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**Ed Asner
 On the Radio
 See page 43.**

Radio World

Vol 20, No 17

Radio's Best Read Newspaper

August 21, 1996

FCC Extends Deadline For Towers

WASHINGTON Tower owners in Michigan, Montana, Arizona, Hawaii, North Carolina, Alaska, New Mexico and New York now have Oct. 1-31, to register their towers with the Federal Communications Commission.

The FCC extended the state deadlines because of delays in the release of the tower registration form. The deadlines have not changed for tower owners in other states. That means Massachusetts and Missouri still have the same Oct. 1-31 filing window.

The tower registration idea has been years in the making. Several years ago, Bob Greenberg, supervisory engineer for the FCC, and others at the FCC determined that the tower process was too fragmented. It varied, for example, from branch to branch whether tower measurements should be reported in feet or meters.

With the premise that "a tower is a tower" whether it is for cellular or

continued on page 10 ▶

Justice OKs Jacor/Noble

by Lynn Meadows

DENVER Last summer, leading up to the passage of the Telecommunications Act, the party line for a National Association of Broadcasters member was "more is better" when it comes to owning radio stations.

Nobody strayed from that party line except "outsiders." Even when an owner knew a cross-town competitor could eat his or her stations for lunch, no one strayed from the party line.

This year, the NAB party platform has expanded as the Department of Justice (DOJ) took a closer look at the consolidation taking place in different markets. It now includes what is best described as a "big picture" view of the local advertising market.

New and improved

Owners have embraced this new and improved party line since the DOJ approved the Jacor Communications acquisition of Noble Broadcast Group. By purchasing Noble, Jacor acquired four more radio stations in Denver for a total of eight.

Arbitron results reveal that three of the former Noble stations were among the top 15 stations in Denver. Jacor already owned first-ranked KOA(AM); third-

ranked KBPI(FM) and fifth-ranked KRFX(FM).

Although Jacor now owns six of the top 15 stations in Denver, the Telecommunications Act is silent on what share of a local market a station group can garner.

Dick Maynard, radio board member for Colorado and Nebraska, disagrees that market rank is an issue.

"Should we penalize Jacor because they are good broadcasters?" he asked. Maynard and his wife own KEKB(FM) and KBKL(FM) in Grand Junction, Colo., and have an agreement to purchase another FM soon. He said their goal is to have the top three stations in the market one day and he does not believe they should be penalized when that happens.

True to party line, most operators in the industry seem pleased for Jacor — even its Denver cross-town rivals.

Positive move

"Jacor is a good broadcaster. I think that in the final analysis it will be a positive move and I think it will enhance overall radio value in Denver as they continue to aggressively market the new stations that they are acquiring," said Mike Murphy, vice president and general manager of KJMN(FM) in Denver.

Radio Board Chairman Dick Ferguson said he was "personally delighted" with the Justice decision.

One "outsider" that is not buying into the NAB party line is the American

continued on page 20 ▶

99X Goes the Distance With Olympic Remote

by Bill Bennett

ATLANTA Question: How do you break through new barriers in radio production and engineering, give your listeners something new and innovative and impress 2 million out of town guests?

How about a remote? Done that.

How about a remote running 24 hours a day, seven days a week, from Memorial Day through Labor Day? Now that's a remote!

Atlanta's 99X (WNNX(FM) 99.7) is the only Atlanta radio station broadcasting continuously from its "temporary" studios at the Coca-Cola Olympic City in downtown Atlanta. Most readers will recognize this phoenix-of-a-city as host of the 1996 Centennial Summer Olympic Games, held July 19 to August 4. Two million visitors from around the world will set down in Atlanta, along with 10,000 athletes and another 10,000 accredited broadcasters.

Almost two years ago, 99X anticipated that having a studio in the Coca-Cola Olympic City would be a great way to further its visibility in Atlanta, and that the studio would prove as a test bed for new broadcast technologies. Certainly such a long out-of-station presence would need new paradigms and technologies, and the staff was ready to take on this Olympian task.

Dubbed the 99X InterActive Studio, the station built its home away from home

inside one of the many tents in the Coca-Cola Olympic City.

The facility includes a fully equipped studio for the on-air staff and a visitor interactive area complete with eight computers with full Internet access and a video wall.

"Our reason for doing the studio from Coca-Cola Olympic City was to demonstrate the vast array of media that is available as an information resource, for



99X Studios at Atlanta's Coca-Cola Olympic City

correspondence and for entertainment," said station general manager Mark Renier.

Visitors, whether from up the road or around the globe, can walk up to any of the eight IBM computers (each equipped with two monitors — one at user level, the other elevated for others to see from behind the user) and be linked to the World Wide Web. From there, the user can request songs from the station's current playlist, send and receive e-mail

continued on page 6 ▶

Honestly... What are the options?



With Sage ENDEC, being in full compliance with the FCC EAS mandate is not an option.

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World Radio History

NEWSWATCH

Westinghouse Will Divest

CHICAGO Eager to have the Federal Communications Commission and the Department of Justice approve their merger, Westinghouse Electric Corp. and Infinity Broadcasting Corp. announced two public interest commitments.

In its filing with the two agencies, Westinghouse announced its commitment to sell two radio stations in Chicago to minority owners to foster the diversity of ownership of broadcast stations.

The company also announced it would have on-air Radio Parents' Program Guides for the CBS children's educational television programming schedule.

"Our filings illustrate the extraordinary public interest benefits of combining the radio and television stations of our two companies," said Westinghouse Chairman and CEO Michael Jordan.

Mid America Ag Network Upgrades

OTTAWA International Datacasting is providing Mid America Ag Network based in Wichita, Kan., with a satellite digital audio system for distribution of four channels of radio network programming in a contract valued at more than \$200,000.

Mid America Ag Network will use

International Datacasting FlexRoute satellite digital audio system to distribute news and agriculture programming to affiliated radio stations throughout Kansas and Nebraska.

The new network digital system includes 100 addressable QPSK receivers and replaces analog equipment the company has used since the 1980s. The programming will be uplinked to the Galaxy IV satellite.

RAB Training in Fox Valley

MADISON, Wis. The 15-station Fox Valley Area Radio Broadcasters Association in Wisconsin joined forces

with the Radio Advertising Bureau to administer the Radio Marketing Associates sales training course coordinated by veteran sales trainer Chris Lytle.

The goal of the program is for every radio sales representative in the Fox Valley area with less than one year of experience in radio sales to achieve RMA certification.

The Association pledged to pay half of the \$350 fee with the station or individual covering the other half.

The objective is to ensure a high degree of professionalism among all radio salespeople in the Fox Valley area.

"This is a milestone in radio sales training," said RAB President & CEO Gary Fries. "It marks the first time a local radio association has invested financially in raising the level of professionalism by

continued on page 3 ▶

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World Radio History

Index

FEATURES	
Expanding Connectivity on the Go	20
Interpreting Psycho-acoustics	21
Meet Challenge of Antenna Farming	24
Understanding Millman's Theorem	27
Museum Houses Radio Oddities	29
RUNNING RADIO	
Underwater Elvises Rock the Reef	33
Winning with Localism in Poland	34
Early Talk Radio Solved Problems	35
Positive Attitude Enhances Career	38
Annual Plan Energizes Promotions	39
National Lammont Radio Returns	40
STUDIO SESSIONS	
Radio Drama Is Alive and Well on VOA	43
Setting Standards for FTP Audio Transfers	45
Tascam Portable DAT 'Welcome Addition'	51
BUYERS GUIDE	
American Gets Scoop from Harris	53
Bext LC-STL Proves Itself at KKIQ(FM)	53
Bomar Customizes with Intraplex	54
Telos Changes Thinking at WKSS	56
MUSICAM Reaches Out in Seattle	57
MSI Meets Exact Needs	57
Comrex Nexus Simplifies Remotes	58
Gentner VRC-2000 Is Useful Tool	59
Zercom Fits the Bill at EHC	60
Moseley Products Meet Signal Strength Challenge	60
Marti Still the One for Great Empire	61
Fibox Is Flawless at WFYI-FM	62
Telfax Eases Remotes	62

FCC Hears Back on EEO Changes

by Alan Haber

WASHINGTON The Federal Communications Commission proposed streamlining of its Equal Employment Opportunity (EEO) requirements has stirred a variety of emotions.

With the July 11th deadline for receipt of comments on its Notice of Proposed Rulemaking passed (the Minority Media and Telecommunications Council had not filed its comments at press time), and the review of around 40 comments received ongoing, the arrival of reply comments, set for Aug. 12, is the next step along the road to streamlining EEO requirements for broadcasters.

Among the travelers negotiating the EEO road is David Honig, executive director of the Minority Media and Telecommunications Council, who takes a dim view of the FCC streamlining concept, calling it "a palpable fraud." He also takes exception to the word "streamlined."

"Suppose the Federal Aviation Administration said, 'We're going to streamline air safety. Small carriers aren't going to have to have the record keeping requirements on whether their planes went down, because we're going to streamline the rules to eliminate these burdens,'" he said.

Eliminating discrimination

Honig says that Minority Media's interest "has always been in eliminating discrimination in this industry completely. Make it a thing of the past." He suggests that the broadcasting industry will one day get to a point where minorities are treated equally. In fact, he says, "If I thought it was hopeless to eliminate discrimination in broadcasting, I would pick another career."

According to Honig, Minority Media would like the FCC to set a date for eliminating discrimination in broadcasting.

"We're saying pick a date that you want to be able to truthfully assert that discrimination in this business is over, and the present effects of discrimination are over. And tell us what is the measurement that you will use to be able to pronounce the patient cured."

The FCC's move to streamline EEO requirements for broadcasters, says Honig, "is not only unlawful, it's unconstitutional." Why? Honig says it's "Because it's not motivated by any rational purpose."

Minority Media would like the FCC to set a date for eliminating discrimination.

The FCC would likely beg to differ. The stated commission goal in initiating its proceeding to streamline EEO requirements for broadcasters — particularly those operating small stations or stations in small markets — "is to ensure that its EEO requirements are not unduly burdensome while, at the same time, maintaining an effective EEO program for the broadcast industry."

In addition to proposing the streamlining of EEO requirements, the FCC "is also proposing to adopt guidelines for imposing sanctions for EEO violations to increase predictability for broadcasters and to facilitate resolution of renewal applications."

Interestingly, FCC Commissioner Susan Ness, speaking before the Texas Association of Broadcasters in San Antonio, Texas, Sept. 30, 1995, said that she was "confident we can find ways to reward performance, give greater certainty, and reduce the paperwork burden, especially for smaller stations, without impairing the (EEO) program effectiveness."

"The goal of the commission EEO rules," she continued, "is for a station's employees to reflect the diversity of the community's workforce. We need to keep our goal in sight."

Streamlining

Toward that end, the FCC process of working toward streamlined EEO requirements continues. Predictably, EEO is also the center of attention elsewhere.

Take, for example, the case of religious

a forfeiture in the amount of \$50,000."

Enter Congressman Charles Taylor, R-N.C., who attached an amendment to the Commerce, State, Justice and Judiciary (CJSJ) appropriations bill (H.R. 3814). The amendment, in part, specified that "none of the funds appropriated by this act shall be used to deny or delay action on a license, license transfer or assignment, or license renewal for any religious or religiously affiliated entity on the basis that its recruitment or hiring of full or part time employees for any position at a broadcast facility licensed to such entity is or was limited to persons of a particular religion or having particular religious knowledge, training or interests."

Taylor's amendment, according to a press release, was adopted on July 24 by the House Appropriations Committee by voice vote and attached to H.R. 3814 for the 1997 fiscal year. FCC funding is provided for in the bill, which now must be approved by the full House, the Senate, and then signed by the President.

Hot topic

It is unlikely that EEO could be anything other than a hot topic of conversation around any table in the broadcasting community. It certainly is a topic of concern at the NAB, which filed its comments on the FCC proposed streamlining of EEO requirements on July 11. In the executive summary, the NAB stated that it "supports most of the concepts presented in the Notice of Proposed Rulemaking."

The summary notes that "Raising the

continued on page 10 ►

NEWSWATCH

► continued from page 2

having all of their members enroll in RAB Radio Marketing Associate correspondence courses."

Another First for Atlanta

ATLANTA For the first time, the Atlanta radio industry will have its own awards program to recognize excellence and creativity in their field.

