls-type guy, the beer, bikers and broods-type guy and that is a very compelling demographic. Go out to one of the hundreds of sound challenges, sound-offs

continued on page 67 ▶

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## INTERNATIONAL UPDATE

# Yes, We Have No DAB, Thank You

**EDITOR'S NOTE:** *RW sent its DAB reporter into the field undercover to find out who knows and who cares about DAB in Germany. Following is that report.*

**MUNICH, Germany** "DAB? No, we do not have that system in Germany. It is something for North America."

"DAB? That has something to do with digital video broadcasting; it is not for audio."

"DAB? No, we have another name for that here — digital satellite radio."

"DAB? No, that is impossible, there is no such new system. You are confused."

All these comments came from owners of audio/video stores in Bavaria; people who,

in theory, should be well informed about the latest technical advances in audio — including digital audio broadcasting (DAB).

After a tour of the Bavarian countryside, it is clear that if DAB is to be successful in Germany, its supporters have their work cut out for them.

### Millions spent

Already the Bavarian government has spent millions of deutschmarks promoting DAB. Broadcasters across the region are producing new and innovative programs for the Bavarian DAB project.

With brochures on the Bavarian DAB system in hand, Radio World

International set off to discover if anyone in the hundreds of small villages that dot the Bavarian countryside knew anything about DAB.

Almost every village has at least one or two small audio/video stores, most of which were or are Grundig dealers, but not a one knew anything about Grundig DAB receivers.

All but two were convinced that DAB was not being offered in Germany: We were assured that DAB was something only being offered in the United States.

After being told this at one fairly large shop, we gave the shop owner the DAB brochure. "Ah, ja, that DAB system."

It seems there must be hundreds of different DAB systems; that is why no one knows anything.

### 'Not really ready'

"No, that is not really a system, and anyway they are only testing it in Nuremberg. It is not really ready."

They are not testing it Munich? "No, only in Nuremberg," he said, his tone now quite confident as he quickly tried to read the brochure I had given him.

Those 15 different program providers broadcasting to the people of Munich would be quite disturbed to hear that.

Reading the brochure, the shop owner's curiosity became piqued enough to call his local Grundig representative. Did the Grundig representative know anything about these receivers?

The representative had not heard of them either. "Perhaps it has something to do with a satellite system," he offered.

As I left the shop, the Grundig representative promised to look further into the matter. I wondered at what point he

would discover that his company was making thousands of these receivers, and that they were being bought up by the people of Bavaria as quickly as they were being produced.

Of all the shops we visited, there was one — a very special one — that knew all about DAB.

It was the type of shop that looked as if it had been there since Marconi first thought about transmitting audio.

Tucked away on a side street of a small Bavarian village, a sign out front assured the repair of all of makes of televisions, radios and appliances. A display of several ancient televisions welcomed visitors to this shop/museum.

### Knew a bit

The owner came out, an older gentleman who spoke only in a Bavarian dialect.

He said he knew "a bit" about DAB, and then proceeded relay as much information as anyone could possibly want concerning the system. Everything from what type of programs to what type of receivers.

This was a man that knew his DAB. "How," we asked, "is it that you know so much about DAB?"

"Simple," he said, "I read the journals they are sending me."

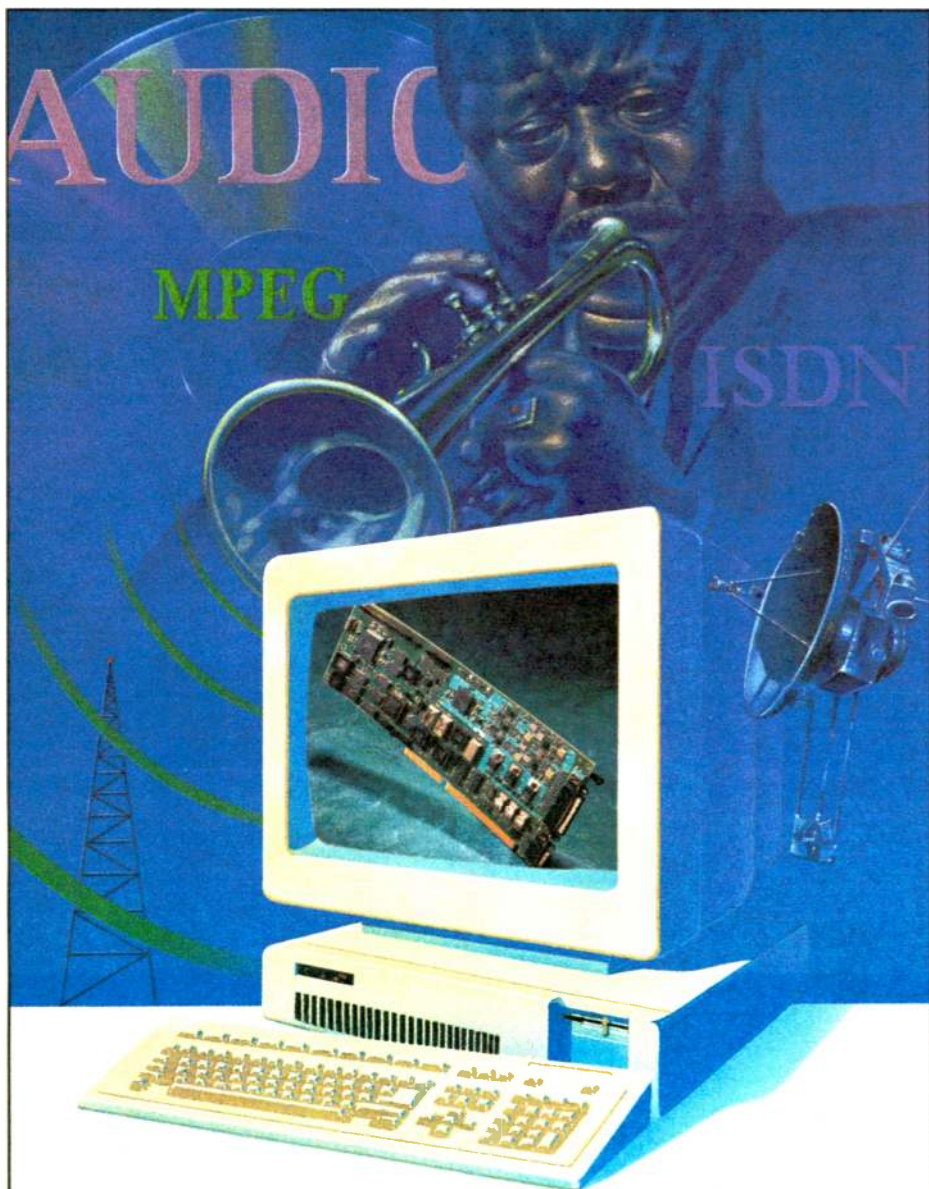
What about people on the streets of Bavaria?

Are those who wear dirndls and lederhosen really informed about the possibilities of DAB?

Most Bavarian towns have a market day that takes place in the town square. This is also the best place to talk to a few people about this exciting new technology.

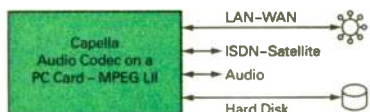
"DAB, no, I have no interest in that," said one gentleman. But did he know anything about it?

He walked away without answering. Perhaps he favored an in-band, on-channel system. ☺



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## Campaigning Technique Involves Tower Climb

**MIAMI** He is articulate, athletic and wants to be vice president. No, he is not Jack Kemp. He is Carlos Paris Alvarez. Alvarez, 36, a communications student at Miami-Dade Community College in Florida, climbed to the top of a 400-foot radio tower during the early morning hours on Aug. 4, for what was just the beginning of a day-long ordeal.

Angel Calzadilla, Miami police spokesman, said Alvarez had hauled three suitcases full of clothes, food, and pamphlets with him, enough for a week-long stay atop the WQBA-FM tower in Biscayne Bay.

"He claimed he was God's ordained messenger, and had scaled the tower to get everyone's attention," said Calzadilla. "He said God is really angry and wants less asphalt in the world, more horses and bicycles, no high-rise buildings and an end to Russian pornography."

Alvarez also told police he could be a lot more effective in spreading the word if he was Bob Dole's running mate.

"We called the SWAT team, which is standard in such a situation, and attempted to communicate through a bullhorn," said Calzadilla.

When that was unsuccessful, Calzadilla said his negotiating team tried another approach.

"We wanted to bring a phone up to him so he could communicate with us. Four SWAT team members carrying a phone started going up the tower to place the phone at the midway point, where he was at the time."

Apparently spooked, Alvarez scurried to the tip of the eight-story tower — without the telephone. Seven hours later, negotiators ended up flashing notes at Alvarez from a hovering helicopter. Finally, with the promise of a cold glass of water, negotiators lured Alvarez halfway down the tower and to the telephone.

"We told him the media was there today, and may not be there tomorrow," said Calzadilla. "We told him he should take advantage of the opportunity now to get his message out."

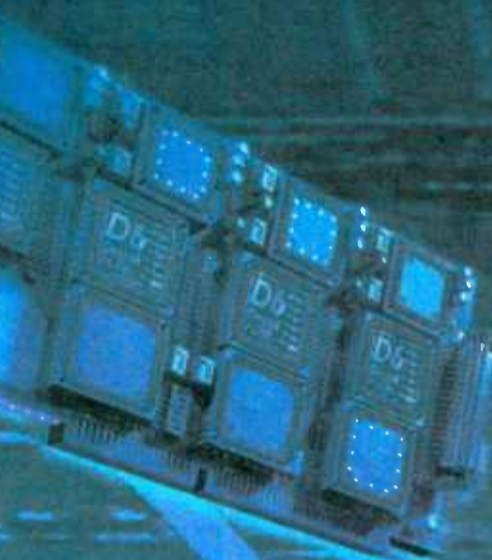
Alvarez was taken to a mental hospital for evaluation.

"Jack Kemp has got nothing on this guy," joked Calzadilla. "I haven't seen (Kemp) on top of a tower yet."

He added, "We're very fortunate that the tower was a backup tower to one of the radio stations, so there was no actual power or else the officers and (Alvarez) could have been in great danger... WQBA's engineers responded and were very helpful in turning everything off, including the lights on the tower to make it safe." ☺



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World Radio History



# TV, Film Producers Look to Radio

by Bob Rusk

**HOLLYWOOD** A mild-mannered architect takes time out from designing a new building for a radio station to gun down a group of thugs who are wreaking havoc on the residents of Los Angeles.

As unbelievable as the scenario sounds, it was the story line in "Death Wish II," the 1982 movie starring tough guy Charles Bronson.

When radio stations are featured in movies, the call letters are frequently fictitious, but not here. Not only were the call letters of top-rated talk station KABC(AM) used, but the station played a pivotal role.

KABC has also made its mark on TV, allowing the producers of "Columbo" and "Frasier" to come in and find out what makes a talk station tick. The studio seen in "Frasier," starring Kelsey Grammer as a Seattle talk host, was inspired by KABC's main studio.

## Buzz words

"When they were planning the pilot, the 'Frasier' people came over and spoke to our programming staff to find out how talk radio is formatted so they would know the cue signals and buzz words," said Norm Avery, KABC director of engineering. "Then

their properties people came through with still cameras and tape measures."



KABC Recording Studio

At the time, KABC was moving into a new building and had "studios full of old

equipment" that the "Frasier" folks loaded onto trucks and hauled over to Paramount Studios where the show is produced.

Audio mixing consoles, screening computers, on-air lights and microphones were among the pieces they borrowed — for use in the pilot only.

"When NBC picked up the show, the equipment was returned to us and 'Frasier' went out and bought its own equipment," explained Avery.

## Movie location

Across town at all-talk KIEV(AM), the station offered its studios as a movie location a few years back — only to discover that the production was a soft-porn film.

When the leading lady arrived in the studio, "all of our guys wanted to volunteer to help," chief engineer Hal Williams recalled with a chuckle.

A more mainstream production, Robert De Niro's recent release "The Fan," took over the KIEV building for several days according to Williams.

"We had to work around them," he said. "We have three studios so we did some of our shows in one studio while the movie was shooting in another one."

Williams did not meet the Academy Award-winning De Niro, however.

"That's no big deal," he said. "We have people like that in here for our shows all the time."

Some KIEV staffers were hired as extras, to stroll through the hallways and add life to the background.

"We're just a couple of miles from many of the major movie studios. We can look out the front window and see the Disney lot," said Williams, who has worked at KIEV for 29 years. "Warner Bros. and Universal are also nearby."

## Hollywood realism

During the filming of "The Fan," Williams "showed the production crew where to put some things." His assistant, Craig Caston, extended cables and moved some equipment.

"They tore the place upside down when they were getting ready to film the in-studio scenes," said Caston. "They turned it into a completely different studio. It didn't even look like our station anymore."

He asked why this was being done and was told that the direction wanted "realism."

"It really got me that they came here and paid the station money for the realism of the studio, but changed everything," Caston said. "There was so much work and expense to get here. They could have done this on a soundstage."

Added Williams, "What he describes is typical. The first few guys came in a month ahead of time and said the station looked perfect."

The next thing you know they're ready to shoot, which it took the better part of a day to prepare for. They took down our pictures and put other ones in the same places. They were just pictures of different stuff."

All in all, however, Williams said working with the movie crew was "a lot of fun" even though more than 100 cast and crew people were on hand.

Outside, it was even more crowded. "Our building was surrounded by trucks," he said. "There were (portable) changing rooms, makeup rooms, potties and generator trucks. They piped in their own electricity because they would have

continued on page 22 ►



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# SBE Adapts to Changing Industry

► continued from page 1

people in the schools aren't attracted to it for that reason.

"The hot buttons right now are in digital technology. An awful lot of people who used to go into broadcast engineering are (now) going into computers. While broadcasting is becoming more computer related, the actual core of it still remains RF technology broadcast from transmitters."

SBE Executive Director John Poray agreed and added, "There are fewer jobs available in broadcast engineering now, compared to five years ago.

partly because the SBE has expanded certification programs at more colleges. In addition, there are additional certification programs for engineers at radio and television stations.

## Career development

"More engineers at a particular station are members now. It used to be that just the chief engineer was the only member. So we're finding more and more staffs are now deeper in SBE membership," said Poray.

"It is important to their continuing education and career development. With less

For the most part, there is not another association that meets their needs.

"We may want to attract additional members and provide them certification. In the next six months, our board will be discussing that and deciding if we want to branch out further."

## Efficiency rules

Interestingly, the industry that many radio engineers have long worked to improve has evolved so much that new technology has put them out of work.

"As we've made the equipment more reliable, it doesn't break as often," said Baun, "which means you don't need as many engineers around. So there's a sifting and winnowing process taking place throughout the industry."

Baun also stressed that as radio has become a more profitable business, backup facilities have become more prevalent.

"It used to be that only the big stations in the big cities could afford to have a backup transmitter, antenna and studio.

"Now, it is common for stations at almost every level to have backup facilities. That helps them stay on the air with fewer engineers. If there's a big problem, the station doesn't have to depend on calling an engineer in the middle of the night. The station can stay

on the air and call somebody the next morning."

Baun, a contract engineer, is philosophical about the changes affecting the profession.

"There are so many factors that come into this," he said. "The SBE is not going to become the Society of Buggy-whip Manufacturers. The business isn't going away. What is going away are some of the ways we used to do business, which allowed a certain status quo.

## The SBE is not going to become the Society of Buggy-whip Manufacturers.

—Terrence Baun  
SBE President

Consequently the funnel of new people coming in is going to shrink."

Poray estimated that about 30,000 people are currently employed in technical positions at radio and television stations nationwide, compared with 36,000 five years ago. FCC deregulation and the emergence of duopolies are among the reasons for this.

Said Baun, "Companies that own many stations in one market can take advantage of the economies of scale. If you have six stations located in the same building and the transmitters are all at the same site, it is easier for a smaller engineering staff to handle them."

## Wider membership

While the average age of an engineer in the industry is not known, Poray guesses the largest percentage of SBE members falls into the 35-45 age group. Board members range in age from their mid-30s to 70.

There is a space to list a birth date on the SBE membership form, but many people choose not to fill it out.

"We're in the process of changing our database which should make it easier to track those kinds of things," said Poray.

The association is opening its doors to professionals outside of the traditional radio and television engineering areas. That is helping to keep the median age of SBE members on the younger side of the age curve.

"I travel around the country to chapter meetings and you see people of all ages," said Poray. "There is a wider assortment of job titles. We have independent contractors and people who work in production, post production and corporate video."

Poray continued, "We have a board member who works for CompuServe. That seems pretty remote from your typical broadcast engineer."

Poray said engineers from non-traditional areas of engineering now account for about 15 percent of the SBE's membership.

"In the Huntsville, Ala., chapter, they are actually in the majority," he said. "A lot of engineers there are employed at the NASA Space Center."

Student membership — totaling about 200 — is also growing. That is

licensing required by the FCC, which previously provided a barometer for stations when hiring engineers, management now looks to the SBE.

"We have structured the exam and certification program to preserve its credibility. We didn't want to be just a memorization test. The question pools are updated regularly — and with the way technology changes, they have to be."

Despite fewer engineers industry-wide, Poray said SBE membership has grown — due largely to the certification program — from about 4,750 in 1991 to 5,212 this year.

And because membership is not required to attend meetings at the 100 chapters across the country, many other professionals are looking at signing up.

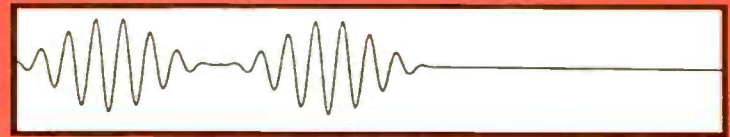
"A lot of people are attending the meetings who haven't yet joined," said Poray. "If we offered additional programs, they probably would be interested in joining."



John Poray

"The bottom line," he concluded, "is there are going to be fewer engineers. That's not a bad thing. It doesn't mean that the industry is in decline. It just means the industry is changing and is becoming more efficient."

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GUEST COMMENTARY

# Folded Unipoles vs. Series Fed

by Jeremy K. Raines

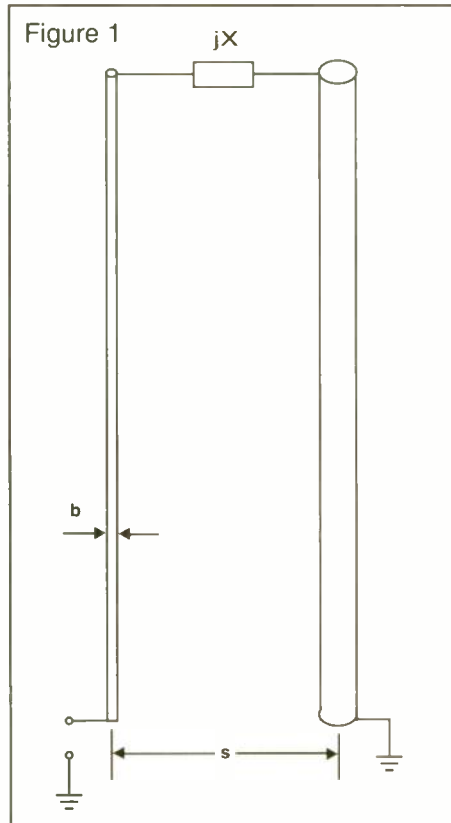
**POTOMAC, Md.** This article is a follow-up to a letter from Lawrence Behr, published in the July 24, issue of *RW*. In it, he disputes the conclusions of a NAB Engineering Conference presentation. I agree with Larry, especially with respect to antenna efficiency. The purpose of this letter is to elaborate on that particular advantage of folded unipoles over series fed towers.

The superior efficiency of folded unipole antennas has not been emphasized in the literature; however, early users of this configuration were aware of it. From our first meeting in 1966, until his death in 1994, unipole pioneer John H. Mullaney and I had many discussions and brainstorming sessions about that type of antenna. He designed and installed hundreds, if not thousands, of them, with the chief goal of optimizing input impedances.

Beginning in 1973, I wrote several FORTRAN programs to predict input impedance as a function of antenna geometry. As a welcome extra, some of these installations radiated much better than hoped for in terms of signal measured at a mile vs. what might be expected from a series fed tower. This was true even in adverse antenna environments characterized by poor ground conductivity and/or a radial system deteriorating with age.

Broadcasters were both amazed and

delighted with the extra, perfectly legitimate, signal coverage. These observations concerning efficiency were anecdotal. We never got around to formalizing a



theory because we were mostly concerned with input impedance and, later

on, with multiplexing. The physics of what is going on are clear, however, as the following paragraphs will demonstrate. Further, it should be clear that with careful design, both input impedance and antenna efficiency can be simultaneously optimized.

Figure 1 shows the fundamental parameters of a folded unipole configuration. For simplicity, only one fold is shown, although in practice three or more are actually deployed. It is seen that there are three variable design parameters. They are:

1. The spacing  $s$  between the tower and the fold.
2. The diameter  $b$  of the fold wire.
3. The reactance  $X$  connecting the fold to the tower.

In the vast majority of actual installations the reactance is either a short circuit or an open circuit; however, leaving it arbitrary gives the engineer some essential design freedom that will be discussed shortly.

To appreciate how the folded unipole is capable of superior efficiency, it is important to understand that it is essentially two devices in parallel. The first is an unbalanced ensemble of parallel wires, i.e., a cage antenna featuring a large central conductor. The second is a collection of balanced wires, i.e., a multiconductor transmission line. The useful feature of this parallel combination is that the radial electric fields may largely cancel each other, with proper design.

Figures 2 and 3 show how the electric fields may cancel each other near the base of the tower. Note that this is where most of the ohmic losses occur because the

electric field, and thus the ground current density, are most intense there. Thus, the more completely we null those, the less the ohmic losses, and the more efficient the antenna. Figure 2 shows the radial electric field, or equivalently the ground current density, for the unbalanced (or antenna) mode. Figure 3 shows the field for the balanced (or transmission line) mode. It is seen that, with proper phasing, the two fields tend to cancel each other as desired. This is simply not possible with a series fed tower. Thus, the folded unipole can be much more efficient.

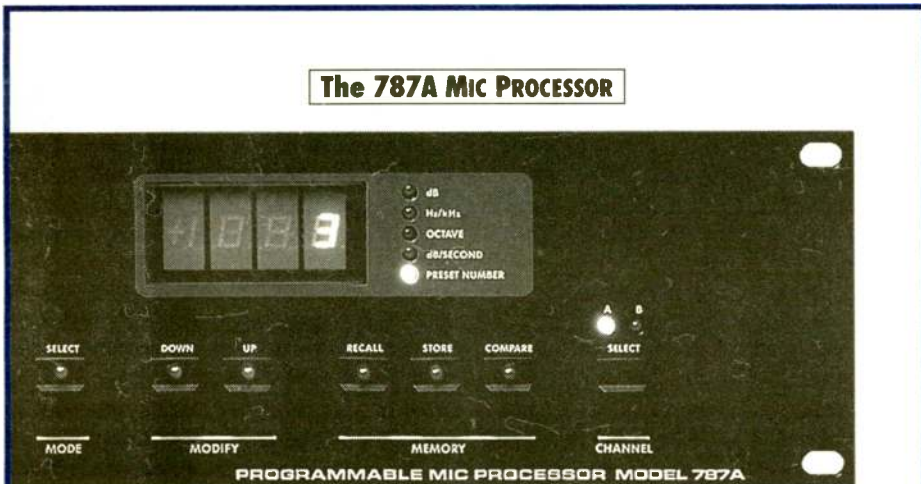
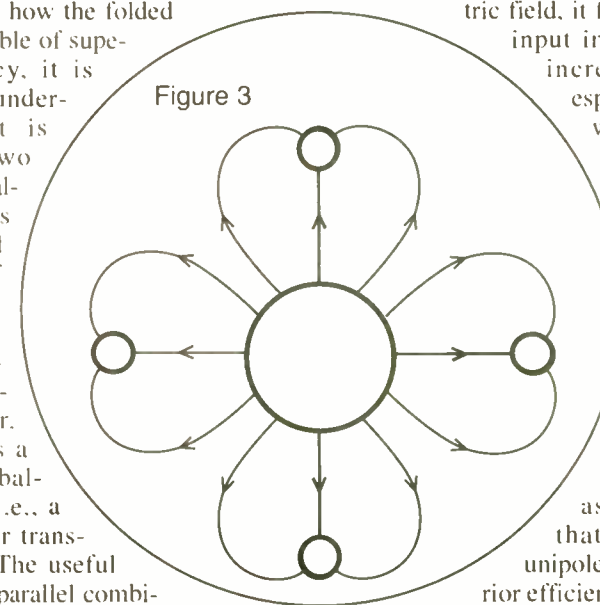
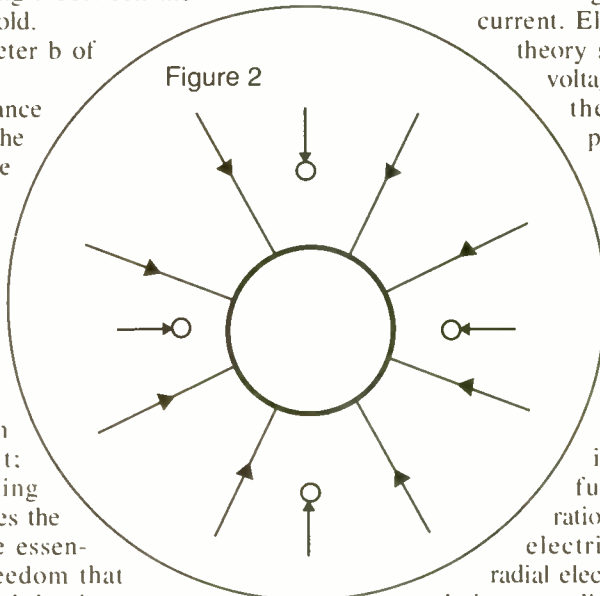
A null radial electric field, and the resultant increase in efficiency, is perfectly consistent with a step up in input impedance, which is the more familiar advantage of the unipole. The reason is as follows. The input impedance is the ratio of

terminal voltage to terminal current. Electromagnetic theory shows that the voltage is related to the vertically polarized electric field in the vicinity of the terminal. The current is related to the radial electric field. Therefore, the input impedance is a function of the ratio of the vertical electric field to the radial electric field. If by design we null the radial electric field, it follows that the input impedance will increase. This is especially helpful with electrically short towers.

So, simultaneous improvements in both input impedance and efficiency is a reasonable expectation. It should come as no surprise that folded unipoles exhibit superior efficiency.

As stated at the beginning of this note, historically the chief design goal for the folded unipole was optimum input impedance. We now see that we can expect superior efficiency as well. So, we may impose three constraints on

continued on page 21 ►



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PIONEER PROFILE

# WBZ: 75 Years and Going Strong

by Barry Mishkind

**TUCSON, Ariz.** Back in 1921, when radio broadcasting was just beginning the transition from experiment, hobby and novel diversion, few people could envision what the industry would become over the next 75 years.

The Department of Commerce (DOC), through its Bureau of Navigation, did notice that something was happening.

Experimental and special land stations all over the country were beginning to broadcast programs designed for the general public to receive and enjoy. At first, the DOC seemed surprised by the popularity of the new medium.

The DOC was not hindering matters, however. In the early 1920s, licensing was a much different process than it is today. One had only to request a license; the DOC was required to grant it. Where these stations would be put was not considered a problem, because until then all stations broadcast intermittently. Many could share a single frequency. Nevertheless a tidal wave of stations was on its way.

The Westinghouse Electric and Manufacturing Company was among the first businesses to sense the commercial potential of the new medium. Noting the positive response of the hundred or so persons able to hear its original broadcasts via 8ZZ and KDKA at the end of 1920, Westinghouse executives sought to expand its operations to other cities where it had factories: Chicago, Newark, N.J., and East Springfield, Mass.

**Spurious entry**

One of the interesting notations in the FCC archives is a handwritten notation on the KDKA file card asserting it was "the

first broadcast license." This appears to be a spurious entry made some years later. Although the Pittsburgh facility had been granted the call sign KDKA in late 1920, it was still considered part of the "Limited Commercial" category of radio stations. (In those days, "commercial" meant only that the station was operated as a business.) According to some contemporary accounts, the early KDKA broadcasts were on 330 meters, or about 909 kHz.

However, Westinghouse apparently did have a hand in setting the famous 360 meter/833 kHz dial position. As interest in broadcasting developed, Westinghouse sought to solidify its pioneering position. In September 1921, L.R. Krumm approached the DOC to request three more licenses, and suggested the use of 360 meters, likely expecting it would become

continued on page 22 ▶

## A Viewpoint On Unipoles

▶ continued from page 20

the folded unipole antenna design. They are:

1. A prescribed input resistance (e.g., 50 ohms).
2. A prescribed input reactance (usually 0 ohms).
3. Null radial electric field at the perimeter of the central tower.

If we have three design constraints, we need at least three variable design parameters. Those are the ones shown back in Figure 1. So, in theory we can adjust those parameters to achieve all three design objectives. To ensure that we don't end up with impractical values (e.g., fold wire diameter greater than the tower diameter), we could introduce a fourth design variable, for example, the length of the fold. In practice, this is often done. A short circuit between the fold and the tower is moved along the length of the latter until the desired input impedance is obtained.

In view of the above discussion, it is no wonder that some of the thousands of actual installations accidentally satisfy the above third constraint, at least partially. This accounts for the surprising reports of superior antenna efficiency. Because there was no deliberate attempt to optimize efficiency, however, this capability was never fully exploited.

Satisfying all three constraints at the design stage requires the analytic formulation and solution of some simultaneous, nonlinear equations. The odds of stumbling upon the correct configuration numerically, even with massive amounts of computer simulations, are negligible. Thus, there is a lesson to be learned here concerning computer simulations: Look (for analytical solutions and theoretical insights) before you leap (into limited-scope experiments and numerically intensive exercises). I say this despite, or perhaps because, I have created dozens of such simulations since the mid-1960s, some of which were quite lengthy and elaborate.

□ □ □

Jeremy K. Raines, Ph.D., P.E., is president of Raines Engineering. Reach him at (301) 279-2972 or via fax at (301) 294-4918.

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# Boston Station Turns 75 Strong

► continued from page 21

"the Westinghouse channel" all over the country. (The flood of new stations in 1922 quickly put an end to that plan.)

The DOC accepted the notion of a "new" service, and one of the first three licenses issued specifically for "broadcasting" on the new 360 meter frequency went to WBZ in East Springfield, Mass., 75 years ago this month. The license actually showed No. 224, but this referred to the total of all stations licensed as commercial entities since 1912. Reporting this on Feb. 1, 1922, the DOC published the following announcement in the Radio Service Bulletin (RSB):

"Because of the rapid development of radio broadcasting during the last three months, the value of such service to the public and the limitation of wavelengths which can be assigned for this service, it has been found necessary to take precautions to protect the broadcasting service from interference. It was decided first to regulate broadcasting by the larger stations by requiring special authority to do so on special wavelengths."

WBZ did indeed begin transmissions on the specially designated 360 meter frequency on Sept. 19, 1921. Operating at 100 watts, WBZ broadcast its opening programs from the Eastern States Exposition in West Springfield, one of the earliest "remote" broadcasts. Over the next two-and-a-half years, power increases brought WBZ up to 15 kW.

Springfield was the site of the Westinghouse plant but it was not a major city. Attracting major artists to the studio proved difficult. Early in 1924 the

**In the early 1920s, licensing was a much different process than it is today.**

owners of WBZ decided to build studios in Boston itself, and originate parts of each day's programming there.

## Broadcast in Beantown

In order to better reach the larger city, Westinghouse built WBZA in Boston in August 1925. The intention was to broadcast the same program over the whole state, with the transmitters synchronized to prevent mutual interference.

This turned out to be a technical nightmare, with WBZ and WBZA interfering with each other, whistling and humming over Boston. The engineers moved WBZA back and forth between 900 and 1240 trying to alleviate the problems, but achieved only very short term successes. Eventually, in June 1926, they achieved synchronicity.

In the meantime, WBZ/WBZA used the resources of its parent company to present a solid, professional product in the Northeast. The studios in Boston took

over more of the programming, and WBZ gradually became a Boston station. The public relations department was busy, claiming many "firsts" ... some-

times even as KDKA was claiming the same ones.

In 1931, WBZ received approval to swap cities with WBZA and install a 50 kW transmitter at Millis, near Boston. It achieved full power in late 1933. There was even an application for "superpower" operation at 500 kW in 1937, but the FCC was not in the mood, so the

application was withdrawn.

Over the years, WBZ kept its reputation for quality programming and a solid commitment to news and public affairs. It sent large news crews out to cover floods, hurricanes and other disasters.

The synchronous operation continued until 1956, when daytime programming was separated. Six years later Westinghouse turned off WBZA in an agreement with the FCC to enable it to purchase KFWD in Los Angeles.

As it has on many stations, entertainment on WBZ has changed over the years, from a heavy schedule of local talent, to the age of the networks, to the rock 'n' roll '60s. This month, as WBZ enters its 76th year of broadcasting, its 50 kW at 1030 kHz serve the Northeast with news/talk programming.

□ □ □

Barry Mislukind can be reached at (520) 296-3797, and invites suggestions for future Pioneer Profiles via e-mail to [barry@broadcast.net](mailto:barry@broadcast.net).

## Radio, Hollywood Style

► continued from page 18

popped our breakers if they plugged their lights in."

### Music to the ears

In a twist on making space available, KKLA-FM often opens its doors to other broadcasters.

The Christian talk station, owned by Salem Communications, provides a studio for Oliver North, whenever his talk show originates on the West Coast.

While North is syndicated by the company's Salem Radio Network, the station occasionally makes room for the competing Moody Radio Network, too.

And since debuting in June, the New Music of Your Life, distributed by Jones Satellite Networks, has made its home in a custom-built studio at KKLA-FM.

According to Dave Armstrong, KKLA-FM general manager, the New Music of Your Life, a pop standards

format featuring artists like Frank Sinatra and Ella Fitzgerald, paid for construction of the studio.

"It's a temporary location for them," said Armstrong. "When they move into their permanent facility we'll get the studio."

The New Music of Your Life, which has recruited well-known radio voices including game show host Wink Martindale and "Laugh-In" announcer Gary Owens, is looking at building its own broadcast center or using the space of a local affiliate.

"It'll happen as soon as we get an anchor station in Los Angeles," said Jim West, vice president and director of affiliate relations.

Until then, Armstrong is pleased to have them as tenants at the station, located on the fifth floor of a high-rise in suburban Glendale.

"They get what they need and we'll end up with something that will benefit us," he said. "It's a situation where both sides win."

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## Marriage Made on Radio

► continued from page 13

had "their song." Nelson never missed kissing the bride before sign-off.

No groom became upset when Nelson kissed the new bride, perhaps because the couple also received refrigerators, stoves, honeymoon trips, or other prizes.

Another show that helped the hearts and flowers along was "Blind Date." Arlene Francis was in charge of this show, which began in 1943 and remained on ABC until 1947.

Servicemen often took part as contestants on "Blind Date." Two males would compete for a date with an unseen female.

The one that charmed her won the date, and the show picked up the tab for a big night out. Each half-hour show included three such contests.

Nobody kept statistics, so we don't know if "Blind Date" produced any weddings.

"Husbands and Wives" aired on Mutual from 1935 to 1939. The show allowed

couples to complain about the faults of their mates, on the concept that talking about these flaws would make the marriage happier.

The show's co-hosts were a chap named Sedley Brown, who trained the husbands, and Mrs. Allie Lowe Miles, who was a cheerleader for the wives.

The arguments were often hot, but cooled down in time for closing commercials.

Whether "Husbands and Wives" saved any marriages remains a mystery. Still, the couples received gifts at the end of the show, so they should have been happy as they headed home.

In 1996, John O'Loughlin says radio is an important part of the success of Proposal Day.

"The newspapers and TV have been fine," he concluded, "but without those radio disc jockeys, my idea would not have caught on. It would have fallen flat on its face. So I say, 'Hooray For Radio!' It's been great!"





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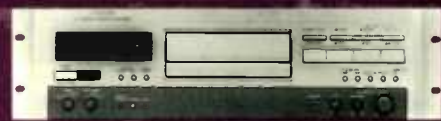
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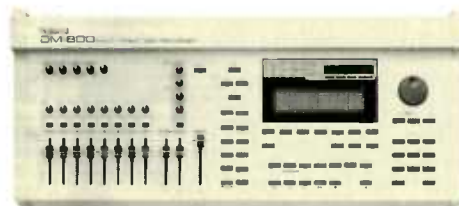


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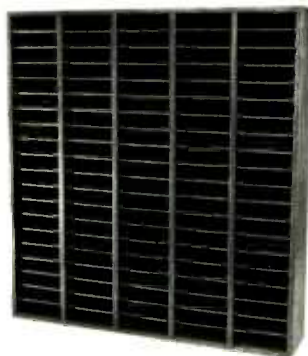
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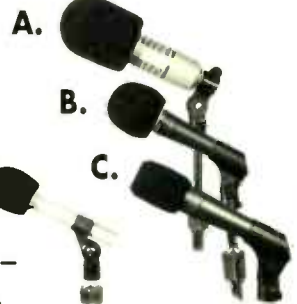
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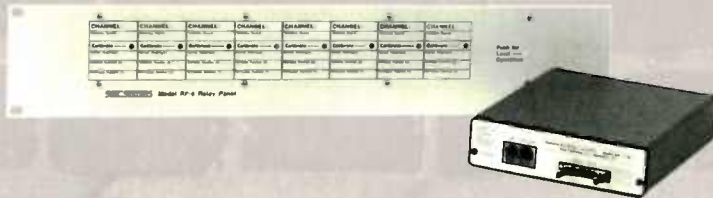
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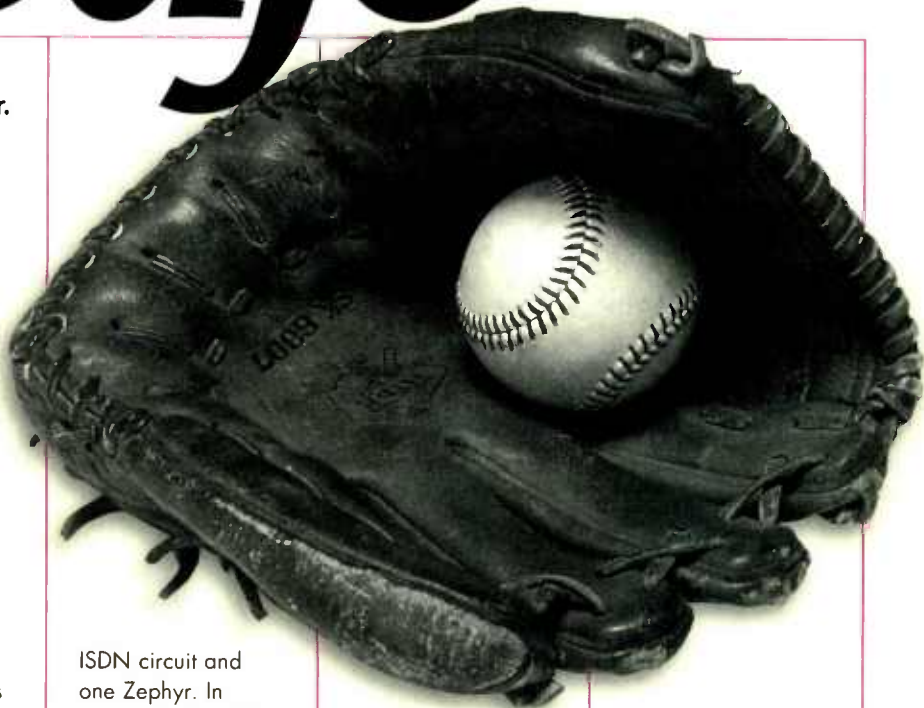
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1	Mackie	MS1202	12 Channel Mixer	\$399.00	\$239.00
2	Mackie	MS1202VLZ	12 Channel Mixer	\$429.00	\$270.00

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1	dbx	1024	buffer/interface amp	\$239.95	\$160.00
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1	Mod. Scr.	StereoMaxx	stereo enhancement	\$2,889.00	\$2,195.00

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1	Audicord	DLRS	stereo rec/play cart mach.	\$1,480.00	\$1,170.00
1	Teac	V375	stereo cassette deck	\$119.00	\$64.50
2	Technics	SL1200MKII	turntable	\$599.00	\$449.00

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1	Denon	DN970FA	pro cd player for production	\$2,800.00	\$1,699.00
1	Denon	DN990R	MD recorder/player	\$3,500.00	\$2,595.00
1	NSM	CD3101ACD	100 CD changer	\$3,800.00	\$1,195.00
1	Sony	CDP3100	CD Player	\$3,650.00	\$2,499.00
1	Sony	CDS3100	controller for CDP3100	\$1,875.00	\$1,275.00
1	Sony	MDSB2P	MD player	\$2,200.00	\$1,495.00
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2	Roland	DM80F	fader unit for DM80	\$1,195.00	\$599.00
1	Roland	DM80R	remote control for DM80	\$1,895.00	\$999.00

## Telco/Remote Equipment

2	CyLink	Airlink64D	wireless modem 64K	\$2,895.00	\$999.00
1	CCS	CDQ2001	digital audio codec - NEW	\$7,400.00	\$3,999.00
2	Comrex	DXPX21	digital codec w/X.21 inter.	\$2,395.00	\$1,895.00
1	Comrex	DXR	digital codec	\$1,500.00	\$1,225.00
1	Comrex	DXR.1	digital codec	\$1,500.00	\$1,199.00
1	CCS	M56	digital audio codec	\$2,145.00	\$1,595.00
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1	Russco	FMSB	phono preamp	\$324.00	\$169.00
1pr	JBL	4412AR	monitor speakers	\$1,386.00	\$858.00
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1	Moseley	DSP6E2	DSP6000 Digital STL encoder	\$2,995.00	\$1,995.00
1	Moseley	DSP6D2	DSP6000 Digital STL decoder	\$2,995.00	\$1,995.00
1	TFT	730A-05	SCA monitor w/05 opt.	\$2,400.00	\$995.00
1	Antennaco	460-6	STL Yagi 460mHz	\$115.65	\$64.00

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# Studio Sessions

MiniDisc Goes  
Multitrack  
See page 33.

Equipment and Applications for Radio Production and Recording

## FIELD IMPRESSION

# Yamaha Mixes Music for Broadcast

by Jim Smith

**MARTINSBURG, W. Va.** When I was contracted to record the Putamayo One World/Unicef free concert in Washington on July 13, I knew an intensive post-production would ensue.

The concert was going to be re-packaged for the Public Radio International program, "Afropop Worldwide, World Cafe" at WPN-FM, Philadelphia and partially for "Thistle and Shamrock" and other audio and video spinoffs. Five very large international bands — Toni Childs, Corneille, Inna Zhelannaya, Kija and Majek Fashek — would perform in five hours with five or no soundchecks.

I deemed an appropriate event to demonstrate the automation and production capabilities of the Yamaha 02R digital mixer.

### Components

With myself and Jason Stelluto — my production partner on the project — have extensive live mixing experience, but a multitrack backup for later remix was essential. We recorded the show live onto four synchronized Tascam DA-88 digital multitracks, striping the tapes with timecode from the SY-88 sync card in the master machine. This arrangement produced 32 tracks of digital audio.

Washington Professional Systems in Wheaton, Md., provided a good rental/demo deal on an 02R with four 8-channel digital I/O cards for the DA-88s. With tapes in hand, I was ready to seek answers to these three questions:

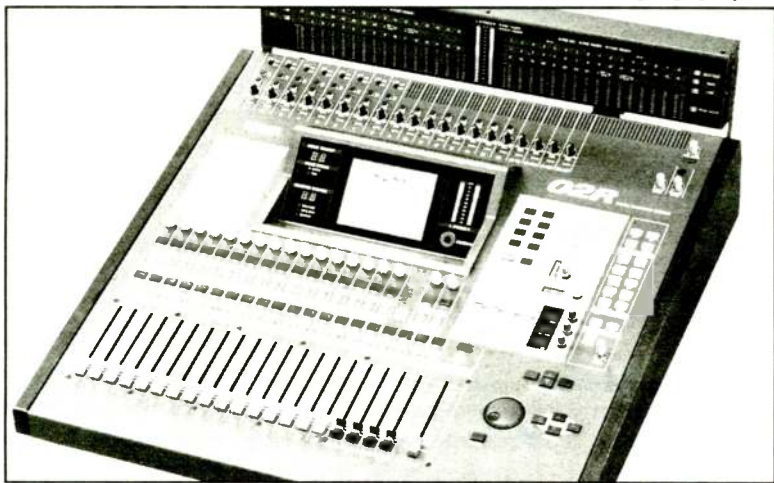
- How quickly could I learn to use this powerful, complicated device?
- Would the automation actually speed up the post process?
- How good would this relatively inexpensive mixer sound?

The Yamaha 02R is set up nominally as a 16-mic/line channel (digital or analog) mixer, with 16 Tape Returns (digital or analog), eight analog Effects Returns channels, plus two internal digital effects processors.

There are full-throw motorized faders on the master bus, effects returns and mic/line channels. The mic/line faders are able to flip at will with the rotary tape return controls, thus providing 32 fader channels for mixing. All 42 channels (32 inputs, eight returns, stereo master) have identical EQ, dynamics, aux sends and automation control.

The all-digital internal signal path of the 02R allows for total automation of all parameters. These include input attenuation, phase, EQ, dynamics, fader level, mutes, aux sends, effects returns and internal effects processors.

Besides faders and rotary controls, individual channel parameters are simultaneously accessible through a series of virtual console screens and channel controls



Yamaha 02R Mixer: 1996 'Cool Stuff' Award Winner

that become active whenever a channel is selected.

In addition, the console can be customized to have the appropriate screen pop up as soon as you touch a knob or button associated with that function.

For example, grab an EQ frequency center knob and immediately see virtual knobs and buttons, level meters and a changing graphic representation of the

EQ curve you are creating, with a library of presets only one page away.

These screens and their associated effects and presets provide more information, control and processing power at a glance than you will find on most outboard units.

I was impressed by the control over dynamics: gates, compressors, expanders and limiters. Kick and tom gating on live drum recordings can be problematic. I pulled a preset from the 02R internal library, tweaked the threshold while watching gain reduction and level on the screen, and instantly had the best gate I have ever used. Vocal, bass and stereo

master compression were all fantastically useful as well.

My outboard analog gear could have been used with the 02R analog inputs, but because I opted to go all digital, I relied heavily on these internal channel processors. I did not have time to become familiar with the internal reverb/effects units, and instead patched in my normal reverbs via the analog sends and returns.