The Achievement in Radio (AIR) Awards are a broadbased competition, which will award distinction to Atlanta radio stations in over 22 categories, including news, public service, promotions, talent, advertising and sports coverage.

The awards luncheon will take place Nov. 14 at The Grand Hotel. Entry forms and tickets to the event are available by calling the March of Dimes, which benefits from the proceeds, at (404) 350-9800.

Forming a Billion-dollar Group

CHANTILLY, Va. Hicks, Muse, Tate & Furst Inc. signed an agreement last month to acquire Osborn Communications in a deal valued at more than \$100 million.

Hicks, Muse, Tate & Furst plans to grow its newly formed company, Capstar Broadcasting Partners, into a group of mid-market radio stations worth up to \$1 billion reported BIA Publications.

The purchase of the 17-station Osborn group follows the first Capstar acquisition, that of Commodore Media in June. When the deal is complete, BIA reports Capstar will own a total of 50 radio stations in 14 markets and be worth \$49 million based on 1995 revenues.

SpaceCom Rolls Out HyperCubed

TULSA, Okla. SpaceCom Systems announced in July the roll-out of HyperCubed, new satellite technology for point-to-multipoint distribution of high-speed data.

The technology will be implemented by October using the Galaxy IV satellite and will reduce the transmission costs of high-speed data channels via satellite.

The HyperCubed service will feature an eight-channel satellite receiver with extensive diagnostics and reporting capabilities.

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Fall Season Packed with Ideas

WASHINGTON It is hard to believe, but World Media Expo and the National Association of Broadcasters fall radio show are just around the corner.

The event will be held in Los Angeles, and the dates are Oct. 9-12. The NAB is hoping to draw a big crowd and is pulling out all the stops to get it. Just announced, seven of the industry's most respected professionals will convene for a forward-looking discussion. "Group Heads: Meeting the Challenge of Change."

Among the heavy hitters on the panel are Bill Clark, former chairman and CEO of Shamrock Broadcasting Inc. (as moderator), Bob Callahan, ABC Radio, Steve Dodge from American Radio Systems and CBS Radio President Dan Mason.

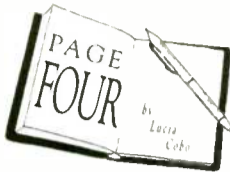
Change dominates the radio landscape in the fields of regulation, business and technology.

And what the shape of radio down the road will be is an interesting question. But, as evinced by "Frazier" and "NewsRadio" on NBC and "WENN Radio" on American Movie Classics, radio past and present is still a pretty interesting and entertaining subject.

To these add one more: "The History of Talk Radio."

The hour-long program is a comprehensive and amusing documentary that provides a closer look at the fastest-growing radio format in the United States. The program focuses on little-known facts that surround the early years of talk radio and includes some never-before seen archival material of some of the pioneers of the genre, including Joe Pyne, Alan Burke, Long John Nebel and Barry Gray.

The documentary includes interviews and interactive clips of leading talk show personalities, including Larry King, Bob Grant, Dr. Laura Schlessinger, Ollie North, Dr. Ruth Westheimer, Morton Downey Jr., G. Gordon Liddy, Howard Stern, Don Imus and Rush Limbaugh.



News anchorman Marvin Scott hosts the program, which is a combination of black and white and color images.

"The History of Talk Radio" is available for \$19.95. If you want more information, contact Jennifer Schaefer at (908) 229-2343; fax: (908) 229-0066.

Inovonics Inc. is giving away an "Old Radio Station Poster." For those of you who attended the spring NAB, it is a copy of the 1940-

style photomural of a radio station studio (see photo). If you are interested in a copy, write Inovonics at

1305 Fair Ave., Santa Cruz, CA 95060 or e-mail to inovonics@aol.com.

I forgot to mention at the beginning that World Media Expo time also means RTNDA and SBE time as well!

On the RTNDA front, the association has put together a radio track, with interesting sessions, including: "Arbitron Boot Camp: Putting Vital Rating Information to Work for Your News Operation"; "Trends in Radio News Technology"; "Program Directors and News Directors: Teaming up to Get More Listeners"; "Captivating Listeners: High Energy Newswriting for Radio"; "Profitable Partnerships: How Radio and Television Newsrooms Can Work Together to Get Ahead"; and "Increasing Profits from Radio News."

In addition to its radio track, RTNDA has pulled together a Small Market track. Small Market programs include: "The Small Market Challenge: Staffing Your Newsroom"; "Attention-getting Promotions on a Limited Budget"; and "Think Big: Creating a Major Market Look for Your Small News Operation."

I mention these because it seems

that fewer and fewer radio personnel get to go to the fall show, and I think it is important to keep infusing your staff with education and fresh ideas. You have to spend a little money to make some money.

On the engineering side, the Society of Broadcast Engineers will feature its Ennes workshops, including digital issues, storage and networking issues, regulatory concerns, EAS updates and concerns and of course, digital audio broadcasting.

I know that budgets are lean in radio these days — particularly when it comes to travel for the station engineer — but see if you can't dig deep for some extra cash and let your staff bring you up to date on what is going on in the world of radio.

And speaking of the EAS, an EAS training seminar for all Maryland broadcasters

— radio, television and cable — is scheduled for Wednesday, Sept. 11, at the Hilton Inn in Pikesville, Md., located at the Baltimore beltway (Interstate 695) and Exit No. 20 and Reisterstown Road.

A continental breakfast kicks off the day at 8 a.m. The session will begin promptly at 9 a.m. and is slated to last until 1 p.m. Frank Lucia, head of EAS at the FCC (as well as other commission staffers) will be in attendance along with representatives from the Maryland Emergency Management Agency, the National Weather Service, FEMA and other concerned officials.

At the conclusion of the seminar, vendors of type-approved EAS equipment will be on hand to offer hands-on demonstrations of their respective EAS equipment.

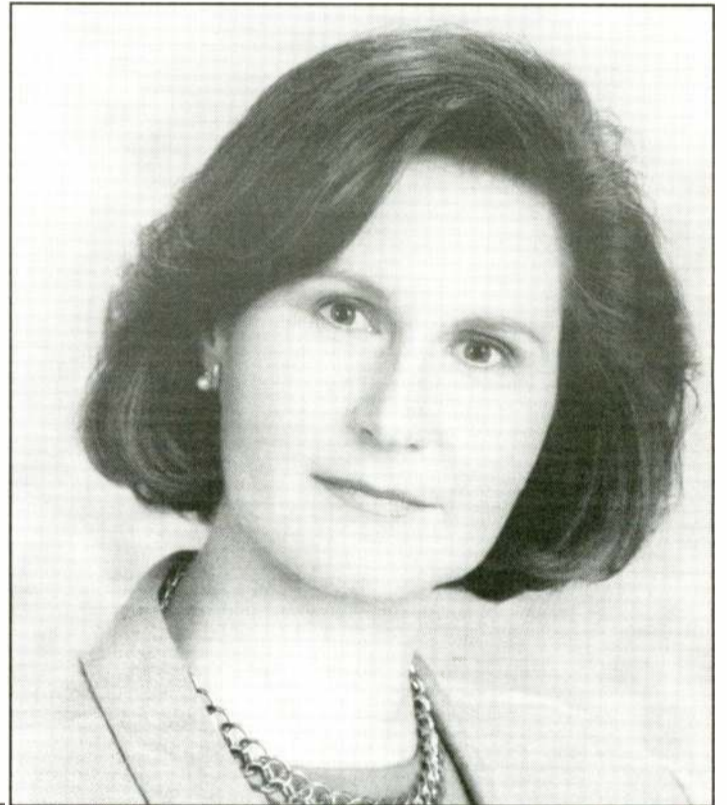
Any questions should be addressed to the State Emergency Communications Committee of the Maryland Emergency Alert System at (410) 269-0700 or (301) 261-2667.

Sokusky Joins Netcast

Netcast, a live audio and multimedia entertainment network on the Internet, named Anna Mae Sokusky vice president of content development. She will be responsible for securing content partners and developing programming primarily for Netcast news, sports and talk channels that will launch nationwide this fall.

Prior to Netcast, Anna Mae Sokusky served as vice president of CBS Radio AM stations.

Anna Mae Sokusky



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World Radio History

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MiniDisc uses

Dear RW,

I read with interest the article by Frank Beecham in the 24 July issue of *RW* about the much needed rebirth of the MiniDisc format. I agree that it has for some unknown reason been overlooked as a real format for both home and broadcast use.

I found a use for the format that seems to turn heads when I talk about it. We use MiniDisc as a background music source for a still photo classified channel on a channel in our cable system. Yup — that's not a misprint — I did say cable.

Photo classified advertising is taking off as a revenue generator on many cable systems throughout the country. Items for sale such as used automobiles and real estate seem to be the driving force behind the success of photo classified. The ads usually include a voice-over describing the article for sale that gets digitally recorded as a file onto a hard disk along with the associated image file. The two files are married and scheduled to run

along with other such files to generate the show.

To enhance the service, background music is played as a music under format, but with the capabilities of ramping it up and down to accommodate the spaces between voice-overs. Usually the source for the background music would be an inexpensive cassette tape player, and most places will opt for a consumer deck that has a continuous loop feature to keep the music going.

But the longevity of a consumer machine used in a 24-hour-a-day format and the inevitable poor quality of the audio to be had — including the commonplace phase errors on account of poor tape path stability and alignment and the severe wow and flutter that result from wearing pinch rollers and capstan motors — I felt, was just an accident waiting to happen. Listening to source music is fatiguing and can cause a listener or viewer tune out scenario. Enter a Mini-Disc to solve the problem.

I admit that cost of MiniDisc appears to be higher than that of a cassette deck, but I was successful in proving the opposite.

A real cassette deck that employs a true dual capstan tape transport system retails for around \$650. Running it continuously will probably mean the need to replace the pinch roller assembly at least once every four to five months, and the capstan motor may need to be replaced once a year to keep the unit performing to spec.

The MiniDisc recorder player that I purchased was bought for right around \$500 — give or take a little considering taxes and such. The rewritable media (the disc themselves) was bought for about \$10 each in a pack of 10.

The system has been playing continuously now for the past two years without any additional costs for maintenance at all. Therefore, I realized not only a cost savings up front, but an on going maintenance savings of time and materials too.

Some other obvious advantages besides the overall lower costs are the CD quality of the playback and the ability to shuffle the music on the disc in a random fashion so the listener never hears two music selections back to back. And we get to select the music that gets put on a disc, which opens the field for locally recorded music to be included in the mix without the need for a costly CD writer.

I feel that MiniDisc is a clear example where you can get more for less. Now if Sony adopts that philosophy in their marketing, their dream of the format propagating could become a reality.

Michael D. Leonard

Production Facility Engineer
Time Warner Cable of Maine

No misconception

Dear RW,

No misconception on Discrete vs. Composite Transmission.

Intraplex is responding to a recent letter written by QEI's Eric Alan Eckstein that

Simply, Good Radio

The more things change, the more they stay the same.

Technology, savvy management and a dash of fun add up to showcase radio as the most enduring and mobile of all media. Nowhere has this been showcased better than at this summer's Centennial Olympic Games in Atlanta.

Witness the deft use of new technological tools that WNNX(FM) "99X" is employing to touch

listeners and serve its community (see page 1).

The facility boasts the best in modern technology, including a fully-equipped studio for the on-air staff and a visitor interactive area complete with eight computers with full Internet access and a video wall.

But step back from all the cool technical wizardry and what you have is a basic radio remote.

Witness the use of the Telos Zephyr to import the post-apartheid national anthem of South Africa, something the National Olympic Council of South Africa forgot to bring (see page 18).

In an Olympian flurry of late night phone calls and mad dashes to the studio, the SABC librarian, within one hour, was able to find the CD, and using a Telos Zephyr Digital Network Audio Transceiver in Atlanta linked via ISDN phone lines to another Zephyr in Johannesburg, forward a clean, high-quality rendition of the anthem in time for the gold medal ceremony.

OK, so that is not a radio story *per se*, but it is cutting edge radio technology that came to the rescue.

A job well done to the folks at 99X for the foresight to capitalize on technology and a once-in-a-lifetime opportunity to hit the streets of their community with style and savvy.

Kudos, too, to the fast-thinking broadcasters at SABC for saving the day. Technology can be a wonderful tool that reinforces all of radio's assets. Exploit it wisely and you too can reap the rewards of working in radio.

—RW

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Next Issue of Radio World
September 4, 1996

was published in your June 12 issue. In his letter, Mr. Eckstein stated that there was a misconception at this year's NAB Engineering Conference when Intraplex made a presentation on "T1 Digital STL: Discrete versus Composite Transmission." I would like to clarify this issue.

Intraplex has stated that it is not possible to digitize an FM composite stereo signal at 16 bits resolution and send it uncompressed over a T1 line.

The composite signal contains frequency components out to 53 kHz, and Nyquist tells us that the sample rate must be greater than or equal to twice the highest frequency contained in the signal. The math is simple: 53 kHz x 2 x 16 bits = 1.696 Mbps, which is greater than the 1.536 Mbps of payload available in a T1.

QEI Corporation claims to transmit "uncompressed" FM composite stereo signals within T1 bandwidth, and points to their document "Stereo Signal Communication System and Method," issued in 1991, to support this claim.

I have read and understand the QEI document. The scheme is basically this: At the studio end, they partially demodulate the FM composite signal by sampling it at 76 kHz, using a clock that is phase-locked to the 19 kHz pilot tone contained within the signal. With 16-bit sampling, this generates approximately 1.22 Mbps of data, which is sent to the transmitter site. At the transmitter end, they reconstitute the full stereo signal by finishing the demodulation process using DSP, and then using the data to produce a new replica of the composite signal. Because they can't count on the original signal being phase or frequency locked to the T1 transmission system, they also include a data-rate justification scheme that requires a second phase-locked loop at the transmitter end.

The bottom line is this: QEI does not transmit an uncompressed composite

stereo signal. Depending on how you want to define the terms, they are either demodulating or compressing the signal prior to transmission. Granted, the compression, which relies on the inherent redundancy that is in the sidebands of the 38 kHz subcarrier, is lossless (as opposed to lossy schemes such as APT-x and MPEG), but it is compression just the same.

While this system works just fine in theory, you should know that it is very sensitive to timing errors. For example, a phase error in the 76 kHz sample clock at the studio end of 140 nS (1.92 degrees at 38 kHz, or 0.96 degrees at 19 kHz) can degrade stereo separation to about 65 dB.

In other words, the phase-locked loop at the studio end must maintain a total phase error of approximately 1 degree while extracting the low-level 19 kHz pilot signal from the composite input in order to meet QEI's published specification. A phase error of as little as 3 degrees at 19 kHz (440 nS) will degrade stereo separation to 45 dB.

Also, QEI makes no effort to mitigate against bit errors in the T1 transmission medium, which cause pops and clicks in the audio in the best case, and can confuse the data-rate justification mechanism, shutting down the transmission link in the worst case.

A true 16-bit uncompressed discrete stereo transmission system with error mitigation, such as the PT/PR-350 modules that Intraplex offers, uses slightly less T1 bandwidth (1.152 Mbps) and cannot degrade the audio quality of your signal.

The combination of error mitigation and robust T1 framing algorithm delivers consistently high audio quality, even at relatively high bit error rates.

David Tweed
Engineering Design Manager
Intraplex Inc.
Westford, MA

DARS: Broadcast Pioneers?

by Lynn Meadows

WASHINGTON It might not be long before satellite digital audio radio service (DARS) companies can start their services.

The Federal Communications Commission is attempting to move DARS forward by creating a panel which will study the issue of which of the applicants is entitled to a "pioneer preference."

Since spring, FCC Chairman Reed Hundt has been exchanging letters with Thomas Bliley, R-Va., and John Dingell, D-Mich., about the commission pioneer preference policy relating to DARS.

Pioneer hopes

Three of the four DARS applicants have applied for a pioneer preference: Digital Satellite Broadcasting Corp. (DSBC), CD Radio and Primosphere.

"To be blunt, I was underwhelmed by the description of the procedures used by the commission," Dingell wrote of the process utilized to examine the DARS applications for Pioneer Preference awards.

In a letter dated June 12, Dingell added he found the FCC decision not to employ peer review panels "particularly disturbing."

In late July, an FCC official said the commission was putting together a panel to review the pioneer preference claims of the applicants.

"We think this is the best way to move the item along," said the FCC official. He did not comment on whether the new panel was inspired by the letters from Dingell and Bliley.

Review panel

The review panel is expected to be comprised of five people from outside the commission who have expertise in satellite technology. They will have to determine who — if anyone — is entitled to a pioneer preference.

CD Radio filed its pioneer preference request for a license on July 30, 1991. DSBC and Primosphere each filed their applications for pioneer preference on June 2, 1993.

Three of the four applicants have applied for a pioneer preference.

The FCC allocated the 2310-2360 MHz band (S-band) for satellite DARS early in 1995. Because the applicants had informed the FCC that 12.5 MHz was the minimum amount they required to turn a profit, the 50 MHz allocated looked like it might be divided perfectly among the four.

Information provided by Canada.

however, suggested that the upper and lower-most portions of the S-band were far more encumbered with existing use than the FCC had anticipated.

While the FCC spokesman would not rule out using those portions of the band for DARS, he did say it will be much harder to put DARS in those portions of the band.

That seems to leave 25 MHz available for DARS — making a fair resolution of DARS licensing more challenging.

Last fall, CD Radio got the go-ahead from the FCC to begin working on its satellite. The FCC basically told the company to "proceed at its own risk."

David Margolese of CD Radio, said the company has invested \$20 million in DARS so far. To be eligible for a pioneer preference, a company must propose a

new service, develop the new technology to make that service possible and demonstrate that it works.

Margolese said he thinks it is well known that CD Radio conceived the idea of DARS, invented the technology and proposed it to the FCC.

Changes

A lot has changed in those six years. Six years ago, auctions were not a possibility. Then, last fall, Hundt suggested that he might consider auctioning the spectrum to DARS applicants.

Thomas Bliley, chairman of the House Committee on Commerce, penned a letter in May expressing his concerns about the possibility of granting one of the four companies a pioneer preference.

Bliley questioned how the FCC reconciled a Pioneer Preference award program with a license award system based on a free market.

"I think the record is very clear," said Margolese. "We think we're very entitled to that grant" of a pioneer's preference. ☺

99X Interactive Studio

► continued from page 1

from the 99X account, e-mail athletes via IBM FanMail, play games and surf the entire Web, all from the Netscape Navigator browser.

To curb uncontrolled WWW browsing, the home site for each kiosk rests at the truly original URL of <http://www.com/99X>. From here users can click their way to the available music selections, e-mail, games, chat and related sites. Users also can manually type in their own URLs. On most days, assistants are standing by to help the uninitiated.

As the 99X Internet presence is available to anyone with WWW access, the station has the opportunity to mention components of its site to listeners, confident its audience can access the site immediately.

The listeners do not have to be physically located at the Olympic City to benefit from the station's offerings. Needless to



say, sponsors enjoy this type of broad coverage.

Webnet Media designed the 99X web site, and Internet Atlanta provided connectivity to the Internet backbone via a dedicated T1 line to the Olympic City site.

To augment the broadcast site, a 3x3 CRT-based video wall projects images from several sources, including cameras in the studio and music videos from videotape.

The cameras are used to project images from the main and backroom studios

(parts of both studios are not visible via the windows). The environment of the InterActive Studio is enhanced by theatrical lighting, as gobo patterns project the 99X logo on the floor and other luminaries provide additional atmospheric lighting.

On the studio side of the Olympic City facility, the main studio is equipped with a standard audio board, CD players, DAT machines, live-assist automation, Telos telephone hybrid, Macintosh-based VoxPro DAW (for editing callers) and related studio gear.

While all music comes from CDs at the Olympic City studios, a touch-screen operated Enco live-assist system plays the spots, jingles, bumpers and related material from hard disks back at the main studio.

Linking the main and remote studios is another T1 line, connected at either end by an Intraplex T1 mux/demux.

Via the T1 span, 99X uses 18 time slots for stereo 15 kHz 16-bit audio at a 44.1 kHz sampling rate. Other slots are used for remote control of the transmitter site and connectivity to the main office Novell network.

The Telos control head at Olympic City talks to the 1A2 key system at the main studios via the T1, with the audio from the selected caller being routed to the remote studios on the same T1.

"The digital broadcast booth offers our listeners top audio quality, and the announcers ease of operation in an unusual remote environment," Renier said.

Indeed, the announcers have all the resources that they would normally have at their familiar home studio location, but they can also enjoy the added benefit of being out with their listeners.

Only lately has such technology made lengthy remotes practical, and the addition of Internet promotions makes for even more coverage.

All this leads one to ask: When is a remote not a remote, but a complete studio relocation? Only 99X knows for sure.

□ □ □

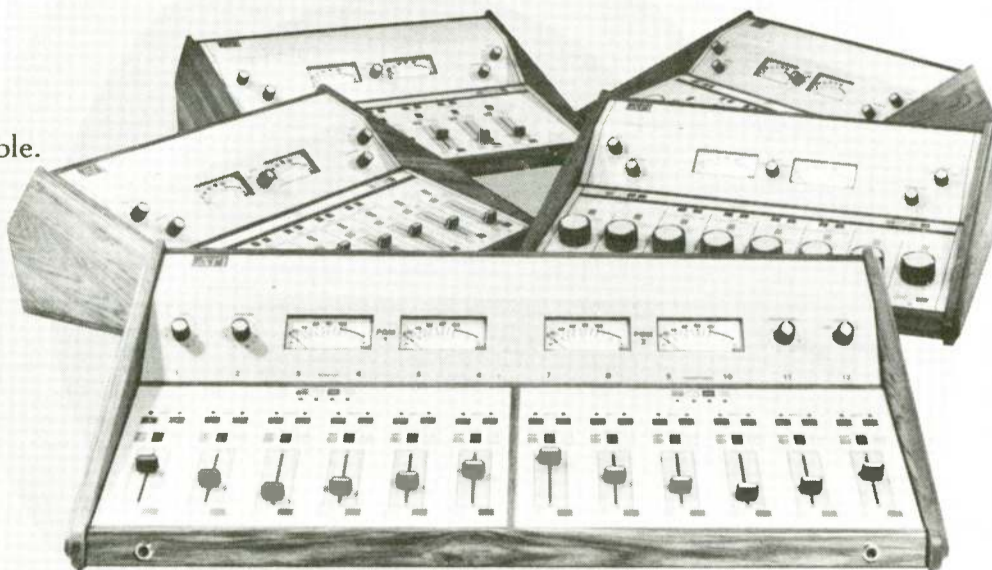
A broadcast engineering manager for the 1996 Summer Olympic's Host Broadcaster, Bill Bennett is now spending his time prognosticating the future of media convergence. You can e-mail him at 70742.365@compuserve.com ☺