Such analog and digital I/O options are available on most of the console ports. These include eight bus outs (with another eight sets of dynamics and EQ), 16 direct outs for routing and recording and a full complement of analog and digital two-track outs and returns.

This mixing session's all-digital path — DA-88 multitrack to 02R mixer to DAW and DAT, then back to mix monitoring — required that all devices be synchronized to the word clock of the master DA-88 deck. This can be accomplished over the Tascam TDIF cables or by adding a single BNC cable from DA-88 to 02R. Timecode for the automation was also provided to the console from the timecode track on the master DA-88.

The automation itself can function like any of the professional automation packages familiar to you — or any combination of packages you prefer — with the addition of many powerful features rarely seen

continued on page 27 ►

## PRODUCT EVALUATION

# VS-880 DAW Replete with Goodies

by Ty Ford

### Part I of II

**BALTIMORE** Roland learned a lot from bringing both the DM-80 and DM-800 to market, and its secret debut of the VS-880 at AES in New York last year — and subsequent delivery of the product — has positioned the company as high on the pole as Alesis and Mackie as credible purveyors of the democratization of audio technology.

In the first part of this two-part review, I will present an overview of the VS-880. In the next issue, we will dig into more details and applications.

### First glance

Weighing in at about 9.5 pounds, the VS-880 comes in different flavors: the VS-880HD with 540MB drive (\$2,595) and the VS-880J with a 1GB Iomega Jaz drive (\$2,995).

The VS-880 must fairly take the criticism of being menu-intensive, but only because there is so much packed into the thing. The VS-880 relies a lot on the use of a Shift key on the right side of the operating surface. Because of the placement of the other operating buttons, the VS-880 requires two hands for many operations.

While the abilities of the VS-880 will be a source of power for the regular user, its

complexity will likely prove daunting to the casual user.

Many of the features of the VS-880 are similar to its predecessors, but it is dis-

Protect feature and enable it. Be mindful of the Initialize feature: if you choose to initialize the disk drive where you have recorded something, all data will be erased even if Protect is enabled.

I was also able to blow out a production by being careless about copying another one right on top of it.

In the company effort to cram such a large amount of technology into this compact (17 x 12 x 3 inches) studio in a box, there have been a few compromises.

The two most noticeable are unbalanced analog inputs and a small, busy and unlit LCD window that is literally a pain in the neck to read. Propping it up at an angle helps a lot. Don't even try to use it on a flat table unless you have unlimited chiropractic services available.

According to Laura Tyson at Roland — who does a great demo on the unit — there is a newer display that is larger and easier to read, but I have yet to see it.

### Compress to impress

Another concession to cost are the VS-880 three data compression modes: Multitrack 1 (MT1), Multitrack 2 (MT2) and Live. These proprietary Roland algorithms operate at 2:1, 2.5:1 and 3:1 respectively. Sample rates of 32, 44.1 and

continued on page 30 ►



Roland VS-880 Workstation

tinctly different in many ways. I managed to accidentally erase a project before I realized the VS-880 is not quite as protective as the previous model DM-800, that seemingly needed small amounts of C4 plastic explosive to remove audio from the hard drive.

If you find yourself lost during the early hours of your use, don't simply wail away unless you have your source audio backed up somewhere. This is not a condemnation, but a caution.

To avoid this, go right to the Song



# The First Name In Digital, The First Family In MiniDisc



**MD Cart Series  
Recorders/Players** *The DN-995R/  
990R recorders and DN-981F player offer  
all the advantages of MD without the con-  
ventional tape cart problems of wow and  
flutter or drop-outs and tape stretching.  
These full-function units provide audio and  
computer interface as well as a multitude  
of options, including synchronization.  
Optional "Hot Start" switchbox adds  
instant playback of any 10 tracks (DN-  
981F).*



**T**he first name in digital, Denon has also become the premier manufacturer of MiniDisc products for broadcast and post production applications. Even the most demanding tasks of repetitive audio required by fixed installations are made easy and reliable with MiniDisc. Denon not only offers the most comprehensive line of MiniDisc products, they are totally committed to the further development of MD technology.

The MiniDisc format has proved to be the most convenient and reliable medium available. MD can literally be used millions of times without any signal degradation. The sonic quality is equal to Compact Disc and immensely superior to celluloid, while offering unsurpassed portability. More and more digital audio users are turning to MD for archival purposes.

From recording and replication to MD Carts and ENG MD recorders, Denon has a full family of products to integrate MD technology quickly and economically. Contact your favorite distributor and find out why Denon is the "first family in MiniDisc".



**DN-1100R MD Recorder** *The DN-1100R MD recorder offers 74 minutes of stereo recording time with a 44.1 kHz sampling rate, 16-bit linear (A/D converter) quantization and ATRAC compression. The unit also features 10 independent "Hot Start" buttons to which any 10 tracks from a total of 255 can be assigned. This feature is ideal for sound effects libraries, sound bytes and announcements.*

**DN-80R Portable MD Recorder** *The DN-80R is the most advanced ENG recorder on the market, allowing up to 148 minutes recording time in mono and 74 minutes in stereo, per disc. The portable unit provides news gathering personnel and reporters who are on-the-move with shock-proof recording and playback capabilities from a 40 second memory buffer. Further time-saving production features include field editing on a single disc. A standard 23dx video camera battery provides maximum power for a full 148 minutes.*



**DN-045R MD Replicator** *The DN-045R MD replicator performs exact digital-to-digital dubs, up to 3.5 times faster than realtime without the cascade of ATRAC compression. The included Windows™ software also allows fool-proof editing during replication.*

**DENON**  
The First Name In Digital Audio



# 02R Digital Console

► continued from page 25

on any but the most expensive consoles.

These 02R features include real-time automation of EQ and panning changes, and true instant recall of all console settings. I cannot think of much, in fact, that the 02R automation does not do.

In spite of the complexity, flexibility and unusual control surface, I found the 02R surprisingly easy to learn and use. After a day of setup and rampant fooling around, I was producing credible automated mixes.

This rapid learning curve is possible because of a consistent, simple logic in all operations. A typical example: To update a portion of an automated mix anywhere within a song, simply click on AutoRecord and start timecode rolling in. Make your changes on the fly, stop the timecode and the update is done.

This smart organization extends to a couple of level-related features that really enhance operation. There are inevitable gain structure adjustments needed in multitrack mixing that arise from too many channel faders above unity gain, or from having too much boost in individual channel EQs.

The fader grouping function allows any or all channels, including returns, to be grouped and reduced quickly in or out of the automation. In addition, the channel EQ units each have an internal gain trim. I have never seen this sensible feature on another mixer, and it rounds out a very logical digital gain structure.

## Timing is everything

Once learned, did the automation actually save me time? With Afropop producer Sean Barlow directing me, we turned out fairly polished 32-track mixes of nine songs — 45 minutes of music — from three completely different musical line-ups in eight hours. To reiterate, this was with only two days experience using the console.

The instant scene memory alone probably saved me a full day over the rest of the week I spent on this project.

Memory and memory management are, in fact, great timesavers on the 02R. All automation and settings are saved to internal RAM that can be dumped to optional MIDI data files or to a Mac using the free Yamaha Project Manager software.

There is 512 KB RAM for memory management, and my three hours worth of automated mixing used up merely 23 percent of resident memory. The entire project, which included some 35 minute full-set mixing passes as well as many single-song mixes and alternates, stayed comfortably in the mixer. With this healthy memory headroom and a very clean, constant Undo capability, little attention has to be paid to organizing your data. It is always right in front of you.

The only minor slowdown comes when naming things. Labelling mixes, scenes, library settings for channels, EQ and dynamics is done by scrolling through alphabets and symbols with a data wheel.

Mac owners, on the other hand, have Project Manager software which allows tiling from a keyboard, and also comes with additional backup and session management features.

Another speed warning: Having 50 four-band parametric EQs, 50 dynamics processors and total automation at your fingertips can lead to some long

explorations. When you can do anything, you might just try everything.

How did this techno-wonder sound? The short answer is: Great. The all-digital

02R does not have a signature "sound" of its own, but the capacity to take the sound to a lot of different places. EQ and dynamics in particular are capable of very extreme settings that sound alarmingly good, as well as the more subtle sounds suitable for mastering.

I have generally found the audio output

mixed on 02Rs, if they aren't already.

This is not meant to limit the 02R to multitrack work. After my initial skepticism, I now believe that you can easily operate this console fast enough for live work. Scene memory, routing capabilities, and massive inputs and outputs would streamline any modern multi-user radio production facility, whether digital, analog or both.

And, being fully 20-bit ready, the Yamaha 02R could be the centerpiece of any all-digital production environment for some time to come. I know that if I can hang on to this one, it will stay at the center of mine. It is a great box.

□□□

*Jim Smith is the former supervisor of technical production at NPR, and currently owns and operates Muddy Hole Studios. He can be reached via e-mail: mudsmith@intrepid.net*

## Grab an EQ frequency center knob and immediately see virtual knobs and buttons.

signal path is pristine, with no resident harshness to the high end, and has an earth-shaking bottom that can really warm things up.

Unlike tube and vintage analog gear, the

of this board to have great depth and articulation. This is a quality that I feel is sadly lacking in some of the newer, high-spec, low-cost analog mixers. You will start seeing major album projects being

## Here's a typical digital audio question:

Can I make it play music on the air, take requests, record Rush, Limbaugh, automate overnight switch, 24 satellite networks, switch transponders and satellite receiver, channel, still the time, tell the temperature, start the coffee pot and let out the cat and a lot of other stuff?

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## DIGITAL DOMAIN

# Digital Audio: Readers Speak Up

by Mel Lambert

**LOS ANGELES** You may recall a couple of issues ago, my asking for your response to a handful of questions about removable/fixed media choices for workstations and automation systems.

I was also interested in your thoughts on the use of networked systems to provide multiple access for the traffic, production and on-air studios, and also the provision of integrated editing functions.

Response was not as extensive as I had hoped, but the quality of reactions was excellent, if not the quantity. I am confident that there are some useful observations to be made from your comments.

## Now the results

Considering each of my five questions in turn:

*Question No. 1: Will the increased use of digital recording and/or editing technologies impact the way in which routine tasks are achieved at your station? If so, in what ways?*

Without a doubt, the storage and replay of material is the main reason to make the transition from analog to digital-based technologies.

The ability to provide random, high-speed access to multiple items (including music cuts, IDs and jingles) frees the station from having to keep multiple copies on cartridge, and streamlines the programming process.

Digital also brings several related advantages, like enhanced audio fidelity, multiple-generation copies and data compression for extended storage capacity.

Integration of recording/editing and replay to multiple destinations seems to be of less importance, as stations look for different power from different configurations. To my mind, this makes a great deal of sense: editing is a much more DSP-intensive, graphics-based process, whereas triggering events from a pre-programmed replay sequence places less strain on a master CPU. Concern was expressed about transferring edited material to a central server for programmed or triggered playback. Standard file structures on removable media would be a wonderful innovation, as would easy-to-implement networking between editors, workstations and servers from different manufacturers. But analog-to-analog transfers solve most problems!

In reality, many users select editing systems for their user interface and flexibility, and playback servers for their librarian and related features. For the moment, interconnectivity is a bonus that few chiefs expect to find, given today's competitive marketplace.

*Question No. 2: Given a choice of removable or fixed media, which do you prefer for what specific applications and why? Have you experienced any problems with data-reduction on MiniDisc, for example, or apt-x100 on cartridge systems?*

Most users have experienced hard-disk systems as part of editors and/or servers, while most stations are using either floppy-disk or hybrid Bernoulli/hard-disk systems for on-air playback.

Only a few stations are using MD and MO-based playback systems, primarily

because of the higher costs of such systems, and few currently need the extended record capacity these systems offer.

It seems DAT is still medium of choice for recording and replay of long-form programming, although the ability to edit material on a plug-and-play medium, such as MO drives, offers significant advantages. This first assumes a standardized file structure.

## Storage and replay of material is the main reason to make the transition from analog- to digital- based technologies.

Data-reduction still seems to be a "wait-and-see" issue, although several users expressed doubts about being able to perform more than a handful of encode/decode cycles before the results became too obvious.

The sonic effects of sequential coding by identical and different data-compression schemes is going to remain a hot topic of discussion.

*Question No. 3: Is the ability to network these recorder/editor systems of primary importance? Any preferred protocols?*

Again, this is a function that would dramatically streamline the preparation of material for the on-air studio, and also provide access to a central server from multiple studios.

The majority of medium-market stations have little direct experience with high-speed networks to provide such connectivity. However, there are increased applications of Ethernet and related topologies to hook up office PCs to provide access to central data bases and common files. Something tells me that it

will not be very long before a knowing program director or owner raises the question: "How come we can share files between these Macs and PCs, but not between X and Y?" You fill in the blanks. But implementing reliable, high-speed multichannel LANs and WANs is not for the faint-hearted. It needs to be approached carefully, with proper attention given to sustained and burst-mode

transfer rates. ATM and related protocols, coupled with FDDI (Fiber Distributed Data Interface) and CDDI (Cable Distributed Data Interface) interconnect schemes, can be a good starting point.

*Question No. 4: Should the recorder unit be separate from a companion editing system, to enable audio capture on location or in the studio as a separate function from the subsequent editing of material? How should they share data?*

Until you actually ask this question, the station chief often does not realize that there is an option. In the analog world, limited editing capabilities of reel-to-reel decks are an accepted way of life.

It would appear that a digital equivalent has several useful applications where simple, segment-based editing is all that the majority of users might need. Such a device would be handy to quickly tidy up a concert recording, top-and-tail a news interview, or chop out irrelevant sections of a contest Q&A sequence.

For enhanced editing power, a fancier version with graphics-based waveform

editing could offer the functions we are used to in our state-of-the-art workstations.

The idea, of course, is that we do not re-record nor transfer the material; once it has been recorded onto removable or easily networkable media, it can be plug-and-play compatible with the recorder's built-in editor or taken to its more power-packed companion system.

*Question No. 5: Similarly, for hard-disk systems intended as cart replacements, should the record/edit station be separate from the playback interface?*

There was little doubt that there are two, distinct functions, and that each stage in the process (inload/preparation and replay) needs a dedicated interface, with specialized tools.

I often make the analogy of word processors versus page-layout software. Microsoft Word, for example, offers editing, glossary, grammar-checking, thesaurus and spell-checking features while Adobe PageMaker is packed with graphics-based layout and text-manipulation features. Write your stories on one, lay them out on the other. Different strokes for different folks.

Many broadcasters require a simple-to-use system for gathering material, and another more powerful system for editing the composite elements into a final program.

Just because a full spectrum of editing functions can be provided in a basic recorder, there is no reason why they absolutely must be there. Additional functions may be unnecessary, and in some cases could reduce user acceptance because of increased cost and complexity.

End of sermon. □□□

*Mel Lambert has been involved in production and broadcast on both sides of the Atlantic for 20 years. He is principal of Media&Marketing in Los Angeles, a consulting service for the professional audio industry. Reach him via mediapr@earthlink.net or (818) 753-9510.*

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# A Warped Look at Vinyl Recordings

by Alan R. Peterson

**WASHINGTON** Thanks in part to contributing writers like Mel Lambert and Read Burgan, **RW** readers are well-informed about digital products such as click and pop removal tools.

These are remarkable programs which should be at your disposal for cleaning up old vinyl records and torn-up tape recordings you thought were beyond salvage. I heartily recommend you look into them and consider one for your production room.

For me, I plan on keeping a mix of analog and digital at my disposal, and the noisier, the better. Maybe you should too.

It is not that I am an analog purist. I do not consider noise reduction to be an abomination or a departure from "the artist's original intent" and certainly don't believe the notion that noise and music always must go together.

If that were true, I would not have been thrown out of so many operas for cracking walnuts during the quiet passages.

No, it is because of that magnificent poppy, scratchy, warped record sound. Now that we don't have records anymore, what do we do when we need to make something sound like one?

### Let's get noisy

Analog noise is a marvelous effect to file and keep in the production studio. This is why rap and hip-hop CDs are produced with deliberate analog crackles and ticks. Pioneer makes disco CD players with "a turntable feel" because vinyl's legacy is too powerful to ignore.

Having vinyl noise effects around can enhance your production when you need to recreate the sound of an old record. We once produced a car dealer commercial where the owner "found" an old 78 made by his grandfather who

started the dealership 70 years prior.

Somewhat trickier is recreating the sound of a warped record pressed slightly off-center. But we will come to that shortly.

### Sample those scratches

Except for the deliberate rhythmic scratching of hip-hop jocks, the basic chronology of record noises from start to finish includes drop-ins, pads, slowdowns, liftoffs and tear scratches. Keep a bank of these sounds nearby for production.

The drop-in is the sound of the stylus being dropped onto the disc surface along with several seconds of pops and ticks. The pad would be the surface noise that underscores program material. A liftoff is where the stylus is lifted off, natch.

Slowdowns are fun. Play a cut on the record, disengage the turntable motor and thumb the edge of the record to get a "murrp" sound. I think we all know what a tear scratch sounds like.

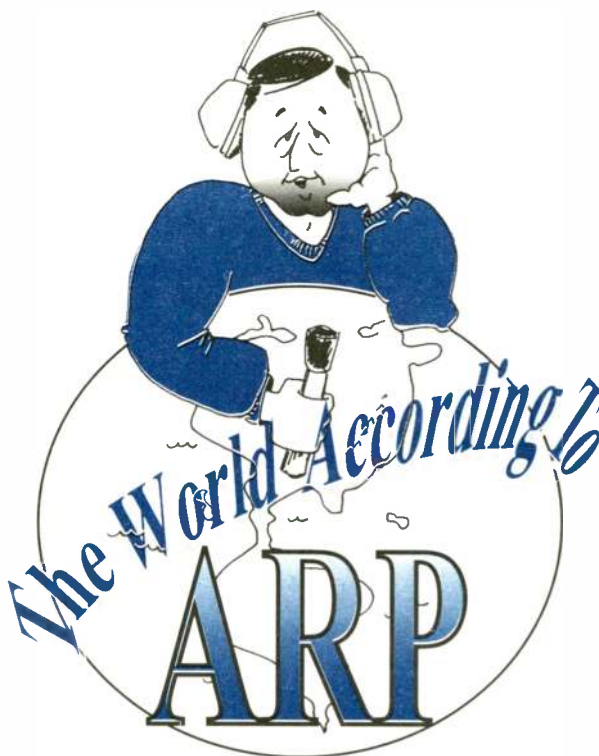
Do not tear up any station LPs in this quest. Many retain some great '70s and '80s remixes, which are difficult to locate now. There is even less sense in ripping up your personal collection.

Hit the neighborhood garage sales. There are never shortages of decade-old Wham! or Michael Jackson albums shot full of surface noise from teenagers' turntables. Many will be let go for 50 cents.

Pay a visit to thrift stores. The back of the rack is where you will find old Fred Waring albums and copies of "Donald

Duck on the Ferris Wheel."

Not noisy enough? Stop at the playground on the way home and drag the disc through the sandbox a couple of times.



On a more literary note, the public library is a wonderful source of recorded material. Forget the subject matter; just grab the oldest-looking recording they have. Ten to one it contains more noise than Art of Noise.

Just be kind. Rip and shred the tag sale specials if you must, but show respect to library discs. Other people must borrow them as well and you should always be the good guy.

Humorously enough, you should save your noises to a digital medium such as

DAT, MD or hard drive. I kept mine on an Emax sampler diskette so each effect could be triggered from a synth keyboard as needed. After all, even bad scratches should sound good.

### I need warp, Scotty

Now things get a little tougher. How does one make a recorded track sound like a warped record?

If you actually have a record you need to sound off-center, the answer is easy. Drill a second spindle hole about one-half-inch from the center.

Horrible old elevator music LPs are the best candidates for this treatment — there is something hysterically funny about hearing out-of-tune violins playing "A Summer Place" or "Georgy Girl" behind a comedy bit or commercials featuring nerdy voices.

If you do not want to ventilate someone else's record, load as much of the song as possible into a sampling keyboard. Work the pitchbend lever back and forth or apply some triangular LFO (low-frequency oscillator) modulation to the pitch. Mix this into the workstation with some of that scratch noise you saved earlier ... you did, right?

Some audio software packages have pitch-altering tools. Draw a triangular envelope of the desired pitch changes with the mouse. When audio plays back, the pitch ramps up and down relative to the positions you drew. It will sound like an eccentrically drilled disc.

No digital doodads? Okay, dub your source audio over to reel tape. Rewind to the beginning, slip the tape out of the pinch roller/capstan path and hit Play. Regulate the playback speed by thumbing the free-spinning reels.

### EQ, Brutus?

No record simulation is complete without proper equalization. I'm not talking about the standard RIAA curve for proper reproduction, but some frivolous knob twiddling to really garbage things up.

Set the midband faders on the graphic EQ on full for real low-fi honk. Parametric EQs are easy: just noodle with the middle knob until everything sounds crummy.

Many digital processors have phone filter simulators built in. These make your recordings sound wonderfully bad.

By the way, do not limit yourself to thinking this can only be a record player effect. Now that you have the basics, whip up some comedy bits for your morning show that sound like the old Civil Defense film soundtracks we endured in elementary school.

Think about creating pull-string doll comedy routines: "Hi, I'm Talking Tessie and you're a !@#%!" Or how about what Tom Edison really said on that first wax cylinder so many years ago?

Vinyl may be down but it isn't out. We might be moving towards better, cleaner, higher-quality audio every day, but sometimes it is fun to take that tonearm in hand — real or virtual — and go to town.

Part of our job in the production room is coming up with preposterous ways of doing the impossible. As long as we have to reinvent the wheel every day, we may as well have a little fun.

And yes, you may quote me for the record (ouch).

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P U R I T Y B Y D E S I G N



# VS-880 Hard Disk DAW

► continued from page 25

48 kHz can be used with any of the compression algorithms, but the system defaults to 44.1 kHz, MT1.

Casual use in this mode left me with an appreciation for this algorithm. The compression algorithms are used for conserving disk space and economizing digital throughput so that the system can handle eight tracks.

Running in the uncompressed Master mode, the VS-880 is capable of dealing with a maximum of only four tracks. Another minor concession is that the VS-880 can only record up to 4 tracks simultaneously.

Roland has remarketed its eight-layers-

per-track feature from the DM-800 quite nicely. Each of the eight tracks has eight layers of V-tracks or virtual tracks, for a total of 64. Although only eight tracks at a time may be heard, you can use this feature to do multiple versions of a production, changing voice tracks, instruments or solo lines as needed.

## Track tricks

The built-in digital eight-channel mixer handles the eight internal tracks and can be toggled to mix an additional six tracks from external sources. With an external MIDI recorder or software program capable of recording continuous controller data, you can automate your mixes.

This means mixing first the eight internal tracks and then the remaining six channels of external sources for a total of 14 tracks. You can use a sequencer for dynamic EQ automation, but not without zipper noise.

The four analog inputs are unbalanced and each has its own +50 dB trim pot. There are both quarter-inch TS and RCA jacks for each input, but you cannot use both at the same time. This presents several problems for microphones.

My "tough test" RCA 44B ribbon mic with its hardwired cable and XLR picked up interference from the VS-880 with two out of three Lo/Hi transformers. The Sescom TR-122 and Shure A95UF were the worst. The Electro-Voice 502CP eliminated the buzz almost entirely.

I then inserted a length of Gotham GAC-3 cable between the RCA cable and

the transformer. That got rid of the buzz entirely unless I coiled the RCA cable up near the face of the VS-880, or brought the microphone up to several inches away from it. The GAC-3 was virtually immune to the interference. I had none of these problems with a Sennheiser 421 and a Gefell UM70.

After I got rid of the buzzes, I found the 50 dB gain provided by the input trim circuits brought the RCA 44B up to a proper level with a minimum of noise. The trim pots make a big jump just before they reach the top of the gain structure. This makes adjustments up there a little sensitive, but most of the time you probably won't need that much gain.

By the way, there is no phantom power, so a separate phantom supply is required if you want to use condenser mics.

Unbalanced audio can present an entire host of frailties, so if your studio is near a high RF area, I would suggest your final purchase be contingent on satisfactory operation. If you are already using unbalanced gear successfully, you may be fine.

## Storage story

The VS-880 has an internal 540MB IDE drive that provides 135 minutes of track time at 32 kHz, 100 minutes at 44.1 kHz and 92 minutes at 48 kHz during uncompressed recording. To calculate the times for MT1, MT2 and LIVE compression, multiply the figures by 2, 2.5 and 3 respectively.

Seven additional SCSI drives can be attached via the DB-25 connector on the rear of the VS-880. A maximum of 32GB can be used to store audio, but each drive must be set to 500MB or 1GB partitions with a maximum of 200 productions per partition.

The A/D converters are 18-bit, 256x oversampled. The D/As are 18-bit, 8x oversampled and the internal mixer operates at 24-bit. Nominal input ranges from -50 dBm to +4 dBm and is adjustable by four trimpots on the main operating surface.

The input impedance is 20K ohms for both the unbalanced quarter-inch jacks and the parallel RCA jacks. Both the Aux send and the Master output level are -10 dBm and have a 1.6K ohm impedance.

Roland lists Residual Noise Level (input terminated with 1K ohm, Input Sensitivity = +4 dBm, IHF-A typ.) for both the Master out and Aux send as -91 dBm or less.

In addition to the other jacks and ports mentioned, the VS-880 also has MIDI IN and OUT/THRU jacks, a set of RCA SPDIF I/O jacks, a quarter-inch footswitch jack and TRS stereo headphone jack.

The power supply is internal and the system uses a standard IEC power jack with removable power cord.

## Conclusions

At first glance, there is a lot going on in the VS-880. It sounds good, has a lot of neat features and Roland has hobbled it just enough to not present much of a threat to its DM-800.

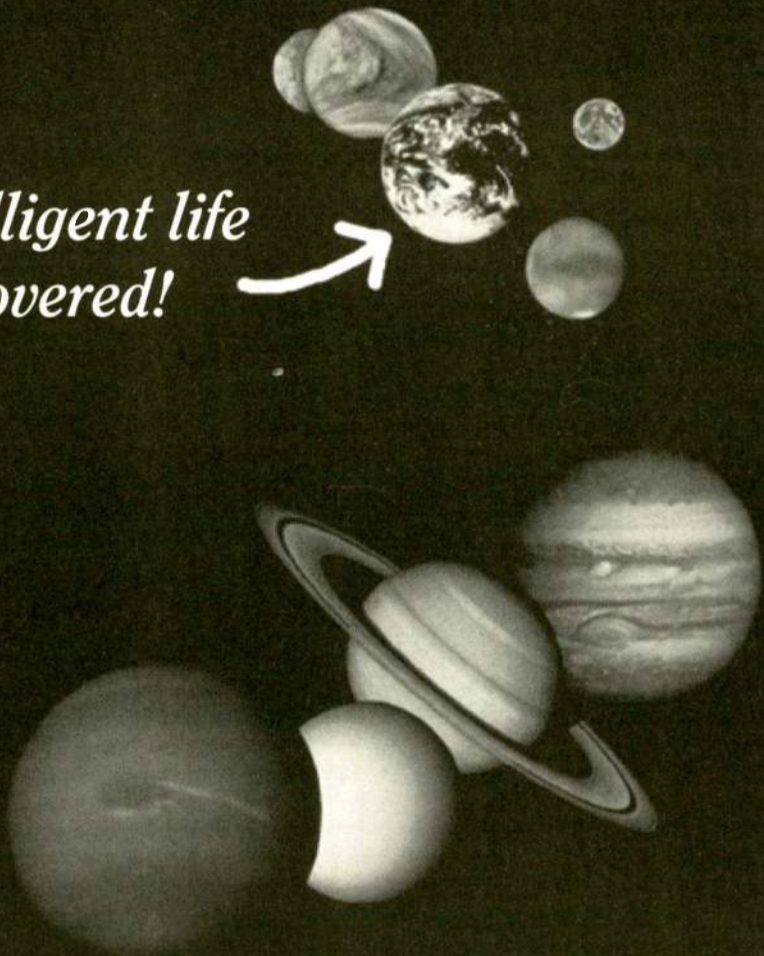
Depending on your definition of "quiet," the VS-880 with internal 540MB drive may be silent enough for one-room studio work. I have heard that the Jaz drive versions make more noise, but have not confirmed it.

Stop by next issue for the rest ... of the story.

□ □ □

Ty Ford's "Advanced Audio Production Techniques" can be found at <http://www.bh.com/fp/24080082.htm>

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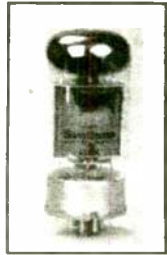
# PRODUCT GUIDE

Companies with new product announcements for Studio Sessions Product Guide should send them to:  
Radio World, c/o Studio Sessions Editor, P.O. Box 1214, Falls Church, VA. 22041

## Svetlana Power Pentode

Svetlana Electron Devices has introduced the SV6550C audio beam power pentode tube for use in studio monitor amplification systems.

The tube, manufactured in St. Petersburg, Russia, is an improvement over the company's 6550B series. In Class A1 applications, the SV6550C can output 19W of audio power under typical full-power operation of 400VDC plate voltage.



Precision alignment of elements during manufacture, gold-plated grids, a new barium getter assembly and improved vacuum processing combine to bring superb sound quality to the Svetlana SV6550C.

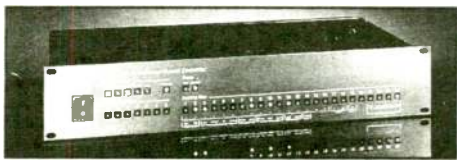
Product manufacture is performed in Russia, with the domestic headquarters in Huntsville, Ala., and the engineering division based in Portola Valley, Calif.

For information, contact Svetlana Electron Devices at (415) 233-0429, or circle Reader Service 208.

## Otari Digital Format Converter

Otari Corporation has the UFC-24 Universal Digital Audio Format Converter.

The device, developed between Otari and Creation Technologies of Vancouver, B.C., can convert up to 24 channels of audio at one time, simultaneously outputting them



in up to five different formats.

The UFC-24 comes standard with ADAT/RADAR, TDIF-1, PD and SDIF-2, with AES/EBU available as an option. Digital audio can be transferred from one

digital source format to various machines, including DTR-900, ADAT, DA-88 and others.

Because the UFC-24 is capable of multiple formats, a single unit can output 96 channels of digital audio across four formats simultaneously. With the AES/EBU option, the number of channels increases to 120 across five formats.

The four format standard version is priced at \$1,995.

For information, contact Otari Corporation at (415) 341-5900 or circle Reader Service 181.

## Lexicon PCM 80 FX Cards

Lexicon has released the latest in its line of Artist FX cards for the PCM 80 digital effects processor.

The David Rosenthal Music FX Card was created by the prominent keyboardist of the same name, and is a collection of 100 presets aimed specifically at music production, recording and mixing. Effects can be used as is, or as templates for a user's own creations.



Other cards existing or planned for the Lexicon series include the Dual FX card with 25 algorithms and 250 presets, the Scott Martin Gershin FX card for spot and post production and the Pitch FX card combining  $\pm 3$  octave pitch shifting and reverb. More Artist FX cards are in the planning stages and will be released in the future.

For information, contact Lexicon at (617) 736-0300 or circle Reader Service 154.

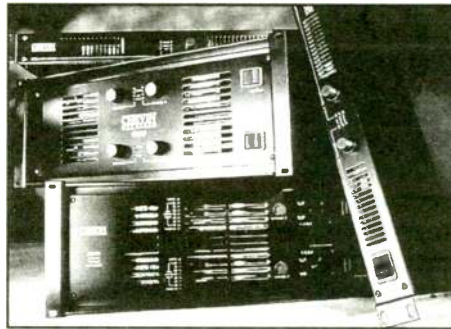
## Chevin Amplification

QMI of Holliston, Mass., has been appointed exclusive U.S. distributor of

British-built Chevin Research audio amplifiers.

The A Series amplifiers in the Chevin line have a minimum bandwidth of 2 Hz - 40 kHz and 200W per channel for the A500 amplifier; to the 2 Hz - 80 kHz, 1200W response of the A6000 unit. Typical THD is from .04 to .06 percent @ 1 dB below clip.

All Chevin amplifiers are DC protected and utilize SoftClip circuitry to reduce gain in the event of overdriving. A custom-designed heatsink and twin high-volume fans maintain moderate operating temperatures.



Lightweight, high-voltage, high-current power supplies keep the amplifiers compact and manageable.

For information, contact QMI at (508) 429-6881 or circle Reader Service 127.

## Shure Phono Cartridge

Shure Brothers Inc., has revived production of the classic V15 phono cartridge in response to resurgent interest in vinyl recordings.

The new model is called the V15VxMR. It requires only one gram of force applied to the diamond stylus tip; half the weight of typical high-mass moving coil cartridges. This maximizes the playing life of irreplaceable vinyl LPs.

The latest generation of the V15 cartridge features a beryllium tube stylus cantilever which achieves high frequency



reproduction with low effective mass. The new V15 also features a polished, ultra-fine Micro-Ridge diamond stylus and a static electricity discharge collector with 10,000 electrically-conductive carbon fibers.

Suggested retail price of the V15VxMR is \$299.95.

For information, contact Shure Brothers at (847) 866-2200 or circle Reader Service 54.

# Employee of the Month.

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The CD-2510 delivers both simple operation and unattended duplication of up to 25 CD-Rs. The CD-4400 is the accepted industry standard for manual duplication. There is no more reliable, effective or efficient way to make CD-R copies... and for less than minimum wage!

## CD-2510 Standalone CD-R Autoloader

This machine is what you have been looking for to simplify your CD-R production by delivering both simple operation and unattended duplication of up to 25 CD-Rs. The system combines the quality of a production proven autoloader, the performance of the industry standard Yamaha 4x CD writer, and the multifunction intelligence of MediaFORM's networkable controller. The result is the most cost effective CD-R duplicator available, with the speed and performance your production requires. Simply stack the input hopper and walk away. Separate accept and reject bins make for easy identification of successfully recorded media.

## CD-4400 Manual CD-Recordable Duplicator

The MediaFORM CD-4400 (right) combines a user friendly interface with multiple format capability. With support for multiple units and autoloaders, the CD-4400 offers the most complete desktop CD-R publishing system available. CD-Rs can be duplicated in nearly any format, from standards like ISO 9660, HFS and CD-Audio, to complex game formats like Sony PlayStation and Sega Saturn. For audio production the CD-4400 is available with an internal DAT drive, allowing for direct DAT to CD-R duplication. Up to ten CD-4400s can be networked together. Given a full master, 120 CD-Rs can be burned in one hour.

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## PRODUCT EVALUATION

# Testing the Tannoy 800 Nearfield

by Bruce Bartlett  
with Jenny Bartlett

**ELKHART, Ind.** The folks at Tannoy have done it again. They came up with a new nearfield monitor that is simple and affordable, yet provides smooth, accurate sound.

The System 800 nearfield monitor has fine rendering of detail and covers most of the audio range. The woofer and tweeter are mounted coaxially, an arrangement that Tannoy calls Dual Concentric.

You see an 8-inch polypropylene woofer — bass reflex loaded — and a tweeter

centered in the woofer cone. Crossover is at 1.8 kHz.

## Lobing and staggering

Why make a speaker this way? The speaker acts as a point source. This prevents the lobing normally found in staggered woofers and tweeters.

As a result, the frequency response stays about the same when you listen off axis; horizontally or vertically. Stereo imaging is enhanced, too. The crossover can be simpler with a coaxial design. Also, the lows and highs are aligned in



The Tannoy System 800 Monitor

time, which gives a tight transient response and smooth phase response.

The box is vented with two ports on the

front. In each port is a foam plug. You can remove the plugs to get more bass (+3 dB at 60 Hz), or leave them in for less bass.

The choice is determined by speaker location. Open-space mounting calls for more lows, while mounting near walls calls for less.

The woofer cone is carefully shaped to act as a hyperbolic waveguide for the tweeter signal. A spherical wavefront results. Using an aluminum/magnesium diaphragm, the tweeter is ferrofluid cooled for high power handling. Both drivers use nitrile rubber surrounds. Special-design trim rings are said to smooth the high-frequency response.

## Specifications

The grey MDF cabinet is thick, rigid, and damped to prevent breakup. It is inert when you knock on it. Shaped like a long octagon, the box has beveled edges to reduce diffraction. On the back is a pair of five-way binding posts for connections. There is no tone control or grille, but they are not needed.

The System 800 is medium size for a nearfield monitor, measuring 10.8 x 17.7 x 10.5 inches. Weight is a portable 23 pounds each.

Tannoy published specs are impressive. Frequency response is rated as 47 Hz to 20 kHz,  $\pm 3$  dB. Recommended power is 60 to 180 W average into 8 ohms. The company claims that the power handling is 90 W average and 180 W program.

**The simple, no-nonsense speakers are clean, honest and detailed.**

Impedance is an easy-to-drive 8 ohms. Claimed sensitivity is high at 92 dB SPL/W/m, and distortion is less than 0.8 percent. According to Tannoy, the speaker can handle high volume levels without compression.

Included with the speakers is a helpful and humorous "Near-Fields Handbook." It covers connections, polarity, amps, placement and equalization. The user manual is clear and thorough.

## Listening tests

In my studio, the Tannoys sound best about two feet from the wall behind them, four feet apart on stands behind my mixer, and toed in. I removed the foam plugs to enhance the bass output.

Here is how the 800 sounded to me on various instruments:

- *Bass guitar*: Deep, tight, not boomy at all.
- *Kick drum*: Solid thump. Deep bass-drum roll has some weight.
- *Cymbals*: Crisp and detailed but not overly bright. Extended high end.
- *Vocals*: Natural, uncolored, not boomy or chesty.
- *Drums*: Clear, strong impact.
- *Percussion*: Realistic.
- *Acoustic guitar*: Crisp, airy and detailed.
- *Electric guitar*: Meaty, neither too edgy nor too mellow.

continued on page 35 ►

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## PRODUCT EVALUATION

# Revolutionary Multitrack Uses MD

by Alan R. Peterson

**WASHINGTON** Portable multitrack recording just took on a new look and feel, thanks to MiniDisc (MD) technology.

Yamaha has introduced the MD4 multitrack MD recorder, which records and plays four near-CD-quality audio tracks using MD media. The result is a remarkable, inexpensive, high-quality personal

multitrack device that will only help bolster the renewed interest in the MiniDisc.

Personal studio owners, ad agencies interested in in-house audio studios and production people looking for a core machine for a home studio should take great interest in the innovative MD4. One should be brought to station events to capture the announcer, the crowd and the big winner flipping out, with total control of the mix.

## Familiarity

For anyone used to working with "stable studio" decks, the operation of the MD4 will be instantly familiar.

Each of the four input strips has three-band EQ, a gain trimmer, an aux send and pan control. Group Assign buttons direct the signal to the track you wish and the Mic-Line key selects between input and playback.

Each quarter-inch input jack handles line (-10 dB) or mic level signals. Another set of phone jacks performs effect send and return functions. Several sets of RCA jacks handle outputs for stereo, headphones, monitor and direct track output.

One may well wonder, why didn't Yamaha put RCA jacks on the inputs too? Quarter-inch jacks more readily accommodate guitar and synthesizer cords and high-impedance microphones; likelier choices for home recording enthusiasts. The pro or semi-pro may be puzzled by this decision but not be slowed down by it.

Transport controls are a blend of familiar tape-style functions and the push/search operation of DAT or CD decks. Again, instantly familiar. I never had to crack the manual until I needed to check about MIDI and Track Bounce.

Even the display is a breeze. The fluorescent panel shows track status, track number, cut number and title, time indexing and percentage of Pitch Change (variable approximately 6 percent up and down).

## Portability

The familiarity ends in the upper-right corner of the MD4, where a low-profile display and buttons for the MiniDisc takes the place of the familiar cassette well most often seen on portable multitracks.

Most of the unit's 10.8 pounds were concentrated toward the front of the MD4, presumably the weight of the MD pickup system and the power transformer and supply to run the device. A wall-wart on this baby.

Before we go on, be warned the MD4 requires the use of data MiniDiscs rather than stock music MiniDiscs. The data MDs are for computer applications and are available through computer stores and outlets. Look for the "MD Data" logo when shopping. You cannot record to standard music MDs on the MD4 deck.

Granted, MD Data discs are much pricier than what you would spend for cas-

sette-based portable multitrack media or even music MDs. This is not likely to change anytime soon. But remember, the MD4 is a different animal with entirely different specs than your old cassette deck.

The fact most tape-based multiscope out to maybe 12 or 14 kHz response — compared to the MD4 typical 20 kHz line — bears this out. That extra portion of an octave really brightens up recordings, to say nothing of what the dead-zero wow-and-flutter specs do for your projects.



The Yamaha MD4 Multitrack MD Recorder

Each MD Data disc allows 37 minutes per track in four-track mode. Stereo recordings allow 74 minutes, and a mono recording can be 148 minutes in length.

My tests included music, ambience and spoken word recordings. To begin, I jacked a 1965 Gretsch electric guitar directly into the MD4 to do some Les Paul/Mary Ford-style multitracking.

In spite of my lame playing, the assembled parts sounded very clean. I did experience noise which increased when I ping-ponged tracks and added more, but I attribute that to the nature of old guitar electronics and the proximity of a TV/FM tower a mile from home; not the MD4.

## Double-check

Indeed, a later test with a noise-gated, balanced mic showed no internal noise buildup at all. MD critics have argued the ATRAC compression scheme degrades the quality of recorded audio after several passes. To my ear, audio integrity after three bounces was fine and would still qualify as "broadcast quality."

In the case of the MD4, audio quality would begin getting ugly if EQ positions were not returned to Flat position during a bounce. I made that mistake several times.

The second test consisted of mixed inputs to simulate a radio production session. The MD4 took feeds from a CD player, a Roland Sound Canvas MIDI module, Sennheiser 421 dynamic mic, a piezo-miked classical guitar and an Aux feed to an Alesis MidiVerb. Again, within the limitations of four tracks, I was very pleased.

Ambience and spoken word recording was done with the Senny 421 and an Audio-Technica stereo condenser mic, straight-wired into the MD4 with no compression.

If your ear has become used to noise reduction treatments on cassette multitracks, the MD4 will be a pleasant

surprise. Vocal recording is wide and accurate without the ducking and dropping associated with noise suppression techniques.

It is actually refreshing to listen to a playback and not readjust your ear to ignore the effects of noise reduction. Amazing what we put up with only a few short years ago.

The Yamaha MD4 does have a disturbing tendency towards channel crosstalk. One would expect this on narrow track-

width cassette recorders, but not on a digital device. If your tracks need to be Sahara-dry with a high degree of isolation, this will be a problem.

## MD perks

Because it is MiniDisc, you have random access to all cuts without the need to fast-forward or rewind. Titles may be assigned to each cut as well. When the display says cut 7 is "JuneMoon2," you know you are on your second take of the June Moon project. I find this vastly superior to a cassette cut sheet which inevitably disappears when you need it most.

The MD4 has no numeric keypad. If you have 99 projects on an MD, you must poke the Skip button to get there.

Note, too, the MD4 does not cut-and-paste as workstations do. There are no waveforms, nor any down-to-the-sample splicing. The unit behaves much like any linear recording device.

On the positive side, digital MD technology means being able to divide and recombine projects, copy track-to-track, erase single tracks or entire projects, all on recordable digital media that can stand up to one million record and play cycles.

Put into perspective, you can record and remove one-minute commercials onto the MD4 once every minute, 24 hours a day non-stop for nearly two years on the same piece of media without failure or degradation. Of course, you may lose a little sleep in the process.

A MIDI Out jack transmits MIDI Timecode (MTC), a clock signal used to synchronize all MIDI devices in a studio. The MD4 becomes the master timekeeping device in a MIDI music system for radio jingle production or commercial music creation. Clock output from the MD4 feeds the MTC input of a sequencer or music workstation and locks the entire system to a standard timebase.

The Yamaha MD4 is an ingenious four-track recorder. Morning show bit

producers can cut clean digital tracks at home or anyplace. If your thing is doing song parodies for your station, the MTC sync feature is very helpful to lock your music machinery to the recording.

The brief time I spent testing the MD4, I was very pleased. Much credit goes to Yamaha for releasing the MD4 ahead of other companies and for helping establish and define the marriage of MD and portable multitrack recorders.

## Documentation

Even more credit should go to its manual preparation division; the book is easy to understand and describes in plain text and drawings how to perform the functions of the MD4. The manual includes an outstanding index and comprehensive glossary. High marks for the book.



After all of the horror stories and opinions you have heard about MD and ATRAC compression, should you even consider a product such as the MD4? I say absolutely.

Stack it up against the cassette multi you have been using and tell me which sounds better and works faster. Place it next to your PC DAW and note which one is easier to unplug, lift and take with you on projects. Look at all the pluses MD offers before saying, "Eww-ww, data compression."

Sure, it may be "only" four tracks in an eight-track digital world. But consider the following: MDs don't snag and tear, where digital tape might. The MD4 has a real hands-on mixer, is simple to operate and carries an outstanding price for those four tracks.

I wish the MD4 could record on less expensive conventional MDs and not the more specialized MD Data discs. The crosstalk issue also has me concerned. The former issue is probably moot due to design considerations of MD multitrack recording. I hope Yamaha addresses the co-channel leakage situation soon.

As long as my Christmas wish list is out, a MIDI In jack would be nice to have. Why? So a second MD4 can slave to the first via MTC. Be the first in your apartment complex to have synchronized eight-track MiniDisc digital recording.

Product Capsule:	
Yamaha MD4 MiniDisc Multitrack Recorder	
 <b>Thumbs Up</b>	 <b>Thumbs Down</b>
<ul style="list-style-type: none"> <li>✓ Familiar analog deck feel</li> <li>✓ Innovative use of MD</li> <li>✓ MTC sync</li> <li>✓ Price</li> <li>✓ Superb manual</li> </ul>	<ul style="list-style-type: none"> <li>✓ Crosstalk</li> <li>✓ Uses more expensive data MDs</li> </ul>
<small>For information on the MD4, contact Yamaha at (714) 522-9011 or circle Reader Service 183.</small>	

The marketplace push for MD is on right now and this unit drops into its own niche very nicely. For a digital product, it is priced to compete with analog cassette multis (less than \$1,200). It uses removable media so you never run out of hard disk space and lets you pocket a finished four-track master when you turn out the lights and leave.

Portable multitrack recorders hardly ever turn my head anymore, but the digital MD4 is every bit as innovative as those first analog tape units were over a decade ago. Check this baby out.

A big thanks to editor John Gatski across the hall at our sister publication Pro Audio Review for procuring an MD4 for this evaluation.



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Circle (8) On Reader Service Card

World Radio History



# Tannoy's Honest, Clean Monitors

► continued from page 32

- *Piano*: Natural, non-resonant, uncolored.
- *Strings*: Smooth, true timbres.