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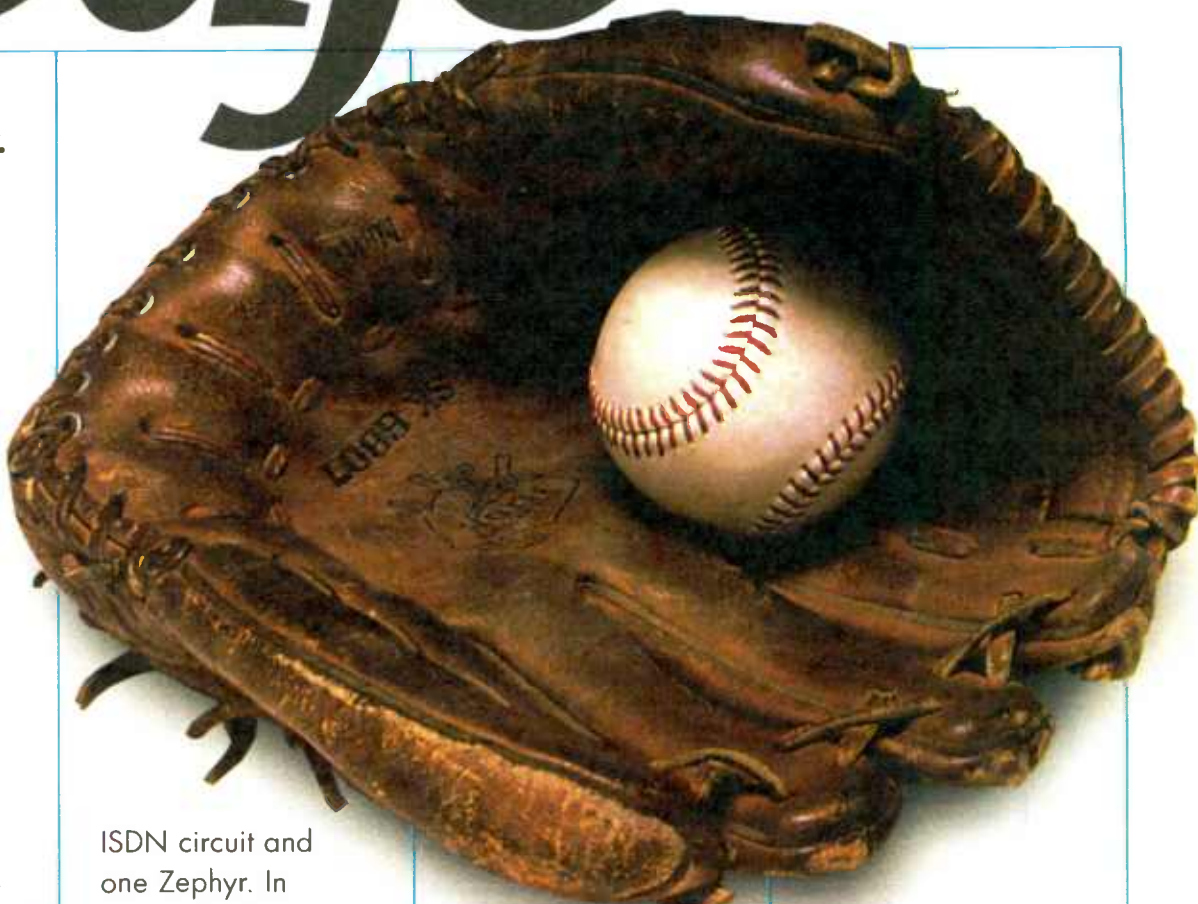
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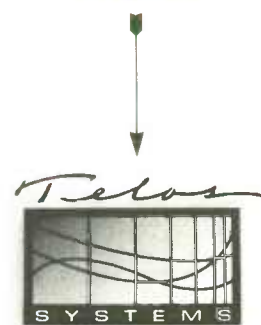
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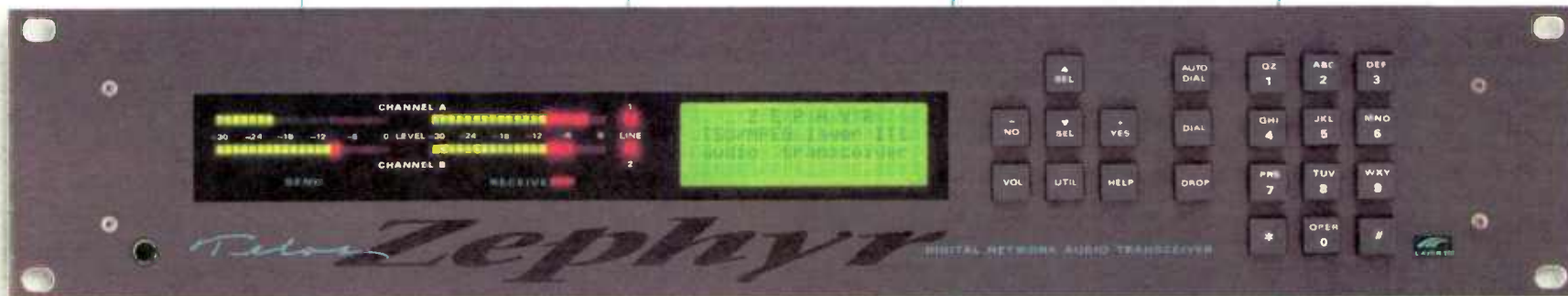
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World Radio History

Seattle Site of Seiko SCA Test

by Bob Rusk

SEATTLE Like people everywhere, workers throughout this city dread the evening commute. Freeway traffic jams, buses that run late and countless fender benders cause more headaches than an FCC inspection.

To ease the frustration, wouldn't it be nice if commuters could see what traffic was like before leaving the office? Well now they can, with S.W.I.F.T. — an acronym for Seattle Wide-area Information For Travelers.

S.W.I.F.T. is a one-year project (scheduled to run through July 1997) to study the use of the Seiko Communications FM subcarrier High Speed Data System

(HSDS) network to disseminate travel information via three devices: the Seiko Other partners include the Federal Highway Administration; the Washington

This will allow us to warn motorists ahead of time to avoid traffic problems.

—Larry L. Senn

Washington DOT S.W.I.F.T.

Project Manager

MessageWatch; the Delco Electronics Telepath 100 in-vehicle receiver; and an IBM portable computer.

State Department of Transportation; Metro Traffic Control; and the University of Washington.

Using the computer, motorists will be able to click on a map showing a portion of the city — such as downtown. Green dots on the streets indicate traffic is flowing smoothly, yellow means slow, red means traffic has stopped.

Watching a demonstration, a key is pressed and another map appears on the screen showing a car-shaped icon with its hood up stalled on the Evergreen Point Floating Bridge. Text at the bottom of the screen explains the incident: Hwy 520 and Evergreen Floating Bridge. Disabled vehicle.

National project

"This is part of the national Intelligent Transportation Systems (ITS) project," said Larry L. Senn, Washington Department of Transportation S.W.I.F.T. project manager. "We believe this will allow us to warn motorists ahead of time to avoid traffic problems by taking alternate routes."

Added Seiko's Gary Gaskill, system architect, "We can identify how much traffic is in the high occupancy vehicle lane and whether the other lanes are full. You can be sitting in your office before the commute and pick your route, deciding which freeway would be best."

And with S.W.I.F.T., there is no more waiting at the bus stop wondering if or when you will catch a ride. Icons indicate exactly where the buses are on the map. The icons move about every two minutes, indicating actual movement of the buses.

A menu allows users to request information for specific bus routes.

"Now you have to decide if you have time to get that double mocha or if you have to stay put because your bus is coming," Gaskill said.

Data available on the MessageWatch is limited to a 16-character alphanumeric display.

Each of the character positions is comprised of seven segments, making it difficult to form letters with anomalies like "G" and "Q" or diagonals like "M" or "X." The undisplayable alpha characters are replaced with the underscore ("_") symbol.

Messages consist of a top line and a bottom line of up to eight characters each. The left portion of the top line shows a number signifying the interstate or highway on which the incident is located.

The right-hand portion of the top line is a three-character display that begins with either the letters "CL" (indicating that the road is closed for a non-accident condition such as weather or construction) or "L" (severity Level), followed by the number 1, 2 or 3.

Also on the top line is a letter indicating the direction on the highway in which the incident is located.

A lower case "n" is used for north, for example, but "w" is used for west. A small case "b" indicates both directions.

The bottom line is an eight-character abbreviation of the cross street nearest to the incident.

According to Lee Balzer, Seiko ITS project manager, 500 of the watches will be handed out to the general public for use during the duration of the study. The computer application, using 100 units, is scheduled to begin on October 1.

By that time 100 of the Delco receivers should be on the road, with about 20 of

continued on page 14 ►

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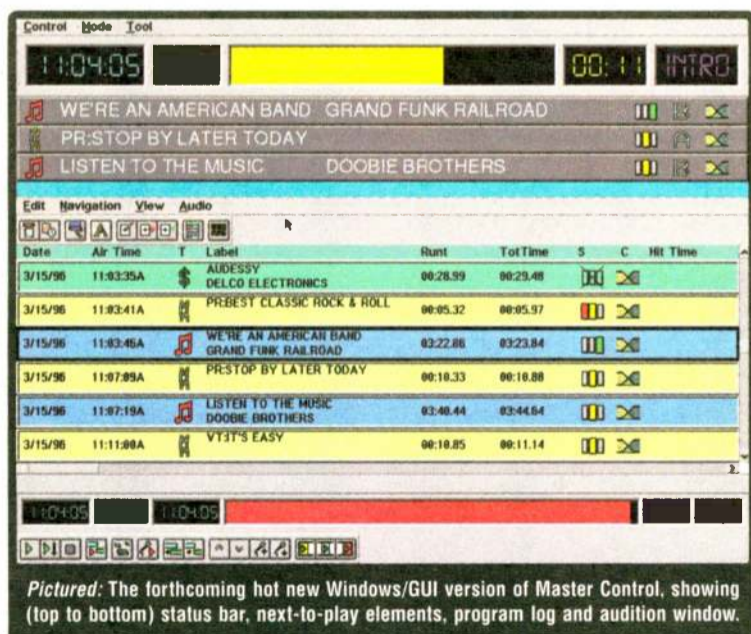
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GM, WTMX/Chicago



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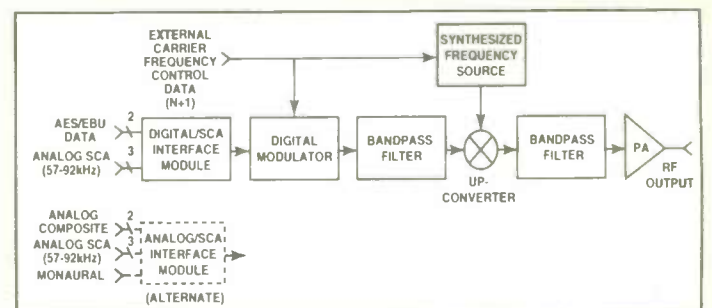
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Deadline Extended

► continued from page 1

broadcasting, the team spent over two years analyzing and dissecting what changes should be made.

They isolated 23 issues that they felt should be addressed. These included whether registrants should pay a fee, how AM arrays should be registered and whether all towers ought to be registered.

When the team compiled a Notice of Proposed Rulemaking, Greenberg said it was "one of the few items where there was pretty much no opposition."

Only tower owners whose structures meet the FAA notification criteria are required to register their towers. In a paper on FCC tower registration,

Greenberg wrote that approximately 75,000 of the 500,000 antenna structures in the United States require notification to the FAA. On average, there are 12 tenant licensees on each of these 75,000 antenna structures. By requiring only the owners to register their towers, the FCC will reduce filings by a factor of 12, wrote Greenberg.

Because the FCC requires only the owner to register the tower, the number of entities responsible for antenna structure painting and lighting is reduced from 900,000 licensees to 75,000 owners.

Registration will also reduce the time it takes to process antenna structure-related applications and notifications requiring

consideration of painting and lighting specifications. The eventual plan is for everybody to be able to tie in to a tower database. If the light on a local tower is out, someone will be able to get the number off the base of the tower, call into the database and find out who owns it.

Greenberg said the industry could save millions of dollars over time in filing procedures alone. In the old days, if a tower owner increased or decreased the height, the other tower licensees minding their own business would have to file — that meant filing fees and consultant fees for everyone.

By July 1998, that will be a thing of the past.

□ □ □

For more information and the necessary forms, tower owners can contact the FCC at (800) 322-1117.

Comments Filed on EEO Rules

► continued from page 3

threshold for reporting requirements will provide much paperwork relief to many stations, while having little effect on the commission EEO mission.

"If the threshold is raised to those with 20 or more employees, the burden would be lifted from 4,616 stations currently subject to reporting, while affecting only 23.7 percent of employees at stations subject to reporting. Raising the limit on requiring a written EEO program for minorities would also aid stations with little minority representation in their local labor force. We recommend raising the threshold to 10 percent."

If the FCC "is truly going to look at the local labor force numbers and make broadcasters live up to their so-called reasonable steps standard in attracting women and minorities," said NAB Staff Attorney Terry L. Etter, the commission "should be a little more realistic about how far broadcasters should have to go in order to attract women and minorities ... If a broadcaster makes a statewide search in some instances, that's probably the best they can expect out of them."

The executive summary also states, among other things, that the NAB supports "the commission proposals to give greater credit to those broadcasters who participate in joint recruiting efforts and to allow broadcasters the option of using alternative labor force data for comparing their staff profiles."

Counterproductive

Additionally, according to the summary, the NAB recommends "that the commission not scrutinize the EEO efforts of small market broadcasters ... who have no history of past discrimination."

Etter says that, "particularly for small market stations" that "don't have a lot of staff" or resources, "requiring them to make all this paperwork is essentially counterproductive." For many small market stations, he said, "it's difficult to attract personnel of any qualification. let alone people with right skills, and so oftentimes (stations are) just glad to have the first warm body come through the door and hire them.

That's why we think (this paperwork is) too much of a burden on small market broadcasters — that should be relaxed a bit."

When will the FCC EEO process be resolved? That's hard to say, although an anonymous industry source had a suggestion: "I really don't see (the FCC) doing anything until after the election, probably because Reed Hundt would like to see what his commission looks like after the election."

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WZHF(AM) Premieres Health Format

by Alan Haber

WASHINGTON Warning: You may feel compelled to run through a couple of push-ups and jumping jacks after reading this.

Washington's Viacom Inc.-owned WMZQ-FM, which simulcasts country programming on its same-name 5,000 W AM outlet, announced it will switch to a health and fitness format on the AM side effective July 29. The station applied for the call letters WZHF.

Health and fitness? On the radio?

"I've always been of the opinion that simulcasting an AM radio station is a waste," said General Manager Charlie Ochs. "The problem is finding something to put on that AM radio station that's going to make some money."

A little more than a year ago, Ochs converted WCPT, the AM station associated with jazzer WJZW-FM, to a business format. The new calls were WBZS(AM).

AM experimentation

Ochs recognized that this kind of experimentation isn't done on the FM band. "On the FM band," he said, "they're operating on their own. They're doing quite well. They're making more money than you can ever make doing the business format or this health and fitness format. But you can make a respectable amount of money doing these niche formats, because there is a group of people in a city this size — there's a group of people that's large enough that will listen to it and will support the radio station."

"There are a lot of fixed expenses on these AM radio stations, and many of them are just really having a tough time even making (them)," Ochs said. "I can tell you that WBZS is doing a heck of a lot more than making its fixed expenses. It's doing great."

Ochs has the same expectations for the new station, which will target baby boomers over the age of 35. "When we



saw how successful the business format was," he said, "we thought, 'There's got to be another format out there that we can operate in a similar fashion,' but we couldn't figure out what it was."

"It" became apparent at a weekly department heads meeting, when WMZQ-FM Program Director Mac Daniels suggested a fitness format, tar-

The new station's sales targets will include health clubs, hospitals, acupuncturists and chiropractors, as well as associations in Washington.

geting listeners who are into fitness and jogging and exercising. "Everybody kind of stopped," Ochs said. "There was just a moment of silence, and I said, 'Health and fitness. They all kind of go together.' Then we started brainstorming, and out of that meeting came this format."

Next, the assembled multitude, from the sales managers to the program directors and producers, wondered about

the revenue that could be attained from such a format. "It's very similar to the business format," Ochs said.

"(With) the business format, we sell segments of the line an hour of time — we sell infomercials and we sell spots," he said. "With the health and fitness format, we felt that there were a number of people who would be interested in buy-

ing those kinds of things to either get their message out or sell their product."

"We're finding that baby boomers are waking up today and finding that they're short on cash and they're out of shape," said Program Director Steve Chaconas.

WBZS takes care of the "short on cash" need. Chaconas hopes "that the health and fitness radio station that we're putting together will fill that we're

catch up on health, whether it's to get in shape, to find out about new alternatives to conventional medicine and practices, or any advice they need on mental health ... It's a critical time for baby boomers, and that's who we're targeting."

Ochs pointed out that there are a number of health- and fitness-oriented infomercials on television at the present time. "We're going to try to move that in the direction of radio," he said. "I think we can go even further than television does because we can do more of a niche."

The new station's sales targets will include health clubs, hospitals, acupuncturists and chiropractors, as well as associations in Washington, many of which Ochs is finding "are probably going to want to use this station as a base to possibly build a syndicated program or a taped program that they can provide to other radio stations for public affairs."

Programming on the new station will include syndicated shows, infomercials, and programs derived from Talk Radio Network.

The new station, currently located in the nation's capitol, is pegged to move to nearby Alexandria, Va., in the same location as WJZW and WBZS.

Because no other station has attempted a health and fitness format, it looks as though the new station will be in a field all by itself.

"It's kind of scary because it's different," says Ochs. "It's a completely different mindset from what you're used to. I mean, I've been doing this for 34 years now, and this is a completely different deal. It's as different as owning a shoe store." Size Health and Fitness, anyone?

Ochs is excited about the new station's prospects. "In the 34 years that I've been in broadcasting," he says, "I've never put on a brand-new format that has taken off like (WBZS) has, and this one's going to be the same way." ☺

HDTV Closer to Adoption of Standard

by Susan Ashworth

WASHINGTON Slowly but surely, HDTV is on its way. In its next step toward adoption of a high-definition standard, the FCC proposed providing broadcasters with a second channel for digital transmission in late July.

The proposal would allow broadcasters to offer two channels: one for broadcast of high-definition television (HDTV) signals and the other for transmission of traditional analog signals.

Under this proposal — which is one of two that the FCC is seeking comment on — the commission would assign each of the nation's 1,600 television stations a new digital frequency.

The digital channels would be located between channels 7 and 51; eventually, the government would take back about 23 channels that could be used for non-broadcast services.

This plan is opposed by the National Association of Broadcasters, who say it will cram too many channels into a small spectrum space.

Another option before the FCC is to allow channels 2 through 69 — the entire television spectrum — to be used for digital broadcasting, a proposal that most broadcasters support.

Spectrum allocation is not likely to be a problem for broadcasters offering digital audio channels, according to Walt Wurfel, NAB senior vice president of public

affairs. Although the FCC has not set a standard or issued a mandate on audio broadcasting standards, "we're not planning on needing additional spectrum," he said, and the spectrum fight that is bogging down television broadcasters "won't have much impact (on radio broadcasters)."

Long road

However, the road to digital acceptance has been a long one. The first steps to set an HDTV standard began in 1987 when the FCC agreed to set a competitive testing and standardization process for high-definition television. Different versions of ATV were devised, and in 1988, broadcasters and the Electronic Industries Association (EIA) agreed to set up the Advanced Television Testing Center (ATTC) to test each of the proposed systems.

In early 1993, the key players in the ATV industry formed a Grand Alliance of companies — including AT&T, General Instrument, the Massachusetts Institute of Technology, Philips Electronics North America,

the David Sarnoff Research Center, Thomson Consumer Electronics and Zenith — who planned to create a digital television system that would incorporate technology and ideas from four previous digital systems.

As the HDTV battle continues, broadcasters are faced with other transmission issues, including proposed public spectrum auctions that would sell digital channels to the highest bidder.

☐☐☐

Susan Ashworth is a reporter for *RW* sister publication, *TV Technology*. ☺

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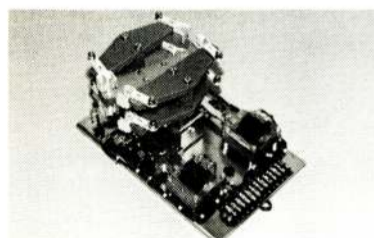
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Towers: Fighting the Good Fight

by Sharon Rae
Rover News Service

FORT LAUDERDALE, Fla. A Florida engineer has issued an industry-wide call to action.

Increasingly strict land use ordinances around the country are making it difficult for broadcasters who wish to build towers. James L. Sorensen is Vice President of Engineering for Cottrill and Holland Inc. in Ft. Lauderdale, Fla., a firm retained by Palm Beach Communications to assist in the writing of zoning and enabling legislation for the construction of radio station towers in the city of Palm Beach Gardens, Fla.

"Our firm was asked to help in a matter regarding both the writing of and compliance with a local conditional use ordinance," said Sorensen. "The city had nothing on the books covering this kind of thing.

"The problem with any governing board at a local level is that they think they have the ability to legislate things that, in some cases, are covered by superior legislation — in this case that of the FCC. Clearly, Congress mandated the FCC to be the sole regulatory authority as far as broadcasting or communications in the country is concerned.

"One of the things that we got involved in with this case was the idea of somebody down the line having to tell the city that there was a possibility — depending on how they wrote their ordinance — that at some future date, the FCC might step in and simply pre-empt it," said Sorensen. "And while this

doesn't happen commonly, it certainly has happened."

One example, according to Sorensen, is in conditional use.

"A couple of years ago, there was a case in Colorado where the city gave a conditional use permit to a broadcaster based on its ordinance, which required compliance with interference specifications.

In short, after the station went on the air, some people complained, and there was no definition within the ordinance as to what, exactly, constituted a legitimate complaint.

"The city council then told the

particularly cellular and PCS. In order to (provide) these services, you've got to have a lot of antennas. And they're going to be distributed all over the place."

And thus, a new problem arises — one that Sorensen calls "nimby."

"Not in my backyard," explained Sorensen. "Kind of like incinerators, garbage dumps, mausoleums, that sort of thing. We know we need to have them, we really appreciate the fact that they're there, but you're not building one next to me."

And that's where the situation enters the subjective arena. "People are afraid of

towers and antennas," said

Sorensen.

"They're afraid

the tower's going

to fall down or

attract lightning.

They're afraid of

the nonionizing

RF radiation that

the things cause and the light pollution.

They're afraid that unsavory persons like two-way radio technicians are going to be driving in and out a lot."

Sorensen said while the fears are understandable, people don't seem to realize that the rules and regulations of the FCC and the FAA are "very real quantities."

"These things are part of the code of federal regulations and carry the force of law," said Sorensen. "The fines for defying these rules are incredibly high."

"The bottom line," said Sorensen, "is the people who are regulating are trying to write legislation that will allow for the orderly growth of the communications industry in the face of things that are subjectively unreasonable on the part of the public or on the part of the local governing organizations themselves, simply because they don't understand the federal regulations and they don't understand the calculus of the industry."

So is there a solution, or at least a way to address these problems? According to Sorensen, the answer is yes, albeit a costly measure. Cottrill and Holland Inc., flanked with legal and technical support, decided to contact a number of broadcasting associations with the offer of a road show. "If the local municipal managers are meeting, discussing these issues, we'd like to be available as resource people through the NAB to help write an ordinance."

Sorensen said the NAB seemed reasonably interested in the idea, however, felt it might be better handled at a state level. Contact with the Florida Association of Broadcasters proved futile, said Sorensen. He received hardly a response.

Stripping local lawmakers of their authority is not the answer, according to Sorensen. Allowing municipal managers to govern their communities is the key, however at the same time, it is necessary to ensure broadcasters and communications users comply with FCC rules and operate their business while still complying with local ordinances.

"You don't want to take away local lawmakers' authority to be effective in their own market," said Sorensen. "Not only will that make them angry, but it'll destroy their credibility. You need to let them regulate and have authority but they need to make themselves aware of how

continued on page 18 ►

Congress mandated the FCC to be the sole regulatory authority for broadcasting.

broadcaster they were taking away the conditional use," said Sorensen. The FCC stepped in at this point and pre-empted the local measure, which, according to Sorensen was "too broad to be useful."

The FCC blanketing interference rules, on the other hand, are very specific. And therein lies the issue.

"When the local community writes an ordinance in which the language differs from that of federal regulation, then the window for interpretation opens widely." According to Sorensen, the multilayered nature of this issue presents some unique problems.

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World Radio History

Radio Rebels Claim the Airwaves

by Frank Beacham

SAN FRANCISCO To tune into the micro radio movement, the first rule is never, never refer to it as "pirate" radio. The real pirates, say these radio rebels, are the large corporations that have stolen the airwaves from the public.

The concept of the airwaves belonging to the public — rather than a few major media companies — is at the heart of a movement that currently boasts as many as 300 unlicensed low-power radio stations now broadcasting in neighborhoods throughout the United States.

Fueled by the enactment earlier this year of new telecommunications legislation and a favorable early ruling in a pivotal court case, the micro radio movement is gaining steam "as a campaign of civil disobedience," said Stephen Dunifer, a Berkeley, Calif., broadcast engineer who began Free Radio Berkeley, one of the nation's premiere unlicensed radio stations.

Reason to fight

Disgruntled with mainstream American media failure to broadcast opposition to the Persian Gulf War, Dunifer built a small portable radio station and went up into the hills above Berkeley, which is located on San Francisco Bay north of Oakland. From there he started broadcasting alternative programming for a few hours every Sunday night. That was the birth of Free Radio Berkeley, which thrives today as a full-time unlicensed station.

The FCC fined Dunifer \$20,000 and has taken him to court in an effort to stop his unlicensed broadcasts. However, Dunifer, represented by attorney Louis N. Hiken, was able to convince U.S. District Judge Claudia Wilkins that there are substantial constitutional arguments at stake in the FCC attempt to ban micro radio stations.

Twice this year, Judge Wilkins has refused to issue injunctions that would stop Dunifer and possibly force Free Radio Berkeley off the air. It is the first time a judge has turned down an FCC request to shut down an unlicensed radio station.