## Balance

Overall, the Tannoys have a uniform balance from octave to octave, with no coloration to speak of. They will not hype your mixes. You will have to work

meter away, on-axis to the coaxial woofer/tweeter. The measurement is anechoic, freefield above 300 Hz and nearfield below 300 Hz. This yields the response in half-space, such as near a large mixing console.

As Figure 1 shows, the response is admirably flat: 38 Hz to 20 kHz,  $\pm 3$  dB in half space without the foam plugs,

40 Hz, though, THD exceeded 10 percent; not surprising for a speaker this size. At 90 dB SPL, THD was below 3 percent at all frequencies above 40 Hz. This explains the low listening fatigue and lack of grunge at high volume.

All in all, I really liked the Tannoy System 800 ... I wanted to keep a pair! They are simple, no-nonsense speakers that are clean, honest and detailed. You can believe what you hear.

Price is \$995 per pair with a five-year warranty. Tannoy distributor is Tannoy/TGI North America Inc., 300 Gage Ave., Unit 1, Kitchener, Ontario, Canada, N2M 2C8.

□ □ □

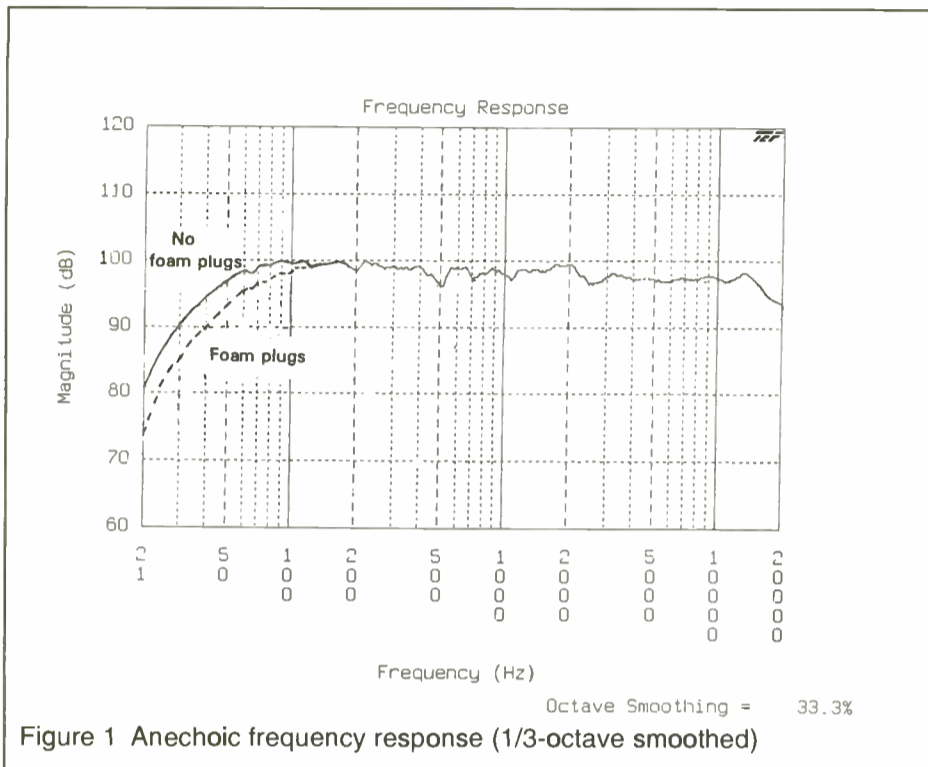
Bruce Bartlett is a mic engineer, writer and recording engineer, and the author of "Practical Recording Techniques" published by Howard Sams. Jenny Bartlett is a technical writer. Bruce can be reached at (219) 294-8388.

**Product Capsule:**

**Tannoy System 800 Nearfield Monitors**

<p style="text-align: center;"><b>Thumbs Up</b></p> <ul style="list-style-type: none"> <li>✓ Accurate, neutral</li> <li>✓ Deep, tight bass</li> <li>✓ Very sharp imaging</li> <li>✓ Tight transient response</li> <li>✓ Low distortion and fatigue</li> </ul>	<p style="text-align: center;"><b>Thumbs Down</b></p> <ul style="list-style-type: none"> <li>✓ Slight high-end rolloff off-axis</li> </ul>
---	--

For more information, contact Tannoy/TGI at (519) 745-1158 or circle **Reader Service 133**.



to get a good sounding mix, but once you do, you know that mix will sound great on any speaker.

In complex mixes, the instruments are clearly separated, not blurred together. You can follow what each one is playing. The 800s are wonderful tools for listening into a recording. I also was impressed by the powerful dynamics and low listening fatigue. Transients are sharp, too.

This flat response explains the speaker's neutral tonal balance and deep bass.

At 30 degrees off-axis, the response is about the same up to 2 kHz, down 3.5 dB at 10 kHz, and down 8 dB at 12 kHz. So a producer sitting next to the engineer will hear a slightly duller sound, weaker in the cymbals. But the off-axis curve is very smooth, thanks to the Dual Concentric design.

The Energy Time Curve or transient

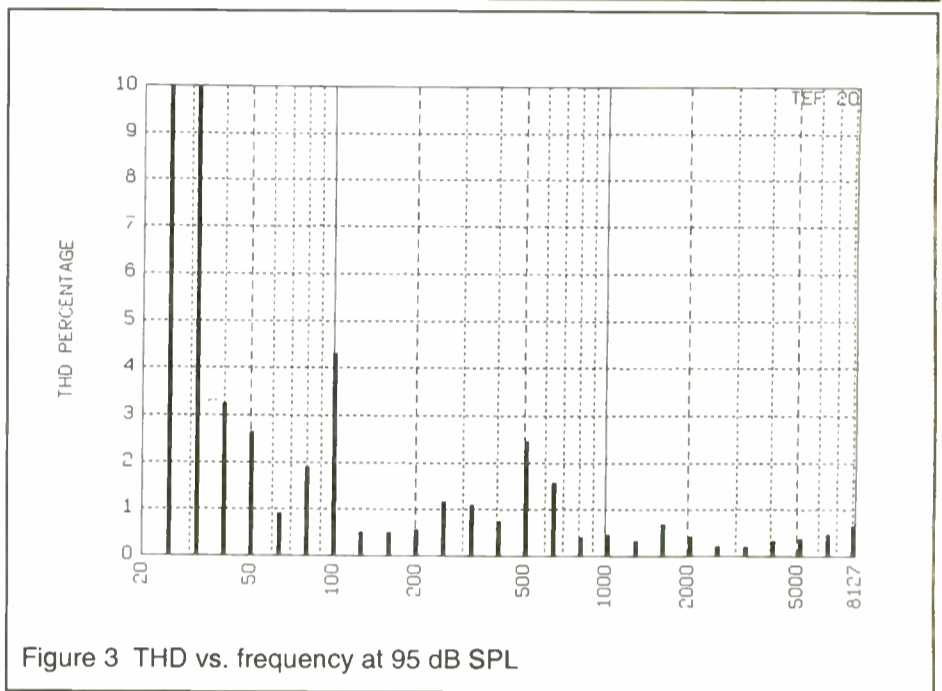


Figure 3 THD vs. frequency at 95 dB SPL

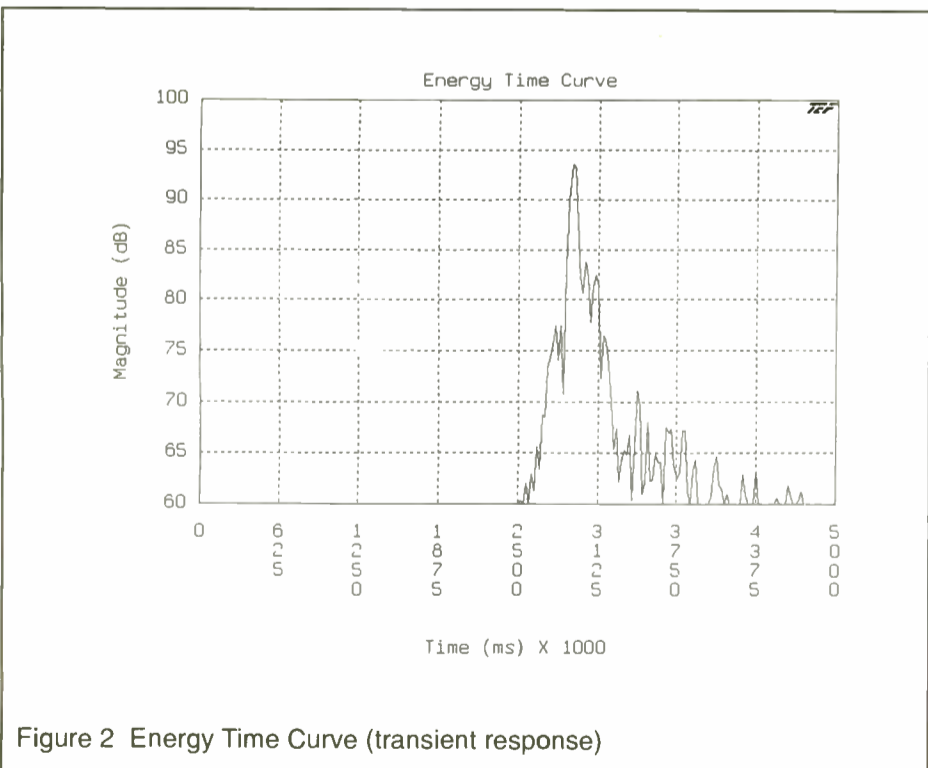


Figure 2 Energy Time Curve (transient response)

Stereo imaging is among the best I have heard. I noted sharply focused images, and a good sense of depth and hall acoustics.

## Lab tests

Using a Crown TEF-20 analyzer, I measured the frequency response of the Tannoy System 800. The mic was one

response was sharp and coherent. Small reflections appeared 10 and 12 dB down from the main spike, but they may be from the speaker stand I used.

I measured THD vs. frequency at 95 dB SPL. From 40 Hz up, distortion was extremely low, reaching only 4.2 percent at 100 Hz. THD was inaudible (below 3 percent) over most of the range. Below

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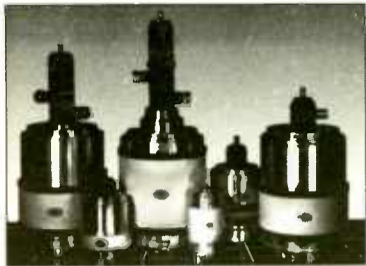
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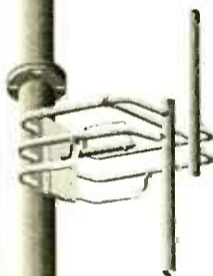
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**Promo Power:**  
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**See page 44.**

## Guard Against Computer Hackers

*'Please accept ... this article as an apology to the radio broadcast industry ...'*

by Justin Petersen

*A self-described former hacker, Justin Petersen is serving prison time for his role in a 1991 incident involving a Los Angeles radio station. He writes of his experience and how you can protect your station.*

**HOLLYWOOD, Calif.** In today's highly competitive broadcast industry, most station managers and engineers do not often have the motivation or the time to concern themselves with computer security. Usually, the subject is ignored until the station suffers a breach. Unfortunately for some, this is a costly mistake.

Imagine for a moment what the temporary loss of your station phone or computer system would cost in terms of lost revenue and wasted man hours. Could your station continue to function effectively?

In the computer and information age, we find ourselves relying more and more on these complex systems. But our increased use of computer and other remotely controllable systems brings an increased vulnerability to an outside attack. All businesses need to be prepared for this new fact of life. You can take a number of measures to minimize your exposure.

### How big is the threat?

The media and law enforcement infatuation with computer hackers has reached almost a fever pitch in recent months. Having been a hacker myself in the past, and also having been somewhat involved in the recent hoopla, I can comment that I find it all a bit amusing. The powers-that-be are pressing their panic buttons a little prematurely. This, however, is not to say that the potential for a major "hack" does not exist. Indeed, I will go on record as saying it is just a matter of time before the headlines cover yet another major computer break-in. Which organization or corporation is the next victim?

Certain computer security consultants would have you believe that an insatiable army of savvy computer criminals is perusing the networks of the world just looking for a way to pilfer funds. In my experience, this is not the case. I believe the threat can be summed up into two types of hacker.

One is the criminal opportunist willing to jump on the hi-tech crime bandwagon. Once someone who knows what he or she is doing passes on to the masses a technique to defraud a system, it becomes a widespread problem, e.g., long distance codes, credit card encoding and cellular phone cloning. This type of dispersion takes time; a company can

plan to limit or prevent it.

The second is the playful or sometimes malicious teenage hacker. Clever, resourceful and sometimes relentless, these kids may make it their mission to

**Imagine for a moment what the temporary loss of your station phone or computer system would cost in terms of lost revenue and wasted man hours.**

get into your systems.

It is the latter who will most likely be drawn to probe a station's systems for vulnerabilities. If your station caters to a young demographic, you may have already experienced some problems.

### Signs of trouble

"Social engineering," as the hackers label it, is the art of gaining information over the phone during a pretext call. Simply put, they cleverly B.S. you into telling them what they want to know. He or she may pose as an engineer looking for work, a potential advertiser, or a telephone company technician tracking down a problem. Social engineering is a popular and effective technique. It's been my experience that in most cases, the target never realizes it has occurred, or only does so long after the call is complete. Many times, the information is gleaned over several days from many sources.

Who is at risk? This is a question that the entire station staff must answer collectively. Assess the level of computerization, automation and remote controllability of your station. It may not occur to you that some of your systems can be remotely accessed. A non-exhaustive list of potential vulnerable systems includes personal computers, World Wide Web servers, computer networks, voicemail/auto attendant/phone systems, STLS, EAS, audio processors, answering machines and remote transmitter controls.

### Where to start

The first step is to determine which systems are either on line (connected to a phone line via a modem) or remotely accessible. Many managers may be unaware that certain systems have a phone line connected for remote control by touch tones. For example, some of the newer audio processors for minimizing signal parameters have remote capability. In addition, many station engineers set up custom remote systems for transmitter control.

Another oversight is the phone system.

Essentially a computer-based system, this could be your biggest and most costly target. A common feature of many PBXs is the ability to dial in, then after entering an access code, dial out. The phone companies have more recently shifted the liability of unauthorized calls to the owner of the system itself. If some kid hacks

your code and runs up your bill chatting with a hacker in Australia, it is your responsibility. Stories of six-digit phone bills are common.

A thorough computer security discus-

sion is beyond the scope of this article. There are a hundred tricks hackers can use to gain privileged access to your system. However, if you follow a few simple rules, you will discourage all but the zealots.

1. Your system should have its password protection activated.
2. Your passwords should consist of an alphanumeric combination and not just a word common to a dictionary, for example OUR4M32. Make it at least four characters long.
3. Disconnect your modem when it is not in use.
4. Install one of the popular virus protection software packages.
5. Regularly back up your data and keep a copy at another location.
6. Educate all of the employees at your station on security issues including the use of "social engineering."
7. Change your password every 30 to 90 days and delete any unused accounts on multi-user systems.
8. If you must use numerous dialups and you run a networked system, I

continued on page 42 ▶



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# Kids Radio on the Web, Well Done

**ALEXANDRIA, Va.** Another month, another column, and by that I don't necessarily mean the column you are reading (although I do mean that, too). I'm actually referring to the columns a couple of construction-type guys are putting in on the porch in front of the ever-busy, ever-ergonomically-aligned global Haberspace

Upon surfing into this site, you're greeted by one of six animated pages, including one with a wacky green guy from some planet or other waving his hands to and fro from within his spaceship, which is nicely-adorned with the "KidStar Online" banner. On this particular page, a simple click on the crater-sized planet transports you to the site's main menu.



headquarters.

Columns? Up in cyberspace? What, you were expecting maybe isosceles triangles?

Anyhoo, we've been up and at 'em again, getting our mitts on the coolest radio station Web sites and Net news around. So, while the columns go up, let's get down with this month's construction - er, I mean cyberstuff.

## Neat-O and Net-O

Well, howzabout that? Once again, one station has the distinction of winning both of the coveted Haberspace awards. Only, this time, this one station is actually a bunch of stations.

KidStar Interactive Media's KidStar Radio, five stations strong, has a real neat-o and cool daddy-o site (up since Aug. 15) at <http://www.kidstar.com>

Colorful to the max, this is radio on the Web done well (or well-done, for you burger eaters out there).

From here, you can link to the live broadcasts of the five KidStar stations in Detroit, Houston, San Diego, San Francisco, and Seattle (Boston is on the way, and so are more cities. KidStar's plan is to hit the top 15 metro markets by early next year). The link buttons on this page are extremely awesome artistic endeavors, each one created around

a particular characteristic of each city (the San Francisco button pictures the Golden Gate Bridge, for example).

Each station's page features some kinda tidbit about the city in which the station hangs its hat, a way to send song requests, and a talkback feature (as well as a fun piece of animation like a guitar-wailin' dog or a neat-o rainstorm).

What else is there to do here? Kids can join KidStar's All-Star Club and check out the programming schedg (and send e-mails to each of the air personalities). And, if that weren't enough, there's a handy-dandy list o' hot Web picks everything from Ben and Jerry's (ice cream) Home Page to the Cow Web Page and Action Figure Times' cyber-home.

Oh, yeah, let's not forget KidStar's live broadcasts, which sound really groovy coming out of computer speakers at 28.8,

A nice clean sound, and it comes to you at the touch of a mouse button! Wowiee zowiee, at least!

Therefore and furthermore, without further ado, a tip o' the cat in the hat, so to speak, and the nod you've all been waiting for: KidStar Online, developed by the company's On-line Development Manager, Kathy Herrmann, and New York City's Vanguard Media, is indeed, without a doubt, this month's Neat-O and Net-O Live Broadcaster Site(s) of the Month! Cool, man, oh so very kid coooooooool!

This past month, I tackled, so to speak, the SportsLineUSA site at <http://www.sportsline.com>. It's everything sports here, including SportsLine's all-sports Internet radio station (a handy, dandy utility for downloading RealAudio and Streamworks' players is provided). The 14.4 stream sounded mighty clean and



powerful, scoring a touchdown (or home run your choice) when I took a listen.

And, speaking of listening, listeners can find out about upcoming guests here. Programming ranges from "Hot Java," a review of the day's sports happenings, to "Fantasy Sports Tonight," which looks at



the wild and woolly world of, yes indeed, fantasy sports.

Head towards the nearest goal post and check it out (say, did I mention enough sports here? Oh, yeah — I forgot tiddly-winks!).

Well, here we go, with a long-promised tidbit about Steve Holstein's InterPrep Online, situated in its cyber-digs at <http://interprep.com>

What's here? Show prep and show prep links, and information about a few services Steve and his wife are publishing, like InterPrep Show Prep and "Cecil's Trashy Tabloid Gossip." "A weekly roundup of the stuff tabloids are made of," it says here on my screen.

Particularly handy is a list of links to some nifty programs radio-types can always use, including a stereo digital editor and a .wav player (okay, everybody, let's do the .wav!). And — here's a nice touch — you can listen to airchecks of stations that are using Holstein's services (if you're RealAudio enabled, that is). Surf on over today.

## The Cyber-mailbag

Hey, you know what? I'm gettin' tired of callin' this "The Cyber-mailbag" or just the plain-old "mailbag." Got a cool name for this area of Haberspace? E-mail me with your suggestions and I'll choose my favorite (address, as always, below).

In this month's "bag," there was a note from David A. Legg at WOVI-FM, a station operating outta Novi High School in Novi, Michigan. On David's suggestion, I took a peek at WOVI's Web site, and I liked what I saw. Michigan Association of Educational Broadcasters Station of the Year (nice goin'!). WOVI packs a lot of station-oriented stuff here, from its programming schedule to pix of its staff. You can even take a virtual tour of the station's digs. And soon, it looks like people will be able to listen in on the station via RealAudio.

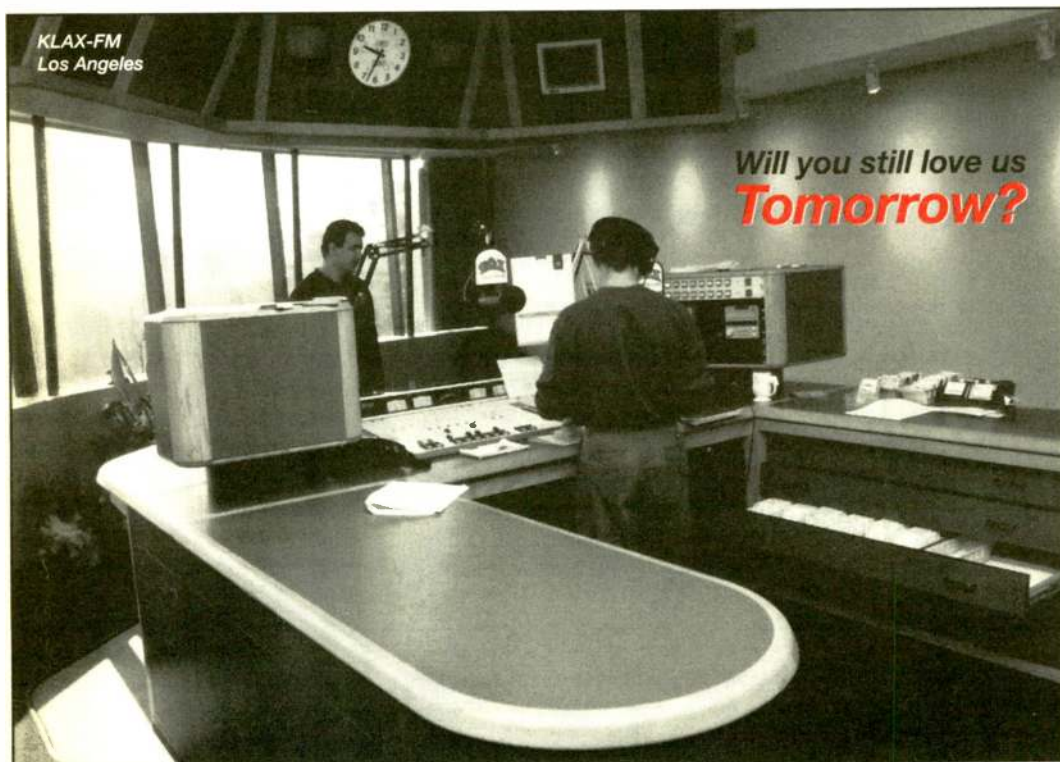
Check out the WOVI goings-on at <http://hs.novi.k122.mi.us/wovi/>. Now, back to school, everybody!

## Hit the e-mail trail

Time to mosey on outta here and check on the progress of the construction guys. Hey, how long does it take to put up columns, anyway? And, am I paying you guys by the hour?

Keep the e-mail comin' to me at [zoogang@earthlink.net](mailto:zoogang@earthlink.net)

Until next month, columns away, my friends. Columns away!



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**—Scott Beeler**  
Manager Broadcast Sales Center



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# The "Super Duopoly" System...

PAGE #1	Record	Autoroll	Cuts List	Swap		Option Menu
POT 1 (A/S)	POT 2 (A/S)	POT 3 (S)	POT 3 (LOCAL)	POT 4 (LOCAL)	POT 4 (LOCAL)	
A APRIL BLOSS 00:15 1	B WAGON WHEE 00:19	C KARLS APPLIA 00:59	D BAKERY CAFE 00:19	E C.INNAMON 00:02	F JACKS PLACE 00:08	
G LARRYS RV 00:31	H HDA 00:03 2	I VoiceTRAC 00:15 3	J DUDDENS 00:45	K EBS 00:50	L HIRSHFELDS 00:03	
M RADIO SONG 04:08	N DAYBRE 03:41	O NOTHING'S NE 02:59	P MANDY 03:14	Q WALKIN' AWAY 02:47	R NOBODY'S HOM 03:25	
S LINER A	T LINER B	U LINER C	V LINER D	W LINER E	X LEGAL ID	
1 2 3 4 5 6 7 8 9						
Sat Mar 2, 1996						
55° High: 58° Low: 32°						
<b>06:36:32 PM</b>						
23 28						
<b>KOGA FM # 2</b>						
SHIFT #04	MANUAL					
BILL SMITH	MODE					
Block Fill ON	Default Source 01	Resync Mode ON				
Run UDE	Special Menu	Play F9				
?	Station Data	Stop F10				
○	Reports	End F11	Skip F12			
	Clipboard-0	Last Delete-0	Hold Bin-27	02:31	Play - Pause	

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1	Clear Line	Bob Taxes	Omaha	On Hold	<b>DUMP DELAY</b>
2	Clear Line	Jill Taxes	Lincoln	On Hold	
3	Clear Line	Mary Football Team	Lincoln	<b>ON AIR</b>	
Next 4	Clear Line	Mark DIA Airport	Denver	On Hold	
5	Clear Line	Bobby Gambling Laws	Grand Island	On Hold	
					Delay Unit ON
					Hybrid Run by audio5
					Clear All Lines



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## Quality

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The system is designed with expandability in mind. You can quickly add more hard drives as your storage needs grow, up to 70 gig or more. And Audio Wizard for Windows can support 100 or more workstations...no other system can even come close to our ability to expand and grow with you!

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# Keep Up Your Guard

► continued from page 37

recommend hiring a security consultant to evaluate it and patch up any holes.

Regarding remote control of transmitters, STLs, processors and the like: If you can disable these systems when not in use, I would highly recommend it. Because this is not often practicable, consider certain measures. In my opinion, a four-digit password is not long enough. A hacker can program his computer to hack that in a day. If you have the option for five, six or seven digits, implement it. Also, when accessing your remote, avoid doing so from a cellular phone.

If the thought of someone else controlling your system makes you lose sleep at night, you have a few more options. First, control your transmitter via your STL link. Some systems are available to do this. Second, install a "pager notification system" that will page you every time someone accesses your transmitter control. These systems are available for under \$200.

## Voicemail

Many large stations have found it necessary to install computerized call processing equipment. Applications range from automatic attendant to voicemail to information services. These systems are usually high profile and as a result will frequently come under attack. As I mentioned earlier, password security is essential. Instruct users not to use simple

passwords such as 1111, 1996, or the extension number. Four-digit passwords will suffice for individual boxes. However, many systems have administrator boxes used for setting up and controlling the entire system. These boxes or extensions should carry the longest password possible.

As I mentioned earlier, your phone system may have a remote dial-in and dial-out capability. If you do not need it, disable it. If your station personnel do use it, regulate it. Keep passcodes long, change them frequently, and if possible, restrict the types and amounts of calls allowed.

Securing your computerized telephone systems is a sizable task in itself. Assign either a knowledgeable employee from the station or an outside consultant specifically to keep an eye on the systems. Many of the control programs associated with these applications generate security reports and you should monitor them routinely. I can think of a few dozen additional tips for securing a system; unfortunately, I find myself running out of room to expound.

Regardless, the simple point here is to be aware of the potential problem. The chances of your station phones getting hacked are high. The amount of damage and how much it costs depend in part on how closely you administer your system.

I almost forgot to point out one of the hacker's favorite pastimes, "Trashing," as it is affectionately referred to, is the

practice of acquiring the garbage of a target company and dissecting it for information. Keep in mind that if one gleans enough seemingly harmless information, it becomes valuable once compiled. This is not to mention that your secretary might throw away an old computer manual with a password scribbled on it. Pay attention to what you discard, and if you feel you are subject to an attack, have

## I should know, I was one of those Los Angeles hackers.

your trash shredded.

If a hacker really sets his or her sights on you, he or she will most likely get in. Remember, you are not protecting missile silos. In some cases, it is just not cost-effective to double bolt every door. If an invasion happens, alert all of your staff, have a meeting, and call the authorities or a security specialist. The latter will likely be more effective.

## Real crime

I'm not aware of any widespread hi-tech crime involving the broadcast industry (aside from the FCC auctions). In 1991, a couple of Los Angeles hackers hijacked radio station call-in lines and won a slew of prizes. The hackers utilized a telephone company computer system that normally is used to test phone lines. Instead of testing the lines, they used the system to seize them, thus preventing the rest of the world from calling in. After \$50,000 in prize money and two Porsche

giveaways, the hackers were arrested and jailed. Being familiar with the technology the hackers used, I can say the chances of this happening again are slim.

The telco system in Los Angeles that was used has since been decommissioned and similar systems throughout the country are difficult to access. However, an unscrupulous telephone company employee could take advantage of his or her position. The only prevention of which I am aware is to have 10 or more contest lines installed at the studio and picking the winning line at random. Having interception equipment attached to more than four lines simultaneously is cumbersome.

I should know, I was one of those Los Angeles hackers. Please accept the information I have delivered in this article as an apology to the radio broadcast industry and an attempt to set straight what I have done. I think I'll leave it at that. And no, I wasn't allowed to keep the Porsche.

Hackers will always be out there doing what they do. Most grow up, mend their ways and move on to legitimate computer careers, much like myself. Unfortunately, my generation has been replaced by one with more resources, more home computers, and ultimately, more targets. With a little education and foresight, your station doesn't have to be an easy target.

□□□

*Justin Petersen is an audio engineer, computer security consultant and ham radio operator by trade. He is currently working on an Internet Radio project and can be e-mailed at [asteal@primus.net](mailto:asteal@primus.net)*

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## ROOTS OF RADIO

# Announcers Wanted, \$25 a Week

by Ronald Pesha

**QUEENSBURY, N.Y.** Broadcast employees often complain that their compensation lags that paid for comparable work in other vocations. Has this always been the case?

Let's compare with the salaries quoted in the 1941 textbook "Handbook of Broadcasting" by Waldo Abbot, published by McGraw-Hill. Abbot was a professor at the University of Michigan and an employee of pioneer station WJR(AM) in Detroit.

Local station announcers started at \$25 a week, averaged \$32.52, and could reach \$75 to \$90. To place this in perspective, average manufacturing income in 1940 was \$33.60 a week, or about \$1,750 a year. Network announcers averaged \$65.54. This was no 40-hour work week. Prior to World War II, most people worked five-and-a-half days a week, sometimes six full days.

## Reaching the top

Average salaries for control room operators (no combo operators in 1941!) ran from \$45 to \$80 a week. Chief engineers in "key stations," presumably including WJR, earned nearly \$6,000 a year. According to Abbot, "smaller stations pay considerably less": \$25 to \$40 a week for operators and \$35 to \$60 for chief engineers, probably less than half as much as the large stations. Times have not changed much, even if the numbers have.

"If you want to get to the top either in local stations or in the networks," wrote Abbot in 1941, "join the sales staff." Network salesmen averaged \$121.23, with independent stations paying around \$48.50 a week. Few if any women held these jobs. Fifteen percent sales commission prevailed. Abbot does state that a chief engineer had a better chance of becoming a station manager than anyone outside of the business staff.

"Few of the business in radio stations, partly because most station managers prefer a man," Abbot wrote. As announcers, women "are not physically able to endure the long hours of work." This is not to say that women could not find jobs in radio. Who else would purvey household hints and recipes, deliver talks about child training and etiquette, or do the filing? Many stations also employed "hostesses" to greet visitors and conduct tours.

## Education

Pay and position, then as now, depended in part on education. Abbot was a professor, but while encouraging a university education, he was willing to accept a high school graduate in sales. College was not essential for control room technicians. Armed with a high school math and physics background and a half-year of technical school, the motivated man should have been able to get a license. Nevertheless, a degree was "nearly a prerequisite when you consider how many college graduates are applying for radio positions."

The textbook reproduces a sample employment application. The form was rife with personal questions that are no longer appropriate — or legal. The 1941 form also indicates a social problem and

fear of the day. When did someone last ask if you have tuberculosis?

Abbot stated that the two national networks, CBS and NBC, and one of five

reports that these stations employed 2,950 people, an average of 109 per station. Radio staffs were larger then, and fewer small stations existed, but do

**Average salaries for control room operators (no combo operators in 1941!) ran from \$45 to \$80 per week.**

regional networks employed personnel directors. Only four of 27 individual stations surveyed maintained such a position. Surveyed a misprint here: He also

you buy 109?

Nearly all stations broadcast live dramatic and musical programs then.

Announcers doubled as actors; singing

ability heightened your chance for a job. Stations wanted writers not only for ad copy but to create continuity, comedy and drama. These employees often earned the least of all. Rates at local stations ranged from \$75 down to \$15 a week.

So use that technical knowledge. Find a job at your local radio station at \$25 a week. Remember, gasoline is 20 cents a gallon and a loaf of bread 10 cents. But prepare to lug remote amplifiers with heavy A and B batteries and iron-core transformers, to do without almost all fringe benefits such as insurance, and to work a 50-hour-plus week.

□□□

*Ronald Pesha is Associate Professor of Broadcasting at Adirondack Community College, Queensbury, N.Y. Reach him at (518) 743-2200 ext. 567, or by fax at (518) 745-1433.*

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World Radio History



## PROMO POWER

# Consultants Bring More Than Change

by Mark Lapidus

**WASHINGTON** Our consultant is coming to town!

Those six words can send waves of anxiety through the ranks of a radio station. Frequently, the one employee who likes the idea is the general manager, who may be the only person in the building who understands the consultant's role. Let's break down the barriers and consider the positive things that a consultant brings to your brain trust and to your team.

## Advice for everyone

In the last decade, radio consultants have exploded into nearly every station area. Consultants specialize in programming, research, promotion, sales, engineering and traffic. Some of the larger groups have developed their own internal consultants by appointing group program directors, group marketing directors and regional sales managers.

Why do people fear consultants? Employees often feel that an outsider is evaluating them subjectively, an outsider whom they cannot influence. You can use a simple approach to eliminate much of this fear. Rather than hiding Fred Jacobs at a local hotel, have your staff socialize with him. When they see that they are dealing with a normal person, they will relax and begin to learn. They will also discover that evaluation is a small part of

a consultant's mission.

When used properly, a consultant gives you the benefit of his or her experience as you form your broad strategy and tactics. If you have hired a consultant but do not invite him or her to participate in major review and planning sessions, you are wasting your money. I have seen stations conduct major research projects, then not share that information with consultants.

Certainly, some information must remain confidential, but your expert cannot offer the proper advice without as much information as possible. If you cannot trust your consultant, why have one? Perhaps your consultant also works against you in three other markets. The confidentiality issue is their problem, not yours. The consultant knows that if they spill your secrets, few clients will trust them.

A consultant may be one of the few employees who does not always agree with you. This is good. When people at the station level work together for any significant length of time, they naturally begin to think alike. This happens so gradually that you may not notice it. If it did not happen, your staff would be arguing all the time. A consultant has probably dealt with any given problem or opportunity many times.

When you disagree about a certain approach, ask him how other clients in

other markets have solved the issue.

Can a consultant become too involved?

If your consultant performs daily tasks for your station, you probably are not consulting him anymore. Instead of working with you, he is working for you.

## How much is enough?

If your sales consultant is dividing your lists, asking for call sheets and doing performance reviews, she has unwittingly become your general sales manager. If your programming consultant does your daily music logs and hires your jocks, he is really your program director. This arrangement may be fine, as long as you realize that you no longer have an outside expert's advice.

How much advice do you need?

Every station should have an outside "ear" who serves as a program and marketing consultant. Every station in America can be improved. If you cannot afford a major league name, call a programming or promotion friend in another market and ask for a review. Perhaps you can return the favor by providing advice in another area.

Also, you must do research. Avoid guessing. If you cannot afford it, do it yourself. Your listeners are dying to talk to somebody about your station. All they need is an invitation. Find out what they think using a simple questionnaire at remotes and sponsor locations, and by

using a dedicated telephone answering machine.

Sales advice pays. Keep your sales staff motivated by bringing in special speakers, even if they are teachers from the local community college. A one-day visit from another general sales manager can also help you spot trouble areas that you would not notice otherwise.

Engineering opinions are invaluable too. Large groups that do not have an engineering "genius" are missing opportunities. Even small stations should make the effort to get advice prior to major changes.

What is the future for consultants? Thunderstorms could be ahead.

In this business climate, when one major group decides that none of its stations will use a consultant's services, he's toast. Consolidation in station employees will no doubt bring consolidation in consulting. Some big stations may simply hire consultants to come on staff.

To those who will say they hate consultants because a certain somebody stabbed them in the back or lost their job, I say: Blame your boss, not the consultant, who is only an instrument that can be played brilliantly or poorly. Not every consultant in our industry is moral or brilliant, but only those with something to offer survive long. Only those of us with an open mind will reap the full benefits offered by the best of consultants.

□ □ □

*Mark Lapidus was until recently VP/Marketing, Liberty Broadcasting. This 23-year vet would like to be VP of Something again real soon! Offer him work today at (703) 764-3994.*

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# Stations Go It Alone To Help You Get There

by Alan Haber

**WASHINGTON** Who's reporting the fender benders, stop-and-goings-on and clear sailing paths home to the road warriors that hit the highways and byways each and every day? You might think the only players are the big traffic operations like Metro Traffic Control and Shadow Broadcasting Services, but you'd be making a left turn from the right lane.

There are, in fact, radio stations that run their own traffic operations, compete against the big guns, and do quite nicely negotiating their own roads.

And, just like the big guns, these stations face challenges on a daily basis. Robin Bryson, who oversees the three-

on the sides, act as rolling billboards and as great advertisements.

WDEL has formed partnerships with businesses that also have vehicles out on the road.

"We check in with each other," said Bryson. "They call me if they see a problem. I call them if I see a problem that will impact their business."

Down in Texas, news/talk KTSA(AM) and CHR sister KTFM-FM are also doing their own traffic reports 24 hours a

continued on page 47 ▶



Robin Bryson

**Traffic can be reported without using the services of the big traffic concerns.**

person-strong Trafficwatch division at news/talk WDEL(AM) in Wilmington, Delaware. (traffic every 10 minutes on the nines, concentrated during morning and afternoon drive), said the challenge is "to stay on top of the growth in the area."

Traffic can be reported without using the services of the big traffic concerns. WDEL switched to doing its own traffic about a decade ago.

WDEL (traffic reports also air on CHR sister station WSTW-FM) operates three vehicles, from which the station traffic reports emanate (a single-engine airplane scans from the skies on Friday afternoon and evening and on Sunday evening during the summer to help people going to and from the beaches). The vehicles, with the stations' call letters emblazoned

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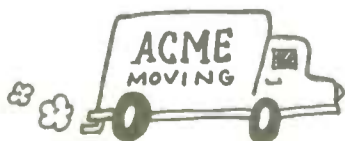
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# Design RF Switching Systems with Care

by James F. Pinkham

**HUDSON, N.Y.** RF switches fall into two general classes: those with moving parts, such as contactors and coaxial switches, and those without, as used with wave guide systems. This article deals with the former.

## Hot switching

RF switching systems should not switch "hot," with carrier still applied. Hot switching risks physical damage to the conducting surfaces of the parts in the switch mechanism. Even with vacuum switches, hot switching is undesirable. The second danger, almost as important, is carrier interruption. In a hot switchover, the antenna system receives a burst of RF energy. This burst is rich in harmonics and generates interference across a good deal of spectrum. Repeated practices of this sort can lead to FCC citations.

As the switch contacts open and the impedance changes, an "arc" is drawn. Repeated arcs eventually will cause switch failure and subsequent loss of air time. If your AM facility has more than one transmitter or antenna pattern, such as DA, Non-DA, or DA-2, or if your FM facility has more than one transmitter or antenna, electrically controlled switching is highly desirable.

In this day of remotely operated and even automatic stations, such electrically controlled switching is critical. In order to operate satisfactorily by remote control, the system should have "memory" to recall the equipment status or configuration after power failure or other interruption, and time delays both before and after switching to control the removal and reapplication of carrier. Carrier may be interrupted either by "blanking" at the exciter, or by removing transmitter "plate" voltage.

## Simple is best

The modern radio station employs many micro-processors. These devices have a susceptibility to static discharges during lightning storms. In one instance, a station with a four-tower DA was obliged to disconnect its micro-processor pattern switcher because it was changing patterns repeatedly during lightning storms without any command from remote control equipment.

As a general rule, simple relays are the best approach, with magnetically latching relays for "memory." Solid-state time delays generally are acceptable. Remember that electrically latching relay arrangements do not retain equipment status "memory" after power failure. The best system is the simplest.

In planning any directional station with more than one pattern configuration, install enough underground control cable pairs with 250 V rating to inter-lock the switch position micro-switches to the pattern controller at the phasor. Because such cable must be installed prior to ground system construction, plan ahead! Most solenoid-operated RF contactors are best operated on 208-220 VAC power. While they may be ordered for 120 V service, control cable runs of 700 or 800 feet can produce voltage drop and sluggish switch transfer.

For typical runs, No. 12 AWG may be required; for interlocking, use No. 14 AWG pairs for each contactor. Use indicator lights to show the status of contactors at each tower and in the phasor, to locate any fault rapidly, if a contactor fails to transfer position. If this happens, the control system should lock out the carrier until the condition is corrected.

For large arrays with lighted towers, you can run the contactor solenoids with low-voltage relays at each tower, if the 208-220 V power to the towers remains on, when tower lights are off. These tower-light mains are usually three-wire No.

remote control capability and the option of automatic or semi-automatic operation.

The advantage of automatic operation is obvious. Should one transmitter cease operating, the other will continue to deliver power to the antenna system at half the normal transmitter output, or a resultant one-quarter the usual combined power output. The remaining power shows up in the reject load. Figure 1 shows this arrangement in a block diagram.

Through automatically controlled, electrically operated transfer switches, the remaining transmitter connects directly to the antenna system, with its full power

authorized the licensee. A second priority is to enable continued operation with minimal power reduction.

In severe weather emergencies, consider reducing power to a level sufficient to avoid antenna system damage. Radomes are desirable for moderately cold climates. However, extreme conditions can put an ice coat even on radome enclosures. Electrically operated deicers have distinct advantages. Remote thermostats save electricity when de-icing is unnecessary.

## Control philosophy

Know the basic requirements for acceptable equipment or pattern switching control:

- Remote Control (Dry contact closure)
- Status Memory (irrespective of control system power failure)
- Hot Switching protection
- Status indicators on local control panel

Most electrically operated RF contactors or coaxial transfer switches have A/B positions rather than on/off positions. The RF switching devices themselves meet the basic status memory condition listed above.

They do not change state without an input of control voltage, either to a solenoid device or electric motor. I strongly recommend such equipment. Contacts open

remain open, and contacts closed remain closed, until control power is applied.

Hot-switching protection is achieved simply by delaying the application of solenoid or motor power until after the RF carrier has been interrupted, and continuing such interruption until after the transfer switching and all mechanical moving switch parts have come to rest. For these functions, use adjustable solid-state or electro-pneumatic time-delay relays.

Each contactor or transfer switch customarily is equipped with micro-switches or detent-switches that act to limit the action of solenoids or motor mechanisms and indicate the status of each contactor or transfer device.

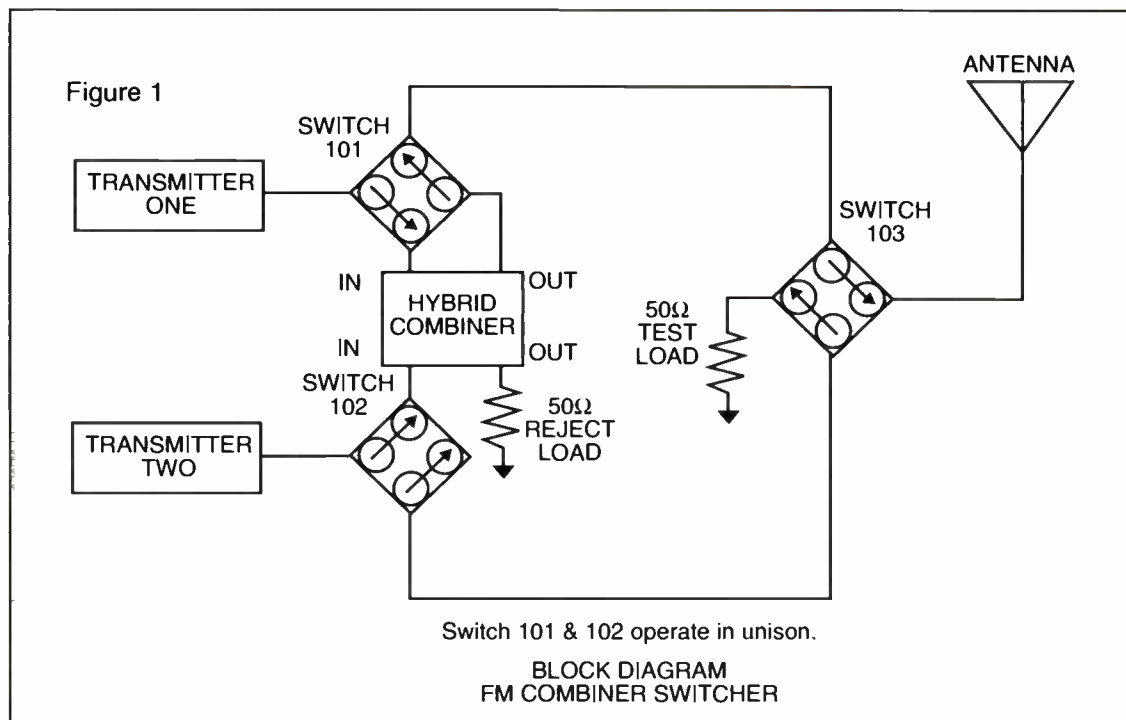
An interlock matrix of status indicator switch contacts operates the time delay relays, which control the application of solenoid or motor power.

A typical system for FM transmitter combiner control has the following modes of operation:

- Automatic, Combined Transmitters to Antenna
- Manual, Transmitter I to Antenna, Transmitter II to Test Load
- Manual, Transmitter II to Antenna, Transmitter I to Test Load
- Combiner Output to Test Load (Test Only)

To establish memory, a magnetically-latching relay simulates the status of each transmitter transfer switch. Diode matrices simplify mode selection and other functions through 24 V DC control. Another magnetically latching relay is used to select Automatic/Manual operation.

continued on page 72 ►



8 AWG. This approach may be more expensive, thanks to breaker panels and light controls, but it may save on wiring for switching.

Some stations make provision for emergency operation at reduced power using a single tower, so they can correct switching problems without losing all signal.

One complex system was designed for a DA-2, 50 kW day, 10 kW night. It used a main 50 kW transmitter, alternate 10 kW, and 50 kW / 10 kW / CB auxiliary trans-

mitters with a 50 kW dummy load. The relay chassis occupied more than 2 feet of rack space. It required six modes of operation, with the third (unused) transmitter locked out. It had originally been a two-transmitter system, 50 kW day and 10 kW night. The station purchased a new 50 kW day / 10 kW CB, and elected to keep the old original main transmitter as a full-power auxiliary. The station added switching to the phasor and completely replaced the relay system.