While both sides wait on the next ruling from the judge, the movement is "kicking ass," said attorney Peter Franck, a micro radio expert at the National Lawyers Guild. He said there is an effort to sprout so many micro radio stations that the FCC will lose control of the regulatory process by the time the issue winds its way through the courts.

Like CB radio

"Our vision is this will be like CB radio," said Franck. "The FCC tried to regulate CB in the 1960s and required everyone that had a radio to get a license. But it grew too fast. Radio Shack sold too many of them. So if this case ever gets to the Supreme Court — where we may not do as well as we're doing in the District Court — there will be so many stations on the air that they will have to recognize them."

The FCC claims the micro radio rebels are threatening public safety.

"It's a terrible problem," said Don Winston, a spokesman for the FCC's Compliance and Information Bureau in an interview with the Associated Press. "Without court intervention, there could be chaos."

Not so, said Dunifer, who contends that good engineering practices and easily available frequency data make it unlikely

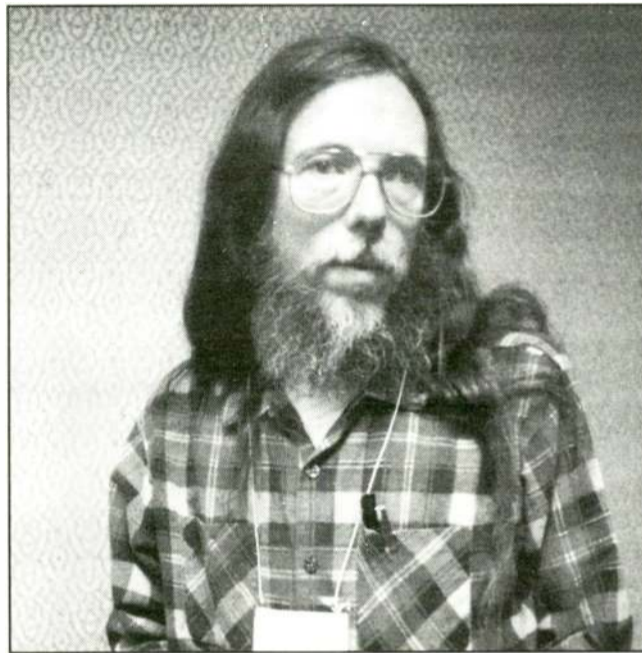
that a micro station will interfere with licensed commercial stations. "We have to maintain clear signals," he said. "The FCC is saying that if we remain on the air, 747s are going to do water landings in the bay and who knows what else might happen. Well, these are all very simple technology problems that can be easily solved."

First of all, Dunifer said, it is easy to research available frequencies in areas where micro stations choose to broadcast.

"On the Internet there's a searchable

Dunifer builds and sells 15 to 20 W transmitters for micro stations that "properly sited with a good location can easily cover a distance of a five to 10 mile radius." Complete micro radio stations can be built at a cost of well under \$2,000.

"Our current transmitters are frequency stable," said Dunifer. "They don't drift. They meet basic FCC specs. With proper filtering there is no problem. If the audio processing is done properly to avoid overmodulating with a limiter, then you can put out a signal as clean or cleaner than any commercial station on the air."



Free Radio Berkeley Founder Stephen Dunifer

Big brother

The FCC problem with micro radio, said Franck, is more about government control of ideas than technology.

"Our research turned up the fact that for the first 400 years after Gutenberg invented the printing press, one had to have a license to own a printing press.

I don't think the issue here is about frequency interference.

"The current regulatory framework is that the government says you have to have a license to broadcast," Franck said. "They will not consider a

database by city or longitude/latitude coordinates," he said. "Another step is to do a manual search of potential frequencies that look good."

Micro radio also maintains the same channel spacing requirements used for commercial stations, Dunifer said. "In certain urban areas where that is not possible, we look into use of space on the UHF TV band," he said.

license application for less than 100 W of power and without very expensive engineering studies. The filing fee at the initial stage is \$2,500."

This is no coincidence, said Hiken, Dunifer's attorney. "Because of the Telecommunications Act there is a land rush going on now that is unparalleled in the history of radio. Within five years, a very few corporations are going to own 95 percent of

the AM and FM bands in this country.

"What we seek as a movement with micro radio — the same thing that the Internet offers to the rich and literate — is an ability to communicate with each other without filters," Hiken said. "The American people do not have access to radio. They cannot participate in it. They have no voice."

Micro radio is a two-way participatory communications system, Hiken said. It moves communications from the model of the passive audience to a model of an expression of people's struggles.

"It creates real spokespeople rather than the ones created by the industry," Hiken said.

As to micro radio's future relationship with the FCC, Hiken said micro broadcasters are not against notification to the FCC of basic information to help prevent interference problems.

"We think it's perfectly appropriate to let them know we are going on the air at this frequency, at this wattage, at this address and to ask them to let us know if there's any interference," he said. "There is plenty of space on the spectrum to set aside micro radio allocations just as there is for commercial broadcast allocations."

In the end, the micro radio movement wants a court trial on its right to broadcast on public airwaves. This, in Hiken's opinion, will be hard to achieve because the government has said it will move directly to the 9th Circuit Court of Appeals if Judge Wilkins does not grant their injunction. Appellate judges, he said, tend to favor government agencies in their rulings.

"The last thing the FCC will ever do is allow a trial of whether or not they are giving out licenses in the public interest," Hiken said.

"By the time that trial takes place they have lost, and they know that."

For Dunifer and the crusade he launched, the wait for the court's ruling is precious time to get as many micro radio stations on the air as possible.

For more technical and legal information on Micro Radio, visit Free Radio Berkeley's Web site at <http://www.best.com/pub/frb>

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World Radio History



Seiko Tests in Seattle Under Way

► continued from page 8

them installed in commuter vans. Also by then a similar project — dubbed Trilogy — should be underway in Minneapolis, where it will be limited to 150 in-vehicle navigation devices.

Real-time traffic conditions and ramp meter status, as well as system-wide messaging, weather reports and paging data will be broadcast via HSDS on a high-resolution screen developed by Volvo.

Both S.W.I.F.T. and Trilogy are part of the Federal Highway Administration nationwide program of field operational tests. "Some have to do with similar applications," said Balzer, "while others deal with things such as electronic toll collection."

Who will win?

Seiko is using subcarriers on eight Seattle FM stations for S.W.I.F.T. The company uses space on a total of 45 stations in five markets to transmit paging information, but all of these subcarriers could eventually be used to send out traffic data.

That translates into millions of consumers who could potentially subscribe to the service.

When it might be available to the general public and the fee schedule have yet to be determined.

Part of the problem in projecting a date is not knowing if and when a single RDS



Delco Electronics In-vehicle Receiver

(Radio Data System) standard will be approved for subcarrier use.

Seiko is clearly concerned about being in competition with two other companies (MITRE Corporation and Digital DJ Inc.) in the race to develop a standard.

Without that standard, Gaskill fears, new technology will not be fully implemented.

"Picking a standardized subcarrier is vital," he said. "Who's going to make a receiver if it only works in Seattle? That would result in chaos. If you get MITRE to rollout halfway and Digital

DJ to rollout halfway, you will never get a nationwide system.

"Manufacturers won't risk putting their bets on something they aren't sure will work nationwide. Why would someone like Delco, our partner on this in Seattle, want to commit to our system if they aren't sure it will work across the entire country?"

"Look what happened to AM stereo," said Gaskill. "The fact is, the marketplace decided there were too many different systems and they weren't going to pick any of them.

Without a standard, all you have are engineering ideas."

Still, Seiko is confident. It is chipping in about \$500,000 of the \$1.7 million being spent on the Intelligent Transportation System Operational Field Test.

"This isn't going to disappear because Digital DJ rolls out its system," Gaskill said. (See Digital DJ story, RW, June 26) "But pick a standard way to deliver information and both the information and the availability of equipment to receive it will grow very quickly."

MUSICAM Adds Layer 3 Algorithm

HOLMDEL, N.J. MUSICAM USA and European sister company CCS Europe announced an increase in the functionality of the Prima ISDN codec.

Already compatible with standard ISO/MPEG Layer II, the MUSICAM-enhanced version of ISO/MPEG Layer II and G.722, MUSICAM USA is adding ISO/MPEG Layer III to the Prima.

The new version of Prima will debut at the World Media Expo in October in Los Angeles, but it was to begin shipping in late August.

According to the company, the Prima codec already features an extremely wide dynamic range of better than 92 dB and an ultra-low distortion level of 0.001 percent.

The Prima guarantees full contribution-quality Layers II and III audio — up to 384 kbps with MUSICAM and 320 kbps with Layer III. The addition of Layer III encoding also allows the codec to provide 15 kHz mono audio on a single ISDN B channel.

According to the company, MUSICAM USA worked on the addition of Layer III to the Prima with the Fraunhofer Institute in Erlangen, Germany, the original developer of the Layer III algorithm.

"Prima was originally designed as a platform that would support a number of audio compression algorithms, as the industry's needs demand," stated Larry Hinderks, founder of MUSICAM USA.

For information, contact Art Constantine at MUSICAM USA in New Jersey at: (908) 739-5600; fax: (908) 739-1818.

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Upsala College Closes, WFMU-FM Prospers

by Lee Harris

EAST ORANGE, N.J. Not many months ago the sounds of music, laughter and conversation echoed through the 37 acre campus of Upsala College in East Orange, N.J. Today all you will hear is the wind whistling through the cracks of the crumbling buildings. After more than 150 years of service, Upsala College is dead, brought down by years of financial mismanagement culminating in bankruptcy.

But while the small Catholic school is gone, its radio voice not only lives, it thrives. WFMU-FM survived the college that gave it birth, largely because it was able to do two things the college could not ... raise money and handle it properly.

In fact the college might have died sooner, were it not for the financial support provided by its 1.4 kW non-commercial radio station. A number of radio stations have been sold off or closed by financially troubled colleges and universities, but this may be the only case on record of a non-commercial station helping to keep its school afloat.

Humble launch

WFMU's early history is similar to that of many college stations. It started as an on-campus carrier current operation, going FM in 1958 with 10 flame-throwing watts. In 1965 the power was raised to the current 1440 watts and the antenna was moved from a building on campus to the South Mountain Reservation about 15 miles southwest of New York.

The station achieved a fair degree of notoriety in the summer of 1969. After summer break school officials returned to campus to discover that WFMU-FM had been overrun by hippies who had seized control of the station. The wild-haired love children had imposed a "free-form" music format.

School officials couldn't quite handle segues like Prokofiev's "Lieutenant Kije Suite" going right into "Are You Experienced" by Jimi Hendrix. Two weeks after Woodstock, the station was shut down and remained silent until early 1970.

Still, the WFMU-FM reputation was made, and ironically this episode planted the seeds that would see the station survive the college administration that temporarily shut it down. In the midst of the turmoil, the free-form programmers started begging for money on the air and the listeners gave what they could, in some cases as little as 10 or 25 cents. The audience proved so loyal that the free-form programming has remained in place ever since and WFMU-FM has never had trouble convincing its audience to chip into cover expenses.

Financial tightrope

Ken Freeman has been station manager of WFMU-FM since 1985. Long before then, he says, Upsala's financial problems were apparent, as the college had a habit of demanding loans from funds raised by the radio station to meet the college payroll and other expenses. While these "loans" were always repaid,

Freeman says getting the money back was often a real struggle.

While Upsala used to provide health insurance for the station's small paid staff along with utility- and rent-free studio space, as the years went by and the college financial situation became more dire, this assistance was withdrawn bit by bit. Eventually, WFMU-FM began paying

rent, utilities and other charges ordinarily picked up by a college which owns a station.

By 1994, the writing was all over the wall and Freeman's Auricle Communications, a not-for-profit organization, bought WFMU-FM

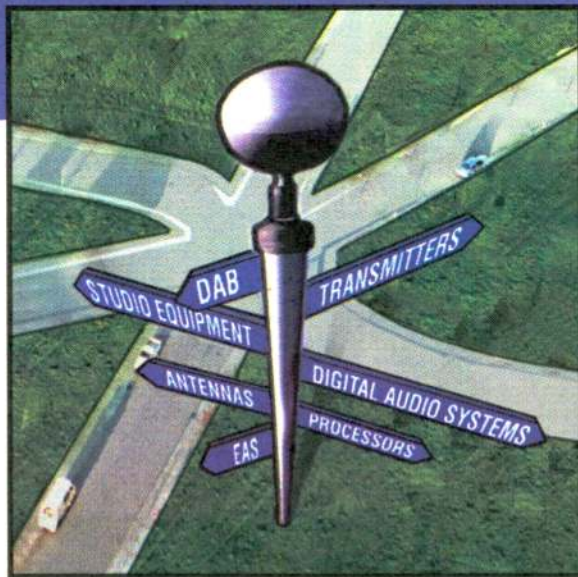
from the college for \$120,000.

"It probably kept the college in business for another 10 days or so," according to Freeman, who adds that "it was a bit like moving out of your parents' house." In May of 1995, Upsala graduated its final

continued on page 22 ▶



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Fireworks Easy with Coupler

WASHINGTON Independence Day draws thousands of people to celebrate the nation's birthday amid the monuments and historic buildings in the nation's capital.

The star attraction, of course, is the fireworks display over the Mall area, down between the Lincoln memorial, the Reflecting Pool and the Washington monument.

The display is always dazzling, but few are aware of the complicated task in coordinating music and pyrotechnics.

Enter the extremely popular

Handi-Coupler, made by Excalibur Electronics Inc. of Chantilly, Va.

The coupler's primary use is to

can't keep them in stock.

National Events of Lorton, Va., the company in charge of the audio portion of the Fourth of

The coupler's primary use is to connect audio to a telephone.

connect audio to a telephone. Bill Ashley, sales representative at Bradley Broadcasting and owner of Excalibur, said he

July festivities for the last eight years, had an idea.

The company wanted to sync the music and the fireworks, and

the tool of choice was the Handi-Coupler.

"It was the easiest way to get the signal. It fit the bill (and) worked pretty well," said Tom Linthicum, vice president and chief systems engineer for National Events.

National Events set up its sound system at the Sylvan Theater located a few blocks from the site of the fireworks on the Mall. There were two communication lines and an audio linkup with the music on one channel and the cueing on the other.

"That's the first time I've heard it being used that way," said Ashley.

— Chris Joaquim

Companies Facing New Standards

WASHINGTON Consumer electronics manufacturers will face new safety standards according to the Consumer Electronics Manufacturers Association (CEMA).

An official statement from CEMA states that the charter for the International Electrotechnical Commission (IEC) Technical Committee No. 92 (TC92) is to revise and update IEC65, which addresses the safety of audio and video equipment that CEMA companies manufacture and market.

According to CEMA Communications Director Lisa Fasold, this equipment includes items such as home stereo systems and car radios.

This effort will try to put all standards into one joint standard.

Currently, work is taking place on UL6500, an IEC65-based safety standard that will eventually replace current UL standards for audio and video equipment.

Fasold noted that there are a number of different safety standards across the world, and this effort will try to put them all together into one joint standard.

According to Frank Hardy, operations manager for Pacific Design Engineering, the new standards will just add more time and expenses to what he says is an already lengthy UL testing process.

"UL is trying to get into the international marketplace," Hardy said. "Testing for UL in the United States takes a long time, and now the amount of time is going to triple and the process will become more expensive," Hardy added.

UL could not be reached for comment at the time this article went to press.

Chairing TC92 is Fred Korzekwa. Korzekwa is part of the Thomson Consumer Electronics TV product development division and has served on several UL and CEMA product safety industry committees.

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by 

Acquire Smarts about Tower Politics

► continued from page 12

their authority is either enhanced or limited by the superseding authority — the FCC.”

“We need to make local governing bodies aware of the idea that they need to look beyond what they would normally use for criteria in establishing conditional use. And to recognize the fact that there is a substantial body of not only research but of other people’s regulations that govern these things.

“Otherwise,” according to Sorensen, “you get right back into the subjective balancing act of whether or not we really want to be a community that has allowed itself to be equipped for what

might be called 21st century communications, or do we want to be a little blank spot on the great map of communications capabilities. Communities want to use PCS as much as it’s available, however they don’t want to allow their community to have the necessary technology built in it to allow them to do so.”

Enter the Telecommunications Act of 1996, which, according to Sorensen, only muddies the waters even more. “The TC measure still says the FCC is the sole authority, but it reinforces the idea that a local community has the ability to make ordinances regarding the safety and welfare of its population.

What does that mean?”

Sorensen said he spoke to a few people at the FCC for clarification. “Without them saying so, the feeling I got was that they really aren’t too interested in inserting themselves into this unless all of a sudden they find out that a community is legislating against an existing property, as in the case of the Colorado situation. Before a tower is built, however, I don’t think they much care.

“I guess if there’s a goal that the industry ought to have it should be ‘Hey, we know there certainly is reason to believe that we have to control RF radiation. The question is, have we done so correctly to date and are we ready to continue to do

so in the future?’ I believe that the industry is. The question is, does the public believe it or are they more willing to believe in witchcraft?”

Sorensen said it’s an across-the-board responsibility for broadcasters to educate local governments as to what the needs of the industry are.

“Make yourself as completely knowledgeable as you possibly can on the realities of what the current regulations are in terms of nonionizing RF radiation, tower marking and lighting and blanketing interference,” said Sorensen. “If you know that, then you can approach local governments with confidence that you’ll have the answers that they’re seeking.”

Sorensen said he believes that between now and the turn of the century, there will be a lot of litigation addressing these issues. “Like it or not,” said Sorensen, “the federal government will have to step in and try to control this. We can’t have local control of this kind of thing because the signals don’t respond to political boundaries.”

And that, stressed Sorensen, is why the whole thing was placed in the hands of the FCC to begin with — so there’s one set of standards and everybody plays by the same rules. ☐

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South Africa’s Penelope Heyns shattered the 100-meter breaststroke world record in a qualifying heat. With Heynes poised to win a medal, those behind the scenes at the Summer Games in Atlanta scrambled to avert a potential disaster at the awards ceremony. Organizers had no rendition of South Africa’s post-apartheid national anthem.

The National Olympic Council of South Africa forgot to bring a complete rendition of the new anthem, so the SABC roused its librarian out of bed where the time was some seven hours different. Within the hour, she rushed to the TV facility from home to pull a CD of the anthem from the library.

Then, using a Telos Zephyr Digital Network Audio Transceiver in Atlanta linked via ISDN phone lines to another Zephyr in Johannesburg, a clean, high-quality rendition of the anthem was transmitted.

That recording arrived in plenty of time to be played for Heyns to receive her gold medal, the country’s first in 44 years.

“This is a butt-saving technology,” said SABC Sports General Manager Robin Kempthorne. “It solved the problem quickly and easily.”

A feat that would have taken hours using an air courier or whose sound quality would have been an embarrassment using conventional analog phone lines, was performed in minutes using Zephyr and ISDN, he acknowledged. ☐

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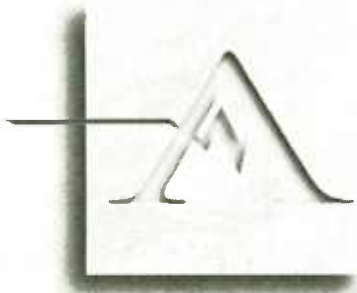
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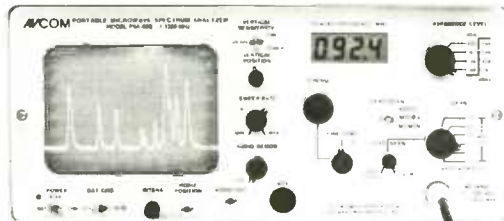
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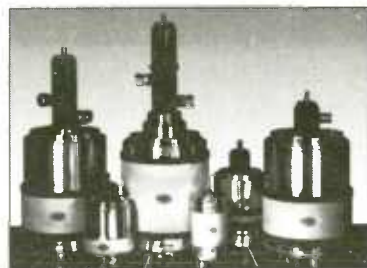
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SIGNAL-TO-NOISE

Expanding Connectivity on the Go

by Frank Beacham

NEW YORK It seems that everything these days is caught in the Web. Two radio-based services that I have long enjoyed — wireless e-mail and personal paging — now have Internet access.

Agent-based

Radiomail, a San Mateo, Calif.-based wireless Internet service that I use to send articles to RW via e-mail, has just announced a new service called RadioWeb, the first agent-based World Wide Web wireless delivery service to operate across nationwide data networks.

RadioWeb, which supplements the standard Radiomail service, is available over the ARDIS and RAM packet data networks as well as cellular and CDPD wireless networks. Radiomail uses wireless modems that operate on a wide range of notebook computers, palmtops and hand-held PDA (personal digital assistant) devices.

In a nutshell, RadioWeb allows computer users to launch wireless web agents that automatically retrieve and deliver information from Internet or intranet web servers. To launch a RadioWeb agent, one simply creates and sends a message requesting that a specific URL be retrieved. It typically takes less than 15 seconds for the RadioWeb agent to find and display the page in text on the mobile computer.

The new service opens some interesting new possibilities for Internet use. People who work outside of their home or office can receive time-sensitive text information from virtually anywhere. That could include weekly schedules, reports and job-related data from business intranets



Modem Mate from TT Systems

or news, sports, traffic reports and weather information from the public Internet.

Web-based databases

One Radiomail customer, J.D. Fleming, a fellow of the American College of Trial Lawyers, uses the new service with his Hewlett Packard palmtop computer. "It is now possible to retrieve such information as biographical data, statutes and court rules, and decisions from federal and state courts," he said. "Firms can provide Web-based databases that can be accessed remotely by their lawyers —

from cars, clients' offices and even from courtrooms."

My Pagemart alphanumeric pager also has gotten Internet savvy. It now has its own Internet e-mail address. Called PageGate, this new bridge from the Internet to Pagemart's text pagers is a surprisingly useful feature. It allows the user to get an overview of incoming e-mail without being tied down by all the trappings of a PC.

Worldwide

Without the need of special page messaging software, an Internet user anywhere in the world can create and send an e-mail message directly to my pager through the gateway. By using e-mail forwarding from my domain server, I can easily transmit the first 100 characters of any e-mail message I receive when on the road or away from a computer.

Though a 100 characters might at first glance seem limiting, the pager software strips out the name of the sender and subject from the rest of the Internet address information before starting into the body of the message. You'd be surprised at how easy it is to separate the important stuff from the junk in just the first few

characters of an e-mail message.

Finally, on the subject of road-worthy Internet access, here's a little gem that eases Internet computer hookups while at the same time offers some nifty audio capabilities for traveling broadcasters. Called Modem Mate, this pocket-sized device allows the easy connection of your laptop, fax or data modem to virtually any telephone, including those troublesome digital office systems that can fry certain noncompatible equipment.

Modem Mate inserts between the phone and the handset and can achieve baud rates up to 28.8 kbps. Of special interest to broadcasters is that the little device allows playback of recorded tapes through the telephone. It also has the ability to record all incoming and outgoing telephone calls automatically when used with a voice-activated cassette recorder.

Modem Mate, from TT Systems of Yonkers, N.Y. ((914) 968-2100), retails for \$120. It makes portable computing easy and offers real protection for your modem when connecting to unknown phone systems you encounter along the road.

□ □ □

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

DOJ OKs Jacor Purchase

► continued from page 1

Association of Advertising Agencies, which is comprised of more than 600 advertising agencies throughout the country. The AAAA sent a letter to the FCC last month expressing the "serious concerns" they had about pending broadcast mergers including the application of Jacor to acquire Citicasters.

With that merger, the AAAA said, Jacor will operate stations that control over 50 percent of the radio advertising dollars in Cincinnati.

Gaining perspective

Radio Board Chairman Dick Ferguson said that the radio advertising dollars are not the issue.

"We strongly believe in legal terms that radio is not the relevant market," Ferguson said. He said the advertising market should be viewed not in the context of what percentage of the radio market an owner has, but rather in terms of what percentage of the entire local advertising market the group has.

Ferguson said that radio sales departments are always trying to get pieces of TV and newspaper advertising.

Maynard said he finds the Justice Department guilty of the same thing radio broadcasters are guilty of when they assume the radio pie is the same as the advertising pie.

In a meeting with the Justice Department, the NAB adamantly defended the view that radio is only a smidgeon of the total advertising pie in any market.

"Increased local concentration of ownership and control may allow market distortion in the price of advertising, thereby undermining the diversity of programming available to the public," wrote the AAAA. "The direction concern of the AAAA is the likely increase in the price of advertising time in markets with duopoly ownership and/or control."