## A station was obliged to disconnect its micro-processor pattern switcher because it was changing patterns repeatedly during lightning storms.

Combining the operation of a pair of similar FM transmitters requires RF switching control. You can set up a combiner without electrically operated coaxial switches, by using manually operated patch panels or transfer switches. However, the advantages of electrical operation are significant. They include

output, or one half the usual combiner output. The inoperative transmitter is switched to an RF test load for servicing. You could accomplish this instead with patch panels, but power must be removed while you switch connecting links, with loss of air time.

In a combiner system, the transfer from full power to reduced power can be automatic, with return to full power requiring control commands. The system can be expanded to allow for main and alternate antennas, with

one additional coaxial switch.

Similarly, system designers can equip main and alternate transmitters and antennas with electrically operated switches. These can be set up for automatic operation of transmitters. Automatic operation of alternate antennas is not normally recommended. If antenna or transmission line failure or antenna element icing in cold weather has brought about high VSWR, an operator should observe such conditions before re-applying full power.

Reflectometer protective devices augment the automatic features of such systems. The use of solid-state detectors has greatly simplified reflectometer assemblies.

The principal aim of automatic systems should be sustained on-the-air operation, at the closest power level to that



# Profiting from Traffic, In House

► continued from page 45

day on the AM, morning drive on the FM. Except for a three-year stint with Metro, the stations have always done their own traffic. Anne Schiller, operations manager of KTSA, said they wanted to have more control over their traffic reporting. They felt they could do a better job locally and be able to sell all the traffic sponsorships.

KTSA has a two-person traffic team: the believe-it-or-not-they're-not-related Matari Jones and San Antonio police officer Michael Jones. The pair takes advantage of three main traffic sources: the police radio system, listener reports delivered via mobile phones (KTSA has an approximately ten-year-strong alliance with Southwestern Bell Mobile Systems), and the Texas Department of Transportation's TransGuide system, which provides traffic information gleaned from buried sensors, and cameras placed at various locations along the local main roads.

For KTSA and KTFM, and other stations reporting their own traffic, having such good, reliable information sources in place means everything. But everything doesn't come for nothing: Schiller said that there's a financial commitment involved. And don't think that doing your own traffic means cutting costs.

"You don't cut costs if you do your own traffic," she said. "You hire people, you invest in equipment."

Salt Lake City news/talker KSL(AM) is another do-your-own-traffic kind of operation. The station has, in fact, always done its own traffic, and faced the challenges inherent in such an enterprise.

"Your biggest challenge is your cost," said Rod Arquette, vice president of news and programming. The station contracts out to Duane Southwick, who reports its traffic and is currently in his 20th year in the air; Southwick oversees the maintenance on his four passenger, single-engine Cessna Cardinal airplane. These days, he flies with a pilot, although that hasn't always been the case.

While traffic reporting for some may be just a stepping-stone on the way to a deejay or other on-air gig, some reporters are happy to be right where they are. Even though he's up and at 'em at 4:30 a.m. and at the airport at 5 a.m., and suffered a severe heart attack 10 years ago, he wouldn't change places with anyone. "Flying's just in my blood," he said.

KSL has put together a cellular telephone network with the help of AT&T Wireless Services; the station depends on its listeners to call in with their traffic reports. KSL has been successful in its efforts and plans to stay on top. "With technology," said Arquette, "I think we'll be in the foreground of being able to do the best traffic."

## Information and entertainment

Pilot/reporter John Phillips, who does the traffic for Jacor Communication's four Cincinnati radio stations (AMers WLW and WCKY and FMers WEBN and WFOX), has been in the thick of the traffic biz for 22 years (he's been a pilot since 1979). He works in morning and afternoon drive, five days a week.

For Phillips, traffic is more than just pointing out the hot spots. "The average commute time (for a lot of people in Cincinnati) is like 13 or 18 minutes," he

said. "They're going to hear one or two traffic reports. If their ride to work is no great shakes, the traffic report has to be entertainment, because they don't need the information. On the other hand, if

get lost in the entertainment. You've got to work the information in, too."

The veteran traffic reporter, who flies a four-cylinder Enstrom Shark helicopter which gets down to about 300 feet off the

**I'll have the door off, be wearing a pair of cutoffs and some flip-flops, and flying around, waving at girls in bikinis on the river. How bad a job is that?'**

somebody needs the information — if they've got a long commute — you can't

ground, above the trees and power lines, also does traffic breaks for WCPO-TV.

the local ABC affiliate, during Good Morning America breaks. He feels that the way he can "become trusted and endeared to the listener" is by making "him feel like I'm riding there in the front seat with him."

Like some of his contemporaries, Phillips is recognized by his voice when he's out and about. And, like some of the other more committed traffic reporters around the country, he thinks his is a pretty cool job.

One recent early afternoon, Phillips was looking forward to getting up in the air. "This afternoon," he was saying, "it's going to be 85, I'll have the door off, be wearing a pair of cutoffs and some flip-flops, and flying around, waving at girls in bikinis on the river. How bad a job is that?"

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## OFFBEAT RADIO

# 'Hooters Girls' Find Radio Home

by Brian Holmes

**CLEARWATER, Fla.** Thirteen years ago, the first Hooters restaurant opened in Clearwater. Hooters was meant to be an exciting alternative to the Bennigans, Chilis and TGIFridays of the restaurant industry. Now, the chain has brought its formula to talk radio.

The concept: Take three Hooters restaurant waitresses and put them in front of microphones each day for a combination guidance session, news report and on-air slumber party.

In April 1994, "Hooters On The Radio" debuted in the midday time slot on what



Lynne Austin and Brenda Lee

was then Tampa Bay's "Entertaining Talk

Radio" station, WSUN(AM), which has since switched to an all-sports format. Nobody knew what to expect, especially creators Ron Bennington and Ed Droste.

Lynne Austin and Brenda Lee (known as B.L.) had been making regular appearances with Bennington on his nationally syndicated "Ron & Ron" morning show and were popular with the listeners.

Bennington saw potential and approached the co-founder of the Hooters restaurant chain, Ed Droste.

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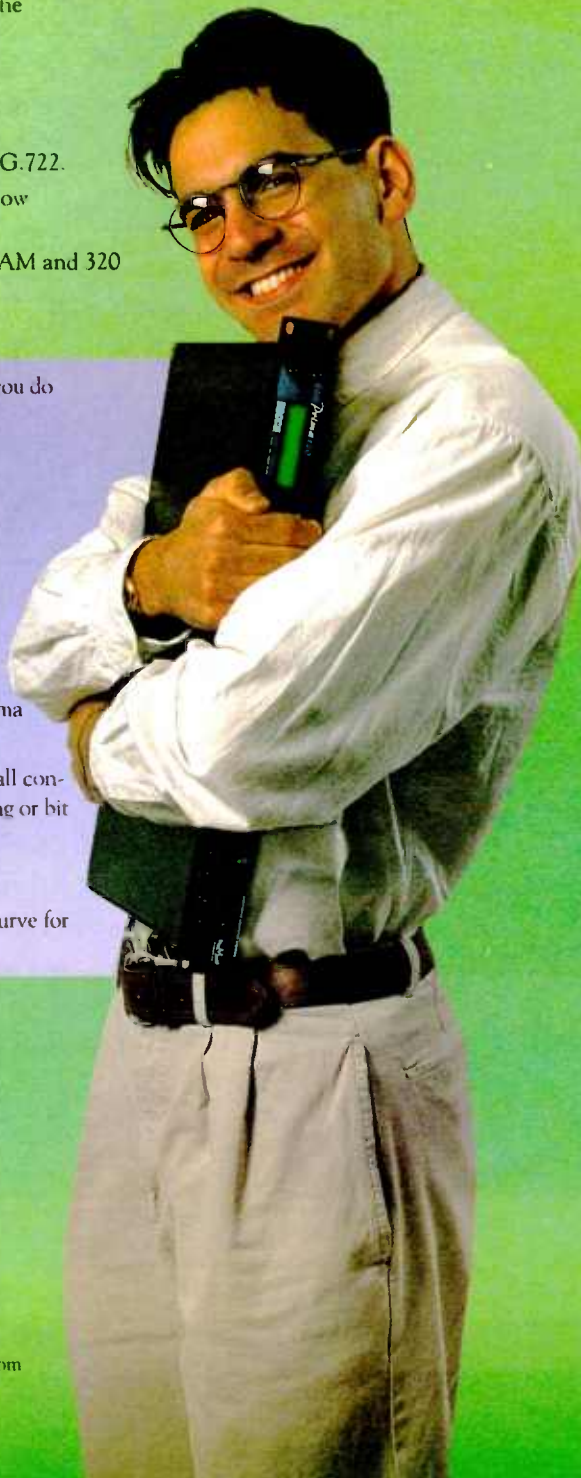
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"I told Bennington that we could maybe try it for an hour each day and he said 'We got four hours a day,'" Droste said. "We did a lot of pacing that first week but we just told the girls to interact with the listeners just like they interacted with the customers at the restaurants."

The "girls" of Hooters have made headlines in the past year, and surely Droste has heard the criticism from those who consider the restaurant chain exploitive of women. Does the show raise the same complaints? Droste said, "The show is not for everyone, and the restaurants may not be for everyone ... It would be a shame to have these girls sitting at home watching soap operas instead of doing the show."

From the beginning, the show had its troubles. Austin and Lee had been arguing for almost two years and had to resolve their differences before the show hit the airwaves.

"We didn't really even fix our problems until they said 'You're on!' The mics were hot and we had to be friends," said Lee.

"We were three women," Austin said. "You could be the best of friends or the worst of friends. If B.L. is upset, she'll confront you right there. She'll get in your face and scream and have a mini temper tantrum right there."

Austin and Lee said the show has been like on-air therapy for them. Julie Williams, a third host who recently left the show, was shy and didn't say much at first.

The relationship between the women has given the show some drama. At times they would fight on the air and threaten that they wouldn't be back the next day or that they wouldn't speak to one another again.

Williams worked alone for a period. Austin was pulled off the show due to a contract she had signed with another part of the Hooters organization, and Lee was involved in a serious car accident in which she lost her thumb. Williams was obliged to work solo for a while, with some help from Fez Whatley of the "Ron & Ron" show.

Eventually, all three were brought together again and the show found ratings success for WSUN. In November 1995, WSUN decided to drop most of its lineup to change to sports talk, leaving the show without a home.

The members of the team say they received many offers from stations outside of the Bay area but they continued to search locally. After four months, a local station with an open midday timeslot expressed interest. The show moved to the studios of 10 kW WBDN(AM) in Clearwater, a talk station that had not shown in the Tampa Bay ratings in several years.

The change brought its challenges. First, they had to rebuild their audience. At WSUN they had been surrounded by successful shows, with "Ron & Ron" before them on the schedule and local talk veteran Bob Lassiter, now at WFLA, following. At WBDN, the Hooters show airs after a health program and precedes People's Network's Chuck Harder. This schedule produces fewer carry-over listeners from other shows. Further complicating matters, Williams left the show to pursue modeling only five months into her second stint.

Marketing efforts, including a few billboards around town and table cards in every Bay area Hooters restaurant, paid

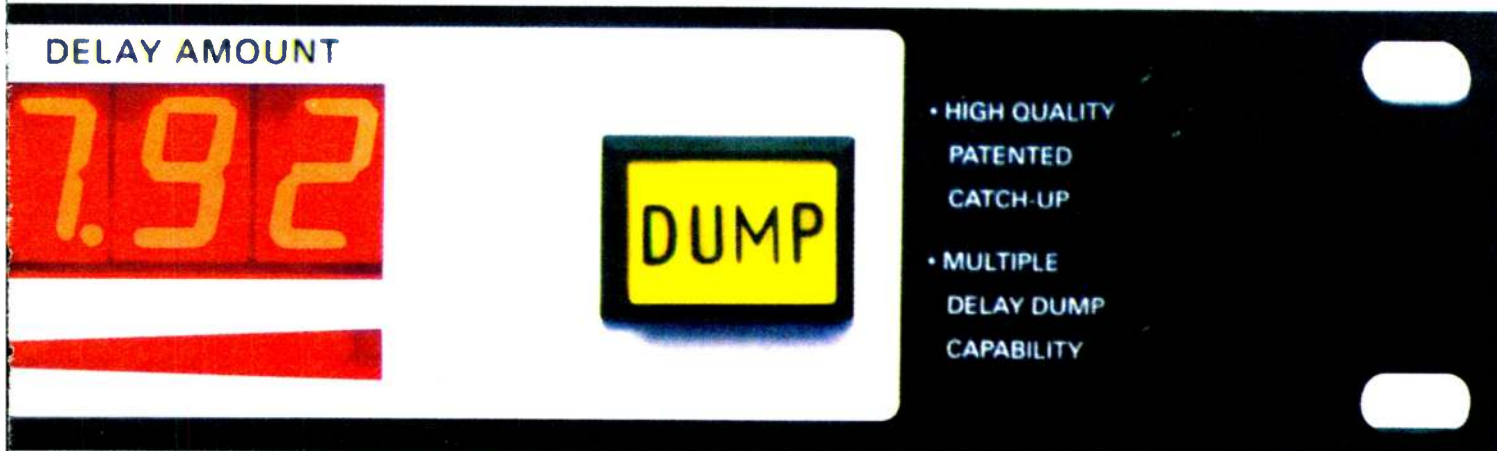
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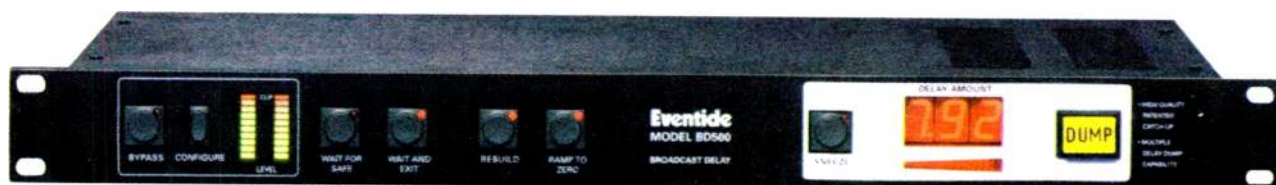
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PERSONNEL LEVEL

# Manners Matter in Getting Ahead

by Sue Jones

**SPRINGFIELD, Va.** Good business manners are far more important than many people think they are. Some people unwittingly fail to win promotion because they are unaware of the "obvious" proper business manners. In case you were not listening or may have forgotten some of the finer points of business manners, here are some useful reminders.

**Start with table manners**

Use your best table manners at meals even though you are "just" at work. Someone will observe you when you least expect it. If co-workers find your manners offensive, you may find yourself eating lunch alone.

Ask yourself if your manners would embarrass your boss if you accompanied him or her to lunch with a client. If your table manners are unacceptable, your supervisor may disqualify you for positions requiring client contact, even though you have the technical or business skills required.

I have recruited for positions that required extensive business social contact with clients. As part of the evaluation, I would invite the interviewee to be my guest at lunch at an upscale restaurant or at one with unusual serving arrangements, such as a chef preparing food at a hot table in view of the diners. I was not just being nice; this was a test of the candidate's table manners. Someone lacking proper table manners or who was extremely uncomfortable would not project the image required by the company. More than one candidate passed the business skills for the position but failed the business social evaluation.

If you are unsure of proper table etiquette, buy a book that explains it in great detail, or compare etiquette notes with a trusted friend.

**Be nice to everyone**

Respect all people regardless of gender, race, religion or present job level. It's true that you should be nice to those on the way up the organizational ladder because you may indeed meet them again on your way down. Use bias-free language. Do not tell insensitive jokes and do not laugh when others do. Before you tell a questionable joke, ask yourself if you would tell it if a member of the other gender, race or religion were present.

Laws protect minority and disabled employees. Try to help make the station a place where those laws are unnecessary.

Today's receptionist could be tomorrow's leader. People will respect you more if you let them feel great when they are with you, than if you try to convince them how great you are.

Do not participate in office gossip. Information passed along the gossip mill is usually unverifiable, often wrong. What may have been a relatively accurate statement or observation in the first discussion will be considerably different and inaccurate after several renditions.

If you are still in doubt about contributing to the rumor mill, remember that the person who is spreading it about a co-worker will also spread "information" about you if he or she thinks he knows something worthwhile.

You can avoid office gossip. When others complain or pass along a derogatory comment about a co-worker, change the subject. Consider another technique for dealing with negative comments: Recall a positive trait or memory of the person.

If you are consistent in your response to gossip, those who feed the grapevine will soon learn that you are an unwilling participant and resist passing additional gossip to you.

Ask permission before borrowing something. Remember, if you borrow a stapler, ruler or scissors, the person from whom you are borrowing uses it too. If you simply take an item, the owner will not know

what happened to it, and will waste time looking for it when he or she needs it. You may prevent that person from completing his or her work.

**Prompt return**

When you do borrow something, put it back where you found it. Make sure you return it to the owner. Do not loan the item to someone else. If another co-worker wants to borrow the item, return it first and let other co-workers borrow it from the owner. The owner can then keep track of his or her property.

Return borrowed items promptly. The owner should not have to ask you to

return the item, much less come to your work area only to find the item sitting on your desk because you had not bothered to return it.

Return all borrowed items. Borrowing something without returning it constitutes theft. If you fail to follow these basic rules of borrowing, the next time you ask to borrow, the answer may justifiably be "no."

These are only a few of the obvious manners that everyone should know. Observing them may not guarantee you the next promotion, but following them may give you a competitive edge over someone else.

□□□

Sue Jones is a principal in Bisset Communications, a communications management firm located in the Washington area. Contact her at (703) 503-4999.

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**Chuck Whitaker, PD**  
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ROOTS OF RADIO

# NBC Chimes Ring Through History

by Dick Stedler

**TONOWANDA, N.Y.** Bong! Bong! Bong! Sound familiar?

You don't need a keen musical memory, particularly if you were born in the late 1920s, to remember the National Broadcasting Company chimes.

The "bong, bong, bong" sounded routinely every 30 seconds before the hour and at each half-hour interval on the radio network.

Those three chimes, heard by millions of listeners and later familiar to TV viewers, were the traditional trademark of NBC from 1927 into the 1950s. Only on

rare occasions were they silenced. They never interrupted an address by the president or a member of the cabinet, nor did they interfere with a special event or program that ended with the national anthem or prayer.

Some listeners considered the early morning bongs to be jolly little fellows coaxing early rising sleepers out of dreamland to face the day with a smile. They also were music to shut-ins, busy housewives and puttering husbands during the daytime hours.

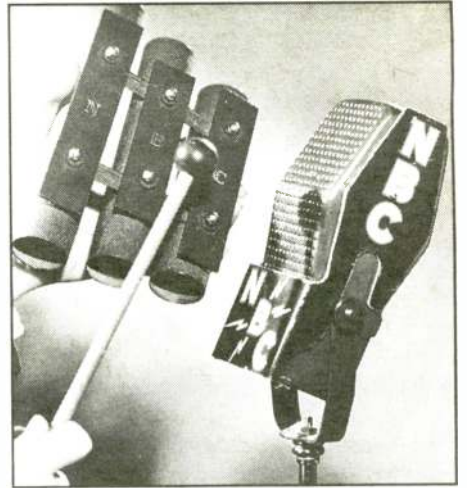
Late-night chimes seemed soft and sad, setting the mood for listeners with insomnia and other post-midnight traumas.

NBC network executives applied for and received from the United States Patent Office the first "purely audible trademark" in the country.

The official gazette of the patent office described the chimes as a "sequence of music chime-like notes which in the key of C sound the notes G, E, C — the G being the one just below middle C, thereby to identify the applicant's broadcasting (and telecasting) service."

Anonymous, however, is the genius who first set the NBC network a-bonging back in 1927.

Radio executives wanted a signal at the end of a program to awaken network



announcers who had dozed off. Announcers sometimes slept through station identification breaks because they were weary or bored.

Many commercials went unread, much to the satisfaction of listeners and regret of the respective sponsor.

Sound technicians experimented with numerous combinations, including "bing, bong, bing," "bong, bing, bong" and "bong, bong, bing."

### Manual chimes

Originally, announcers worked the chimes by hand, as shown in the photo. The quality of bonging varied with the announcer. New technology later eliminated the effects of carelessness or indifference. The announcer's toy was replaced by a push button for more consistent and pleasant chiming.

The treble-toned trademark still rings in radio history.

□□□

Dick Stedler is a former reporter and columnist with the Buffalo Evening News.

## 64 Years Ago

Reprinted from Radio World (October 1, 1932).

Editor's note: The RW of old, printed for a time in the 1920s and 1930s and today's RW are unrelated except in name.

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Workstation View Tools Help

LOCK :14 03:01 SW00 :1

BROWN EYED GIRL VAN MORRISON Non-stop :40 Kickoff

Queue [Time: 14:28] Artist

09:12	* Non-stop Music Kickoff *	00
	<CHW LOOK AT ME	BRIAN
	M104 FALL IN LOVE	KENNY
	SW05 Yng Cntry/Why U Listen?	
09:21	*** :20 Stopset ***	00
	T333 HILLER LITE	
	T490 PIZZAHUT	
	T004 COKE/DIET	
	1317 MCDONALD'S RESTAURANT	
	Dodge.dlr	
	U701 Voice Track	
09:26	*** 70's Flashback ***	
	J716 KHHT - Legal ID #1	
	J714 KHHT - U/M	
	<73F THE LION SLEEPS TONIGH	
	J960 KISS FM Jingle	
	<71H SOUL MAN	

70's music | Beads | FFF Bed | KFF Jingles | KFF Promos | KFF Legal ID's | People Effects

YC Jingles | YC Sweepers | YC Wind Sweeps | YC Lapovers | Shotgun Snaps | Yng Cray Beds | YC Promos

Edited Country | Unedited Country | Mac Jingles | Sound Effects | Music Beds | PHMT Jingles

Straight Tequila Night	Acoc's	Drive South	She's Not The Cheatin' Kind	Every Little Thing
Standing Outside The Fire	Ain't Goin' Down Till The Sun Comes Up	Callie's Baton Rouge	Much Too Young To Feel This Damn Old	One Night A Day
He Thinks He'll Keep Her	Shut Up And Kiss Me	She Dreams	What A Crying Shame	Girls With Guitars
What They're Talkin' About	Pickup Man	Liza Jane	Old Enough To Know Better	Look At Me Now

Audition

Cart Number: M104

Description: FALL IN LOVE

Length: 01:31:06 Intro: 00:15:00 Outro: 01:18:00

Hook Line

Start: 00:30:70 End: 00:34:56

00:00:00 00:22:76 00:45:52 01:08:28 01:31:06

Main Screen

Audition Window

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## NAB Salutes a Life of Service

by Alan Haber

**WASHINGTON** EFM Media Management Chairman and CEO Edward F. McLaughlin will receive the 1996 NAB National Radio Award at the 1996 NAB Radio Show in Los Angeles.

The award, which will be presented during the radio luncheon on Friday, October 11, recognizes McLaughlin's long career, 14 years of which (1972-1986) were spent as president of the ABC Radio Networks.

McLaughlin first came to ABC in 1964 as the general sales manager at KGO(AM) in San Francisco. While he was president of ABC Radio Networks, McLaughlin increased the number of radio networks to six from four (in 1982); additionally, ABC's special programming area's first long-form programs (Elvis: Memories and The Barbra Streisand Special) were produced during his tenure there.

McLaughlin's company, EFM, produces and distributes "The Rush Limbaugh Show," "The Rush Limbaugh Morning

Update," and "The Dr. Dean Edell Show." Limbaugh airs on about 640 radio stations.

### Delivery

San Francisco native McLaughlin has been involved in a good number of "big" accomplishments during his career, including moving to satellite delivery of programming while at ABC. Satellite, he said, "sort of gets overlooked now, because it's like the fax machine — nobody pays much attention to it because it's there."

Satellite, said McLaughlin, "really did change the face of broadcasting, particularly for syndicators and anybody in long form." He said that "If we hadn't had satellite, we couldn't have done what we've done in the past 10, 15 years."

Can satellite distribution of programming take away from the local aspect of radio?

"Stations should make their programming decisions based on what's right for (them) and what's right for their community," said McLaughlin.

McLaughlin said that he has always felt that "the whole issue between localism and nationalism was overblown. If a radio station has a local talent that's getting great ratings, that's who they should have. If there is a talent that isn't local that can get the station great ratings and big audience, that's who they should have. I think the role of the station is to satisfy the need of the listener and to attract as many listeners as they possibly can. Whatever gets that done is what should be done."

### Rush

Rush Limbaugh is one of the radio talkers getting the job done. McLaughlin plucked Limbaugh out of Sacramento, Calif., where he was doing a local talk show and deposited him within earshot of the nation.

"He proved in the first hour that I listened to him that my original concept was correct," said McLaughlin. "Things he was talking about were not local in nature. He was talking about national issues, world issues (and it was working in Sacramento. People were calling in, and the phone lines were jammed. He was just hitting their hot buttons."

Limbaugh is just one of the wide array of talkers hitting hot buttons across the country. What makes a good talk show host?



Edward F. McLaughlin

"Innate intelligence, a major curiosity bent," said McLaughlin. "You have to love people and have an interest in people and issues that deal with people. You must be compelling."

And, he added, a good talk show host should have "a major sense of showmanship."

Can talk radio be defined by any one host? "I don't think any one personality should be the criteria for all other personalities," said McLaughlin. "I think it's a mistake when the press writes about talk radio in a very generic sense and says, you know, 'Talk radio is hate radio.' It's obvious that they haven't done the research. They haven't done their homework, and, in most cases, they probably haven't listened to any of the program."

Can the popularity of a radio personality be maintained and then increased to ensure longevity?

"I don't know that you can ever insure longevity," said McLaughlin. "I think the talent is the one that makes that longevity happen. I think the thing you do is stay on top of it. Don't ever think for one moment that you've reached some sort of a plateau and that you can quit and rest on your laurels."

Looking ahead to radio's future, McLaughlin said he believes that technology will be a driving force.

"We like to take a lot of credit for doing a lot of wonderful things from a creative standpoint, but so much of this has come from technology," he said. "Unless somebody discovered how to record music, we wouldn't have had music radio. So, technology may be the thing that will change the creative process."

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## RTNDA Grabs a Surfboard

by Alan Haber

**WASHINGTON** A comprehensive program for registered attendees of the Radio and Television News Directors Association (RTNDA) International Conference, being held next month in Los Angeles, will provide hands-on training and demonstrations of all things Internet. Access to the program is included in the RTNDA '96 registration fee.

Produced by the Radio and Television News Directors Foundation (RTNDF) News in the Next Century Project, The Internet & On-Line News Lab will be held all four days of the RTNDA conference. Not only will the electronic journalists converging on Los Angeles be able to

hear about the benefits of cyberspace from working journalists and news directors, RTNDA conference registered attendees will be able to check out the 'Net with their own eyes and hands during the Lab's daily Open Surf Time.

One highlight of the four-day conference will come Wednesday, Oct. 9, with the pairing of the Lab and CNN TalkBack Live. The Lab — some sessions of which will be repeated over the four days — will act as a remote site for the cable television program from noon to 1 p.m., allowing people to actually be a part of the live discussion.

This will show "how this technology is starting to be used in actual news organizations," said RTNDF News in the Next

continued on page 57 ▶



# Radio Show: Full Internet Plate

*For Stations Jumping on Web, NAB Internet Sessions Will Cover Bootcamp, Basics and Beyond*

by Alan Haber

**WASHINGTON** Radio chefs whipping up Web site souffles for their stations will find the basic ingredients they need on the cyberspace menu of sessions being offered at the 1996 NAB Radio Show in Los Angeles.

From Internet 101 to the popular three-hour Internet Bootcamp, there's a full plate of Internet gumbo in store for stations making the trek to the west coast this October (see below). And, make no mistake about it, radio and the Internet are a spicy pair.

Rick Ducey, senior vice president of the National Association of Broadcasters' Research and Information Group, is excited about the possibilities that radio can achieve paired with the Internet.

"Radio has always found its own way to survive and then thrive with new technologies," he said. "I think that's what's going to happen with us and the Internet."

The Net, said Ducey, "is not something that can be successfully ignored." Radio stations can become part of the possibilities: "The payoff will be there," he said, "at least in terms of loyalty, and I think definitely in terms of revenue."

## Minimum presence

Ducey suggested that the Internet could end up helping radio stations to enhance their services for listeners and advertisers. At a minimum, he said, stations should have "sort of a business card presence. Have a page (on the Web).

"If you have a listener that's fooling around with the Internet and looks up your call letters, you probably want to be there. It's sort of electronic billboard advertising."

What's involved in putting up a Web site for a station? All the basics, from making the initial decision to stake a claim in cyberspace to maintaining a site, will be discussed at four down-and-dirty sessions and during the popular Internet Bootcamp at the NAB Radio Show.

Kicking off the cyber-lesson plan is the Ducey-led Internet 101 gathering on Wednesday, Oct. 9 from 2 p.m. to 3:15 p.m. Be sure to check on-site for times and locations for all Radio Show sessions and note that all moderators and panelists are subject to change.

Internet 101 will cover the basic terms and concepts involved with getting on the Net.

## Fresh and appealing

The Thursday, Oct. 10 Internet session, "Congratulations! You've Got a Web site. Now what?," will show radio pros how to keep a Web site fresh and appealing. Moderator Larry Miller, AT&T Solutions, will be joined by panelists Craig Clayton, Paxson Radio South Florida; Peggy Miles, Intervox Communications; and Dave Van Dyke, KCBS-FM, Los Angeles.

"Web Site Mania: Loyalty Builder or PD Time Waster?" is the Internet meeting place on Friday, Oct. 11 from 10:30-11:45 a.m.

Are the pioneering folks who have already mined cyberspace getting

measurable results? Moderator Tommy Edwards, KCBS-FM; Mark Cuban,

Radio Data Group, will tell all.

The Saturday Internet Bootcamp, which requires a separate seminar fee, seems like the perfect way to kick off the last day of the 1996 NAB Radio Show for cyber-minded station

personnel. Everything Internet wrapped up into one neat day-long package, this Bootcamp will present "a mix of what stations are doing now, exploring the fun ways they're using their sites to connect with their business objectives," said Ducey.

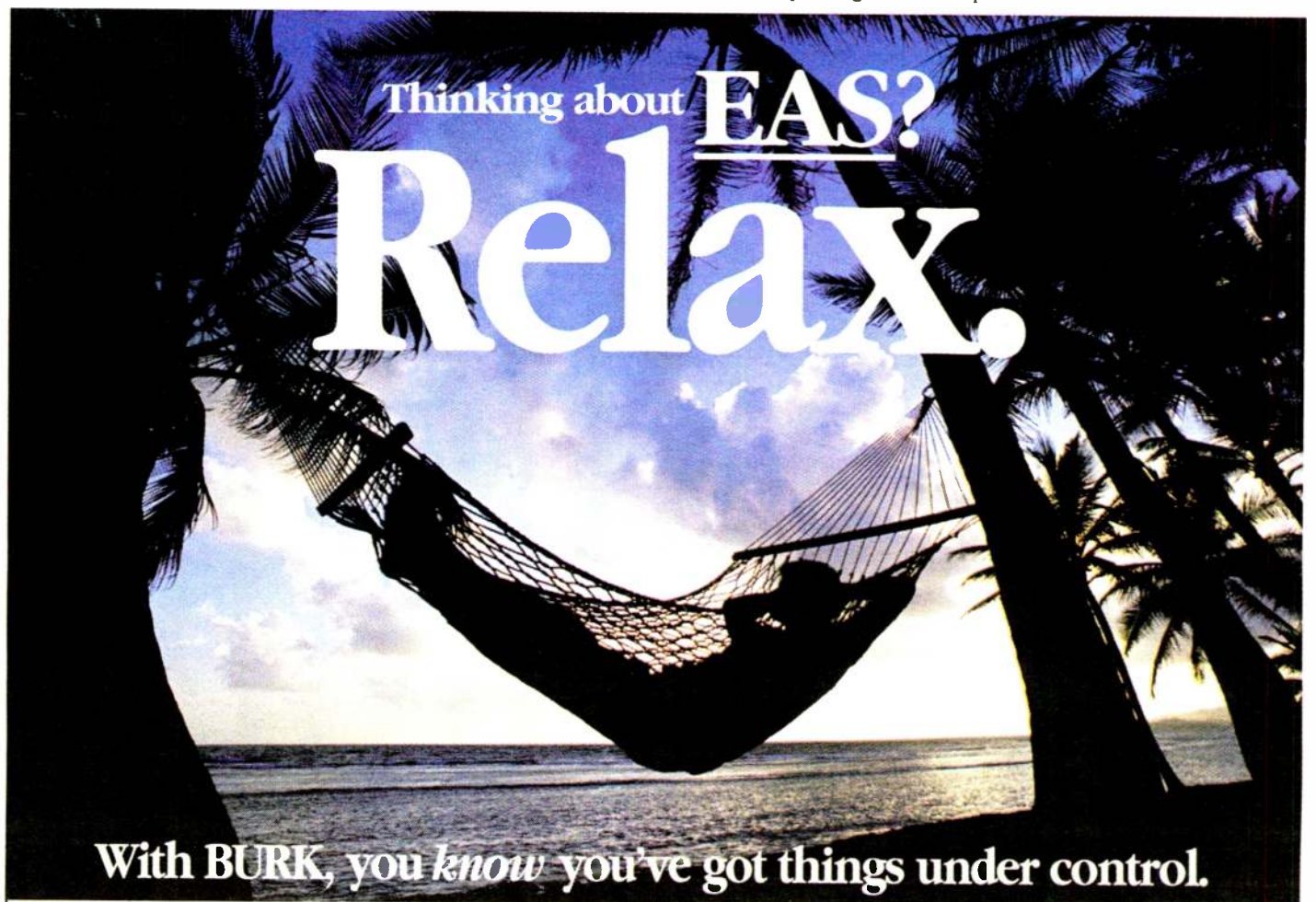
Everything from advertising to building listener loyalty will be discussed. Live radio station Web site demos will be offered, along with success and horror stories from stations that have already had Web adventures.

Another cyber-oriented session, "The Internet: Its Hidden Potential for Your Station," is part of the NAB Digital Radio Seminar: Creating the Future, which will be held on Thursday, Oct. 10, but a separate seminar fee is required. Presenter "Wild" Bill Goldsmith, KPIG(FM), Monterey, Calif. — a living, breathing Webmaster — will preside.

## Are the folks who mined cyberspace getting measurable results?

AudioNet; Howard Freedman, iRADIO - Interactive Radio and Michael Rau,

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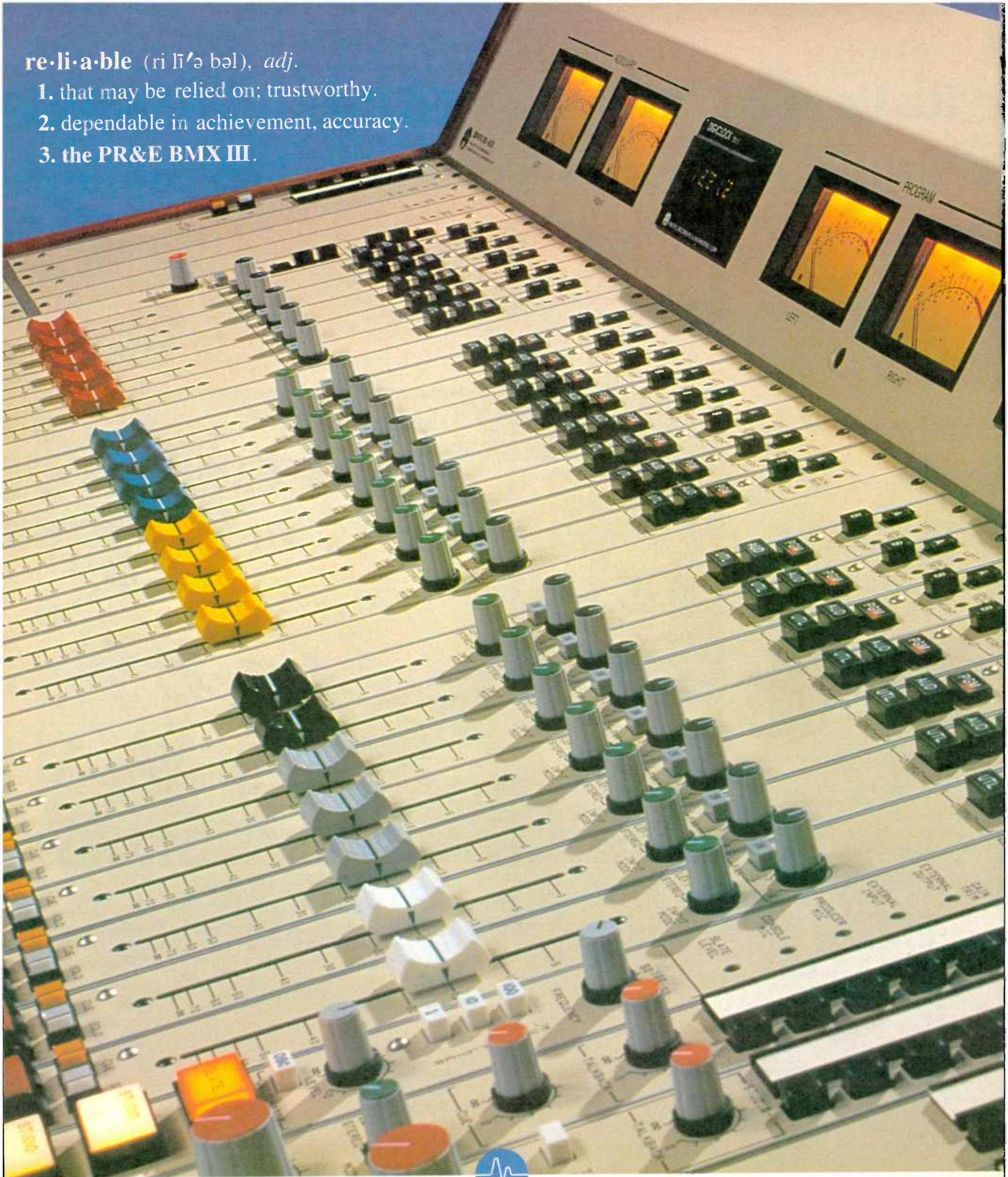
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World Radio History



re·li·a·ble (ri lī'ə bəl), *adj.*

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## Sessions Aid Small Market Radio

by Alan Haber

**WASHINGTON** Small market radio will be in the spotlight with a variety of targeted sessions at the upcoming NAB Radio Show in Los Angeles.

"We're trying to present sessions for small market broadcasters because we know that they have some unique challenges that the major markets and large markets don't have," said NAB Radio Senior Vice President John David. "By sheer numbers, there are more small market stations than there are major and large market stations," he added. "A big portion of our membership is who we're trying to serve, and they're in small markets."

One of the major circumstances under which small market broadcasters work, said David, is "they sell at rates that are usually a little bit smaller than the larger markets. They have to run stations. They have to be a little more cost conscious."

Additionally, said David, "They have to be very promotion-minded. They're selling against cable, which sometimes is selling below radio rates in those smaller markets. They don't sell with numbers. They don't have audience surveys, as in the larger markets, and many (small market broadcasters) do not have national business to supplement their local retail ad dollars."

## RTNDA Looks at the 'Net

► continued from page 54

Century Project Director Mark A. Thalhimier.

CNET Radio, available on the Internet, will be broadcasting live from the Lab on Thursday, Oct. 10, from noon to 3 p.m.

Other lab sessions being held during the conference include Introduction to the Internet which will be targeted to Net neophytes; Advanced Internet & On-Line Research Techniques, a survey of ways to make the resources of the 'Net work for newsrooms; and Building a Newsroom Web Site, that will take attendees through the Web site development process. Check on-site for additional sessions, times and locations.

Program participants include Jim Morris, CNN; Harvey Nagler, director of News Programming, WCBS(AM) in New York City; Rich Riemann, vice president, Radio Data Group; Andy Beers, executive producer, Daily News, Microsoft Network/MSNBC; and Eric Schoenfeld, senior coordinating producer, ESPN Net.

### A better idea

Journalists should come away from the Lab with a better idea of how they fit into the whole Internet pie.

Thalhimier believes the Internet is an important tool for journalists. However, he said that the 'Net is "also something that has been overhyped, so our objective here is to cut through the hype to show both the benefits and the weaknesses."

Broadcasters are continuing to mine the idea of an on-line presence with sites that often contain some type of news component. Thalhimier said he thinks "there's a very different look and feel and very different content on a Web site where the news department has

A number of NAB Radio Show sessions, all taking place in the Los Angeles Convention Center, will steer small market broadcasters in the right direction.

The small market focus kicks off on Wednesday, Oct. 9 from 2 p.m. to 3:15 p.m. with the \$wap \$hop Idea Swap. Check on-site to confirm all session times, locations and panelists.

### \$wap \$hop

Building on the value of the NAB's small market newsletter, "\$wap \$hop," this session promises to be a good venue for the exchange of innovative, money-making and money-saving ideas.

Session moderator Walt Wurfel from the NAB will be joined by panelists Gary Kidd, WMOK(AM)/WREZ(FM)/WZZL(FM), Metropolis, Ill.; Mike Martin, KFMI(FM)/KATA(AM), Eureka, Calif. and Mike Overton, Kommerstad Communications.

Set for Thursday, Oct. 10 from 11:45-12:45 p.m. is the session "Programming On a Tight Budget: Satellites and Automation." Here, attendees will find out how broadcasters are coming up smelling like roses armed with programming of the satellite and automated varieties.

Panelists Bill Evans, WQXE(FM), Elizabethtown, Ky.; Terry Gillingham,

significant say than (there is on) a Web site (which is) run entirely by the promotional department."

A lot of Web sites — not specifically those run by broadcasters — "are billboards," observed Thalhimier. "Once you see the billboard, you've sort of seen it — if there isn't a reason for somebody to come back to a Web site more than once, they won't."

News, he noted, "is a very special piece of content that tends to draw an audience over time. If it's done right, hopefully, we'll bring them back (to a site) again and again."

Thalhimier said he would not tell Lab attendees that they can find "significant revenue in the Internet quite yet," although he said he feels the 'Net "certainly is a technology they ought to keep their eye on."

In the same way that radio walked up on newspapers very quickly, and television then walked into radio's market and sort of shifted the mix around, this technology has the potential to be pretty significant for news delivery."

### New territory

The Internet is absolutely new territory for broadcasters. The question is, however, at what point will broadcasters be able to stop referring to the 'Net in that way?

"I think the question is whether or not news is a motivating content, or, as the software people say, 'Is it a killer app?'" said Thalhimier.

The Net will play two significant roles in disseminating news, said Thalhimier. "It will be more significant to the general audience and to specialized sections of that general audience," he suggested, "but it's also going to be very significant for journalists."

KMBY, Salinas, Calif.; Larry Graf, KDUZ(AM)/KKJR(FM), Hutchinson, Minn. and Steve Hanson, KLOG(AM)/KUKN(FM), Kelso, Wash., will emote under the guidance of moderator Martha Dudman, Dudman Communications.

Other sessions targeted to small market broadcasters include three Radio Advertising Bureau gatherings. "Surviving and Thriving In a Small Market" on Thursday, Oct. 10 from 9-10:15 a.m. will be moderated by Dean Sorenson, Sorenson Broadcasting, and will key attendees in on how to "make it" in small market radio.

"Up Against the Wal-Marts" will show

attendees how to break through to national and regional retailers for ad dollars and will be presented by the RAB's George Hyde on Thursday, Oct. 10 from 1-2:15 p.m.

"Event Marketing in Small Markets: How To" will focus, according to the NAB, on "new money, new business, new events." That session takes place on Saturday, Oct. 12 from 9-10:15 a.m.

### More sessions

More small market sessions abound: Attendees can find out about the right questions to ask before getting help from a consultant at the session entitled "Consultants: Good Advice Without The Price," moderated by Donna Halper, Halper & Associates. Panelists include Nick Anthony, Nick Anthony & Associates; Mark Kassof, Mark Kassof &

continued on page 58 ►

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# Small Market Radio

► continued from page 57

Associates and Ed Shane, Shane Media. That session takes place Friday, Oct. 11th from 9-10:15 a.m.

"Promotions! Promotions! Promotions!" puts the spotlight on promotions; ideas! ideas! ideas!, no doubt, will be flying fast and furious during this session held Oct. 11 from 10:30-11:45 a.m. It will be moderated by Bob Duchesne, WQCB, Brewer, Maine, and Jay Mitchell, Jay Mitchell Associates.

"Smaller Market Station Financing in the Age of Deregulation" will be moderated by William Fleming, William Fleming & Associates on Friday, Oct. 11 from 1:45-3:00 p.m. Panelists include

Dick Blackburn, Blackburn & Co.; Tom Buono, BIA Consulting; Linda Eckard, Roberts & Eckard, PC; Hank Kush, Summit Bank; Jim Leven, Pilot Communications, LLC; and Kathy Marien, Allied Capital Lending Corp. Here, attendees can find out about available sources of capital and the associated cost, structure and terms.

Small market broadcasters will also be able to benefit from the thoughts of country music singing sensation and small market broadcaster Dolly Parton, who will speak at the NAB Radio Luncheon on Friday Oct. 11 from noon-1:30 p.m.



John David

## NAB RADIO SHOW '96 HOSPITALITY SUITES

The suites listed below are accurate at the time of publication. For any last-minute changes, please check the NAB RADIO SHOW NEWS.

COMPANY	HOTEL
ABC Radio Networks	Biltmore
Americom Radio Brokers, Inc.	Biltmore
AT&T Capital Corporation	Wyndham
BIA Companies	Biltmore
Blackburn & Company, Inc.	Biltmore
Bob Harper & Company	Omni
Broadcast Marketing Group	Omni
Broadcast Programming/	
BP Consulting Group	Biltmore
Broadcast Asset Mgmt. Corp.	Biltmore
CBS Radio Networks	Biltmore
CEA, Inc.	Biltmore
Children's Broadcasting Corp.	Biltmore
Critical Mass Media	Omni
Direct Marketing Results	Omni
Fairwest Direct, Inc.	Omni
Film House	Biltmore
Fisher Wayland Cooper Leader & Zaragoza L.L.P.	Biltmore
Guerrilla Productions	Omni
Impact Target Marketing	Biltmore
Interop	Omni
IQ Television Group	Omni
Jones Satellite Networks	Biltmore
Kalil & Co., Inc.	Biltmore
KeyBank	Biltmore
KISS Radio of San Antonio, Ltd.	Omni
Let's Talk With Dick Cavett	Century Plaza
McVay Media, Inc.	Omni
Media Services Group, Inc.	Omni
Media Venture Partners	Biltmore
One-On-One Sports	Biltmore
Paragon Research	Biltmore
Pepper & Corazzini, L.L.P.	Biltmore
R.E. Meador & Associates	Biltmore
Ray Stanfield & Associates	Omni
Richard A. Foreman Associates, Inc.	Biltmore
Salem Radio Network	Biltmore
Shark-TV	Omni
Sony Worldwide Networks	Biltmore
The Benchmark Company	Biltmore
The CIT Group/Industrial Financing	Biltmore
The Crisler Company	Omni
The Exline Company	Biltmore
The Research Group	Omni
United Press International (UPI)	Omni
Vallie Richards Consulting, Inc.	Omni
Veronis, Suhler & Associates	Omni
Westwood One	Biltmore

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Drew Horowitz GM, WTMX/Chicago



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## EXHIBITOR LISTINGS — WME LOS ANGELES CONVENTION CENTER — OCT. 10-12

*The following is a list of companies that are scheduled to exhibit their products at World Media Expo. Product information was provided by the companies and was updated until press time. Subsequent changes may have occurred in booth numbers and/or product display information.*

**Americalist Broadcast Marketing 2466**

*Intro:* "Cash Mountain" promotion package for expanding station cume and increasing TSL by combining direct mail and other features; COREgister program for solidifying listener relationships. Listeners can win prizes by calling to register and speaking with our trained operators, who will develop a database of core listeners.

*Also:* Listen At Work telemarketing; Listen at Home telemarketing; COREcloning program; full service custom direct marketing programs.

**Ametron 2762**

*Intro:* Supplying Shure, Sennheiser, Sony, Beyer, AKG, Bogen, and Da-Lite products for sale, rent, service, and permanent installations for many needs, including sound recording, public address, video projection, infrared simultaneous interpretation (up to 32 channels), and surveillance.

*Also:* Supplier of many brands of products listed in the product category above.

**Andrew Corp. 446**

*Intro:* Dual HMD Antenna; ALPAC antenna and tower System; higher power HJ9HP HELIAX coaxial cable; 2.4M SNG antenna; type-approved earth station antennas; rectangular waveguides.

*Also:* Transmission equipment including antennas for UHF and VHF-TV, MMDS, LPTV, HDTV, STL/TSL and earth stations; transmission lines including HELIAX coaxial cables, circular waveguides, and rigid coaxial lines; ESA systems including antenna controllers and broadcast quality receivers.

**Apple A Day/Down and Dirty 867**

*Intro:* Apple A Day with Dr. Jim Applegate. Healthy-mercials for television and radio programming, daily segments with seasonal and local topics for 52 weeks; Down and Dirty Home and Garden Tips, segments for radio and television programming featuring weekly seasonal segments for eight weeks per quarter.

**Arrakis Systems Inc. 2635**

*Intro:* Digilink 4 digital workstation; SAS shared audio storage, digital audio library; Digilink 3 - Live.

*Also:* Digilink 3, satellite, CD, music on hard drive workstation; furniture, radios.

**ATI-Audio Technologies Inc. 2951**

*Intro:* NANOAMP Series BGD200 two channel VU or PPM Meters with phase indicator and headphone outputs, balanced analog or AES/EBU digital inputs; NANOAMP series L200 two channel line amplifier; NANOAMP series MXS100 stereo three-input mic/line

mixer; XPS100 four input mic/line stereo input expander; WPS200 two stereo line level input expander.

*Also:* Vanguard Series includes broadcast on-air consoles, six-, eight- and 12- mixer, dual channel stereo; NANOAMP series is portable, includes rack and desk mount mixers and mixer expanders, battery packs, mobile DC converters, IHF to PRO interfaces, 2 and 4 channel VU and PPM audio level indicators; ENCORE Series includes audio distribution amplifiers, precision phono preamplifiers; Match-Maker, Disc-Patcher includes precision IHF to PRO level and impedance converters; MICROAMP series includes microphone, line buffer, distribution, power and turntable amplifiers, headphone drivers, studio metering systems, system 10,000 modular rack system.

**Audioarts Engineering 2043**

*On Display:* Audio Broadcast Radior-60 on-air console; R-16 on-air console; MR-40 Production and backup on air; SDA 8400 audio distribution amplifier.

**Aztec SA 2859**

*Intro:* DIGIPLEXER FMX400, an RDS/RBDS and STEREO and DARC subcarrier generator, DSP based; DATA LINK DL10 transmission of data and relay commands through standard audio or MPX links; RXCAR 4 mobile RDS/RBDS data receiver.

*Also:* FMB10 and FMB40 RDS/RBDS encoders; DSX1 tuner; RDS Monitor; RXEXE - PC software, RDS/RBDS analysis.

Remy Levillain  
31 Rue Du Chemin de Fer  
Strasbourg, France, 67200  
Telephone: 33-03-88-30-9090

**Belar Electronics Laboratory Inc. 2465**

*Intro:* Model TVM-230 Digital BTSC TV stereo monitor. Main features: Uses the latest DSP technology for the most precise stereo demodulation and measurement available on the market. Only one-rack-unit high, with RS-232 port for remote operation.

*Also:* Complete line of accurate, fully-featured AM, FM and TV mod monitors and frequency monitors. Rebroadcast receivers, digital stereo decoders, and RDS/RBDS decoders/monitors will also be shown.

**Belden Wire & Cable Co. 319**

*Intro:* RGB Cable (3, 4, and 5 coax) installation does not require conduit; lowest loss RGB cable made by Belden makes it useful for long runs (in excess

of 500 ft), pre-timed within 5 nsec/100ft; Speaker cable (12, 14, 16, and 18 gauge) allows connection of speakers through drop ceilings or raised floors without the need for conduit; Super Flexible AudioFLEX Snake configured so that the overall size of the resultant snakes is the smallest 24 AWG super-flexible snake, 24 gauge braid-shielded flexible snake line that fits into the 56-pin Elco/Edac connector without removing the jacket; RG-59-sized flexible triax cable for high frequency performance for high-bandwidth cameras, and all employ our new jacket compound, Belflex; 1865A miniature precision digital video cable for truck and broadcast installations; PowerBrite short cords, available in hot pink, lime green, and yellow, and as short as one foot; Flexible 50 RF Cable for microwave designers and installers.

**Ben Freedman Productions 2942**

*Intro:* Radio ID jingle packages, includes free CD demos to select clients.

*Also:* Radio ID jingle packages, PAMS brand and other brands from the 1952-1995 era, jingles for all formats.

**BIA Companies 2053**

*Intro:* Version 2.0 of MasterAccess Analyzer and MasterAccess Contacts, the updated version of radio and television database software, features 500+ fields for each station, more power and

improved searching capabilities, more flexibility with fields that allow customization, more analytical capability, including built-in reports.

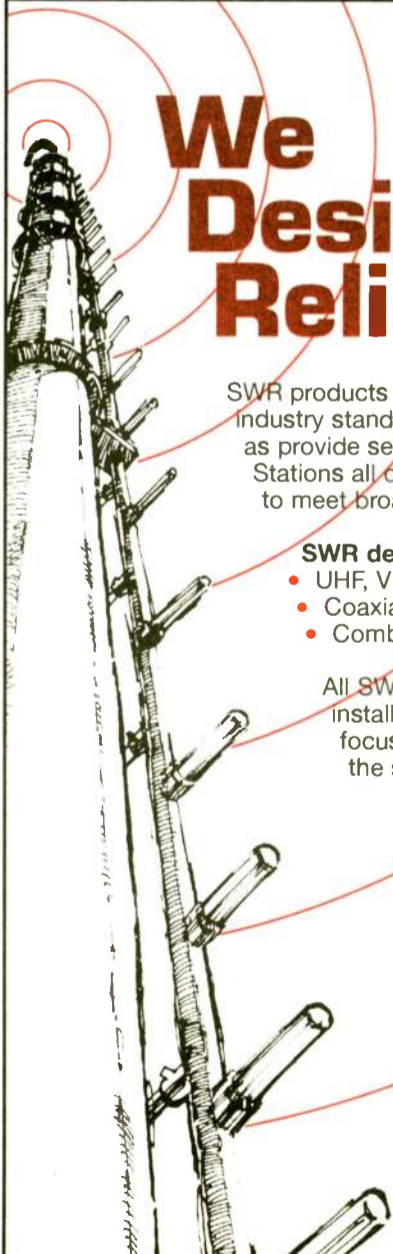
*Also:* Suppliers of several publications, including Investing in Radio/Television, Radio/Television Yearbooks, Radio Rankers, State of the Radio/Television Industry 1996, and The BIA Monitor; database software, especially MasterAccess Analyzer or MasterAccess Contacts; consulting services, such as appraisals, business plans, customized financial models, and strategic consulting; investment banking for broadcasting and telecommunications deals of \$5 million or more.

**British Information Services 2701**

*Intro:* Newsbreaks from Britain on the Internet allows Internet users to download the Radio Newsbreak service "live" on Britain in the United States; Radio Newlines sends live audio news feeds from press conferences or pool interviews given by top officials in the British government from London, or other cities during ministerial visits abroad, plus 35-second clips of newsworthy soundbites of British government reaction to breaking news stories; Radio Newsbreaks provides a toll-free number that allows callers' access to a maximum of eight one-minute reports from London.

*Also:* Supplier of broadcast links to

continued on page 61 ▶




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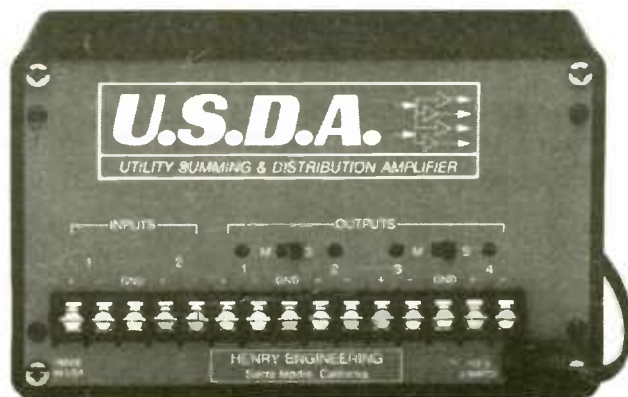
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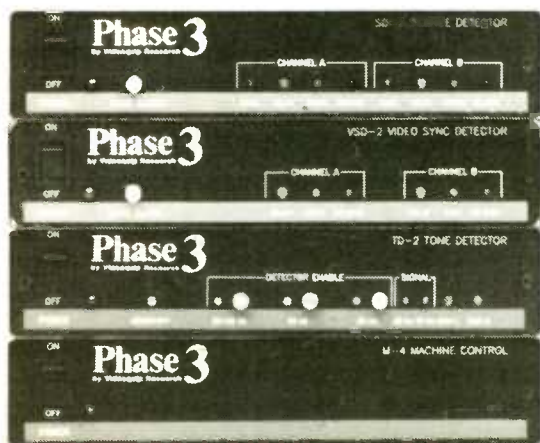
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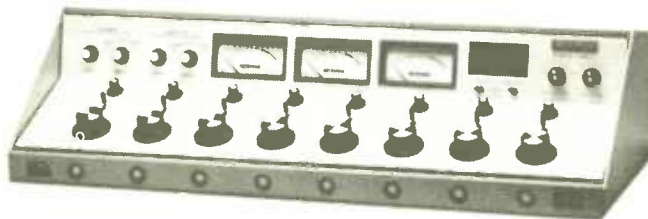
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## EXHIBITORS

► continued from page 59

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**Broadcasters General Store 2631**  
Intro: 360 Systems Shortcut standalone 1.5 hour phone editing system; HollyAnne HU-961 SAM (Safety Alert Monitor) featuring an EAS encoder/decoder.  
Also: 360 Systems Instant Replay.

**BSW 2153**  
Intro: 360 Systems Shortcut digital editing system.  
Also: TFT EAS911R; EAS Unit; DigiLink IV; Dialect Digital Systems; 360 Systems Instant Replay.

**Burk Technology 2265**  
Intro: EAS-related products  
Also: Transmitter remote control systems; stereo audio switcher.

**Circuit Research Labs 2234**  
Intro: DP-100 digital FM audio processing system and stereo generator using advanced 32-bit floating point processing.  
Also: Line of audio processing for AM, FM, SW, and TV; FM stereo and TV stereo generators; SCA and RBDS generator; dynafex noise reduction systems; Real Time event sequencers.

**Clark Wire & Cable 961**  
Intro: Hannay portable audio/video reels constructed of steel or steel/aluminum, black matte finish, removable side panels for customized connector patterns; Ultra-Flex Triax cable featuring abrasion resistant MINK jacket; Lemo Triaxial connectors are compatible with King's.  
Also: Clark remote composite cables; audio and precision video cables; Amphenol; ADC; Neutrik; Switchcraft; and Alcatel connectors; rack panels; and custom cable assemblies.

**Communication Graphics 2238**

**Communications Data Services 2053**  
Intro: RFCAD 2.0 uses rasterized USGS topographic maps, provides instant coordinate and elevation retrieval, and allows importation and manipulation of multiple map layers.  
Also: RFCAD 1.3; DEM data on CD-ROM; on-line remote access service; population data on CD-ROM.

**Computer Concepts Corp. 2321**  
Intro: Maestro integrates music, commercials and copy into station operations, provides for full automation; Newsroom, an integrated, computerized news system that works with text and audio encountered in a radio newsroom; V.T. (Visual Traffic), a Windows based, management oriented traffic system.  
Also: DCS; StudioFrame; Cartrack; Voicetracker.

**Comrex Corp. 2253**  
Intro: HotLine POTS codec combines

V.34 modem technology and low bit rate data reduction algorithm; Nexus ISDN codec delivers 15 kHz bidirectional low delay audio, with built-in ISDN interface and data port for computer hookup to the studio; Codec Buddy remote mixer handles program mix, headphone feeds, communications, studio return audio and PA feed, and includes a built in one-line frequency extender.  
Also: Frequency extenders; telephone couplers; wireless cue system.

**Continental Electronics Corp. 2039**  
On Display: Complete line of AM and FM transmitters; the totally digital 802D FM exciter and related RF equipment.

**Crown Broadcast/International 2702**  
Intro: FM receiver module is designed for installation into the Crown Broadcast integrated transmitters and includes stereo jack for monitoring while providing the installer with front panel sensitivity to help insure accurate receiver antenna positioning; FM2000 lightweight, small modular transmitter package incorporates power amp section allowing "hot" unplug and plug-in capacity.  
Also: FM30, FM100, FM250, FM500 integrated FM transmitter systems.

**Cutting Edge Technologies 2145**  
On Display: Unity AM and FM processing; dividend composite filter.

**Dalet Digital Media Systems 2444**

**Datacount Inc. 2244**  
Intro: DOS Darts (Data Accounts Receivable and Traffic System) for Windows is updated for Windows 95 and enables multitasking from single terminal while simultaneously capitalizing on Windows functionality.  
Also: Darts (Data Accounts Receivable and Traffic System); Darts EL (Entry Level); Salescall; Musicbox.

**Dataworld Inc. 2812**  
Intro: DATAxpert CD-based software, modular information sets.  
Also: Ethnic and demographic reporting via tabular and graphical (map) formats; on-line database provides instant access; Internet capability; ethnic/demographic shading overlays for any base map; allocation map books, coverage analysis, terrain digitizing, AM, FM, TV, LPTV and wireless databases, interference studies (24-hour remote access).  
Ed Hawkins,  
Vice President - Marketing  
P.O. Box 30730  
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**DG Systems 2523; 756**  
Intro: Advantage Digital Video Playback System (DVPS) allows TV stations to receive commercials via digital satellite; Advantage Audio Communication Server

(ACS), allows radio stations to receive, record, and send audio.

**Dielectric Communications 325**

**Digital Courier International 2235**  
Intro: Digital Courier International Rackmount Workstation, designed to fit most studio environments, will help expand coverage by DCI of radio stations in the United States; Capella Version 3.0, audio codec on PC card, enhances applications of ISO/MPEG Layer 2 codecs by adding full PC-based software control and disk access while transferring real-time audio between audio ports, hard disk, and V.35 port.  
8618 Commerce Court  
Burnaby, BC V5A 4N6  
Canada

**Digital DJ Inc. 2758**  
Intro: Digital DJ AM/FM Radio and Data Receiver, using FM subcarrier, sends 1,000 words per second to receiver allowing listeners to receive data while listening to the radio; Digital DJ PCM-CIA card receives FM Stereo and data transmitted on subcarrier using the Digital DJ system and allows the user to receive all types of custom information, including traffic, news, sports, stocks, weather, etc.

**Dorrrough Electronics 935**  
On Display: Audio loudness meters, Generation Two.

**DTN Weather Center 2839**  
On Display: DTN Weather Center.

**E-Z UP International Inc. 2164**  
On Display: Instant Shelters; Instant Monitor Stand; and accessories.

**Earth & Space Communications 2564**  
Intro: "Sports Health Today," two-and-a-half minute radio feature hosted by former NBA center Mark Eaton, topics include a range of fitness and sportsmedicine subjects.

**Econco 2939**  
On Display: Rebuilt power tubes for transmitters.

**Electric Village 2900**  
Intro: Syndicated on-line entertainment programming that links to and is accessed through radio station home pages on the World Wide Web, offering of seamless integration to station site, retaining each station logo as the user browses through the site, programming available in classic rock and new rock formats.

continued on next page ►



## DYNAMAX DIGITAL DESK

The new MX/D digital console  
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Fidelipac Corporation □ P.O. Box 808 □ Moorestown, NJ 08057 U.S.A.  
TEL 609-235-3900 □ FAX 609-235-7779

Circle (17) On Reader Service Card



## EXHIBITORS

**Electric Works Corp.**

2515

**ENCO Systems Inc.**

2559

*Intro:* DADpro Digital Audio Delivery System PC-based digital audio production and on-air delivery system, allows live assist or automated operation for any market size; DADSAT Satellite Based Store Forward is a management system.

Larry Lamoray,

VP - Sales/Marketing

24555 Hallwood Court

Farmington Hill, MI 48335

(810) 476-5711

**ERI - Electronics Research Inc.**

2511

*Intro:* CP-11 Series FM antenna, low power FM or translator antenna, non-pressurized to 1.5 kw input, (also pressurized version); Lightning Spur lightning dissipation system, stainless steel construction; K-ROD enhanced grounding system designed to reduce resistance, can replace up to 10 driven copper grounding rods; MAG-ROD prevents detrimental electrolytic and cathodic corrosion of tower anchor shafts and underground steel parts while also providing low impedance grounding system; Guy Guard non-corrosive guy wire grounding attachment and guy grip protection.

*Also:* FM and AM antennas, towers, filters and combiners; lightning protection and grounding systems; installation and construction services.

**Fidelipac Corp.**

2159

*Intro:* MX/D Digital on-air console, eight-channel with A+8 input switches.

features choice of analog or digital inputs, 20-bit A/D converter, 24-bit internal processing, digital inputs with SRC, accept both AES/EBU and SPDF format, outputs in both analog and digital at either 32K or 48K sample rate.

*Also:* DCR 1000 series digital cartridge machine; MX series consoles; CTR 100 and CTR 10 series tape cartridge machines; broadcast audio consoles; broadcast cartridges; bulk erasers; on-air lights.

**FirstCom Music**

424

*Intro:* The Production Edge: Edgier rock, torquier promos, hotter country. If other libraries are a skateboard, the Edge is a nitro-class dragster. Total Access-The Music Library: Just released from Techsonics! Over 1000 tracks loaded with eyeball dilating, earmagnet production music. The most comprehensive Techsonics library ever offered and it crackles with attention, recall and action results. Tech-X: Planetary and plenteous. Over 600 new production elements including variety of short MTV-like elements, buzz clips, X-static sounds and more. It's the definitive alternative/modern rock library.

*Also:* Sound Designer, Sound Designer II, Nashville-The Promo Library+.

Kim Jenkins, Mktg. Coordinator

13747 Montfort Dr., Suite 220

Dallas, TX 75240

(800) 858-8880

**Film House Inc.**

2029

*On Display:* Services include production of television marketing campaigns for

radio stations with a specialty in developing and producing TV campaigns custom designed for the objectives of each station.

**Gentner Communications**

Corp.

2615

*Intro:* GSC3000 transmitter remote control system, a networkable, expandable control system for both broadcast transmitters and other sites that can be used with Windows. *Also:* TS612 Multiline telephone system; TeleHybrid digital hybrid for digital phones; couplers and IFB products.

Marketing Director

1825 Research Way

Salt Lake City, UT 84119

(801) 975-7200

**Gepco International Inc.**

908, 2810

*On Display:* Wire and cable products including audio, video, LAN and fiber optic; custom products include cable assemblies, breakout boxes, direct boxes, patchbays, and panels.

**Harris Corp., Broadcast Div**

2111

*Intro:* Harris Z10CD 10kW solid-state FM transmitter with digital exciter features field-changeable AES/EBU interface, redundant and hot-pluggable RF amplifier modules, dual output settings, directional RF sample port and more; Harris S-15, a multi-function SNG truck built on a Chevrolet Suburban or GMC Yukon, features a digital, DVB-compliant SNG exciter and receiver, 1.2-meter Ku-band antenna made from carbon fiber.

*Also:* Sage Alerting ENDEC EAS System microprocessor and DSP-based encoder/decoder.

**Imtech Corp.**

247

*Intro:* NewsWall high resolution digital Imtech videowall system offering true broadcast quality on multiple video projection cubes under various configurations, features touchscreen interface.

**Inovonics Inc.**

2835

*Intro:* FM "Relay" receiver - Model 630 single-channel and tunable, features selectable bandwidth, composite and stereo outputs, remote control/alarms, and RF level and multipath readouts.

*Also:* "DAVID" FM Processor/Generator; FM Mod Monitor; FM Stereo Generators; AM/FM/TV Audio Processors; "TVU" On-Screen Audio Level Display.

Jim Wood, President/C.E.

1305 Fair Ave.

Santa Cruz, CA 95060

(408) 458-0552

**International Datacasting Corp.**

2713

*Intro:* SR253 DataNet PC Card utilizes the PC power supply and chassis,

compatible with DataNet Satellite Data Broadcast System, addressable and under full network control; SR263 FlexData PC Card, SCPC BPSK operation, 267 kbps aggregate data rate, data output at RS-422 levels at rates of 64, 128, 192 and 256 kbps; EchoCom Plus one-way data broadcast system, distributes any type of PC file, Windows 95 and 3.1 compatible, independent of broadcast channel type satellite, LAN, FM-SCA, RDS, cable.

*Also:* FlexRoute and MPEG Pro satellite digital audio systems; DataNet satellite data broadcast system; EchoCom Multimedia data broadcast software; RadioNet network management software.

**JAM Creative Productions Inc.**

2847

*Intro:* Jingle Packages are custom and syndicated ID jingles for stations of all formats. *Also:* Supplier of "qfx" and "The Answer for the '90s" production music CD libraries.

**JAMPRO Antennas Inc.**

2521

*On Display:* JMPC and JHPC FM side-mount antenna; JA/LS UHF slot antenna; JUHD UHF panel antenna; HAHD Arrowhead dipole panel antenna; JBCP FM sidemount antenna.

**JK Audio**

2304

*Intro:* RemoteMix 3 combination phone line hybrid mixer and universal handset interface featuring two mic inputs, tape in/out, two headphone jacks, VU meter, and an internal talkback microphone and speaker; Quick Tap IFB connector between the handset and base of the telephone.

*Also:* QuickTap; THAT-1 telephone handset audio tap; RemoteMix handset interface; RemoteMix C+ hybrid mixer; TAP-1 telephone audio and power interface; Pureformer isolation transformer.

**Johns Hopkins Medical Inst.**

2364

*On Display:* "Health Newsfeed," daily report on health and medicine.

**Killer Tracks**

2501

*On Display:* BMG Production Music, the "Scoring Library," includes music from Europe's top film composers, a base of 35 CDs, which will be added to annually, is available with the TuneBuilder self-editing system; Chronic Trax, a library of underground music and producers; Killer Tracks Production Music, a contemporary production music library featuring acoustic and electronic instrumentation designed on the basis of need, application, and result; Killer Classics 21-CD classic and opera collection, formed in association with Koch International.

Ben Trust, Director of Operations

6534 Sunset Blvd.

Hollywood, CA 90028

(213) 957-4455

**KD Kanopy Inc.**

2935

*Intro:* KD Majestic, with a 10x10

continued on page 65 ►

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System Two is a true Dual Domain analyzer. Other test instruments may have both analog and digital inputs and outputs ... but they're not true Dual Domain! They rely on performance-limiting converters to pass analog signals back and forth to a DSP core of digital-only hardware. Passing signals through a/d or d/a converters for every measurement robs the test instrument of performance. System Two includes

separate, independent hardware for direct audio measurements in both domains, plus additional and extensive interface measurement capability including jitter measurements, eye patterns and all other parameters described in AES3, the serial audio interface standard.

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Circle (21) On Reader Service Card

World Radio History



## EXHIBITORS

► continued from page 62

aluminum frame, weighs 48 lbs. and is 40 percent stronger than the steel unit; KD outdoor BannerPole with 15-foot banner that displays any message; indoor BannerPole is 10 feet.

Also: KD Original; KD Majestic 64, 100 and 200; KD StarShade 400, 550 and 800; Accessories: side panel, rail curtain, "service panel," graphic banner, graphic skirt, sand bags, rain gutter, customized graphics.

**Mag-Zon Inc. 2264**

*Intro:* Audio Magnetic film and tapes

Vanig Gaboudian, President  
16134 Wyandotte Street  
Van Nuys, CA 91406  
(818) 989-2059

**Marketron 2205**

*Intro:* Marketron/Great Plains invoicing and accounts receivable, customized software for broadcasting, combined with PC/Windows financial software, supports multistation operations; Marketron headquarters reporting software designed for corporate headquarters or regional offices information includes station performance, revenue vs. budget, station share vs. market, etc.

Also: PC Traffic; receivables; Firstrate management reporting; demand pricing; audience research and proposal.

**Media Touch 2305**

*Intro:* MediaDisk IV (play-to-air software) supports up to four audio cards, new production record screen, new copy and move features, new pick and play screen; OPLOG V.765 E (automation engine) features access to any element of a broadcast day, traditional sources (CDs, reel-to-reel, etc.) accessible through touchscreen.

**Modulation Sciences Inc. 959**

*Intro:* Model PRO-11, PROceiver-11 channel receiver for audio, with dual antenna diversity input, communications for vans, aircraft, any outside crew, CTCSS selective calling and main channel pushdown/talkover; Model PCS-II, Pro Sidekick, PRO channel generator eliminates cell phone charges by transmitting IFB onto aural carrier, contains limiting and audio processing circuitry.

Also: Composite clipper; StereoMaxx; FMMod monitors; RBDS encoders and receivers; SCA and Data SCA equipment; TV stereo generators; Stereo Reference decoders; TV Mod Monitor; SAP and PRO generators and the new PRO-II PRO Receiver.

**Moseley Associates Inc. 2400**

*Intro:* STARLINK 9003 TI all digital, modular system for transmitting CD-quality audio over EI/TI lines; STARLINK 9001SS provides CD-quality stereo remotes over distances up to 30 miles using spread spectrum technology.

Also: Supplier of PCL 6000 studio-transmitter links; DSP 6000 digital STL system; RPL 4000 remote pickup link;

MRC 2 remote control system; MRC 1620 remote control system.

**Music 1 Inc. 2802**

*Intro:* Music 1 music scheduler designed specifically for Windows

**MUSICAM USA 2329**

*Intro:* CDQPrima digital audio codec with updated Layer III; FieldFone pots codec for use on all analog telephone lines worldwide; StudioFone pots codec with IFB and in-band signaling, relay contact closures and factory direct software upgrades; ISDN FieldFone featuring 15 kHz audio on an ISDN "B" channel; portable ISDN codec with

multichannel mix capabilities, and memory presets.

**Nautel Maine Inc. 2600/2601**

*Intro:* Solid State AM/FM radio broadcast transmitters: FM series modular FM transmitters 4 kW, 7 kW, and 10 kW standalone, 20 kW watt; on-air serviceability; NE50 - 50 watt digital FM exciter with AES/EBU digital or analog input; XL series: modular AM transmitters 12 kW to 60 kW, AM stereo/monaural, on-air serviceability, dual exciters; ND series: low power, modular AM transmitters 1 kW to 5 kW: AM stereo/monaural; NA series: high power frequency agile medium wave AM transmitters 100 kW to 300 kW standalone.

on-air serviceability, dual exciters using Direct Digital Synthesis technology.

**News/Broadcast Network 419**

*On Display:* Producer and daily distributor of TV and radio news releases.

**Nokia Paging Inc. 2365**

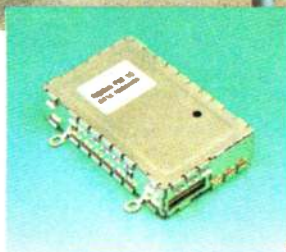
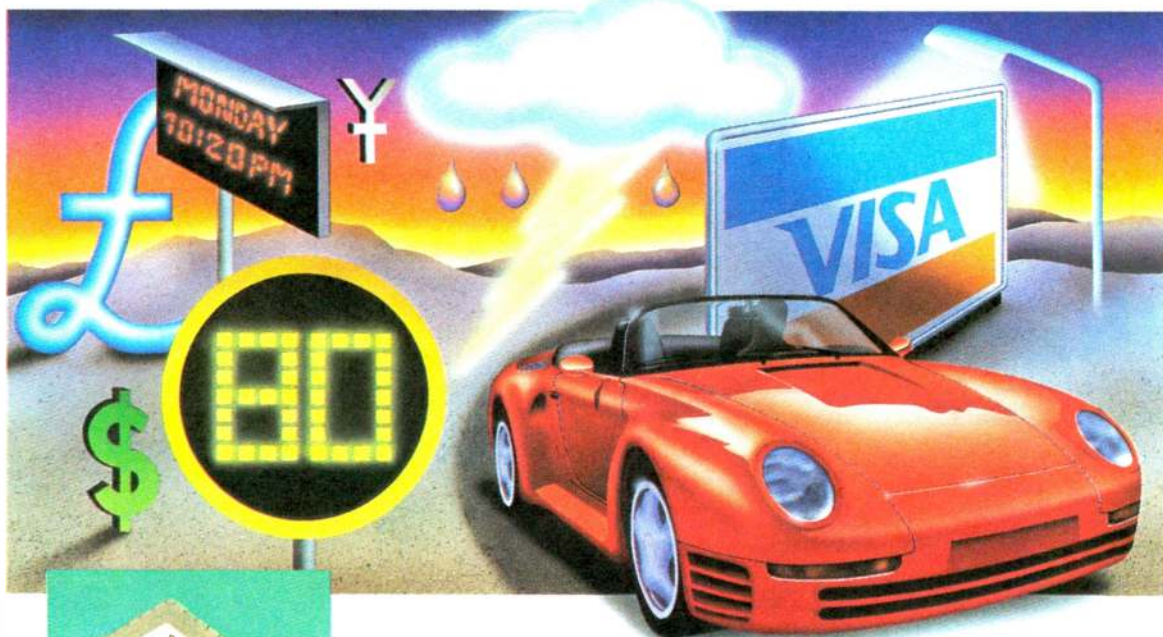
*On Display:* RDS and MBS FM pagers, both numeric and alphanumeric and FM data receivers

**Non-Stop Music 421**

*Intro:* Non-Stop Music Library contains new categories including film and stage, world music, jazz and blues, and techno

continued on next page ►

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With the new FM 10 RDS Data Receiver, Nokia opens the door for you to get the most from your existing FM radio network and telecommunications infrastructure. Utilising FM subcarrier technology the FM 10 helps provide fast and cost effective point to multi-point services on a local, regional or nationwide basis. For example the FM 10 enables you to update information displays and advertising billboards, change traffic signs and street lighting, immobilise stolen cars and much more besides. In fact, the variety of uses for the FM 10 is limited only by your Imagination.

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Florida 33773, USA  
Tel. +1-813-532 4241  
Fax +1-813-531 4847



## EXHIBITORS

dance, while updating existing categories including Sports Tracks, and Light Moods; CD audio demo of Non-Stop Music Library.

**NPR Satellite Services 2306**

*On Display:* C-band satellite space, SCPC transmission on Galaxy IV. Also provides uplinking services and Comstream digital equipment.

**Orban 2529**

*Intro:* Optimod-FM 2200 digital audio processor, brings optimod quality sound and features to smaller broadcast radio stations; DSE 7000FX - digital audio workstation featuring real-time 24-bit

internal effects, including four-band parametric EQ, optimod compression, and reverb by Lexicon.

*Also:* Optimod FM 8200 Digital; Optimod TV 8282 Digital; DSE 7000.

**Panasonic Broadcast/TV 919**

*Intro:* AJ-LT75 DVCPRO Laptop editing system featuring two full-featured DVCPRO VTRs, two-color 6.5 LCD monitors, stereo speakers in briefcase-sized package; AJ-D640 Professional DVCPRO Recorder/Player fulfills general record/playback requirements, offering two hours of recording and LTC/VITC time code recording/playback; AJ-D650 Professional DVCPRO editing VCR, digital component editing

VTR that features variety of interfaces, analog in/out, 9-pin serial (RS-422A) offers two hours of recording, search at 60X normal speed, PCM audio in four-rack unit.

*Also:* Digital VTRs including D-5, D-3 and DVCPPRO; digital cameras and camcorders; nonlinear editing systems; HDTV processor for HDTV playback; full line of station automation systems including M.A.R.C. and Cart; a range of digital and broadcast monitors.

**Potomac Instruments Inc. 2565**

*On Display:* Directional Antenna Monitors; Audio Measurement; MW, VHF, UHF, Field strength meters; Tower light monitor system, remote controls

**On Air Worldwide Media 124**

*Intro:* Callout. Main features: All-in-one software package for doing in-house research on music, comedy, commercials, etc., including hard disk recording and graphical output. Runs on Windows 95. PC-Hotclock. Main features: Graphical software package to make analog clock creating easy. Software able to import and export created clocks to music scheduling systems. Build Hot Clocks in a 3D graphic through easy drag and drop.

Bill Stoller, President  
20527 Archwood Street  
Winnetka, CA 91306  
(818) 887-6529

**Pristine Systems 2936**

*Intro:* Pristine Rapid Fire on-air digital broadcast playback system that includes live, graphical user interface.

*Also:* Pristine MMC; Pristine Music PLYS; Pristine Timewarp; Pristine Voicetraxx; Pristine Audio Commander.

Boyce Williams, President  
5841 Uplander Way, Suite A  
Culver City, CA 90250  
(310) 670-7800

**Prophet Systems Inc. 2345**

*Intro:* Call-In Show Interface allows show engineer or talent to run call-in show from any workstation on the network, or from modem, can be configured to connect to telephone interface and delay unit; Novell SFT III hot stand-by mirrored file server provides automatic and continuous operation, whether file server or hard drive is working or not; local backup allows control room computer to continue running up to four days worth of logs in the event the file server is unavailable.

**Radio and Television Commission 2761**

*On Display:* Radio Programs; Powerline, Country Crossroads, MasterControl, On Track, and The Baptist Hour.

**Radio Computing Services 2335**

*Intro:* Master Control, Windows version; Main features: digital air studio with PD-controllable access to selector. Allows split spot feeds, electronic copy book and satellite switching/recording. Live-assist or full automation. Talkback. Main features: Talk show management system for PDs, producers and screeners.

*Also:* Selector, Linker, Newlink, RCS Traffic, Songtrack, Pro-Rate, Tracker, Misichase  
2 Overhill Road #100  
Scarsdale NY 10583  
Telephone: (914)-723-8567

**Radio Data Group Inc. 2045**

*Intro:* AdNext Website Advertising  
continued on page 69 ▶

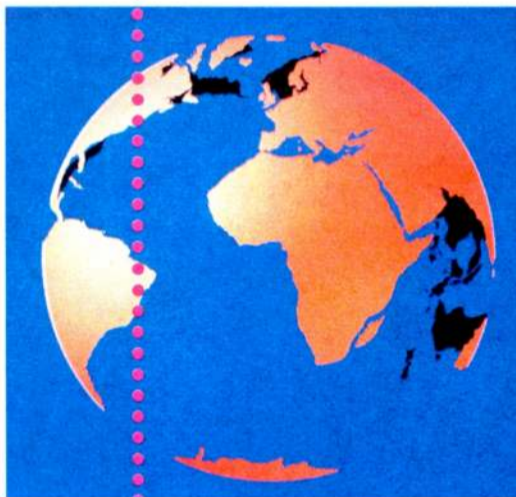
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- Sends bi-directional remote relay closures to another StudioFone
- Built-in IFB, which can be remotely located and controlled
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Internet: <http://www.musicamusa.com>  
Email: [fieldfone@musicamusa.com](mailto:fieldfone@musicamusa.com)

MUSICAM USA is the d/b/a of Corporate Computer Systems, Inc.



# CEMA: You Need to Look Ahead

► continued from page 15

and things like that around the country, and you will find that it is not how loud but the sound quality.

It all comes out to how good it sounds, and a CD changer is mandatory in that sound system. There is a whole culture that has evolved in society — which is growing very quickly — of people who want the top quality sound in their cars, and those are the people who are going to want digital radio.

Once digital radio is out here as a product, digital radio will be part of that installation. So there are two markets we're talking about before you get to your John Q. Public and that is the very attractive 18-35-year-old male and then the 40-year-old upscale consumer. Both markets will want digital radio.

**RW:** But what about the third market — the people who maybe aren't in that kind of a world where they know about upgrading and getting a higher quality audio system, the people with lower-priced cars who can't fit bigger speakers in them because the way that their car is made, the doors aren't deep enough?

**Shapiro:** A CD is almost standard on cars now. I remember going to an NAB radio show and debating with people five years ago and everyone told me that no one wants CD-quality sound in their car. We said "guys, you're ignoring something — we have this double-digit growth" and it has followed a trend since then. Everyone is getting CDs in their cars. People do want quality sound, and radio has become an inferior medium. That has to be addressed by the broadcasting industry.

**RW:** An inferior-sounding medium?

**Shapiro:** It is an inferior-sounding medium. It is an inescapable fact which many radio broadcasters want to avoid but you have to look five and 10 years out and say if this an inferior-sounding medium, how do we deal with it?

At EIA we saw this five years ago and I testified in Congress. But we did not embrace Eureka the way that broadcasters did. We did not say we embrace USADR. We said we want to find out what the technical facts are here.

We were very upset that the NAB, without hearing the technical record, embraced one proponent, just the way we are concerned again that the NAB appears to have embraced another proponent.

The facts are not in yet. Let's get the facts and then figure out what is best for the country. And despite concerted efforts by broadcasters, by NAB and by proponents to paint us as somehow being unfair or injudicious or not technically sound, we've done everything by a community process. We've done it the way we said we were going to do it, we've gotten input from everyone. The proponents bought off on the way we were going to do it, and every step along the way we've been attacked after the fact by unsatisfied proponents, but we have not wavered one iota.

The bottom-line answer is that people want quality, and this is a gradual evolution, and radio broadcasters have to understand and recognize they are losing market share.

DSS is the fastest-selling product in

consumer electronics history. People are listening to that rather than radio. That is a reality.

I love AM talk radio, but I often cannot listen to it because of the way it sounds. The reality is music listening has gone down and broadcasters have to address that.

**RW:** Broadcasters would be really worried if they didn't have something like DAB coming down the pike.

**Shapiro:** I would think so. I think the reality is that in virtually every business around the country, most people look at the next quarter results rather than the long term future, because there are fundamental changes that are occurring because of technology and are affecting everyone.

**Radio has now become the inferior listening media by far. So, digital radio is evolutionary.**

—Gary Shapiro

But when you get thinking CEOs in a room, what they will tell you is that they know that business is going to be different, they're just not sure how. What they assume often is that their industry association is thinking for them and that is what appears to be occurring in broadcasting now.

**RW:** Well, there's another thing occurring, and you even mentioned it, the Internet. The incidence of broadcasters doing their thing on the Internet and having their live 24-hour signal or programs grows more and more every week.

**Shapiro:** There are some copyright implications which have to be worked out and those are very serious.

**RW:** Right, right. But is there a danger of something like this catching on, which it obviously is fairly quickly, to the point where it could actually eclipse the need for something like DAB because people are going to be listening to their radio on the Internet right now?

**Shapiro:** There are three answers to that.

First of all, these changes are incremental, they are never revolutionary, they are evolutionary. With all the talk about the Internet, it is still a minority format that a minority of the population is using to get information. If you look at people even using it once a week, it's an extreme minority. If you look at people who use it every day, it's an extraordinary minority.

People are still going to be driving in their cars, and it is going to be very difficult to access the Internet. Maybe 20 years from now, but the Internet is still not the medium for cars.

The reason that digital radio will be important on the Internet is that — despite the fact I believe national radio service is important — I believe local radio is essential. It will always be essential. It performs an extraordinarily valuable service and will not go away, nor should it go away. As a matter of public policy we should encourage it.

What I see coming is the Internet and a computer where you can receive a local

radio signal and you can do it by broadcast or you can do it through the pipeline of the Internet. It will still be a local radio signal, and it will still be most economical to reduce a local radio signal in a broadcast way going to lots of people, commercial-supported. So I don't think the Internet threatens local radio. I don't think the Internet threatens the absolute predetermination that digital radio will come here. I think it is complementary to digital radio.

**RW:** Are all these things going to be able to swim in the same fish bowl?

**Shapiro:** Absolutely. I think the marketplace will sort it out.

**RW:** One of the things that I find very interesting in the DAB picture is TDMA.

*I was wondering what your opinion is on introducing TDMA into the picture? For example, it solves one of the big objections to Eureka-147 in this country. It allows the formation of channels and to maintain the traditional structure of the tiered broadcasting system that exists here now.*

**Shapiro:** To me, that is not a reason to do anything. That is like saying we really should make the cars go slower because those guys making all this money with horse-drawn buggies are a very valuable industry and we should protect it.

To say that we should protect AM or FM or the existing status quo is unacceptable from a public policy point of view. Essentially, as you are entering a new age of technology, while you can make a very good argument and I will make the argument that the existing broadcasters should be the ones to get the licenses, to protect the boundaries of those licenses or the inferiorities in them and preserve the caste system in broadcasting simply because it has been there is not a compelling argument for technology.

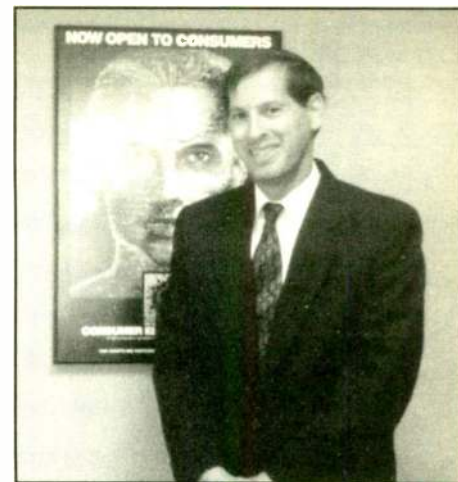
From a public policy point of view, it doesn't make sense.

**RW:** If a broadcaster spent all that money to get a 100 kilowatt station, he or she doesn't want the 25 kilowatt station coming up with the same quality. TDMA has stopped a lot of broadcasters in their tracks when I've asked them about it. Because all of a sudden one of the big objections they've had to Eureka-147 has been taken away.

**Shapiro:** It may be an acceptable political solution for broadcasters, but it does raise serious questions as to the DAB objectives — are they simply to satisfy political concerns of broadcasters?

**RW:** Will stations move quickly on DAB once a standard is selected? The way that some stations have been waiting on the lines for HDTV — like Channel 4 here in town.

**Shapiro:** Yeah, we are helping finance



Gary Shapiro

that. What we did, and it is possible we could do it with digital radio as well, is we have a great interest in making sure that broadcasters understand how we implement new technology.

We are funding 75 percent of that model station, several million dollars. We are putting up, as an industry, \$4.5 million to make sure broadcasters understand. And it is a partnership, a pure partnership.

Whether we do that with digital radio has not been a discussion, but I can assure you it is something we would consider. We want to work with the broadcasters as much as possible — once we get past these differences and reclaim our historical role of cooperation.

I have to say even with a cooperation partnership I think other than the proponent things, I think NAB has kept its portion of the deal as much as it politically can.

**RW:** I am always reading in articles where people say, "gee, you know, that is the next VCR," or "we haven't had a new VCR in 30 years," or something along those lines. Would you consider, just as maybe DBS or HDTV could be the next VCR on the video side, could you make a case for DSS being the next VCR on the audio side a little bit, or DAB as the next VCR on the audio side?

**Shapiro:** I don't think there is another VCR. The VCR profoundly changed the electronics industry and software production, and created some distribution network of video software stores and made wealthy people out of people like Blockbuster and the folks at Erol's. It profoundly changed how we view entertainment at home. That was a once-in-a-lifetime product — the only analogy is perhaps the home computer.

Digital radio will be a nice product, but it is just a natural evolution from the CD. What makes digital radio different is that radio used to be the superior fidelity in audio compared to what you could buy packaged.

In other words, if you bought a 33 1/3 RPM record, after a couple of plays, no matter how good your system was, it was hisses and scratches, and difficult to listen to.

But with radio, that wasn't the case. If you had a good clear signal and a good radio receiver, it was a better sound. Radio has now become the inferior listening media by far. So, digital radio is evolutionary.

**RW:** DAB to the rescue!

**Shapiro:** DAB to the rescue. If you were to ask the readership of RW, I don't think they would share that view. But I think if you asked outside observers to objectively look at it, I think it's an inescapable technical conclusion. ☺



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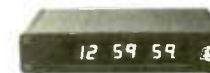
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► continued from page 66

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Also: Website Construction Software tools for the radio and TV marketplace; Animated logos; Web page updating tools, including home page text, events calendars, and scrolling text.

**Radio Netherlands 2666**

Intro: Satellite Programming, features, news and documentaries; Custom products include news and interviews customized. Also: Euroquest/Documentary CD.

**RE America Inc. 641**

Intro: MPEG - 2 Video Demonstration. Also: Broadcast and post-production video codecs for PDH and SDH/SONET networks; MPEG Layer II audio codecs and RDS/RBDS encoders.

**Register Data Systems 2135**

Intro: Traffic 32. Windows 95 or Windows NT-based Traffic and billing system designed for single or multiple station operation; the Replicator long-form network program record and delay, capable of up to three simultaneous recordings and on playback will record and play back both audio and GPI closures.

Also: The Phantom digital audio automation; Phantom Lite digital automation.

**Roland Corp. U.S. 2207**

Intro: VT-1 Voice Transformer raises or lowers human voice, produces reverb effects and robot voices; VS-880 Digital Studio Workstation with integrated hard disk recording, editing, digital mixing and effects processing workstation, integrates digital studio into one box, with internal 540MB hard drive or optional 1GB Jaz drive; PMA-5 Personal Music Assistant hand-held music composition device featuring 306 sampled instrument tones, 16 drum sets, MIDI compatibility, touch-pen interface, serial port, optional connection kit for linking to home computer.

Also: DM-800 Multitrack disk recorder; SN-700 noise/hum Eliminator.

**Roll-A-Sign/Div. Reef Industries 2730**

On Display: Roll-A-Sign promotional disposable plastic banners.

**Scott Studios Corp. 2421**

On Display: Hard disk digital audio; cart replacement.

**Shively Labs 2139**

On Display: Focus on broadcast antenna markets: FM, Low Power, UHF, MMDS and PCS; manufacturer of branched and balanced multistation combiners, transmission line, pressurization equipment, patch panels, filters and compressor dehydrators.

P.O.B. 389  
Evanston IL 60202  
Telephone: (207)647-3327

**SESAC 2948**

On Display: Music licenses (performance licenses).

**SMARTS Broadcast Systems 2726**

On Display: SMARTCASTER digital audio and automation.

**Solid Electronics Laboratories 2349**

On Display: SEL Modeo DCP-1 dynamic composite processor (FM composite limiter and low pass filter).

**SpaceCom Systems 2203**

On Display: FM Squared (digital and analog) SatVantage.

**Strata 2105**

Intro: Sales Pro provides customized presentation pieces which include station logo, feature point and click functionality, tools to show station top selling points, generates Audience Comp breakouts, uses qualitative and quantitative numbers within the same program to create powerful sales proposals. Also: View; Q-View; New Biz; Retail Dollars; SBMS.

**Tapscan Inc. 2429**

Intro: Tapconnect private and secure environment to send e-mail, data and orders. Also: Software solutions for research, media buying, marketing and presenta-

tion use in radio, television, agency and cable companies. Compatible with the data supplier of your choice.

**Tektronix Inc. 533**

Intro: Grass Valley Products Model 2200-2I integrates Krystal control within the Model 2200 control panel; Grass Valley Products 8900 series serial digital distribution amplifiers; Profile RAID storage system; Profile library system; Profile event management system; Profile ToolBox; Lightworks V.I.P. Also: Lightworks Newsworks, Grass Valley Products Krystal digital Effects System, Grass Valley Products Series 6000 Compact Signal Management System.

continued on next page ►



**250 Programmable 5-band Processor**

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EXHIBITORS

**Telex Communications Inc. 1040**  
*On Display:* Intercom systems; headsets; headphones; and wireless video/microphones.

**Telos Systems 2145**  
*Intro:* Zephyr Express combines audio codec, ISDN terminal adapter and audio mixing/monitoring system in a road-rugged chassis; Call Screen Manager Client Server is talk show management software for Windows.  
*Also:* Zephyr ISDN audio transceiver; range of talk-show/call-in equipment; intercom-to-telephone interface equipment.

**TFT Inc. 2535**  
*Intro:* EAS 911T encoder/decoder features two audio inputs, two RS-232 digital interfaces, audio output, digital voice recorder, printer and four-port COM expander with standard character generator protocol.  
*Also:* Model 850 BTSC TV stereo aural modulation monitor and test system; Model 850 BTSC TV SAP/PRO channel monitor and test system.

**The Media Audit 2411**  
*On Display:* Producer of syndicated, local market, multimedia and consumer behavior surveys covering 450 socioeconomic and consumer consumption measurements in 71 metro areas.

**The Church of Jesus Christ of Latter Day Saints 2302**  
*Intro:* "Family Times," designed for the entire family, presents solutions to the challenges facing today's families with 26 28:30-minute programs available on a barter basis; "Times and Seasons" Family Edition radio program, provides commentary on family-related topics and significant local issues with 14 28:30-minute programs available in both English and Spanish, and on DK and broadcast quality cassette.  
*Also:* PSAS, and Weekly Radio News Service.  
 Don Russell, Media Relations Manager  
 15 E. South Temple Street  
 Salt Lake City, UT 84150  
 (801) 240-4397

**The Omnia Group 2711**  
*Intro:* Omnia MX3 software based employee management system; the Omnia Department/Company Overview (DCO), an objective pre- and post-acquisition and succession planning tool.  
*Also:* The Omnia Profile 12-minute tool that helps in hiring.

**The Sports Network 2543**  
*On Display:* Provider of sports scores,

news and statistics via satellite transmission coast-to-coast.

**Thompson Creative 2627**  
*Intro:* Virtual Session, featuring ISDN capabilities, allows stations to hear their jingles in CD quality, as they are being recorded, without leaving the radio station.  
*Also:* Radio Jingle ID packages for domestic and international radio stations.

**TM Century Inc. 2405**  
*On Display:* Producer of Hit Discs, weekly CD updates with the latest releases for AC, Country, CHR, AOR, and Urban; Gold Discs, full CD libraries for all major formats; station ids, custom and syndicated ID jingles for all formats; production libraries, full service, format targeted, and promo-oriented CD collection; comedy network, cash or barter morning show services; Ultimate Digital Studio, digital control room system for live-assist or full walkaway; CoSTAR, all hard disk studio with full network and redundancy capabilities.

**U.S. Census Bureau 2610**  
*Intro:* PROFILE AMERICA, a weekly service to radio broadcasters highlighting the latest information about America (people, economy, agriculture, some trivia) Formerly known as the Census Radio Broadcast Service.  
 Maury Cagle, Executive Producer  
 Public Information Office, Room 2705-3  
 Washington, DC 20233-0900  
 (301) 457-2808

**U.S. Tape and Label Corp. 2843**  
*Intro:* Producer of bumper stickers, window labels, body badges, cassette labels, address labels.

**USA Radio Network 2853**  
*Intro:* Two new long-form programs:

"Daybreak USA," a five-hour morning magazine show, and "USA Radio Daily," a three-hour conservative talk show featuring Gary Nolan.  
*Also:* USA Radio News for the top of the hour, a news update at half past and sports at 45 minutes past the hour.


**V-Soft Communications 2301**  
*Intro:* ID Tower, ID Airport, and Census; Windows search programs with current data, accuracy, and flexibility, Interactive, Professional.  
*Also:* SearchFM, Plotpath (STLs), SearchTV, FMCont, InterDlg (DOS) Contour, Stafile, Optimized FCC technical databases, U.S. terrain data.

**Warner Electric/Superior Electric 2366**  
*Intro:* Stabiline UPS Model SL3000B is a 3 Kva line interactive, uninterruptible power supply for 120 volt, 60 Hz or 230 volt 50/60 Hz service.  
*Also:* Automatic voltage regulators, transient voltage suppressors/RFi filters, power conditioners, and uninterruptible power supplies.

**Wheatstone Corp. 2311**  
*On Display:* SP-4; SP-8; TV-600; A-300; A-500; A-6000; television and radio broadcast and production audio consoles; Wheatstone control room furniture.

**Who Did THAT MUSIC? Library/Groove Addicts 2205**  
*Intro:* WHO DID THAT MUSIC? Library collection of 20 CDs containing 400 themes, with additional six-to-eight updates per year; "Mindreaders," collection of three CDs of sweepers and stringers for radio, TV, and post production; jingle packages.

**Wolf Coach Inc. 259**  
*Intro:* Benchmark 2 (B-2), ENG van design, maximizes operator usability and comfort.  
*Also:* Full turnkey ENG Satellite uplinks; expanding side trailers for EFP; production vehicles, communications vehicles for special government agencies and DoD.



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# Designing RF Switching Systems

► continued from page 46

tions, and a fourth is used for Auto-Transfer alarm indication. Carrier control and Plate-Restart functions are via 24-28 V DC time relays. Other simple DC relays are used to feed back the status indications of each RF switch to the Control Ladder.

Other control relays matched to transmitter circuitry are used to interlock transmitter on and Plate On conditions to the control ladder. An ideal system employs three coaxial transfer switches, the third functioning to transfer to a fourth mode: Combiner Output to Test Load.

Such a system avoids micro-processors which sometimes react unfavorably to

high-intensity RF fields. Because the magnetically latched relays remain unchanged even during power failure.

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When automatic mode is in use and a transmitter fails, status relays will call for the other transmitter to come on line automatically, and remain in that config-

uration until changed manually. The transfer alarm will notify the operating personnel via remote control that they are on reduced power.

Simpler systems for Main/Alternate Main Transmitter Operation are similarly configured, with a means of selecting Transmitter I or II, with automatic transfer to the other transmitter. The system remains in this configuration until reset manually.

□ □ □  
*James F. Pinkham has been a control systems designer and consultant since 1960, associated with Multronics Inc., Mullaney Engineering Inc., and other manufacturers. Contact him at (518) 822-9425 or via e-mail at JimPink@aol.com*

# Hooters...

► continued from page 48

off in the Spring '96 Arbitron ratings. The show debuted with a 2.7 share of its target audience of men 18-34 years old and a 1.7 in the men 25-54 demographic.

What makes this show work? "We've all been friends for seven to 10 years, so when you get a chemistry going like that, you just take your coffee talk in the morning and put it on the airwaves," said Lee.

"Two different types of personalities. It's girls, number one, and it's kind of unusual to have just us girls sitting around talkin' about things we do," Austin said.

Droste said the men targeted by the show are interested in such talk. He said that, from the days of childhood slumber parties or sleep-overs, boys have wanted to know what girls were doing and talking about. The boys may be older now, he said, but they still want to know what women talk about and how to understand them better.

"Hooters On The Radio" is intended as a light-hearted alternative to the political conversation on most talk stations. The producers want to put the show on the edge, but not over the edge, with tasteful sex appeal and lots of tongue-in-cheek humor.

"When people want a break from the rigors of the day, they punch that show up and it gives them a chuckle," said Droste.

The women are active in promotions. According to Droste, they attract a crowd if they even hint that they may be visiting a club. A remote in Sarasota attracted more than 2,500 people to a Hooters restaurant. He says the women are also active in raising monies for charities whenever possible.

"Most DJs are not that visually exciting, but when these girls strut into a promotion they just glow," Droste says. "When you can take that visual aspect of the show, along with the wittiness and the synergies, it really turns into a decent package."

Syndication became a reality two months ago when "Hooters On The Radio" gained its first affiliate, news/talk WWCN(AM) in Ft. Myers/Naples.

Jere Sullivan, general manager of WBDN in Tampa and president of show producer Wingnuts Productions, has been instrumental in placing the show in other markets.

With restaurants located in markets across the country, Hooters management finds syndication attractive. Droste says restaurant franchisees in Miami, Dallas, Chicago and other markets have contacted him about getting the show in their markets.

He says plans are in the works for a major motion picture about the radio show, with what he called "a decent budget." Being in front of the camera would not be new to the show's hosts; both have modeled, and in the past Austin hosted a syndicated Hooters television show that reached 16 markets.

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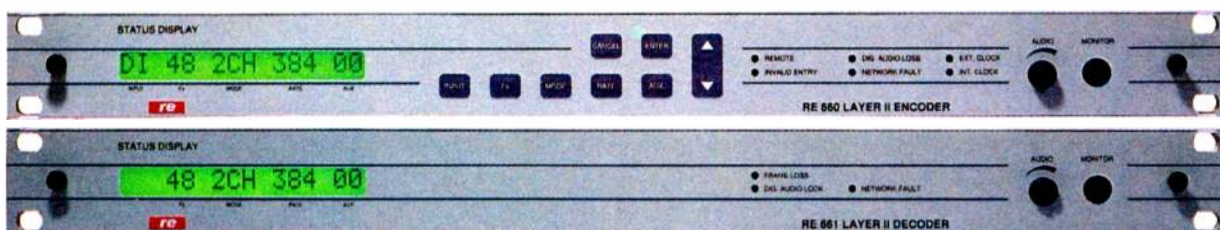


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# Engineering Forum Looks at Honor

by W.C. Alexander

**DALLAS** When an engineer accepts employment at a station, he or she usually is coming in behind another engineer who is departing. Often, the new engineer finds that he has inherited a multitude of problems that may include chronic maintenance troubles, undocumented wiring, "temporary" fixes that have become permanent, repairs made with chewing gum and baling wire, you name it.

The station manager, program director and staff have high expectations. They want the new engineer to fix all the problems left by the departing engineer, and to do so quickly.

Often, the previous engineer found it necessary to get by with less-desirable fixes and creative engineering solutions because he had no budget or support from station management or ownership. Perhaps things were tight, as they often are in today's economy. Perhaps the previous engineer was not adept at communicating his needs to management. He may have felt obliged to do what he had to, in order to get by.

Sadly, in other cases the departing engineer may have been the kind of employee who did not do any more work than necessary. Cleaning the mess may consume a lot of time and quite a bit of money. This schedule more than likely does not meet the expectations of management.

"So what's the holdup?" they ask. "When we hired you, it was with the understanding that you would get all these problems under control. Can you do the job or can't you?"

Now our engineer has to make a decision. How would you respond?

## A thread on ethics

The thread instinct is to blame the preceding engineer.

"We wouldn't be in this mess if Joe had done his job," the new employee wants to say. "You should see the rat's nest behind the console. I can't make heads or tails out of it! You should have dumped him years ago."

This response may be natural, and it may contain a good deal of truth. It may all be true. But what does our new engineer achieve? How would you respond in the reverse situation, if the newly hired engineer stood in your office and blamed his slow performance on his predecessor? Your opinion of the new engineer would probably go down a few notches. Perhaps your opinion of engineers in general would go down as well.

A number of engineers recently addressed this problem in a nationwide on-line forum.

"In the real world," writes Ken Hoehn of Teletech in Dearborn, Michigan, "a spot is never called a spade ... but it is often not politically correct to do so. Taking management for a walk, showing

them the problems, and pointing out that they could be due to a variety of reasons (budget or time constraints, or lack of expertise) would be the best way. Not all senior managers would take that tour or accept that kind of frankness, though."

Chip Morgan, rep. of CBME in Sacramento, California, replies, "That's right. That's what should be done. And a new engineer should tell the new station that time is needed to determine the condition of the facility and to come up with the first steps in their plan to make improvements. The feedback to the station depends on the reason the old engineers went away."

He continues, "But what of the newly hired engineer (or even program director) who comes into a station and attempts to discredit other employees by telling everyone that they don't know what they're doing? How does this make the new guy look? What can be done to teach people in our industry the harm they do to themselves and to their profession?"

Sid Schweiger, chief engineer of WXLO(FM) in Worcester, Massachusetts, offers this advice: "Do your job to the best of your ability ... which doesn't have to involve getting where you want to be by stepping on others. There's a name for people who do that ... and it isn't 'professional.'"

George Nicholas, an engineer from the Cedar Rapids area, says he tries never to question the work of the previous engineer, no matter how bad the

situation might be.

"Doesn't do much good to change the situation. The exception might be if something is extremely dangerous, such as exposed HV wiring, or some no-brainer. But for the most part, I always try to look ahead rather than behind. Most times where it's held together with baling wire, it's usually because management wouldn't come across with the money to do it right the first time."

Nicholas also "had the pleasure of following an engineer who I considered better than me. The first few weeks you're proving yourself to the staff."

## Preserving integrity

These offerings point out one thing: You gain little by badmouthing your predecessor, even if he truly was responsible for the mess. Honor in our profession lies in acknowledging the problem, devising an economical and efficient plan to deal with it and presenting that plan to management.

You may not have the budget to deal with the problem. Management may not want to hear about it. You may still find yourself stuck, unable to do much to fix the myriad of problems your predecessor left behind and that may earn your predecessor a degree of respect in your eyes. Yet by refusing to give in to the natural tendency to point the finger at the other guy, you will have preserved your own integrity and honor as well as that of your profession.

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*Cris Alexander is director of engineering for Crawford Broadcast in Dallas. Contact him at (214) 445-1713 or via e-mail at 76440.1670@compuserve.com*

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## SIGNAL - TO - NOISE

# CD-ROM Explores Classic Mics

by Frank Beacham

**NEW YORK** OK, so you know by checking the classifieds in the back of RW that the prices of pristine old RCA 44 BX and 77 DX ribbon microphones have gone out of sight. But are these classic microphones useful today, other than as nostalgic reminders of radio's "good old days"?

Better yet, which one has a "nasal, pinched quality" and is now of little practical use, and which is "particularly suited" for recording the trombone?

The answers — yes, opinions — are part of a unique CD-ROM called "Allen Sides' Microphone Cabinet," an interactive audio/visual exploration into one of the world's most extensive microphone collections.

For the first time outside a recording studio, here is a chance to actually hear and compare 66 classic microphones used to record 33 musical instruments.

Allen Sides is an accomplished recording engineer and owner of Ocean Way/Record One Recording Studios in Los Angeles.

He has recorded such artists as Ry Cooder, Count Basie, Ray Charles, Sinead O'Conner and Brian Setzer. He is also one of the world's most avid microphone collectors.

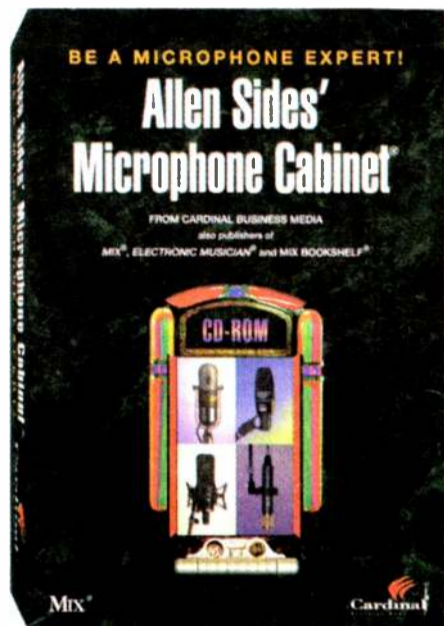
"There's never been a way for an individual to actually compare this many microphones used on this many instruments, especially some of the models that are more difficult to find," said Sides.

On the CD-ROM, Sides compares microphones from 21 manufacturers on a wide range of instruments, including six types of drums, five guitars, a Hammond B-3 organ and a wide variety of brass, woodwinds and strings.

The audio samples (played by session pros like drummer Hal Blaine and guitarist Elliot Easton) are to 16-bit Red Book audio specifications, meaning they

have the same quality as commercial CDs.

Users access the various mics from a "selector cabinet" of popular and vintage models for recording each instrument. The content includes color photographs and complete specifications for each mic, including frequency response diagrams



and polar patterns, a primer on microphone basics by author John Woram, and a directory of microphone manufacturers with a list of current models.

I liked Sides' tips on how to use each mic and his often sharp criticisms of various models.

Coming from radio and growing up with the vintage RCA ribbon mics, I was especially fascinated with his comments on these old gems.

In choosing between the 44 BX and 77 DX, Sides sees no comparison. The 44 BX wins easily, though he said the old broadcast workhorse generally lacks top end and presence.

On the 77 DX, Sides is brutal: "This is a great looking mic, but apart from the aesthetic appeal I can find little or no use for this mic.

"It has a nasal, pinched quality with no real high except for a slight unpleasant narrow band rise around 4K, and that's assuming it has a good ribbon. I quite often see it used as a trumpet mic and I'm at a loss as to why. The 44 BX is generally superior."

However, Sides' favorite vintage RCA ribbon mic is the MI 10001, which he said has a "unique quality" for vocals, room, horns and acoustic bass. For ribbons in current production, the Coles 4038 is Sides' mic of choice.

You can hear these mics in action yourself, and choose to agree or disagree with the opinions Sides offers.

For example, when evaluating a 44 BX on a trombone, I can, with the click of the mouse, switch to a Coles 4038, an AKG C-12, a Sony C-48 and any one of several Neumann microphones for a quick comparison.

You should hook the audio output of your computer to the best sound system you have.

Only with a decent monitoring setup can you really hear the subtle differences between these microphones.

"Allen Sides' Microphone Cabinet" is not only a real joy for microphone connoisseurs but also a valuable educational tool for anyone involved in recording and music production. This is a rare breed: a true plug 'n' play CD-ROM with compelling content.

List price for the CD-ROM is \$69.95. Buy it through pro audio dealers, or call (800) 233-9604 or (510) 653-3307.

□ □ □

Frank Beacham is a New York-based writer and producer. Visit his web site at: <http://www.beacham.com>. Mail: 163 Amsterdam Ave. #361, New York, NY 10023. E-mail: [frank@beacham.com](mailto:frank@beacham.com)

## 65 Years Ago

Reprinted from Radio World  
(October 3, 1931).

Editor's note: The RW of old, printed for a time in the 1920s and 1930s and today's RW are unrelated except in name.

## MARCONI TALK FROM ENGLAND IS HEARD HERE

Coincident with the opening of the public show in New York City, Senator Guglielmo Marconi spoke before a microphone of the British Broadcasting Company, in London, and his talk was carried by the WABC and WJZ chains. The Senator, an Italian, spoke with an English accent, for he has lived much of his life in England. He said in part:

"I am supposed to confine myself to an account of point-to-point wireless telegraphy, but broadcasting has become such an important factor in the daily life of nations that the practice of it depends on principles which are common to wireless telegraphy.

"The thing from which it may be truly said that wireless has sprung was the discovery made by Michael Faraday 100 years ago, that it was not necessary for two electrical circuits to be in actual physical contact in order that electrical energy might pass through the small space between them.

"The great need of the present day is for a better understanding between men and nations," said Senator Marconi. "This understanding can be fostered and helped by improvements in our communications. A most direct and satisfactory means of communication between men is the spoken word. In this respect broadcast telephony occupies a unique position as being the most potent means for the dissemination of instruction and entertainment that the world has ever known. I am happy if by any effort of mine I have been able to make some contribution toward international sympathy and understanding."

## Shakespeare Used Some Radio Lingo

Shakespeare, though he wrote three centuries before radio, said:

"Ah, stand by."—Anthony and Cleopatra.

"Take up some other station."—Coriolanus.

"His lecture will be done ere you have tuned."—Taming of the Shrew.

"And my dial goes not true."—All's Well That Ends Well.

"'Tis no matter how it be in tune, so it makes noise enough."—As You Like It.

"And those musicians that shall play to you hang in the air a thousand leagues from hence."—Henry IV.

## Data Compiled on Sets, Tubes and Trademarks

Radio Set Manufacturers 1931-1932 Specifications, with name and address of every important set producer, model numbers, list prices, current, cabinet data on size, weight, wood, frequency, tubes required, etc., has just been compiled by National Radio Trade Directory, 303 Fourth Ave., New York City.

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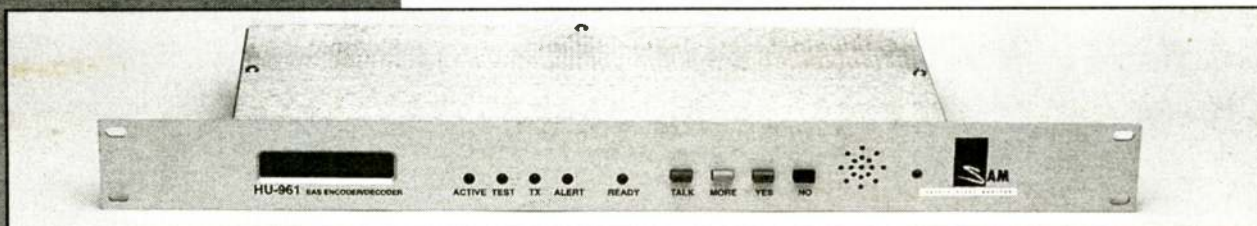
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## FEEDLINE

# Install Buried Copper with Care

by W.C. Alexander

## Part IV

**DALLAS** In the most recent installment of our series on AM transmission, we looked at ground system theory; the "whys" of all that buried copper. Today we look at the more practical aspects of ground systems.

### Installation

Ground radial installation usually requires the use of a specially adapted plow. Such implements have a spindle for the spool of wire, and a tube or conduit that conveys the wire from the spool to a point beneath the surface just behind the plow blade.

The end of each radial is secured to the copper strap or ring of copper tubing at the tower base, then the plow blade is lowered into the ground at a point 10 feet or less from the tower base. It is then pulled radially away from the tower to the desired radial endpoint previously established by survey and marked with a stake. When that point is reached, the plow is raised, the wire is cut and the wire end is pushed back into the furrow.

In this manner, the actual installation of a radial ground system can proceed rapidly. A typical crew can install a full 120-radial system for a single tower in about one day, assuming a clean site and that the surveying and marking of the radial endpoints is complete.

The engineer in charge of station construction and maintenance should observe the installation of the ground system. As we have previously established, the performance of an AM antenna system relates directly to the condition of the ground system. Mistakes made in the installation process will remain long after the installation crew leaves. The performance of the station will suffer as a result.

### Careful selection

Select a ground system installation crew carefully and not necessarily on the lowest bid. Choose a reputable contractor with good (and recent) references. Carefully review the amount of materials needed and keep track of the material as it is used in the installation. Copper wire, screen and strap are costly and can disappear quickly from a site. Spot check individual radials by digging into the furrow and locating the wire. Such spot checks have revealed empty furrows more than once.

At the tower base, the ends of the ground radials are terminated into a copper strap or piece of heavy copper tubing. One method is to build a square frame around the tower base pier out of wooden two-by-fours, then to lay a length of 4-inch copper strap over the wood. A galvanized roofing nail is then driven partially into the wood through the copper strap for each radial, and the end of the radial is wrapped around the nail.

Once all of the radials are plowed in, the radial ends are silver soldered to the copper strap and the nails are either removed or driven all the way in. The straps from the underside of the tower base insulator are also silver soldered to this strap.

Use silver solder, not tin/lead solder,

when making bonds in a ground system, or it will quickly deteriorate in the ground. The mechanical strength of tin/lead solder also is inferior to that of silver soldered joints.

### Silver solder

Another method calls for a piece of 1-inch diameter copper tubing shaped into a circle around the tower base pier with the two ends silver soldered together. The individual radial ends are wrapped one time each around the tubing and silver soldered into place.

If the installation uses short, interspersed radials close in, the ends of these radials are attached to the strap or tubing in the same manner. Where a copper screen is used, the individual pieces are laid out on top of the ground, cut to the proper size and shape and silver soldered together and to the strap or tubing. Cover the screen with large gravel to a depth of at least 2 inches to protect and secure it. Pea gravel works, but a typical copper-weld screen is likely to work itself up through small gravel eventually, and become exposed in places. Typically, large gravel is less expensive than pea gravel, making it a better choice.

Where radials intersect a transverse strap, cut them to length and bond them to the strap by silver soldering. Secure strap intersections mechanically and then silver solder them.

Many installations use a copper strap from every tower to every other tower and to the transmitter building ground system. It's not wrong, but it is unnecessary. The outer jacket of the transmission line feeding each tower serves well as a ground strap between the tower and transmitter building or phasor. You need not connect the tower bases with a strap, because the radials and the ground itself carry the ground currents adequately.

### Special circumstances

What happens when a special circumstance does not permit a "conventional" ground system installation? We can identify as many variations on the basic ground system scheme as there are engineers. Some solutions are quite creative.

Many AM transmitter sites are located in flood plains or flood-prone areas. In these cases, the transmitter building, tuning houses and tower base insulators are often elevated so that the highest predicted level of flood water will not reach the buildings or base insulators. In these circumstances, the buried radial ground system is still used, but the ground screen or interspersed short radials are mounted on a counterpoise at base insulator level.

A frame of some sort usually is constructed in a hexagon or octagon shape with a 20- to 25-foot radius, and the screen or short radials are installed from a strap or tubing ring below the base insulator to the edges of the counterpoise. The outer edges of the counterpoise are lined with copper strap, and the edges of the screen or the ends of the short radials are silver soldered to this strap. A copper strap is then run down each support leg of the counterpoise to ground level, where it is bonded to the buried ground system, which has been installed in a normal manner below the tower base pier or support pylon.

A set of ground straps (usually three or four) is run from the inner ring of the counterpoise down the tower support pylon to join the inner ring of the buried ground system. In the same manner, a number of large gauge wires (0 AWG or larger) should be run from the bottom side of the spark gap to the ground rod array around the base pier or pylon for lightning protection.

### Protection required

Note that if the counterpoise support frame is constructed of a conductive material, cathodic protection must be used to protect it. Cathodic protection is a method of inducing a negative DC current into a metal object that is in contact with the ground or another conductive object, thereby preventing corrosion.

In the case of a steel frame counterpoise without cathodic protection, corrosion of the frame will eventually occur, both below the ground and at the points where the copper ground material contacts the steel of the frame. If cathodic protection is used, consider insulated rather than bare copper wire for the buried portion of the ground system. Through bare wire, a substantial part of the cathodic protection current would flow in the copper ground radials rather than in the steel where it is needed, reducing the effectiveness of the cathodic protection.

If you think your situation may call for cathodic protection, retain an engineering firm that specializes in such systems. The variables and calculations of cathodic protection are well outside the realm of broadcast engineering.

In other installations, you may wish to extend a ground system across a creek, river or canal. Unless the waterway can be lined and capped, avoid stringing ground radials across the top. Plowing radials in through the bed of the waterway also is inadvisable. Flooding, dredging, erosion and the like can displace the radials and damage or destroy part of

your the ground system.

To cross a small waterway, try installing a strap, usually 4 inches in width, along and parallel to either side of the waterway. All the radials that intersect this strap should be trimmed to length and silver soldered to the strap in the same manner as with a transverse strap. On the side of the waterway opposite from the tower(s), the radials start at the parallel strap and continue to their full length. Then, in at least three evenly spaced locations, connect a large strap at least 6 inches wide across the waterway to each parallel strap. Bury this strap a safe depth beneath the waterway invert (usually at least 3 feet).

Because it is out of sight and difficult to observe in place, the ground system often is blamed for signal problems. Station

continued on page 79 ▶

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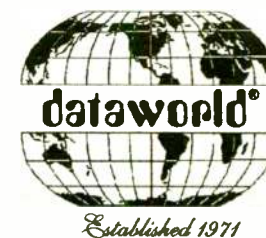
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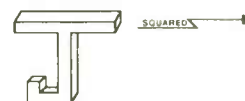
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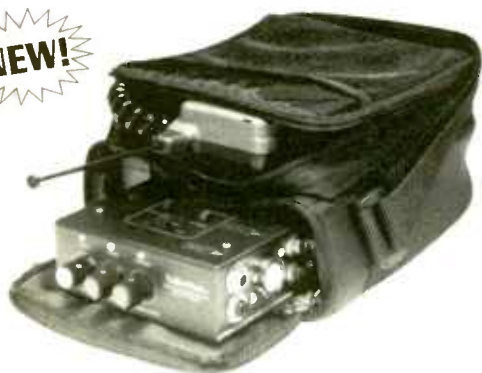
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POCKET PROTECTOR

# Utilize Psycho-acoustics Wisely

by Jim Somich

Part II

**BROADVIEW HEIGHTS, Ohio**

Last month I introduced you to psycho-acoustics, a term that refers to the psychological aspects of hearing, in contrast to the physiological transfer of impulses. An understanding of psycho-acoustical techniques can be invaluable when you are processing a broadcast station for maximum impact.

While your competitors across town are preoccupied with crunching their sound and restricting their dynamics, you can apply psycho-acoustical principles to create a soundfield that is cleaner, brighter and vastly easier to listen to. It can draw listeners to your station like a magnet.

**Back to basics**

Before we start, let's cover a few basic definitions that apply to psycho-acoustical hardware.

An exciter is a device that affects musically relevant frequencies, improving treble definition and adding presence. The resulting even-order harmonics fatten your sound and give your signal body.

An enhancer uses program-dependent boosting of high frequencies, together with program-dependent pulse-width enlargement of those same frequencies. Your signal gains in brightness and clarity with no signal coloration.

As program material passes through electronic circuitry, bass frequencies, with their longer wavelengths, are delayed progressively relative to the rest of the audio spectrum. Enhancers apply frequency-selective phase shift to restore bass definition and coherence.

A sub-harmonic generator produces musically relevant harmonics below those of the program material. Think of it as a downward enhancer, although technically the generation of lower harmonics is less straightforward than that of higher ones.

A spatial enhancer works by phase-shifting/delaying the components that make up your stereo audio signal. The processed signal blends with the original to produce a range of quite startling effects, from widening the perceived stereo image and improving the position of instruments within the stereo spectrum, to the creation of an illusion of three-dimensional space.

Used properly, all these tools can add intelligibility and definition to your program material. In most cases they affect a relatively small portion of the signal, yet we hear a large subjective effect. Why?

The human hearing system is much more sensitive to phase and frequency than to level changes. This ability to decode tiny phase and harmonic shifts enables us to appreciate fine musical detail, and to perceive real three-dimensional space. Thus, changes in phase and harmonic content greatly affect what we hear.

**Under the hood**

While psycho-acoustics is not a new science, broadcasters are just discovering its many applications. To better understand this field and strip away its aura of mystery, let's take a look at a modern psycho-acoustical processor and learn

what makes it tick.

The UltraFex II is a good processor to study because it contains, in one box, all of the functions described earlier, helping us to understand the broad application of psycho-acoustics to the audio signal. Figure 1 is a simplified block diagram of

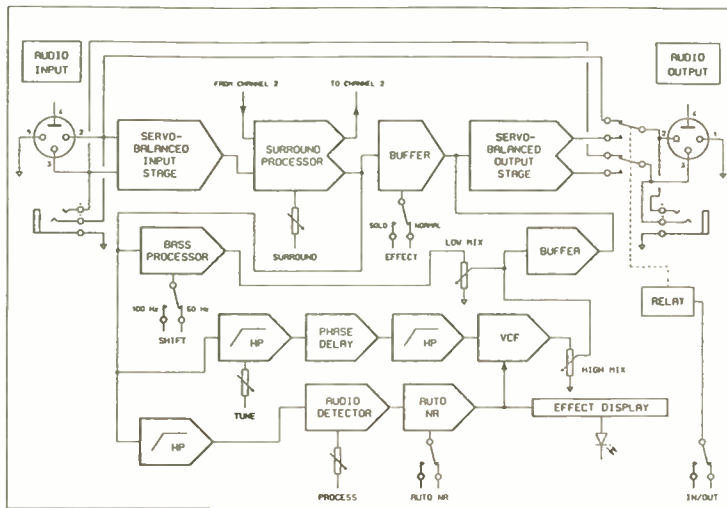


Figure 1: The UltraFex II

the UltraFex II.

First, the input signal passes through an electronically balanced input stage to be subsequently split up into four paths.

The first path is directly routed through the adjustable surround processor and a buffer amplifier to the output stage. If the UltraFex is operated in Solo mode, this bypass path is short-circuited and the original signal will be muted. In this case the pure effect signal is assigned to the outputs.

The output of the UltraFex features a servo-balanced output stage. Due to the servo function, we can also use unbalanced connections here, and the difference in level (6 dB) will be compensated for automatically.

The second path includes the bass processor circuitry. The cut-off frequency can be changed with the Shift switch. The amount of bass frequencies added is determined by the Low Mix control. The bass processor is a simple equalizer.

The third path contains the enhancer circuitry. First, the signal is fed through the Tune filter (1—8 kHz), with which the user can select the frequencies that are to be routed to the subsequent Natural Sonic Processor.

**Inside the NSP**

The high-pass filter cuts the low-frequency components before the signal reaches the VCF (Voltage Controlled Filter). With its program-dependent cut-off frequency, the voltage-controlled filter determines the bandwidth of the processed signal. At the same time, the amount of phase shift is determined by dynamically controlling the cut-off frequency. The subsequent High Mix control sets the amount of high frequencies to be added.

The fourth path provides program detection and VCF control. Within the preceding high-pass filter circuit, unwanted low-frequency signals are cut, and the filtered signal is sent to the Audio Detector, which allows for intelligent program detection by analyzing the frequency and energy of the input signals. The circuit is adjusted to the input level by means of the Process control and the corresponding Effect meter. The rectified control voltage from the Audio Detector is then routed to the control input of the VCF and deter-

mines the VCF cut-off frequency and thus the amount of noise reduction.

In conclusion, the path from microphone to loudspeaker is a long one, losing a little quality at every step. The total signal chain can contain literally hundreds of amplifiers, equalizers, switches and transducers. Delicate harmonics are

acoustic processing can restore harmonics and dynamics while clarifying low frequencies through time alignment. The net result is increased perceived loudness as well as a definite improvement in subjective audio quality.

We have gone about as far as we can with compression, limiting and clipping. Level dynamics is only a single component of comprehensive signal processing. The next step is to apply the science of psycho-acoustics to a properly level-processed signal. The results can be startling. Instruments stand out on the dial and presence improves dramatically, improving your station sound.

Don't drive away your audience with a tight, over-processed sound. The '70s and '80s are over. Let's re-establish "broadcast-quality" as a meaningful term. Satellite broadcasting is an immediate concern. Terrestrial Digital Broadcasting will come about eventually. The overwhelming success of the compact disc is evidence that the listening public wants a higher-quality medium.

Audio processing is indispensable in creating a great sound for your station. In excess, it can create the opposite effect. The best-sounding stations have a well-balanced, dynamic, easy-to-listen-to sound that is the product of the intelligent application of compression, limiting, clipping and psycho-acoustic processing.

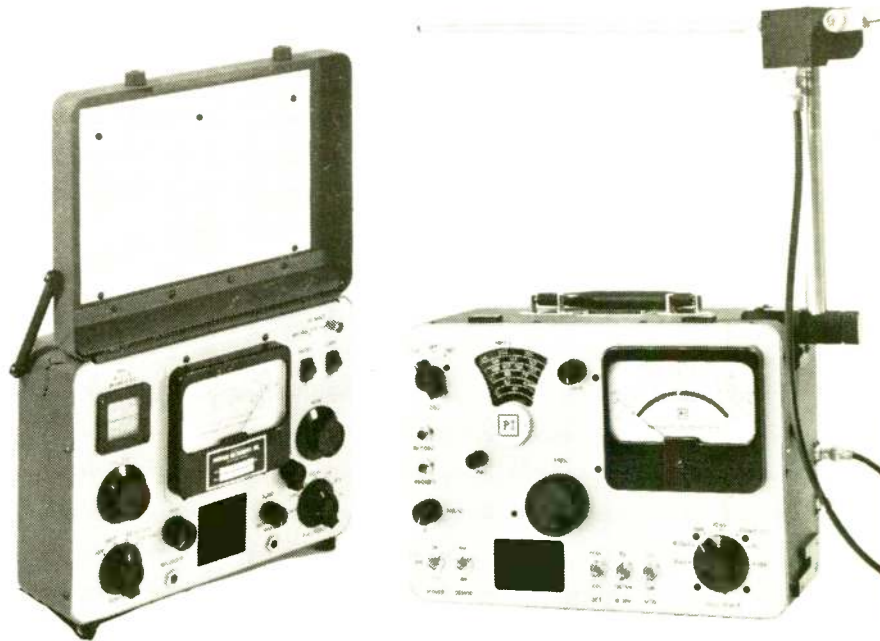
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*Jim Somich is a radio broadcast engineering consultant and president of MicroCon Systems Ltd., a manufacturer of broadcast equipment. His e-mail address is jimsomich@aol.com*

the first to go, then the accumulated phase shifts begin to affect the time alignment between frequencies, causing low-frequency smearing. We can understand why the output — your signal — seldom resembles the input that entered the microphones.

The intelligent application of psycho-

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# Wiring with Digital in Mind

by Stephen H. Lampen  
Belden Wire and Cable

**RICHMOND, Ind.** Are you designing a new audio or video installation, or re-wiring an old one? You have a problem: technology! The "digital tomorrow" that seemed a long way off is already here.

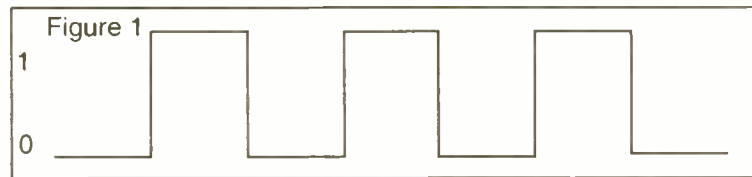
Your new studio design raises some questions: How much of it will be analog? How much of it will be digital? Are you going to ship analog signals from digital box to digital box? Why not ship digital? Can you use analog cable for analog now and digital tomorrow? Can digital cable be used for analog too?

First question: Can you use your existing analog cable for digital? The answer is: yes ... but!

The AES/EBU digital audio standard is an impedance of 110 ohms,  $\pm 20$  percent. That 20 percent means any impedance

understand digital signals.

Digital signals are composed of digits, ones and zeros, as shown in Figure 1. If we run this signal through a pure resistance, it is attenuated, and might look like Figure 2.

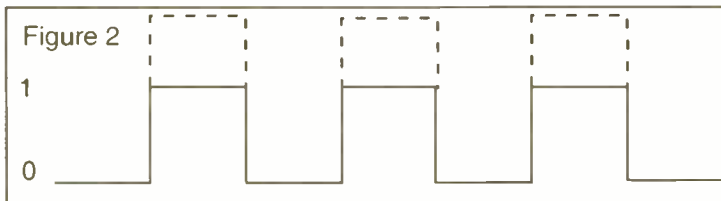


from 88 ohm to 132 ohm will work. Standard analog cable, like Belden's 8451, is around 42 ohm. At analog frequencies below 20 kHz, the wavelength of the signal is so long that the impedance of the cable is meaningless. But at digital audio bandwidths of 3 MHz and a data rate of 3 Mbps for single channel and 6 MHz/6 Mbps for dual channel, it's a different world.

When you run a 6 MHz signal intended for 110 ohm cable through a 42 ohm cable, you get standing waves, or what

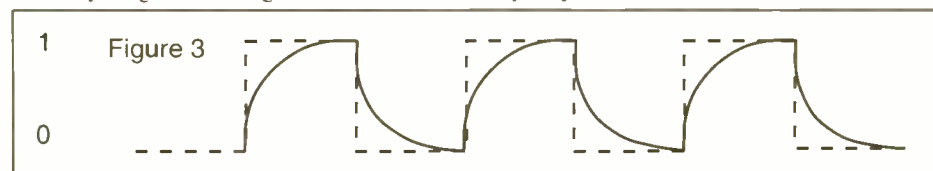
and one) must be as instantaneous as possible.

An instantaneous rise means an infinitely high frequency. In the real world, the rise-time is not instantaneous and not infinitely high frequency. However,



it is high enough to be important.

Resistance is linear over frequency. A pure resistance treats all frequencies equally and therefore has no effect on



cable people call "structural return loss." High SRL reflects the signal back to the source.

If the line is really long or the cable is particularly bad, you may get nothing at the other end.

So what is good or bad cable? If the catalog does not tell you the impedance, how can you tell? Two other specifications will help you: resistance and capacitance. But to understand what constitutes "good" and "bad," you must

rise or fall, just attenuation. However, a wire is really an R-C network with both resistance and capacitance values. Capacitance in analog audio affects higher frequencies more than lower frequencies. The rise time of a digital signal is a very high frequency. Capacitance will store energy during the rise time and discharge during the fall, turning the ones-and-zeros into a signal like that shown in Figure 3.

As if capacitance isn't trouble enough,

resistance changes the rate at which the capacitance charges and discharges, lengthening the charge-discharge cycle time, also called the "time constant." To reduce the R-C time constant, you must reduce the value of either R or C.

To reduce the capacitance in a cable, you can (1) add more plastic, spreading the wires farther apart, (2) keep the same dimensions but change to a plastic with lower dielectric constant (and, therefore, lower capacitance), or (3) foam the plastic (bubbles of air will reduce the capacitance). More plastic will increase the cost slightly but will make the cable bigger and stiffer.

Using a plastic with better dielectric constant will keep the wire small, but will add cost.

Foaming the plastic requires that the plastic must lend itself to being foamed, as polyethylene does.

This increases the cost and allows the wire to migrate within the jacket and vary in impedance, increasing the SRL.

To reduce the resistance, you must use a better conductor, or use the same conductor but make the wire larger. If you choose to use a better conductor, usually silver, the wire is much more expensive and difficult to use.

If, instead, you make the copper wire larger, you must also add more plastic just to stay at the same capacitance.

The resultant wire is bigger, stiffer and harder to handle. In other words, changing the wire gauge is a triple-whammy as wire, plastic and the entire construction get larger.

The most cost-effective way to reduce the R-C time constant is to add more plastic. Thus we find that most digital audio cables are larger than analog and yet contain smaller conductors.

They also are much more expensive, perhaps two or three times as much as analog cable.

In the previous graph of ones-and-zeros, notice that there is no longer an instantaneous transition from zero-to-one or one-to-zero.

This difference between the desired and actual positions of the rise and fall is called "jitter" and is a major factor affecting all digital systems.

The effect of capacitance can obscure these transitions so that we cannot tell where they are. The receiving device then cannot read the signal.

Remember this rule of thumb in digital cabling: the less capacitance, the better. The same rule applies to analog audio as well.

## How far can you run?

Figures 4-6 show the difference between a popular Belden analog cable at 34 picoFarads per foot and a digital audio cable at 13 picoFarads per foot.

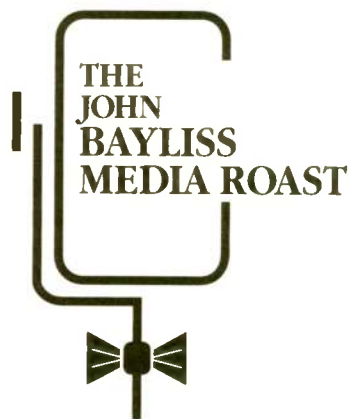
For cables with even higher capacitance, including some popular brands on the market rated at 55 pF/ft, the distances are even less, reducing its suitability for even short runs of digital. In other words, if you use analog cables for digital runs, limit them to very short distances.

Second question: Can you use digital cable for analog audio? Answer: yes ... but!

AES/EBU digital cables normally use a twisted-pair with an overall shield. The twisted pair must have an impedance of 110 ohms  $\pm 20$  percent, and as low a capacitance as can reasonably be constructed. Top-of-the-line AES/EBU cables are rated at about 13 pF/ft.

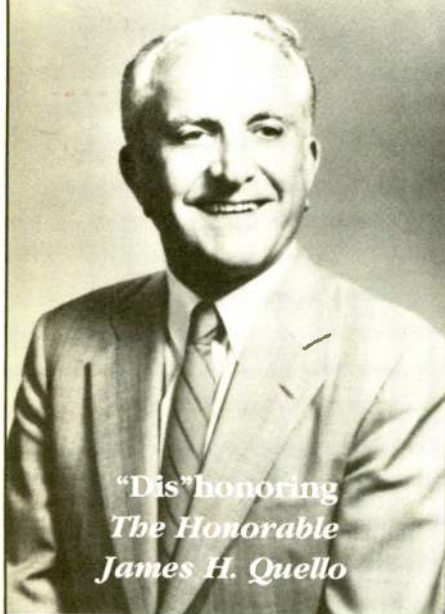
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# Radials and Screens

► continued from page 75

personnel assume that something must be wrong with it when coverage is not what it should be.

In truth, a properly installed and buried ground system will last many, many years.

Except in the most extreme circumstances, a buried ground system will not deteriorate appreciably in place. Stations that have been in place for 50 years and more have operated with the original ground system without difficulty. Spot checks of radials have found them in excellent condition.

The biggest threats to buried ground systems are construction, acts of God, and vandalism or theft.

A construction company installing a pipeline, sewer or underground cable across an AM station site can cut many radials and cause significant damage. After the ditch is filled in, you might never locate the cut ends of the radials; the more affordable solution then may be to plow in new radials in those directions. Perhaps you cannot avoid construction work across the property, but careful planning and supervision will allow you to splice any cut radials before the ditch is refilled.

## Sidestep trouble

Acts of God present a more difficult problem. Erosion, floods, earthquakes and the like are usually beyond our ability to predict and can leave a ground system exposed. An ounce of prevention is the best medicine in cases where such calamities are possible.

Bury radials deeper, for example, to prevent them from coming unearthed in a flood or from erosion. At some antenna sites where erosion is a constant problem, owners keep a tractor with several implements, using it to keep the ground system covered. Constant vigilance is necessary in such cases. Even a short length of exposed radial can easily be broken or further unearthed by wildlife or livestock.

After a flood or earthquake, make a careful inspection of the antenna site property. Check the condition and integrity of the ground system with a field strength meter or metal detector if you suspect damage.

Periodically inspect the ends of the radials where they connect to the base strap or ring to be certain that they have not been burned open by lightning. Periodically check the lightning ground wires and connections, particularly at the beginning and end of thunderstorm season.

Vandalism and theft are perhaps the most common dangers to a buried ground system. Copper is valuable, and a determined thief can rip an entire ground system out in a matter of hours. He may not get more than \$500 from the scrap value of the copper, but the cost to replace the system can exceed \$50,000.

Perhaps the best way to protect a ground system from thieves and vandals is to keep it properly buried. "Out of sight, out of mind" is a maxim to remember in protecting your ground system. If thieves do not know about the buried copper, they will be unlikely to look underground for it. Maintain good overall site fencing.

Nothing can substitute for good relations with site neighbors. Keep this in

mind when the farmer next door complains about station audio in his telephone. Fix or replace his phone and enlist him to help you keep an eye on the site.

## Shared site use

AM antenna site property is becoming too valuable to use for antennas alone. Open real estate is scarce in many locations, and the big, open field with the tower is often attractive to developers. While a discourse on the use of shared AM sites is beyond the scope of this discussion, the treatment of ground systems bears consideration.

One common use places a parking area or roadway across an AM station site

property. There is nothing wrong with paving over a ground system. In fact, this can serve to protect the buried radials from damage and theft or vandalism. Work carefully with the contractor to ensure that the radial wires are not broken during construction, and have a surveyor make an accurate set of as-built drawings. The paving work can break radials easily. To prevent this, place some sand around each radial to give it a cushion.

The as-built drawings will allow you or others to locate buried radials during future excavations.

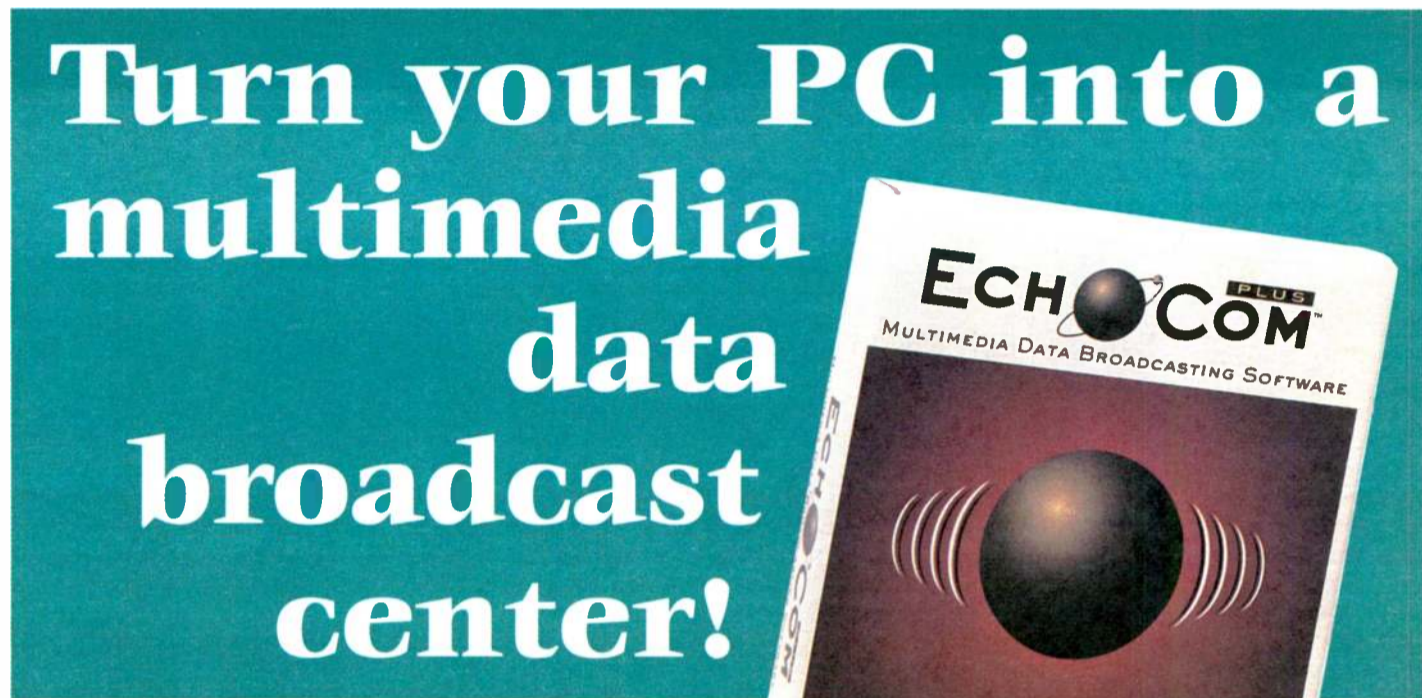
Can you erect buildings on top of a station's ground system? Yes, but this may not be a good idea if RF power densities are high or the antenna system is a directional array. If a building is required, consider treating it in the same manner as

you would a canal or waterway, depending upon the size of the building. Run a copper strap around the outside of the building foundation, terminating intersecting radials onto the strap. Several straps can then be run under the building foundation, connecting between the straps along the building sides.

Very little in the way of displacement currents will enter the ground through the building, so having radials in place beneath the building is not important. Providing a radial path for currents already flowing in the ground system is important, however, and interconnected perimeter straps serve this purpose nicely.

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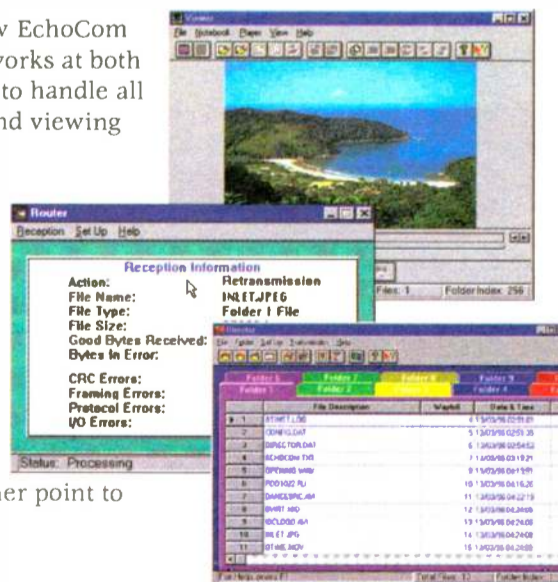
*Cris Alexander is director of engineering for Crawford Broadcasting in Dallas. Reach him at (214) 445-1713, or via e-mail at 76440.1670@compuserve.com*



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# Digital and Analog Cable Issues

► continued from page 78

Shielding is much less critical in digital than in analog. The vast majority of data cable installed today is Unshielded Twisted Pairs (UTP). Nevertheless,

Serve (spiral) shielding is a poor choice for digital. It is generally analog-only shielding. Its effectiveness at 3 MHz or 6 MHz is disputed. (At those frequencies, the coil effect of the wire acts as an

inductor, making it highly reactive.)

Braid shielding is effective well above 3 MHz or 6 MHz. But braid shielding is the most time-consuming, and expensive, step in the manufacture of this cable. If field ruggedness and flex-life are required, then a braid or braid-foil combination might be a good choice. Ask your supplier.

However, the ruggedness of the digital signal cries out for the simplest shield, if any shield at all. The solution is an overall foil shield and drain wire. This cable would be "install-only" and not intended to move after installation, because the foil creates noise if flexed while in use.

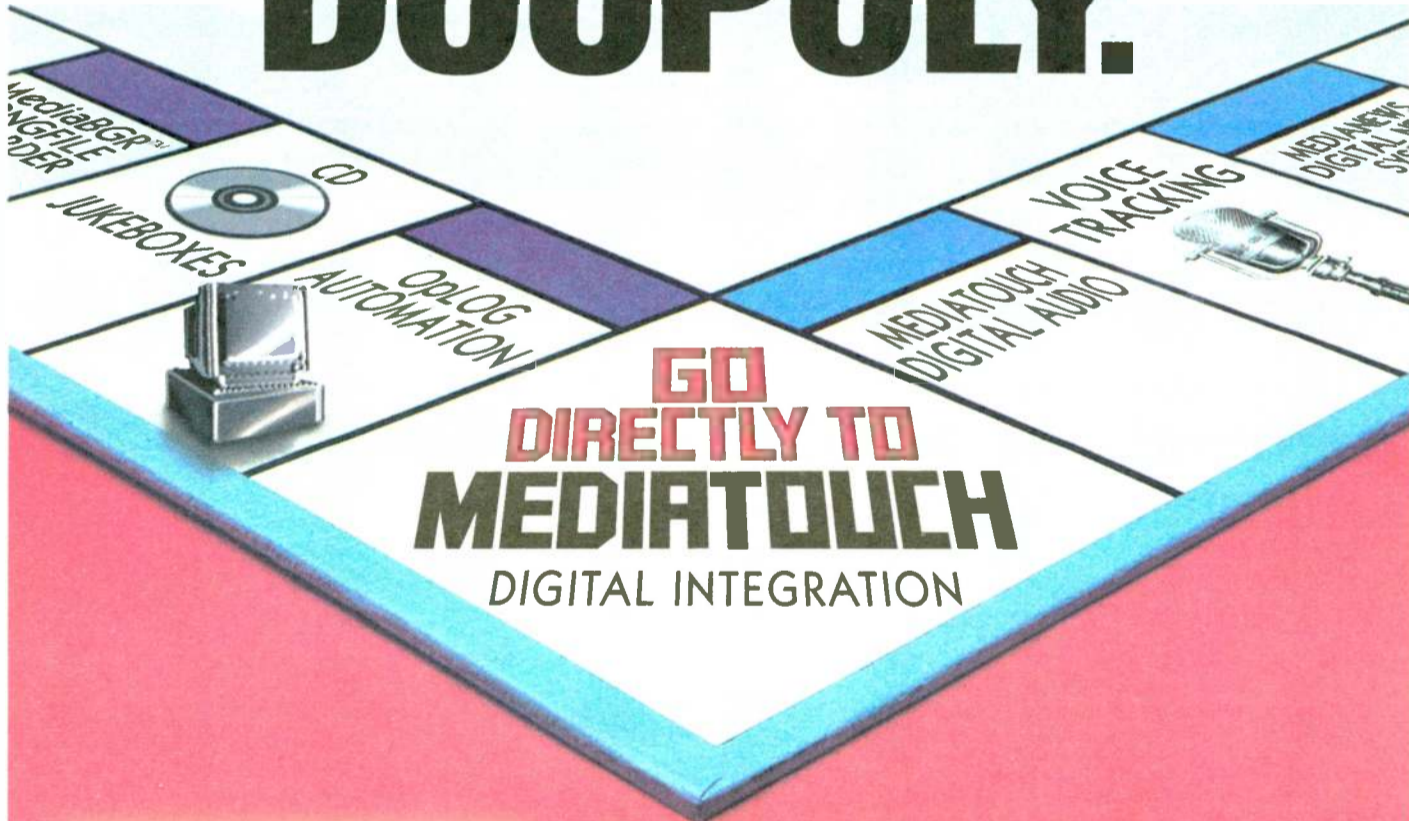
So we end up with a foil-shielded twisted pair. Standard analog install cable is

**So you can install AES/EBU digital cable now, use it for analog now, and not have to change cable when replacing analog equipment with digital.**

shielded digital audio cables come in three shield variations: serve (spiral), braid and foil cable.

Serve shields tend to open up and produce gaps when bent, reducing the effective-

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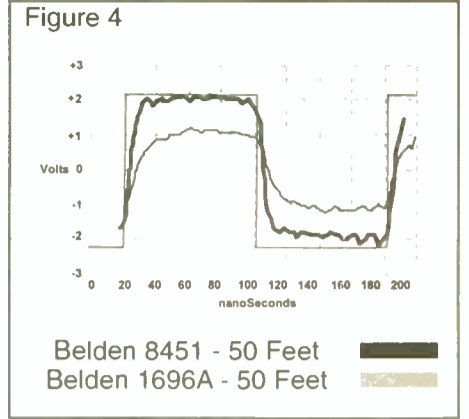
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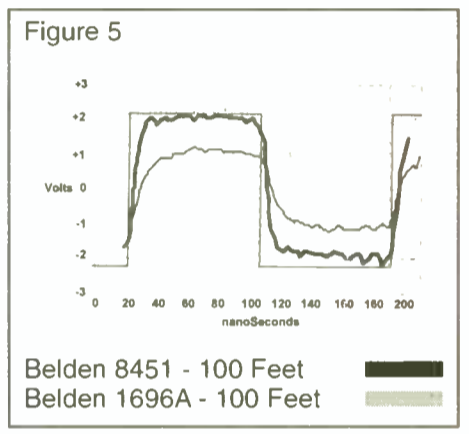


also a foil-shielded twisted pair. Can you use digital for analog? Yes. Low capacitance makes it most effective.

How far can you run? Low-capacitance AES/EBU designs can carry digital signals 800 to 1,000 feet depending on the quality of the cable and the error correction capabilities of the receiving device.

### Futureproofing

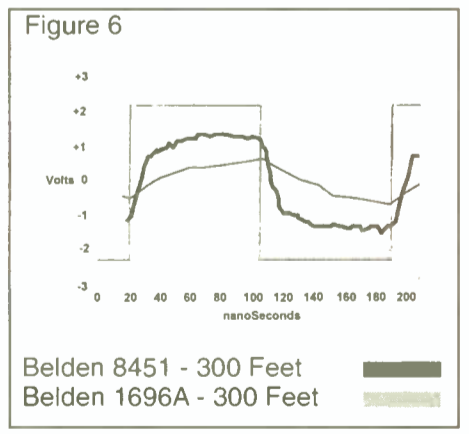
So you can install AES/EBU digital cable now, use it for analog now, and not



have to change cable when replacing analog equipment with digital. Standard connectors for both systems are XLRs, so you may not even have to change connectors.

But at what cost? Certainly digital audio cable is expensive, generally two to three times the cost of standard analog cable. But you can justify the price difference in two ways: First, in an average installation project, six percent of the expenses goes for wire and cable, a small amount. Second, the cost of the labor to install the cable is often more than the cost of the cable.

If you know for certain that you will never go digital, then you can install analog cable now and leave it.



If you operate in the real world, you know that you will go digital eventually. Someday you will find yourself pulling out the old wire and putting in the new. Why not just install the digital wire now? One installation must be cheaper than two. Futureproof yourself now.

Steve Lampen is Technology Development Manager for Belden Wire and Cable. Contact him by phone at (317) 983-5323 or by fax at (317) 983-5825.



# Ham Resurrects His Antenna Farm

by Al Parker

## Part II

**HICKSVILLE, N.Y.** Last time I whined a bit about my bout with Old Man Winter. The tragic result of his last slap in April was a ham antenna farm that literally bought the farm.

My master plan for resurrection was hatched at the NAB convention with the encouragement of some fellow hams. It's fitting that I penciled in the finishing touches at 30,000 feet, aboard the flight home. Looking down on all those toy-like rooftops made me feel kind of ashamed. From high in the sky, the idea of scampering around on the lowly plane of my roof made me wonder why I'd ever felt the slightest hesitation about balancing tiptoe on my chimney like Dick Van Dyke in "Mary Poppins."

## Up on a roof

Once I was on the ground, however, the roof suddenly took on the character of Mount Everest. The first order of business was to clear out the ruins of what had been. The tempered-aluminum masts installed two years earlier were now silver pretzels.

Their lightweight design had been instrumental in allowing the easy erection of tall towers of babbling. The "self-guying" Inverted-Vs at the top and ropes at two levels had kept the masts from moving horizontally more than a fraction or two during the fiercest of winds. But I'd failed to consider the aluminum pipe's inability to bear vertical stress. Ironically, the copious nylon guying that was so effective in preventing horizontal sway became a magnet for wet snow, adding such tremendous weight that it literally collapsed the aluminum like empty beer cans at a stevedore's picnic. Clearly, new masts must be made of heavy gauge galvanized steel.

My first project was to erect a sufficiently tall mast for the apex of the Inverted-L and 75-meter Inverted-V, 55 feet over ground.

The old, faithful roof tripod sat on the western peak of the house undamaged. The quarter-wave 160 meter "L" would ride topside, insulated from the metal mast by a short porcelain doughnut at the top. The dipole would be a simple coaxially-fed type, cut up for the high end of 75-meters, two feet under the "L," to be hauled up the mast via pulley action.

Because the "L" and dipole wires had survived, this array could get me on the air fast. The big Radio Shack telescoping mast seemed sufficiently strong to handle the load, but not too heavy to lift onto the plumbing pipe peg projecting two feet out of the tripod. All guy ropes would be a dark gray to reduce visibility and increase the speed of ice and snow melt-off.

I have the same attitude about erecting antennas that most males do about asking directions. I always work solo. In the ham society, this is sacrilegious and foolhardy, to be sure.

The habit goes back to my shameful early days as an 11-meter punk erecting absurdly large and ill-fated beam antennas. Whenever friends helped, things seldom turned out as I had envisioned. How do you tell someone who is doing you a

favor, at risk of his life or limb, that the favor stinks? The issues of liability and just plain guilt also arise. If a friend or family member took a nose-dive into the bushes, I could never enjoy my radios again. (As for any damage to my own miserable carcass, I'd be merrily operating my station from a full body-cast in no time, or at least admiring the handiwork as I moved up toward the light into infinity ... or checking my ground stakes if it's in the other direction I'm headed.)

This is not to suggest that I didn't experience abject fear, wobbling precariously at the edge of the roof and balancing some 30 feet of steel pipe over my head. The extended mast with guy ropes,

dangling Inverted-L and pulley had to be held straight up, lifted to chest level and slipped over the peg.

The trick with this circus act is to keep the thing from getting away from you as you lift. The slightest tilt of weight is magnified in a hideous white-knuckle perversion of the mechanical laws of leverage.

As Murphy ordered, the winds that day were relentless. The moment I managed to seat the mast, a gust of wind tugged the rigging at the top. The sickening feeling of panic is hard to describe. Do you fight it, hang on as the thing goes over the side or drop the whole works, possibly damaging the roof and hardware? I

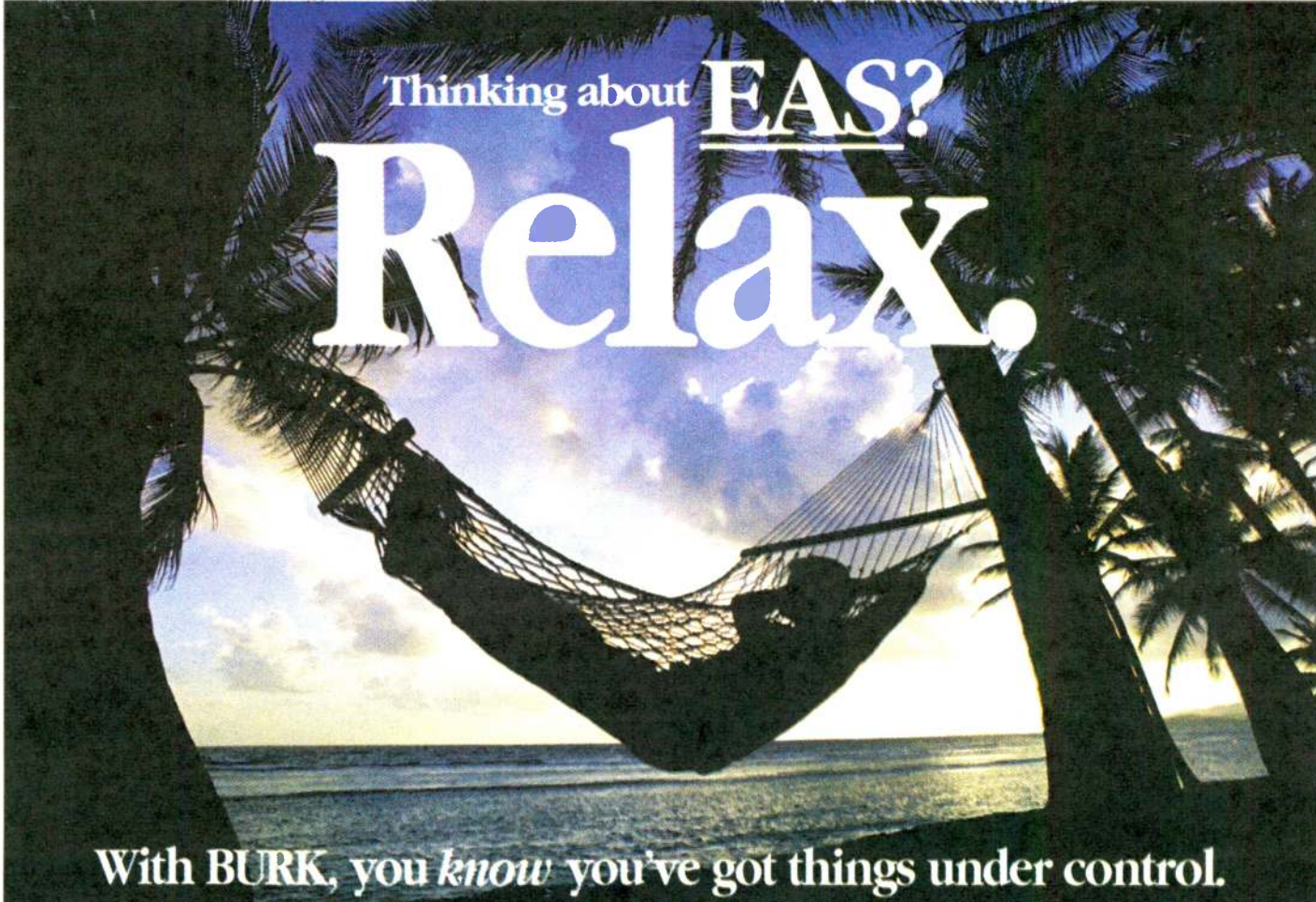
don't know where the energy came from: perhaps it was adrenaline. I over-compensated and the thing started pulling in the opposite direction. The muscles in my arms knotted in agony as the oscillations continued.

After what felt like an eternity, actually only seconds, I surrendered to implacable gravity. As I watched in amazement, the new mast slipped over the tripod peg with the precision of a docking spacecraft.

## Snow gear to the rescue

This lucky outcome, and the ensuing encouraging signal reports, did not diminish the recurring nightmares of the following nights as I relived those awful moments at the brink. But demented male psychology being what it is, the

continued on page 82 ►



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World Radio History



# Fiddling on the Roof

► continued from page 81

whole affair soon morphed into a source of perverse pride. I couldn't wait to get up there again to complete the master plan.

Over the next few days, I erected a "storm-proof" helically wound, multi-band vertical over the garage. Plans for the third major element of the antenna system also took shape. A super heavy-duty 50-foot Rohn push-up mast, mounted over a compound beam on the attached garage sub-roof and braced against the building's massive chimney, would be the foundation of a central "mainmast," of which I had dreamt for a long time. An open-wire fed dipole

antenna, coupled to the ancient (but magnificent) Johnson Matchbox, with 65-foot legs and feeder, would be an effective "all-band" workhorse.

## Another layer of redundancy

Any two of the three independent structures could go down without putting me out of business. A side benefit was the possibility of using the two Inverted-V antennas in tandem on 75-meters. The one-eighth wave spacing might produce some useful lobes. Living on Long Island, I've always resented all that wayward RF shooting off ineffectively into the Atlantic.

Any undesired interactions between the

antennas could be worked out later.

Aside from the mast, the raw materials at hand were 12-gauge "Flex-Weave" wire, ladder-line and a nifty little center-insulator from an outfit called "RadioWare" in Massachusetts. The device looked a bit like a large, translucent crucifix, but opened to reveal molded receptacles for the dipole wires and feeder. Once the wires were routed and soldered to the ladder-line, the thing closed tight, locking the elements in place for maximum strain relief and protection from the elements. The unit had a hole at the top for attachment to a pulley.

The idea of all those floppy ropes and ladder line bobbing about, possibly tangling in high winds, was not appealing. I preferred to attach the center-insulator rigidly to the top of the push-up mast, which could be lowered easily for access

to the center-insulator if I stood atop the ample chimney. This arrangement would also improve stability at the top, because the dipole served double-duty as a guying element.

The metallic mast also presented problems in securing the ladder-line. Some separation between the support and feeders is important to prevent the mast from affecting the impedance characteristics. That's probably why the drawings of such antennas in older ARRL publications specify wooden masts.

Another complication: such feeders are notorious for catching the wind and moving around at the point they meet the center-insulator. Eventually, the constant movement can fatigue the copper wires, resulting in failure. The daunting problem of securing the ladder-line while preserving a discreet distance from the mast, all without compromising the mast's telescoping action, seemed insolvable ... until I spied a long, black and silver object hanging from the garage ceiling.

What is about 4 inches wide, 6 feet long, mostly nonmetallic, weather-proof and perhaps the most indestructible object known to man? The answer: a fiberglass snow ski!

## No 'agony of defeat'

That poor devil hurtling off the ski jump might have been busted to atoms doing the opening credits of "Wide World Of Sports," but I bet his skis were none the worse for wear!

I drilled holes to mount the center-insulator, added two holes for the guy ropes, and secured the ladder-line to the length of the ski with UV-resistant ties through another series of small holes.

The feeders would then come off at an angle, well away from the metal mast, sloping gently down into the wind in free space. Last, I fitted a pair of U-bolts to the rear of the ski to facilitate attachment to the top of the mast.

A bonus: once in contact with the mast, the ski's stainless-steel trim-ring made an ideal auxiliary lightning arrester. The N2SAG SKI-TENNA was born!

To be frank, I had my doubts in the moments before raising this strange contrivance. Once it was 55 feet up in the sky, however, it looked great. It ceased being an old vertical ski stuck to the end of a pipe, and became a rather formidable-looking piece of antenna hardware.

## Waiting for winter

The curved tip was faced east for a minimum profile in the direction of the prevailing winds. The overall higher wind profile was a concern but turned out to be no problem atop the massive, well-guyed mast. A few weeks later I collapsed the mast to use that extra hole at the apex of the SKI-TENNA.

The thing had turned out to be so stable that I could press it into double-duty as a support for the horizontal section of the Inverted-L. Now the "L" was at 55 feet for virtually its entire horizontal length between the two big masts. The change reduced undesirable interactions between the "L" and the other antennas and made quite a difference in performance.

The all-band SKI-TENNA is working great on all the HF bands workable with vintage gear. Only after the next hard winter, though, will I honestly be able to claim the "joy of victory."

□ □ □

Al Parker writes about amateur radio and photography. He can be reached at (516) 681-6733.

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USER REPORT

## Genelec Speakers Suit WBUR(FM)

by Michael LeClair  
Chief Engineer  
WBUR(FM)

**BOSTON** The choice of speakers for a broadcast studio control room is one that requires careful consideration. If possible, I like to actually listen to many different speakers of all price ranges to allow for subjective comparisons, as well as the technical data.

More than any other equipment purchase, the speakers will define how well the station can monitor its sound. When WBUR built its new studio complex we architecturally designed control rooms with superior acoustics to allow critical and accurate listening. After research and listening tests, we chose the Genelec 1031A speakers to complement this architectural design.

### Best and most accurate

WBUR(FM) is a National Public Radio affiliate station in Boston. We produce programming in our studios used by hundreds of other stations nationwide, including longform news stories using carefully gathered ambient sound to provide the listener with a sense of the story location. This type of production requires speakers that are extremely accurate and free of coloration. The Genelec 1031As are without a doubt the most accurate and best sounding small speaker I have ever used in a studio environment.

The 1031A speakers are a two-way bi-amplified design with an 8-inch bass driver and a 1-inch metal dome tweeter. Integrated into the speaker enclosure are two 120 W power amplifiers and active crossover circuitry. To compensate for speaker location and room acoustics the treble and bass frequency response of the crossovers can be trimmed using DIP switches on the back panel. The audio inputs are electronically balanced with adjustable sensitivity to accommodate a range of input levels. In addition, ampli-

fiers are protected against thermal overload and feature an input overload LED that is visible on the front speaker.

We installed the 1031As in the control rooms of all four of our studio suites. While these speakers are relatively heavy (26 pounds each, due to the built-in amplifiers) we had no trouble mounting them on Atlas floor stands in a matching black color. The floor stands allowed us to adjust the speakers to an optimal level

### Subjectively, these speakers sound wonderful.

and directionality. During setup, I found that the input gain, while specified for a range of -6 dB to +6 dB, operates best with our Wheatstone consoles when set at minimum sensitivity, otherwise the console control has inadequate range to full volume.

Many broadcast studios use soffit mounts, or worse, ceiling mounts to keep the speakers hidden or out of the way. Both of these approaches have disadvantages. Soffit mounts are typically fixed when the room is designed on paper and leave little room to compensate for problems after the walls are in place. Ceiling mounts tend to throw sound at the top of the engineer's head, rendering a poor listening environment for a program producer sitting behind the engineer.

We placed our speakers at head height on the studio front wall to form an equilateral triangle with the engineer listening position. This provides us with excellent sound at the engineer position and very good, although more reflective sound, at the producer position. The speakers are attractive and provide a "high tech" look in the front of the room.

After installation we had the opportunity to measure the frequency response of

the speakers as part of a series of acoustical measurements made on the rooms by our acoustic consultant. We intended to use this opportunity to make any necessary adjustments of the speaker equalization to provide a flat response. I was pleasantly surprised the response was very flat and needed no equalization. The low frequency response rolled off starting at about 50 Hz, a typical number for a speaker with only an 8-inch bass driver.

### No distortion or compression

Moving up in frequency, where many speakers show large peaks and notches, the bass response held within approximately 1.5 dB until about 400 Hz. Above this the response was virtually flat all the way up to 14 kHz when it began a gentle roll off to -2 dB at 20 kHz. These measurements were made at the engineer's listening position and represent the actual achieved performance (rather than measurement in an anechoic chamber, which is not necessarily what you will hear).

Subjectively, these speakers sound wonderful. What you notice first is the high end and mid-range are exceptionally clear and present. On music, well-recorded cymbals and horns cut through perfectly with no hint of distortion or compression. Some of our audio engineers, not used to this kind of accuracy and clarity, first declared that there was not enough bass response.

However, on second listening it is apparent that low frequencies come through with plenty of "punch," literally causing you to feel the audio on bass guitar notes. On voice material — our primary concern — these speakers allow an engineer to immediately hear distracting breath and paper noises from the talent and request a second take before leaving the studio.

While the audio quality is less accurate at the producer's position, it still retains excellent clarity for the monitoring of content. By the way, for those skeptical

about the size, these speakers are loud; in fact, very loud.

We have had no problems with these speakers since their installation approximately six months ago. All speakers arrived in good condition and operational. In sum, I would recommend these speakers to anyone designing a studio where accurate listening is required. Combined with rooms that are properly designed, these speakers allow true reference listening environment.

For more information from Genelec, contact Will Eggleston in Massachusetts at (508) 440-7520; fax: (508) 440-7521; or circle Reader Service 82.

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### TECHNOLOGY UPDATE

#### CROWN

**ELKHART, Ind.** Designed for broadcasters, the Crown CM-311HS and CM-312HS are rugged, lightweight, head-worn microphones that mount on a Sony MDR-7506 or MDR-V6 headphone.

Because the CM-312HS microphone is to the side of the mouth, the mic looks inconspicuous and does not pick up breath pops.

The sound can be tailored by moving the microphone closer or farther from the corner of your mouth.

The CM-311HS adjusts to any user. It mounts securely on either earpiece of the MDR-7506 or MDR-V6 headphone.

Two included foam pop filters reduce breath noise.

The CM-312HS hypercardioid pickup pattern reduces feedback and aids isolation.

The CM-311HS is the latest version of Crown's differoid technology.

Its cardioid pickup pattern rejects noise from behind the microphone and its noise-cancelling ability rejects ambient noise at a distance.

In difficult situations, the Crown CM-311HS head-worn mic is recommended because it picks up even less feedback and leakage than the CM-312HS.

Supplied with both mics are belt packs.

They include an XLR-type output connector, a battery on/off switch and a push-button mute switch. The microphones are an electret-condenser type, powered by phantom power or by the 9 V battery in the belt pack.

For more information from Crown, contact the company in Indiana at (219) 294-8000; fax: (219) 294-8FAX; or circle Reader Service 184.





## PRODUCT EVALUATION

# JBL 6208 Offers Big Monitor Sound

by Bruce Bartlett  
with Jenny Bartlett

**ELKHART, Ind.** Industry giant JBL has a strong contender with this two-way, powered close-field monitor. An 8-inch ported paper-cone woofer and 1-inch titanium/gold dome tweeter pump out some great sound. They are driven by a built-in power amp of 50 watts per channel.

The unit is magnetically shielded to prevent interference on computer monitors. It has a modern sculpted look, in which the woofer bulges out past the tweeter. This reduces diffraction and smooths the response, and signal-aligns the woofer with the tweeter. Result: sharper transients, smoother response.

The dome tweeter is ribbed to prevent breakup; this reduces distortion and smooths the high-frequency response. Carefully built, the dense wood cabinet is finished in black oak. A Neutrik combi XLR quarter-inch phone jack takes balanced (+4 dBu) or unbalanced (-10 dBV) line-level signals.

Using a Crown TEF analyzer, I measured the anechoic frequency response of the JBL 6208. Except for a narrow dip at 2.6 kHz, the response is 60 Hz to 20 kHz +/- 2.5 dB. A broad bump around 200 Hz gives the speaker a chesty or puffy sound on vocals.

The lows roll off rapidly below the port resonance of 40 Hz. Off-axis response is

uniform. Measured transient response is impressive, thanks to the curved baffle and the driver alignment. THD vs. frequency at 90 dB SPL is fair. It is below audibility (<3 percent) from 70 Hz up, and reaches 5 percent at 62 Hz and 5.5 percent at 40 Hz.

At 95 dB SPL (not shown), THD is more than 3 percent below 200 Hz. You might not want to exceed 90 dB SPL in use. I listened to the 6208 and had these comments:

- Cymbals: Crisp and airy, extended highs. "all there." Excellent tweeter.
- Drums: Transparent, very strong impact, punchy.
- Kick drum: Reasonably deep, with good attack. Deep bass-drum rolls are audible but not earthshaking.
- Acoustic guitar: Delicate and clear, not edgy.
- Electric guitar: Slightly warm or puffy; slightly reduced bite.
- Bass: Fairly deep. Very tight and articulate, not at all boomy. Lowest fundamentals are weak, and midbass is emphasized.
- Piano: Mostly uncolored, realistic, believable.
- Vocals: Mostly natural, not too sibilant. Slightly chesty or puffy, as if the singer were in a box.
- Strings: Neither steely nor muffled. Not a lovely string tone, but not bad

either.

● My master tapes: The mixes translate pretty well on the JBLs. The lowest notes are weak and the midbass is a little bumped up.

Strong points include the sense of ambient space, sharp imaging, and great dynamics.

You can pick out all the elements in a complex mix. Overall, the speakers sound dry, tightly controlled, detailed and transparent.

Listening fatigue is low at moderate levels. Tonal balance is a bit strong in the midbass and weak in the deep lows, but smooth overall.

Price is \$1000/pair with a five-year limited warranty. Contact JBL at 8500

## Product Capsule:

## JBL 6208 Two-way Monitor

Thumbs Up	Thumbs Down
<ul style="list-style-type: none"> <li>✓ Mostly accurate, smooth</li> <li>✓ Sharp definition</li> <li>✓ Great sense of space</li> <li>✓ Powerful dynamics</li> </ul>	<ul style="list-style-type: none"> <li>✓ Slight midbass puffiness</li> <li>✓ Weak deep bass</li> <li>✓ Some bass distortion</li> </ul>

For more information, circle **Reader Service 93**

Balboa Blvd., Northridge, CA 91329; (818) 894-8850; fax: (818) 830-1220.

□ □ □

Bruce Bartlett is a mic engineer, writer and recording engineer, and the author of *Practical Recording Techniques* published by Howard Sams. Jenny Bartlett is a technical writer. Bruce can be reached at (219) 294-8388.

Andrew Corp. has promoted **Debra Buck Huttenburg** to vice president, antenna systems.

She will assume responsibility for managing the sale and distribution of the company's commercial products.

**RF Industries Ltd.** recently promoted **Donald J. Catledge** to president and general manager of its Neulink division. Neulink designs and manufactures wireless telemetry equipment.

**Celestion Ltd.** has organized its operations into two separate divisions: professional and consumer.

Formed in Ipswich, Suffolk, United Kingdom, the professional division is spearheaded by **Richard Wear**, following his recent appointment as director and general manager.

**Broadcast Electronics** has announced the realignment of responsibilities within its domestic sales structure.

**Susan Dingethal** has been named director of national accounts and **Mike Troje** was promoted to director of domestic sales.

Troje was most recently RF and studio sales manager.

**Telex Communications Inc.** has announced four new personnel appointments in the Pro Sound and Entertainment Group.

**Gary Bosniacki** has become the national dealer sales manager for sound reinforcement products.

**Tom Hansen** has assumed a newly created position as national dealer sales manager for broadcast products. **John King** was promoted to Eastern regional sales manager and **Lisa Hankins** has been promoted to Western regional sales manager.

**Stephen A. McNeely** was recently named president of **Keystone Communications Corp.**, a broadcast transmission service provider.

**Joel R. Rollins** has joined **Extron Electronics** as director of education and training.

**Sony's SW Networks** has named **Joyce MacDonald** vice president of affiliate marketing.

## MANUFACTURER'S SPECS

Frequency response: 60 Hz - 20 kHz ( 2 dB, down 10 dB at 38 Hz and 21 kHz.  
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Maximum SPL at 1 meter: 106 dB continuous, 110 dB peak.  
Dimensions: Approx. 18x11x13 in (HWD).  
Net weight, each: 30 lbs.  
Amplifier power output: 2x50 W continuous.  
Amplifier distortion: <0.05% @ 1 and 10 kHz from 0.01 W to full rated output.

## TECHNOLOGY UPDATE

## AKG

**NASHVILLE, Tenn.** The results of more than 20 years of research in the field of infrared technology and



acoustics, the two new **AKG Acoustics** wireless headphones extend the performance quality first delivered by the original AKG entry in the field, the AKG K 222 IR headphone.

"The addition of these two models provides audio professionals with a complete choice when it comes to matching headphone models with particular types of music," said AKG Acoustics Vice President of Marketing and Sales Doug MacCallum. "They are

ideally suited for users who want convenience and the same performance quality traditionally delivered by wired headphones."

The blue-colored AKG 333 IR headphones feature a powerful bass and sparkling treble and mid ranges, making them the ideal choice for pop, rock,



funk and punk styles of music. The silver-finished AKG 444 IR headphones deliver a clean analytical sound and provide high definition, appropriate for their intended use with classical music.

Both the K333 IR and K444 IR headphones deliver acoustics for "borderless" entertainment. Both feature physi-

ological sound leveling for total transparency even at the lowest volumes. They also feature an ergonomic adaptation of the earpads for great supra-aural headphone performance, semi-permeable earpads for optimal sound pressure, specially developed suspension, perforated grids on the outside for optimal acoustic transparency, and an ultra lightweight of only 6.4 ounces.

These headphones also offer four diodes for perfect signal reception, mute function that eliminates annoying hisses when transmission is disturbed, multi-user operation, one loudness/one balance control and three connectors.

With regard to battery operation, the K 333 IR model is powered by a rechargeable NiCad battery that delivers four hours of operation before requiring a recharge. The K 444 IR comes with a longer lasting NiMH rechargeable battery that will last as long as six hours. Further, it has no memory effect so its overall lifetime is much longer than that of conventional batteries.

For more information from AKG Acoustics, contact the company in Tennessee at (615) 399-2199; fax: (615) 367-9046; or circle **Reader Service 60**.



# Products & Services Showcase

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## Excalibur Electronics

### CDA-1

#### Composite Distribution Amplifier

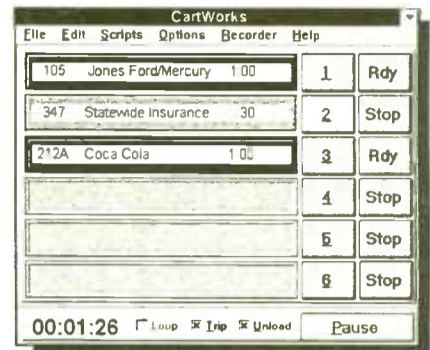
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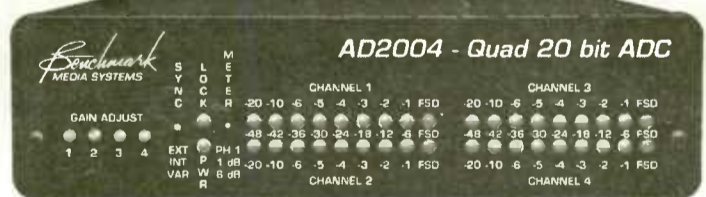
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The converter runs at a fixed sample rate of either 48 or 44.1 kHz. A dual sample rate option is available. The two 75 Ω BNC outputs conform to AES3-id.

Metering has both coarse and fine scales for monitoring near FSF. A selectable hold function can retain the highest peak until manually reset. FSF detection is exact.

The AD2004R has the same performance as the AD2004B but has an 110 Ω AES3 reference input, two 110 Ω AES3 outputs, and a word clock output.

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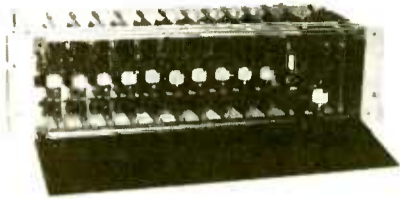
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# Products & Services Showcase

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## USER REPORT

# Stellar Performance from Symetrix

by **Bryan Hubert**  
**Chief Engineer**  
**KCMS(FM)-KCIS(AM)**

**SEATTLE** It is really nice when you can forget about studio equipment in your rack because it never screams for attention by failing during drive time. Our Symetrix 420 stereo power amplifier simply keeps running without complaint. It is only an amp, but we expect stellar performance from our 420. Our monitor amps and speakers consist of our first line of defense, instantly letting us know when we have an audio quality problem.

When the time came for a new studio monitoring amplifier, I chose the Symetrix 420 based on my previous experience with the old Symetrix A-220. Our A-220 had been around the station so long no one can remember when it was installed. Most importantly, it has never failed. I received a pleasant surprise when our 420 arrived. Our old A-220s used small screws on the output barrier strip. Now I could wire the amp to the speakers with standard size spade lugs right out of my tool box. The A-220 made it difficult to connect to anything larger than No. 18 gauge wire.

I could not resist opening the lid and was pleased to see a well laid out PC board with a generous ground plain to

minimize hum and buzzes. I also noted the internal jumper for the 420 mono-bridged mode. By changing the position on the jumper, my 420 could drive a single speaker with 40 watts.

We use the 420 stereo amplifier to drive a pair of JBL studio monitors. The 20 watts-per-channel affords ample volume for our mid-sized production room. The 420 switchable gain controls include dual tracking (adjustment of both channels with one control) or independent adjustment of each channel.

The independent adjustment comes in handy when the studio layout does not allow proper positioning of the monitor speakers. The separate level adjustments provide a balance control function for alignment of the stereo image with the board operator's position.

The speakers do not automatically mute when using the 420 with headphones, which happens with most consumer grade amps. The Symetrix 420 gives us the ability to manually mute the speakers via a front panel push button.

The designers at Symetrix also added another feature not found on consumer amps. They included a mono/stereo switch on the front. This allows me to easily make quick and easy phase checks with the push of a button if things start sounding fuzzy.

The technical specifications of the

Symetrix 420 measure a respectable signal to noise greater than 95 dB. Distortion remains below 0.04 percent, and frequency response is within 1 dB between 20 Hz and 20 kHz.

The 420 input connections allow use of either male XLRs or one-fourth inch phone plugs. The phone plugs can be either the tip-sleeve type for unbalanced circuit or tip-ring-sleeve for use with balanced outputs. The XLRs are wired with pin No. 2 hot.

The TRS plugs use the standard tip hot configuration. Symetrix silk-screened the wiring diagram for each connector on the rear panel to save a scramble through the

manual during installation.

We are always setting up a couple Ramsa 200s when we haul out our remote gear. I am considering another Symetrix 420 for the remote rack. The 8-pound 420 would be a nice, clean, simple way to



The Symetrix 420

cover a car dealership or parking lot.

Overall, the Symetrix 420 will provide years of clean monitor audio without cluttering up your "things to do" list.

For more information from Symetrix, contact Walt Lowery in Washington at (206) 787-3222; fax: (206) 787-3211; e-mail: 102102.1126@compuserve.com or circle Reader Service 66.

## TECHNOLOGY UPDATE

### ATI

**HORSHAM, Pa.** ATI offers two stereo headphone amplifiers — the HD100, a single channel amp and the HD1000, a four channel amp. Both work comfortably with all headphones with quiet, efficient, high compliance, low distortion output circuitry.

Features include balanced instrumentation amplifier lines and microphone inputs that provide low noise and excellent common mode hum rejection.

The self-powered HD100 will bridge any balanced stereo or mono line for individual remote monitoring. The HD1000 drives four stereo head-



phones with a mix of a stereo/mono balanced line level inputs, and includes a panned front panel microphone input to add paging, annotation or instructor comments.

You can loop HD1000 line outputs into additional HD1000s or daisy chain any number of small HD100 single headphone modules distributed among various locations.

The HD1000 is designed for desk or EIA rack mounting singly or two side-by-side. The compact HD100 will mount on or under a desk top or behind a panel.

For more information from ATI, contact the company in Pennsylvania at (215) 443-0330; fax: (215) 443-0394; or circle Reader Service 134.

### BEYERDYNAMIC

**FARMINGDALE, N.Y.** The new DT290 sportcaster headset by beyerdynamic is a lightweight, rugged, yet comfortable headset with low visual profile earphones which reduce on-camera visibility. The headset has broadcast-quality microphone elements mounted on low profile, but sturdy gooseneck booms and reject unwanted off-axis crowd noise.

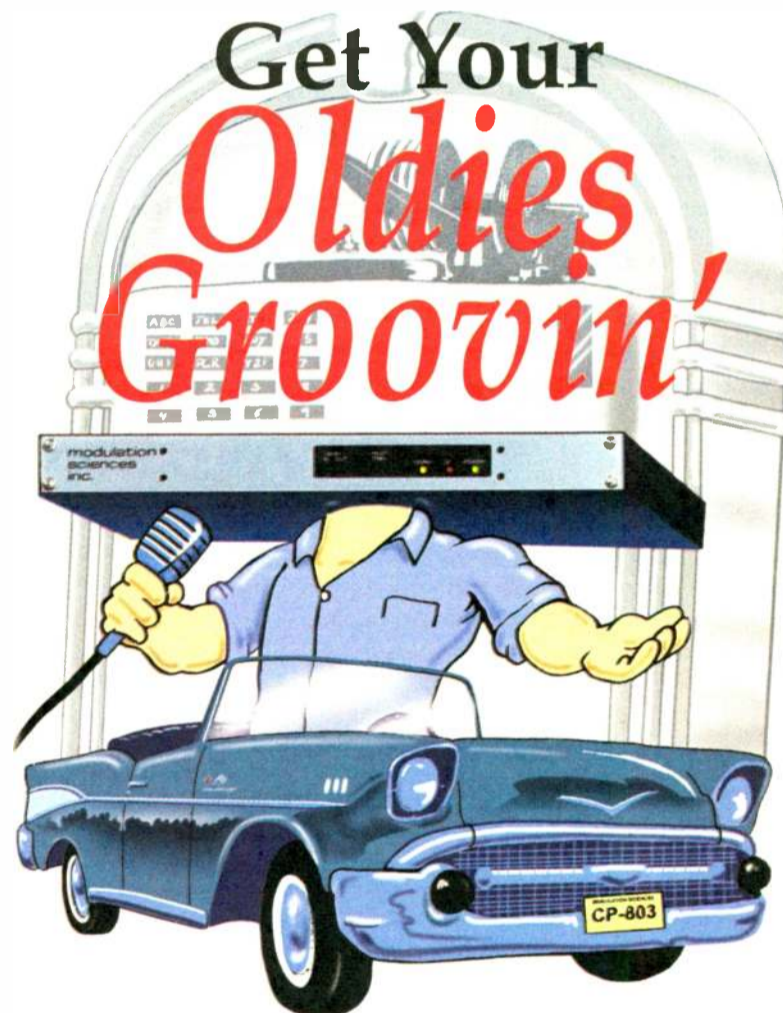
The headset is available with either



dynamic or condenser microphone elements and with single or double-sided earphones.

The DT 290 was developed in cooperation with ABC Sports Operations and the beyerdynamic engineering team.

For more information from beyerdynamic, contact the company in California at (516) 293-3200; fax: (516) 293-3288; or circle Reader Service 84.



**T**he golden sounds of the past are a goldmine for your station but you won't rock around the clock if you get lost on the dial. Crash through the dial clutter and make your mark with the MSI CP-803.

The CP-803 blasts through the sha-na-na and doo-wop-wop of other processing and puts you on top with the sound your listeners keep listening for. Those sound-alikes just aren't what's happening.

Your audience will get down with the power. Engineers won't mind the easy set-up. The PD will sleep better. And the GM won't grumble about the cost.

The CP-803 will revitalize your dial presence. Up on the roof or under the boardwalk, your station will break through all the yakety-yak.

**Call MSI, the processing authority at (800) 826-2603 and be the leader of the pack.**

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**AUDIX**

**NASHVILLE, Tenn.** Audix announced significant upgrades to its PH series speaker systems. The speakers have become a popular monitor speaker for use with PC multimedia computer systems, and in other applications where a compact, self-powered speaker is needed.

"We originally designed these speakers as a cost-effective alternative to other powered speakers costing two to three times as much," stated Cliff Castle, Audix vice president of sales and marketing. "They immediately became a hit with sound designers and engineers using PC-based workstations due to their small size and punchy sound. These users asked for a few added features, so we decided to upgrade both models."

Although the PH-15 and PH-25 rely on the same internal amplifier, the PH-25 puts out an additional 6 dB SPL due to its double woofer and higher sensitivity. The upgraded speaker models are at the same price point as the original.

Upgrades include: amplifier provides 40 watts RMS/50 watts peak power, balanced inputs using floating ground principle (RCA connectors), thermal-protect circuitry safeguards speakers against thermal overload, DC, and short circuits with the heatsink area increased by 50 percent.

For more information from Audix, contact Cliff Castle in California at (714) 588-8072; fax: (714) 588-8172; or circle Reader Service 68.

**FOSTEX**

**NORWALK, Calif.** The 6301B personal monitor by Fostex is a built-in 10-

watt amplifier that provides a big sound in a small, versatile package. It accepts any line level signal, so it can be used with instruments in project studios or on stage, on remote recordings, in video productions and multimedia presentations and more.

Features include quarter-inch phone jacks, power switch with LED indicator, level control and a jack for accessing the amplifier output independently — for driving headphones or another speaker.

These utility speakers have earned high marks over the years among production and presentation professionals for being rugged and roadworthy.

Frequency response 80 Hz-13 kHz, impedance 4 ohms, amplifier (output) 10 W RMS with 8  $\Omega$  load.

For more information from Fostex, contact the company in California at (310) 921-1112; fax: (310) 802-1964; or circle Reader Service 89.

**SENNHEISER**

**OLD LYME, Conn.** The Sennheiser HD25SP blends advanced acoustical technologies with rugged durability and excellent isolation from external noise to yield a headphone that is perfectly suited for high noise environments.

Utilizing dynamic drivers in a closed supraural design, the HD25SP offers a lightweight and comfortable fit. High efficiency driver elements and an ability to handle very high sound pressure levels make HD25SP perfect for home, studio and location field use (ENG). Effective attenuation of background noise minimizes risk of feedback, and a nominal impedance of 85 ohms ensures universal compatibility.

As has been the Sennheiser manufactur-

ing tradition, all parts to the HD25SP are replaceable due to their modular nature. An oxygen-free, copper signal cable with kevlar fiber reinforcements provides accurate signal transmission, added strength and long-term durability. The cable terminates with a stereo one-fourth inch phone plug.

Technical data includes frequency response: 30-16,000 Hz, impedance: 85 ohms, sensitivity: 105 dB, cable length: 10 feet.

For more information from Sennheiser, contact the company in Connecticut at (203) 434-9190; fax: (203) 434-1759; or circle Reader Service 145.

**WOHLER**

**SAN FRANCISCO** New source selection options from Wohler Technologies allow convenient monitoring of multiple digital or analog sources through the company line of rack-mount powered stereo monitors.

The new DSS-8 option selects one of eight AES/EBU digital inputs for monitoring by a Wohler AMP Series powered monitor equipped with the optional D/A converter board. The DSS-8 mounts inside the Wohler monitor (1U or 2U models available), with input selection by front panel rotary switch.

A Wohler monitor equipped with the DSS-8 option is ideal for all-digital production studios with multiple DAT, DAW and CD-R sources.

For analog source monitoring, the Wohler AMP Series offers a full range of internally mounted source selection options which may be configured for two, four or 10 mono or stereo inputs.

For applications requiring greater switching flexibility, Wohler offers the

ARS Series of single rack-space source selectors. Analog ARS units select from multiple mono or stereo input sources, or from multiple groups of four or eight channel inputs.

Digital ARS units are available for selecting AES/EBU inputs in 16-1 or 8-2 routing configurations.

For more information from Wohler, contact Carl Dempsey in California at (415) 589-5676; or circle Reader Service 136.

**BENCHMARK**

**SYRACUSE, N.Y.** The DA-101 by Benchmark Media Systems is a dual input mono distribution amplifier with 10 onboard output splits. A signal routing switch allows selection of either input 1, input 2, or both for signal mixing. A direct output may be used with external build out panels to furnish many additional outputs.

The dual 10 W power amplifier output stage, operating in a balanced configuration, provides ample power to the 60 $\Omega$  outputs.

Even with up to one third of the outputs shorted, the remaining outputs continue to work without loss of audio.

In addition to its use as a 10-output (or more) mono DA, the DA-101 can be used as a 40 W mono monitor amplifier, or as a time code DA without crosstalk to other modules.

Features include 120 V input overvoltage protection, 13 segment LED meter, fused power inputs, outstanding RF immunity and optional daughter boards are available.

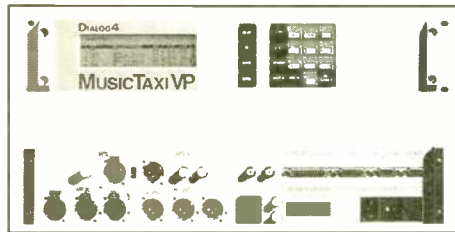
For more information from Benchmark Media Systems, contact the company in New York at (315) 437-6300; fax: 315-437-8119; or circle Reader Service 135.

# MARKETPLACE

## Recently Introduced Products for the Radio Broadcast Professional

**Dialog4 ISDN Audio Codecs Make United States Debut**

G Prime Limited introduced the full line of Dialog4 ISDN audio codecs to the



U.S. market. These ISO/MPEG Layer II and Layer III codecs are available in stand-alone rackmounts, PC plug-in cards and systems with multiple codecs and multipoint access. The MusicTaxi is a third generation audio codec capable of the highest level of performance in low bit rate coding. The PC plug-in cards and software can turn an IBM compatible PC into a fully functional ISO/MPEG layer 2 or layer 3 workstation.

For more information from G Prime Limited, contact Russ Hamm in New York at (212) 765-3415; fax: (212) 581-8938; e-mail: russhamm@gprime.com; or circle Reader Service 94.

**New Frontier Surge Technology**

Underwriter's Laboratories is now testing to a new U.S. government surge suppressor specification. New Frontier

Electronics entire product line of Series Mode surge suppressors uses the technology certified by UL to the highest performance levels. Series Mode devices will not contaminate the safety ground. Available in rackmount, stand-alone and specialty models.



For more information from New Frontier Electronics, contact the company in Pennsylvania at (215) 862-9344; fax: (215) 862-0270; or circle Reader Service 109.

**Antex Electronics Digital Audio Adapter**

Antex Electronics introduces the model SX-34 digital audio adapter, offering personal computer users and systems integrators broadcast-quality audio with MPEG compression at a low cost.

Featuring multichannel, ultra-high fidelity, direct-to-disk, digital sound sampling and reproduction, the SX-34 offers users the ability to enhance applications with high performance digital audio record and play functions with industry-Layer I/II and other compression formats.

For more information from Antex, contact Robert Bird at (310) 532-3092; fax: (310) 532-8509; or circle Reader Service 122.

**Absolute Zero Near-Field Monitor from Spirit**

Spirit's Absolute Zero compact near-field monitor both performs and sounds like a much larger studio monitor system.

The woofer utilizes a deep 30mm voice-coil and features optimized suspension enabling it to produce high levels of low frequency from its small enclosure.

This, along with a large-diameter port located on the rear, allows the bass response to remain unrestricted, even at



high listening levels. The soft-dome tweeter is driven by a 25mm ferrofluid-cooled voice coil mounted on a shaped waveguide.

For more information from Spirit, contact the distributor in California at (916) 888-0488; fax: (916) 888-0480; or circle Reader Service 124.

**Cloth-covered Accoustic Panels**

Spacewise Broadcast Furniture introduces the Spacesorber, a cloth-covered, 4-inch-deep, high-density sound absorptive panel.

The panel isolates sound and quiets rooms, but does not sacrifice that for the sake of appearance.

They absorb sound and also reduce the transmission of sound.

These panels are available in many color choices to blend with any room motif.

For more information from Spacewise, contact Peter Palagonia in Arizona at (800) 775-3660; or circle Reader Service 138.

**D-Win Digital Radio Input System**

The D-Win system from the French company, Itis, provides a universal interface for digital radio broadcast (DAB) sources, with as many as eight channels on a single broadcast.

The system accepts up to four synchronous audio or data inputs and four asynchronous data channels, outputting them in the proper format to a WG-1-WG-2 bus for connection to a digital radio multiplexer or to the next unit in the digital broadcast cascade.

For more information from Itis, contact the French Technology Press Office in Illinois at (312) 222-1235; fax: (312) 222-1237; or circle Reader Service 195.







## CART MACHINES...WTS

**Marathon test carts:** #301 head cleaner cart, #302 torque tester, #303 speed indicator set, #303 speed cart only, \$10 ea. M Crosby, 408-363-1646.

**STL alignment carts:** C0030-F1 (NAB), C0031-F1 (IEC), C0234-2-F1 (stereo IEC), X1235-1-F1 (3150 Hz flutter), unused, \$30 ea. M Crosby, 408-363-1646.

## Want To Buy

**ITC Delta triple deck w/record,** clean & reasonable. K Hurst or D Payne, 317-816-4000.

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

## CD PLAYERS

## Want To Sell

**Tascam CD-301 (3) CD plyrs** w/remotes, vgc, \$300/ea; Radio Shack/Optimus CD2460 CD plyrs, fair cond, \$30; JVC XLV251 CD plyr, vgc, \$75. T Steele, WIKE Radio, POB 1490, Newport VT 05855. 802-766-4485.

## CONSOLES

## Want To Sell

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audio console;  
3M 500, 16 trk recorder  
Rick (405) 341-9041

**Collins IC-6 6 pot stereo board** in gd cond, no amp cans, \$1200 +shpg. J Parker, WUSQ, 381 Spinning Wheel Ln, Winchester VA 22603. 540-662-5101.

**Shure FP410 automatic mixer,** 4 inputs, new, \$500. E Davison, 1129 Willowbrook Dr, Springfield IL 62707. 217-793-0400.

**Autogram RTV-12, slide faders,** stereo, vgc, \$3500. G Blau, KXST, 9416 Mission Gorge Rd, Santee CA 92071. 602-956-9696.

**Harris stereo 80, \$1000;** Sparta AS40B 8 chnl board. D Rose, KDUC, POB 432, Barstow CA 92312. 619-256-2068.

**LPB Signature III (2) S-13 8-chnl** stereo consoles, excl cond, \$2500/ea/BO; Ramko DC5MS 5-chnl stereo console, \$200. T Steele, WIKE Radio, POB 1490, Newport VT 05855. 802-766-4485.

**Autogram AC-8 stereo console,** \$2000. Call 817-414-6570.

**CUSTOM:** Mono audio radio console circa 1960 (with tubes), \$300 plus crate & UPS. Call/details (518) 283-2023.

**Soundcraft 600, 32x16, w/patch-** bay, mint, \$6950; Tascam 512, 12x8 mixer, \$750; Tascam 520, 20x8x16 mixer, \$1750; Allen & Heath SYNCON 28x24, great sound, \$8000; Ramsa 820 mixer, \$2200. W Gunn, Box 2902, Palm Springs CA 92262. 619-320-0728.

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**Peavey Deca/700 350W chnl,** \$800. R Branske, Southwest Comm, POB 952, New Lenex IL 60451. 708-399-5444.

**Portable disco, \$1000;** instrument speakers, \$100 ea. D Rose, KDUC, POB 432, Barstow CA 92312. 619-256-2068.

## Want To Buy

**Korg M-1 keyboard.** J Burdick, Chicago Groove, 3 Eastpark Blvd, Villa Park IL 60181. 414-638-9077.

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## Want To Sell

**Harris MSP90, \$300;** Inovonics 270 AGC limiter, \$300. D Rose, KDUC, POB 432, Barstow CA 92312. 619-256-2068.

**Harris MSP-95 FM composite** processing unit, stereo generator, needs minor repair, \$1500/BO as is. S Avery, KRAJ/KLOA, 731 N Balsam, Ridgecrest CA 93555. 619-371-1700.

**Inovonics 222 AM processor/limiter** NSRC, new, \$450; CBS stereo FM volumax units (2), good cond, \$90. T Steele, WIKE Radio, POB 1490, Newport VT 05855. 802-766-4485.

**Orban 245E stereo synthesizer,** \$225. J Gelo, 941-642-6899.

## Want To Buy

**Audio compressor/limiter.** J Powley, WNGS, 9279 Dutch Hill Rd, West Valley NY 14171. 716-942-3000.

## Wanted

**Texar/Gentner Audio Prisms**  
800-678-4762

**Collins 26U-1 or 26U-2, Altec 436** or 438. M Mayeux or K Keller, First Ward Productions, 504-595-8623.

**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, 214-271-7625.

## MICROPHONES

## Want To Sell

**EV RE 38 ND mic w/case, \$330.** 206-839-9414.

**Neumann M49b (M249b), great** cond w/pwr & case, \$4800; Studer SKM5U, mint cond w/case, \$350; Sennheiser MKH415T, great cond w/case & pwr, \$700; EV DL42 shotgun, great cond w/case & shock mount, \$450. P Seretti, Post Snd Corp, 6500 Sunset Blvd, Hollywood CA 90028. 213-462-0000.

**Sennheiser MKH 816 P48 shotgun** mic, near mint cond, will swap for a Neumann U-47 FET, physical cond not important. J Roper, Imperial Sound, 383 N Studio St, Terre Haute IN 47803. 812-877-2663.

**Sennheiser MD421-U5, clean,** \$300. M Crosby, 408-363-1646.

## Want To Buy

**Mic flags for RCA 77 DX & 44 Bx's** or photo copy for flag dimensions. J Manzi, 369 Greenville Ave, Johnston RI 02919. 401-231-6516.

**RCA 77-DX's & 44-BX's, any** other RCA ribbon mics, on-air lights, call after 3PM CST, 214-271-7625.

**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.

**Sennheiser, Neumann, AKG,** many models. W Gunn, Box 2902, Palm Springs CA 92262. 619-320-0728.

## MISCELLANEOUS

## Want To Sell

**ADC Bantam patch bays, 3 row** in new cond (2), \$100 ea; equipment racks, many avail, some new some used, various makes & sizes & cond. J Reichard, WIAV TV 2501 Breenway Ctr Dr, Greenbelt MD 20770. 301-345-2742.

**Comdial voice express speaker** phone w/amplified hand set, \$45; 6 & 10 button phones, cheap. E Davison, 1129 Willowbrook Dr, Springfield IL 62707. 217-793-0400.

**RCA 1966 receiving tube manual;** 1965 Sylvania tube manual w/annotations, \$15 ea +shpg. H McDonald, KKJV, POB 807, Veradale WA 99037. 509-484-4531.

**DB Products DB-254A corner** reflector hi gain, \$192. W Moring, WSCI, 2187 Wapoo Dr, Charleston SC 29412. 803-795-9401.

**Gates 794 4703 motor operated** Rheostat, \$70; GCR201B scissor switch, \$60; Ramko DC5RA 5 chnl mixer w/manual, \$40. F Creser, KC4MOP, 6922 Furness Ave, Oxon Hill MD 20745. 301-567-2012  
eves. Utility 340 270' 18"face/pipe leg, w/lighting, guy wires, base insulated, on ground, \$5000 +shpg. T Callahan, POB 170411, Boise ID 83719. 208-866-1791.

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**Want To Buy**

**Loss of audio alarm**, silence sensor. J Powley, WNGS, 9279 Dutch Hill Rd, West Valley NY 14171. 716-942-3000.

**RCA TA-19** instruction manual. J Powley, WNGS, 9279 Dutch Hill Rd, West Valley NY 14171. 716-942-3000.

**Jazz record collections**, 10" LP/12" LP be-bop, swing, dixie, highest prices paid. B Rose, Program Recdgs, 228 East 10th, NNY 10003. 212-674-3060.

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**Dynaudio BM10's** studio monitors, perfect for FM production rooms. \$750. K Thomas, Rebel Recording, 5555 Radio Ln, Jacksonville FL 32205. 904-388-7711.

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**Want To Sell**

**Wegener 1601** mainframe, many cards, formerly used on oldies format, analog, \$1500/BO. S Avery, KRAJ/KLOA, 731 N Balsam, Ridgecrest CA 93555. 619-371-1700.

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**EBS encoder/decoder**, old system not new EAS. J Powley, WNGS, 9279 Dutch Hill Rd, West Valley NY 14171. 716-942-3000.

**RECORDERS**

**Want To Sell**

**Ampex 440B** 3-3/4 & 7-1/2 in vgc, mono 1/2 trk w/set sync (2), \$275 ea. J Reichard, WIAV TV, 2501 Greenway Ctr Dr, Greenbelt MD 20770. 301-345-2743.

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**Nakamichi 550** portable stereo cassette rcd w/Dolby B & test time, blend mix input, \$250. M Yashicko, KPFA, 1929 Martin Luther King Jr Hwy, Berkeley CA 94704. 510-848-6767 x218.

**Sony MDS-B3** pro minidisc R/P, new in box, \$2100; Aphex compeller/limiter/compressor, \$790/BO. 206-839-9414.

**Otari 5050 BIII** 2 trk, \$3300; Panasonic 3900 DAT w/controller, \$2100. J James, Main Voice Studio, POB 1641, Sausalito CA 94966. 415-331-9346.

**Otari MX 5050** 2 trk r-r, w/stand, 7.5/15 ips, \$1200 +shpg. B Journey, Journey Prod, POB 1103, Cooper Sta, NNY 10276. 212-714-8190.

**Teac X-2000M** 10.5" r-r, electr needs minor repair, \$300 +shpg. J Parker, WUSQ, 381 Spinning Wheel Ln, Winchester VA 22603. 540-662-5101.

**Ampex AG-440** stereo rcd, rack mount, good cond, \$500/BO; Otari MX-5050BII2 stereo R-R rcd, vgc, \$850/BO; Ampex ATR-700 stereo R-R rcd, good cond, \$400/BO; Ampex AG-440 stereo rcd in new Russ Lang cabinet, vgc, \$750. T Steele, WIKE Radio, POB 1490, Newport VT 05855. 802-766-4485.

**Ampex AG440** (4) 1/2" FT rack mount, \$200 ea. F Pierce, WMBW, POB 73026, Chattanooga TN 37407. 423-629-8900.

**ITC Delta 3** deck player, stereo, vgc, \$1100; ITC Delta single deck players (5), stereo gd cond, \$4000. G Blau, KXST, 9416 Mission Gorge Rd, Santee CA 92071. 602-956-9696.

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**McMartin B-802** 8 chnl mono, \$250. T Toenjes, WREN, 201 NW Hwy 24, Topeka KS 66608. 913-437-6549.

**McMartin MX-5** 5 input mixer, similar to Shure M-67, excel cond, \$125. D Meyer, 805-962-8273.

**Otari ARS 1000** (2), BO; (2) Otari MX 5050, BO; (2) Sony RS 700 DAT, \$500. C Barinowski, Good News Network, 3213 Huxley Dr, Augusta GA 30909. 706-733-8201.

**Ramko**, \$150 ea; Technics SL1200 MK2, \$350. D Rose, KDUC, POB 432, Barstow CA 92312. 619-256-2068.

**Studer B-67** (2) 1/4" 2 trk in roll around stands, one set of wheels & one set NAB adaptors, some dents & scratches but seem to work fine, \$1500/BO pr + shpg. A Dentone, Audio Answers, 407R Locust St, Denvers MA 01923. 508-739-4992.

**Ampex AG602-2**, stereo, rack-mounted, \$250; (2) Ampex Samponite cases for 600 Series, mono, brown, \$50/ea; stereo, grey, \$50. M Crosby, 408-363-1646.

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

**Otari MX70's** 16 trk 1", mint, 150 hrs w/video layback system, \$6950; Tascam ATR60-2 in stand, \$1200; Tascam ATR60-8, \$2750; Tascam 58 8 trk, \$1950; Tascam 38 8 trk, \$1650; Otari 5050-8 Mk III, \$2200; Ampex 440C-8 1", \$2900; Ampex 1200 PURC cards, \$400 ea; nakamichi 550 portable cassette, \$250; Custom locator for ANY deck, \$495. W Gunn, Box 2902, Palm Springs CA 92262. 619-320-0728.

**Otari MX70** 16 trk 1", like new, 150 hrs, \$5950; MX70 video layback system, \$900; gd used 1/2"x2500' 456 tape, \$20; 1"x2500' 996 & 250, \$35; Nagra III sync rcd w/SLO resolver, \$695/both; Nakamichi 550 great port cassette, \$250; new 2" MRL short test tapes, \$229. W Gunn, Box 2902, Palm Springs CA 92262. 619-320-0728.

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**Revox A77** recdrs (2), both need work, \$50/ea. M Crosby, 408-363-1646.

**Want To Buy**

**Technics SLP1200** in new to gd cond. J Burdick, Chicago Groove, 3 Eastpark Blvd, Villa Park IL 60181. 414-638-9077.

**Ampex machines**, record electronics, mixers. W Gunn, Box 2902, Palm Springs CA 92262. 619-320-0728.

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

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**Want To Sell**

**Marti STL-10** discrete system on 950 Mhz w/Tx combiner & Rx splitter, 4' & 6' grid antenna's on 950 Mhz, \$350, \$425. J Katonah, 914-336-6199.

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**Burk TC8** & relay panel, \$700; Moseley PBR 15 remote control, \$300; Moseley SCD-8 subcarrier demod, \$200; moseley TR55A 101.7 telemetry rcvr, \$200. D Rose, KDUC, POB 432, Barstow CA 92312. 619-256-2068.

**Comrex 2XP** two-line encoder, case scratched in placed, \$650. R Links, Links Sound, 1656 California St, Berkeley CA 94703. 510-845-5557 aft 6:30 PM PST.

**Comrex LX-T** encoder for single line freq extension, seldom used, like new cond, \$500. A Clough, Ski Areas of NY, 2144 Currie Rd, Tully NY 13159. 315-696-6550.

**CRL SGC-800** stereo gain controller, excel cond, \$1000; Sony DSP-R7 digital delay, stereo, excel cond, \$800. G Blau, KXST, 9416 Mission Gorge Rd, Santee CA 92071. 602-956-9696.

**Moseley MRC 1600** STL/TSL modems, \$500; Marti RMC-15 STL/TSL modems, \$400. T Toenjes, WREN, 201 NW Hwy 24, Topeka KS 66608. 913-437-6549.

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**FM or LPTV stations**, operating, dark or CP, experienced bdctr, will consider joint venture of LMA, prefer purchase or lease. J Powley, WNGS, 9279 Dutch Hill Rd, West Valley NY 14171. 716-942-3000.

**Production company seeking** small FM station in South/Southwest for Christian format. Also seeking co-investors. Robert, CMS, 512-349-0527.

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**7" Maxell** empty reels, brand new, never used, some w/new Maxell boxes. BO. B Clain, The Music Director, POB 51978, Indian Orchard MA 01151. 413-783-4626.

**Audiopak AA4** 5.5 min cartridges, 24 avail, new, \$48. D Kelly, KWPN, Box 84, West Point NE 68788. 402-372-5423.

**Cart tapes**, (117) 10.5 min; (22) 5.5 min; (8) 3.5 min, BO. C Barinowski, Good News Network, 3213 Huxley Dr, Augusta GA 30909. 706-733-8201.

**CD music library**, TM Century Golddisk 3 oldies libary, vgc, always kept in Denon CD cannies, \$3000. G Blau, KXST, 9416 Mission Gorge Rd, Santee CA 92071. 602-956-9696.

**Large quantity of "A" size** carts for sale. 979 count. Consisting of 884 Fidelipac consisting of 480 gray, 233 red, 113 green, 57 blue & 1 gold. 51 Audiopak, 32 Sound Corp of America, 1 Marathon, 1 Tohel, 4 Unireel, and 6 unlabeled, \$0.25/ea/buy all or some. R Meyers, 305-995-2115.

**Lots of misc carts**, hundreds, all lengths, can't be bothered checking them out, \$100/BO. T Steele, WIKE Radio, POB 1490, Newport VT 05855. 802-766-4485.

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Non-profit Christian bdctg organization seeks 5kW-10kW FM xmtr & 4-6 bay antenna near 90.3 kHz. JC Goggan, MO River Christian Bdctg, POB 87, Washington MO 63090. 314-239-0400.

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Tritthich 700A signal level meter, \$1000. J Whatley, WNUZ, 110 Glenhaven Dr, Alexandria City AL 35010. 205-234-2492.

Heathkit IO-10 small, portable tube type oscilloscope from late 1960's. W Gunn, Box 2902, Palm Springs CA 92262. 619-320-0728.

Sencore FC51 counter to 1 Ghz, manual, calibrated at factory, \$275. W Moring, WSCI, 2187 Wapoo Dr, Charleston SC 29412. 803-795-9401.

Tektronix 2754P 21 Ghz spectrum analyzer, w/digital storage, excel cond, \$10,000. G Blau, KXST, 9416 Mission Gorge Rd, Santee CA 92071. 602-956-9696.

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DuMont 279, electr tube H-21, RCA WO-27A, WO-79A, 327A, 715B, Tektronix 511-A scopes; RCA Channelyst. M Vincent, 2101 Camborne Rd, Richmond VA 23236.


Potomac SD31/RX31 synthesized signal gen & companion rcvr. L Murcler, 316 E Highland St, Altamonte Sp, FL 32701. 407-830-6398.

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Hansuld, Act Radio, 718-274-  
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The Music Director, POB 51978,  
Indian Orchard MA 01151. 413-  
783-4626.

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tridges, vgc, \$150/ea/BO; AT1  
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Steele, WIKE Radio, POB 1490,  
Newport VT 05855. 802-766-  
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travel is required.

One telephone order person to handle accessory and support product sales  
from our main office in Glen Falls, N.Y. Send resume's to or contact Rich  
Redmond, at Northeast Broadcast, P.O. Box 1179, So. Glens Falls, N.Y.12803  
(518) 793-2181

## American Radio Systems has an immediate opening for an Assistant Engineer.

## Requirements:

We are looking for a flexible individual who can take direction well. Candidates  
should also have at least two years of domestic broadcast experience, be pro-  
ficient at studio maintenance, all types of remote broadcasts, and computer  
experience including Novell Netware. SBE certification a definite plus. We  
invite all interested individuals to forward their resume to:

KLUC/KXNO Radio  
ATTN: Tracy Teagarden, Chief Engineer  
3510 W. Hacienda Avenue  
Las Vegas, NV 89118

It is the policy of American Radio Systems to provide equal employment oppor-  
tunities to all qualified persons regardless of race, sex, color, national origin or  
religion in all terms and conditions of employment.  
American Radio Systems is an equal opportunity employer and we encourage  
women and minorities to apply.

## National Public Radio has the following opening

Digital Audio Systems Administrator  
#662 Salary commensurate with experience

NPR has an immediate opening for a Systems Administrator to handle full day-to-  
day responsibility for implementation, operation, and training on a multi-phase,  
multi-user digital audio production and on-air system. Demonstrated ability to  
troubleshoot highly complex, networked digital audio workstation systems  
required. Progressive responsibility of 3-5 years managing advanced  
broadcast computer audio system projects required. BSEE or equivalent pre-  
ferred. Ability to work effectively in a team environment meeting high-pressure,  
deadline driven, on-air operational needs required.

For consideration send cover letter and resume to:

National Public Radio  
Human Resources Dept. #662  
675 Massachusetts Ave., NW Washington, DC 20001

Leading radio broadcaster situated in national market areas seeks  
qualified candidates for the following positions:

## Chief Engineers (West-Midwest-East):

Five years experience in radio broadcast engineering. Electronics  
degree, SBE certified and/or FCC License. Ideal background  
includes combination AM, AM directional and/or FM radio. Basic  
trouble shooting and computer capabilities coupled with  
transmitter and studio maintenance experience essential.

## Technical Facilities Manager (California):

Corporate based position reporting directly to the VP of  
Engineering. Ten years experience in AM, AM Directional and FM  
radio. Knowledge of digital technologies related to audio digital  
storage, ISDN, satellite, data circuits and broadcast engineering,  
Computer literate with Novell certification and CAD a plus.  
Understanding of FCC regulations; SBE certified and/or FCC  
License. Studio and transmitter construction skills a must. EOE  
Employer.

Salem Communications Corp. 4880 Santa Rosa Road, Ste.300  
Camarillo, CA 93012, Attn: C. Goldsborough.  
FAX (805) 482-8570

## Sales Engineer /Broadcast Antenna Products

Scala Electronic Corp. is seeking a candidate with a strong technical background to  
promote sales & support customer product & service needs in the design or operation  
of TV & FM transmission systems is highly desirable. Candidates with experience in  
technical sales, knowledge of industry specific antenna systems & applications, familiari-  
ty with FCC rules & regulations, strong technical & interpersonal communication skills  
are preferred. Travel required. If you are self-motivated, results driven & professional,  
enjoy the advantages you'll discover by joining our successful & growing company,  
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Human Resources Mgr., Scala Electronic Corp., POB 4580,  
Medford, OR 97501 fax: (541) 779-3991. EOE

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PROFESSIONAL ANTENNA SYSTEMS FOR  
BROADCAST AND COMMUNICATIONS



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5 KW FM 1969 RCA BTF 5D	10 kW AM 1976 Continental 316F
10 KW FM 1965 Collins 830F1	25 kW AM 1982 CSI T-25-A
10 KW FM 1970 Harris FM 10H3	50 kW AM 1978 Harris MW50C3 (1100 KHZ)
10 kW FM 1968 RCA BTF 10D	50 kW AM 1978 Continental 317C-1
10 kW FM 1976 RCA BTF 10E	50 kW AM 1973 Continental 317C
20 kW FM 1974 Collins 831G2/Cont 816R2	50 kW AM 1981 Continental 317C-1
20 kW FM 1975 Harris FM20K	50 kW AM 1982 Harris MW-50B
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IF YOU WISH TO E-MAIL US, WE ARE AT TRANSCOM@VOICENET.COM

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WELLER AUDIO-VISUAL ENGINEERING  
Baltimore, Maryland  
Phone: (410 or 800) 252-8351  
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Reach radio professionals  
worldwide by advertising in  
Radio World's  
international edition.  
Call Simone for more information.  
**1-800-336-3045**

### ABOUT OUR EMPLOYMENT SECTION

#### HELP WANTED

Any company or station can run "Help Wanted" ads for \$1.95/word or buy a display box for \$60/column inch. Payment must accompany insert, use your MasterCard or VISA; there will be no invoicing. Blind box numbers will be provided at an extra charge of \$10. Responses will be forwarded to listee, unopened, upon receipt. Call 800-336-3045 for details.

#### POSITIONS WANTED

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

Mail to: **BROADCAST EQUIPMENT EXCHANGE**

PO Box 1214,  
Falls Church, VA 22041  
Attn: Simone Mullins

## TRANSMITTER

### TRANSMITTERS

#### Want To Sell

**Cetec/Sparta** 1.5 kW FM xmtr w/out exciter, stereo gen, gd cond, \$3500. J Arzuaga, WLAZ, Clarmont FL. 787-895-0000.

**Gates BC1G** 1 kW/500 W AM on 1320 kHz, clean, '71 vintage, will deliver within 200 miles of Charlotte NC, \$2500. B Elliott, WRFX, 915 E 4th St, Charlotte NC 28204. 704-338-9970

**Collins 830E-1A** 5kW FM xmtr, 2 cabinets, 250W driver & 5kW PA; Rotogen 3-phase gen 30 amps, 230 volts output. Randy, KDKD AM/FM, Clinton MO. 816-885-6141.

**Gates BC-1T** 1kW AM xmtr, 1490KHZ, gd cond, \$750/BO; **Gates BC-250GY** 250W AM xmtr, 1490, \$250/BO. T Steele, WIKE Radio, POB 1490, Newport VT 05855. 802-766-4485.

**Gates BC-250P2** 5 kW tuned to 1590, no pcbs, BO. N Lent, WWIS, Rt 1 Box 279A, Black River Falls WI 54615. 715-284-4391.

**RCA BTE 15A** FM exciter (2), \$250 ea. F Pierce, WMBW, POB 73026, Chattanooga TN 37407. 423-629-8900.

**RF 6** 600 W continuous load, 1500 W surge, 50 Mhz air cooled, \$275. W Moring, WSCI, 2187 Wapoo Dr, Charleston SC 29412. 803-795-9401.

Used equipment for sale: Belar SCM-1, Belar RFA-1, Belar FMS-1, Belar FMM-1, Moseley MRC 1600 system, TFT EBS receiver/generator, Gentner patch panel, and Harris racks. Call Transcom Corporation 800-441-8454 or 215-884-0888.

### Superior Broadcast Products

FM Transmitters - Translators  
Amplifiers - Antennas  
Call Jimmie Joynt  
**800/279-3326**

#### Want To Buy

**Harris AM MW1** 1kW, ok if needs work. C Mellon, WILI Radio, 720 Main St, Willimantic CT 06226. 860-456-1111.

Need manual or readable copy for ITA 10,000 D/S xmtr. J Addison, KHCB-FM, 713-520-5200.

**McMartin AM/FM xmtr**, any model, exciter or stereo modules. Goodrich Ent., 11435 Manderson, Omaha NE 68164. 402-493-1886.

For details on  
space availability  
contact Simone  
at  
**1-703-998-7600**  
Ext.154

### CCA ELECTRONICS

#### USED TRADES

Harris FM2.5k 2.5kw \$9,500  
w/FM MX 15 exciter  
BE FM3.5 3.5 kw FM \$11,500  
w/FM FX 30 exciter  
Harris FM10G 10kw \$9,500  
w/FM Collins 3102 exciter  
CSI FMT3F 3kw FM with \$7,500  
w/EX 20 exciter  
AEL FM 5kw \$6,000  
Harris AMS X 1 \$6,000

#### CCA DEMOS

**FULL 3 YEAR WARRANTY!**

CCA FM 1000SS 100w FM Exciter  
\$4,200

#### NEW SPECIALS!

**3 YEAR WARRANTY!**

AM 1000D 1kw AM \$10,500  
FM 1000SS 1kw FM \$12,000

Compact Solid-State

Call Steve or Tyler

**770-964-3530**

**Gates BC-5P2S** AM, 900 kHz, 5 kW, runs but needs work, extra parts, manual; **Gates BC1J**, 900 kHz, 500-1000 W, gd cond, some parts, manual. L Osborne, WZLK, 446 By Pass Rd, Pikeville KY 41501. 606-432-9805.



### Where In The World Are You?

Reach radio professionals  
worldwide by advertising in

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international edition.

Call Simone for more information.

**1-800-336-3045**

Ext.154

# WE'RE ON THE MOVE

DEMAND FOR ENERGY-ONIX TRANSMITTERS AND STL SYSTEMS HAS BEEN SO HUGE WE MUST INCREASE OUR FACTORY SIZE!

WE ARE MOVING INTO OUR NEW FACTORY WHICH IS OVER 6 TIMES AS LARGE AS OUR PRESENT FACILITY!

PLEASE NOTE THE FOLLOWING CHANGES EFFECTIVE SEPTEMBER 15TH.

NEW PHONE #: 518-758-1690

NEW FAX #: 518-758-1476

NEW MAIL ADD: PO BOX 801  
VALATIE, NY 12184

NEW SHIPPING ADD: 1306 RIVER STREET  
VALATIE, NY 12184

THANK YOU FOR HELPING ENERGY-ONIX BE SUCH A HUGE SUCCESS!

"The Transmitter People"



Circle (163) 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 \_\_\_\_\_ I would like to receive or continue receiving Radio World FREE each month.  Yes  No

Title \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

Company/Station \_\_\_\_\_ Please check only one entry for each category:

Address \_\_\_\_\_

City/State \_\_\_\_\_

Zip Code \_\_\_\_\_

Telephone \_\_\_\_\_

Brokers, dealers, manufacturers and other organizations who are not legitimate end users can participate in the Broadcast Equipment Exchange on a paid basis. Line ad listings & display advertising are available on a per word or per inch basis.

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: 703-998-7600 Ext.154 • Fax: 703-998-2966

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This listing is provided for the convenience of our readers. Radio World assumes no liability for inaccuracy.

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## SUBSCRIPTION/READER SERVICE FORM



### FREE Subscription/Renewal Card

I would like to receive or continue receiving Radio World FREE each month.  Yes  No

Signature \_\_\_\_\_ Date \_\_\_\_\_

Please print and include all information:

Name \_\_\_\_\_ Title \_\_\_\_\_

Company/Station \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ ZIP \_\_\_\_\_

Business Telephone ( ) \_\_\_\_\_

Please check only one entry for each category:

- I. Type of Firm**
- D. Combination AM/FM station  F. Recording Studio
- A. Commercial AM station  K. Radio Station Services
- B. Commercial FM station  G. TV station/teleprod facility
- C. Educational FM station  H. Consultant/ind engineer
- E. Network/group owner  I. Mfg. distributor or dealer
- J. Other \_\_\_\_\_

- II. Job Function**
- A. Ownership  G. Sales
- B. General management  E. News operations
- C. Engineering  F. Other (specify) \_\_\_\_\_
- D. Programming/production \_\_\_\_\_

### Reader Service

Sept 18, 1996 Use until Dec 18, 1996

Please first fill out contact information at left. Then check each advertisement for corresponding number and circle below.

Purchasing Authority

1. Recommend 2. Specify 3. Approve

001	023	045	067	089	111	133	155	177	199
002	024	046	068	090	112	134	156	178	200
003	025	047	069	091	113	135	157	179	201
004	026	048	070	092	114	136	158	180	202
005	027	049	071	093	115	137	159	181	203
006	028	050	072	094	116	138	160	182	204
007	029	051	073	095	117	139	161	183	205
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010	032	054	076	098	120	142	164	186	208
011	033	055	077	099	121	143	165	187	209
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013	035	057	079	101	123	145	167	189	211
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Copy & Mail to: Radio World, PO Box 1214, Falls Church, VA 22041, or FAX to: 703-998-2966



Call Simone Mullins, Classified Ad Manager, to reserve space in the next issue. Use your credit card to pay, we now accept VISA and MASTERCARD.

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### Select from these categories for best ad positioning:

- |                            |                        |                          |                          |
|----------------------------|------------------------|--------------------------|--------------------------|
| Acoustics                  | Computers              | Receivers & Transceivers | Tax Deductible Equipment |
| Amplifiers                 | Consoles               | Recorders                | Test Equipment           |
| Antennas & Towers & Cables | Disco-Pro Sound Equip. | Remote & Microwave Equip | Transmitter/Exciters     |
| Audio Production (Other)   | Financial Services     | Repair Services          | Training Services        |
| Brokers                    | Leasing                | Satellite Equipment      | Tubes                    |
| Business Opportunities     | Limiters               | Software                 | Turntables               |
| Cart Machines              | Microphones            | Stations                 | Positions Wanted         |
| CD Players                 | Miscellaneous          | Stereo Generators        | Help Wanted              |
|                            | Monitors               | Tapes, Carts & Reels     |                          |

### Classified Advertising Rates Effective January 1, 1996

	1x	3x	6x	13x
1-9 col inch (per inch)	\$65	62	58	52
10-19 col inch (per inch)	59	56	52	47
Distributor Director	100	95	90	85
Professional Card	70	64	59	53
Classified Line Ad	\$1.95 per word			
Blind Box Ad	\$15 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 \$195, at the 3x rate \$186, at the 6x rate \$174, at the 12x rate \$156, etc.

Publisher/CEO	Stevan B. Dana	Ad Traffic Coordinator	Kathy Jackson
Chief Operating Officer	Carmel King	Production Assistants	Kris Willey, James Cornett
Production Director	Lisa Stafford	Ad Coordination Manager	Simone Mullins
Production Manager	Lisa Lyons	Circulation Director	Eleya Finch
Publication Manager	Heather Heebner	Circulation Manager	Robert Green
Classified/Showcase Production Coordinator	Vicky Baron	Accounts Receivable	Steve Berto

### Advertising Sales Representatives

U.S. East: Skip Tash	703-998-7600	Fax: 703-998-2966
U.S. West: Dale Tucker	916-721-3410	Fax: 916-729-0810
U.S. Midwest: Sandra Harvey-Coleman	317-966-0669	Fax: 317-966-3289
International: Stevan B. Dana	+1-703-998-7600	Fax: +1-703-998-2966
Latin America: Alan Carter	+1-703-998-7600 ext 111	Fax: +1-703-998-2966
Europe: Dario Calabrese	+39-2-7030-0310	Fax: +39-2-7030-0211
Japan: Eiji Yoshikawa	+81-3-3327-2688	Fax: +81-3-3327-3010

Free Subscriptions are available upon request to professional broadcasting and audiovisual equipment users. For address changes, send current and new address to RW a month in advance at P.O. Box 1214, Falls Church, VA 22041. Unsolicited manuscripts are welcomed for review: send to the attention of the appropriate editor.



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Ext.154





# LOOK

and

# LISTEN



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 **AUDITRONICS**

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GSA Contract #GS-03F-4032B

CE Compliant




# Some Countries Have It ALL!

## WSIX - Nashville, Tennessee "Country Music Station of the Year"

A-500 Studio Furniture delivered March 1993  
A-500 Console S/N 20789 delivered April 1993  
A-500 Console S/N 20792 delivered April 1993  
A-6000 Studio Furniture delivered March 1995  
A-6000 Console S/N 22536 delivered March 1995  
R-16 Console S/N 22557 delivered March 1995  
SP-5 Console S/N 22593 delivered April 1995

1995 Academy of Country Music Award  
1995 Marconi Country Music Award  
1995 Billboard Country Music Award  
1995 Country Music Association Award  
1995 Country Music Association SRO Award  
1995 Gavin Country Music Award  
1996 Gavin Country Music Award  
1996 Academy of Country Music Award

*Wheatstone Model A-6000 Audio Console shown*

 **Wheatstone Corporation**  
tel 315-452-5000 / Syracuse, NY.

Circle (42) On Reader Service Card

See us at WME booth #2311

World Radio History