Valerie Schulte, a lawyer for the NAB, countered that the radio marketplace is both fragmented and volatile and formats and market share can change easily. She suggested that it will always be supply and demand that sets the price of radio ads.

In the end, Schulte said, it may be that with consolidation, radio will be able to offer advertisers efficiencies and ad prices may actually go down.



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Interpreting Psycho-acoustics

by Jim Somich

BROADVIEW HEIGHTS, Ohio

The birth of modern audio processing took place over 40 years ago when CBS Laboratories introduced the Audimax to broadcasters.

Before the Audimax, there were peak limiters and compressors, but never before was there a box that promised better sound. The protection devices of the '30s and '40s had become the enhancement devices of the '50s.

We've seen a lot of processors come and go during the past four decades. Most of these were variations on compressors and limiters. Processing became more intelligent and more integrated over the years, but the basic concepts remained. Funnel the sound from a wide dynamic range to a narrower one for broadcasting. Make the sound big, fat and loud.

The loudness wars of the '60s and '70s were a remnant of the nature of radios up to that time. A louder signal that stands out on the dial is easier to tune on a manual radio ... more difficult to pass over. Loudness at all cost reached its zenith in the '80s with the wholesale destruction of the sound of entire markets. Digital-tuning radios make this entire argument for loudness invalid.

In the '90s we are seeing the introduction of digital signal processors that promise more of everything: loudness, quality, coverage and ratings. The fascinating thing is that these modern marvels of computational power are still cloning the basic analog processing chains of the past: leveling, compression, peak limiting and clipping.

If the '90s are a swing back to broadcast quality and the DSP boxes are clones of what has gone before, what is really new on the processing horizon? Psycho-acoustics.

The term psycho-acoustics refers to the psychological aspects of hearing — in contrast to the physiological transfer of impulses (transmission of nervous impulses). Psycho-acoustics examines the effect of sound on the listener and the reasons for certain sonic impressions. How a sound is interpreted is influenced by a lot of factors, most of them can hardly be measured, yet are fairly important, for instance, those portions that are responsible for the spatial localization of a sound. Nevertheless, they determine the quality of a recording to a large extent.

There are also portions of the spectrum that we perceive as "presence" or "naturalness." If this kind of information is missing, the recording suffers from a loss in "freshness," "liveliness" and spatial transparency.

Furthermore, natural harmonics are essential components of the sound. Often enough, they only represent a minor portion of the signal and are easily lost. It's the harmonic structure that makes a tone color unique. Without this structure, different instruments would not be distinguishable. When comparing acoustic musical instruments, for instance acoustic guitars, you will note that even two instruments from the same series have a different sound. Numerous factors determine the sound of an instrument: The design, the materials used and so on create the individual sound of an instrument.

From a physical point of view, a guitar produces a tone by means of a vibrating string that, in turn, sets air in motion. The subsequent propagating sound waves reach the ear and are identified by the brain as a tone.

Because the string vibrates within itself, the tone consists of not only the fundamental oscillation but also innumerable upper harmonics that are based on the fundamental wave.

The complex vibrations of the string are transferred to the body, which, in turn, is also set in motion.

The combination of string and body produces the sound of the instrument. For example, certain harmonics may

be amplified due to resonances in the body, while other frequencies may be canceled due to the properties of the wood.

This phenomenon creates complex sounds and is underlined by the fact that a combination of harmonics can produce additional tones known as interference or residual tones.

All of these tiny sound portions contribute to the sound of certain instruments. The human ear, which is highly sensitive, can detect even minimum changes in the harmonic structure of a sound.

By experiencing the CD quality of 18
continued on page 22 ▶



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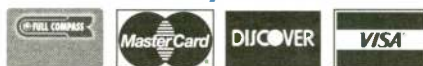
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Analyze Psycho-acoustic Effects

► continued from page 21

bit-converters, etc., we have made considerable advances toward the naturalness of sound, yet recordings still do not sound like the music in a concert hall. Why is there a difference?

Here, the key word is "intelligent hearing": The visual contact with the musicians enables us to concentrate our attention on a certain instrument, which results in an intensification of the sonic experience. The listener sitting in front of a speaker system lacks this spatial experience and the visual feedback aspect of listening to live music. The perceived positioning of instruments is made even more difficult because the dispersion of the sound is not homogeneous, i.e., widely panoramic, but usually reduced to two sound sources.

In particular, the loss of upper harmonics during the transmission of the sound additionally affects the perceived positioning of the instruments and the transmission of room ambience. The reason for this loss in sound quality is the inadequacy of the sound recording and reproduction processes. Each link in the transmission chain — from the microphone via amplifiers, mixers, effects devices, tape recorders, etc., through the broadcast chain to the loudspeakers — causes a loss in sound quality. Each time the sound is processed, it becomes audibly less "natural."

Psycho-acoustic devices

In the field of what is known as psycho-acoustics, numerous terms such as enhancer, exciter, psycho-acoustic processor, psycho-dynamic processor, clarifier, etc., are commonly used. What do these terms mean?

Although the psycho-acoustic effect of enhancers and exciters, etc., has been known for several decades, the function of these devices has been deliberately surrounded by mystique, to increase their appeal.

However, it is fairly clear that all

devices in this field are based on certain technically repeatable methods of functioning. Basically, three principles apply:

- Sound improvement by means of dynamic frequency correction.
- The generation of a "wider" sound with the help of phase shifting with respect to delay times.
- The enrichment of the program material with artificially generated harmonics.

Psycho-acoustics can make your station stand out.

Independent of each other, each of these methods produces a certain effect that is perceivable as a subjective enhancement within the sound.

Frequency correction

The boosting or cutting of certain frequency ranges is the simplest form of sound modification. Equalizers can correct the sonic image in order to produce a sound that is more pleasing to each taste.

So-called "treble boosters" achieve this effect by emphasizing the high frequencies, which the listener perceives as a transparent sonic image.

It is also possible to combine any frequency correction with a frequency-dependent phase shift, which results in a sound that is "warmer" and more musical.

The term phase shift describes the displacement of a signal's phase in relation to its point of origin. As a matter of principle, the phase shift produces a delay within the signal.

If the delayed signal is added to the original signal, the resultant signal becomes "wider." Below time delay values of 20 mS, the brain perceives the delayed arrival of the two signals as the arrival of one signal, which results in the desired "pulse enlargement" effect,

sometimes called "3-D" effect.

The effect produced by so-called "chorus" units is based on the same principle of phase shift and signal delay. Here, several delayed signals are added to evenly intensify this effect.

Modern psycho-acoustic processors use frequency-selective phase shift circuits that comprise several stages. Due to the program-dependent delayed signal, the sonic impression becomes more vivid.

Artificial harmonics

By 1955, an American, Charles D. Lindridge, had already invented the first "exciter" (a unit that excites upper harmonics), when he presented a unit for "improving the sound of music and speech." He enriched signal sources with artificially generated upper harmonics and found that sound quality, transparency and perceived positioning of musical instruments could be considerably improved using this effect. He was granted a U.S. patent on his circuit design.

Compared to modern technology, Lindridge's circuit was anything but fully

developed. However, it had all the features of modern circuit designs.

Psycho-acoustic findings and knowledge gathered over the years have allowed for new and improved circuit designs through the use of advanced technology.

If you are like most broadcasters, you have not had much experience in psycho-acoustics. But, as you will see in the next column, the use of modern psycho-acoustic processors can contribute more to the sound of your radio station than any new compressor, limiter or clipper can.

Psycho-acoustics can make your station stand out on the dial and give the impression of increased loudness and spaciousness. Psycho-acoustics eliminates the need to destroy the sound quality of your station just to stand out on the dial.

Next month I will introduce you to the hardware of psycho-acoustics. We will examine the circuits that produce the effects, and show how psycho-acoustics can give you a competitive edge.

□ □ □

Jim Somich is a radio broadcast engineering consultant and president of MicroCon Systems Ltd., a manufacturer of broadcast equipment. He can be reached by e-mail at jsomich@gm.com

WFMU Prospers Alone

► continued from page 15

class and WFMU-FM found itself the sole surviving occupant of the ghost-campus, in a blighted section of East Orange, charitably described by Freeman as "no-man's land."

Volunteer staff

The station was still paying rent, but now the checks were made out to the Bankruptcy Court. Because the station relies on about 100 volunteers to keep it operating, the top priority now is moving the studios to a neighborhood where those dedicated staffers won't be risking their lives just by showing up.

To accomplish this, WFMU-FM has set

up the "House of Tomorrow" fund, which collected \$78,000 during its recent fundraising marathon.

Freeman says he'd really like to move the operation to Jersey City, to give volunteers from New York easy mass-transit access.

That money is separate from the nearly \$300,000 WFMU raised for its general operating fund.

The station takes no outside funding and will not accept underwriting announcements. Unlike many non-commercial stations, when WFMU-FM says it depends on its listeners for survival, it is telling the whole truth.

History lesson

Freeman is hoping to add to that base of loyal listeners by supplementing WFMU-FM "1940's technology," that is to say, the FM signal, with some newer transmission methods. "We're about to make our signal available on satellite, and if all goes well we hope to make our actual programming available on the Internet."

WFMU-FM has a fairly elaborate website (www.wfmufm.org), where listeners can even make pledges electronically. Yet despite all this emphasis on new technology, WFMU pays great homage to the old.

On Tuesday evenings, the curator of the Edison Sound Archives takes to the WFMU-FM airwaves and plays original Edison Cylinder recordings. Recently, WFMU-FM conducted the premiere broadcast of the world's oldest known sound recording, a cylinder of Edison himself dictating a message which he then dispatched to a congressman in Washington.

This may also be the world's oldest example of voice mail. While the classrooms of Upsala College are forever silent, WFMU-FM persists as a living lesson to broadcasters: serve your audience well, and watch your cash, and you too may survive even the most disastrous turn of events.

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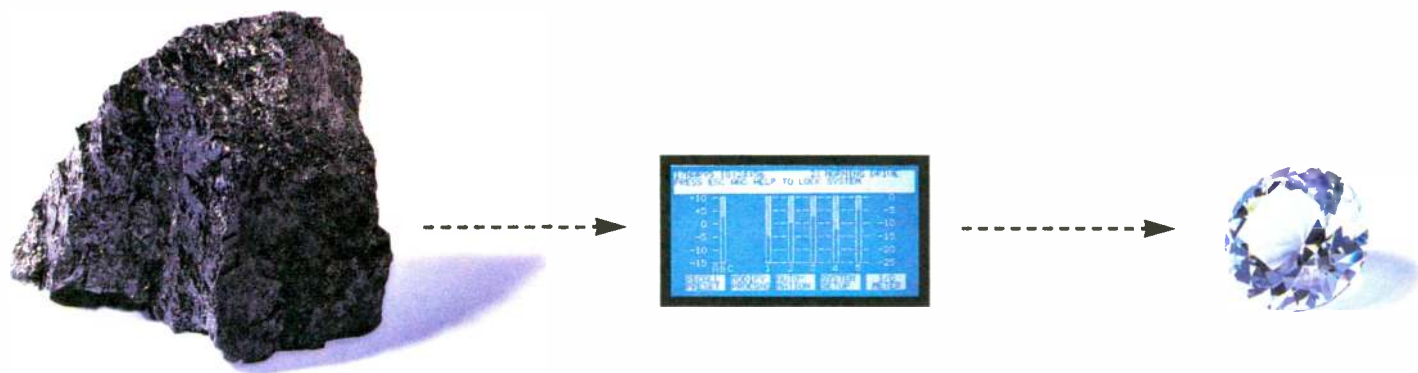
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Meet Challenge of Antenna Farming

by Al Parker

HICKSVILLE, N.Y. A few months back I was feeling pretty good about my antenna system. I had individual Inverted V dipoles for 20 meters, 40 meters and 75 meters. I even managed to raise a pretty effective Inverted L for 160 meters. The heights of the 75- and 160-meter antennas were over 50 feet.

Monuments to RF

All of these home-brew monuments to RF were erected without the aid of a tower or any high-priced hardware. Considering the lack of real estate in my neck of New York and my extreme reticence about

heights, the achievement was impressive — if I do say so myself.

The universe took note of my vainglorious pride and pleasure and decided to provide an altitude, er, attitude adjustment, in the form of an individual well known to hams all over the world. The implacable and ubiquitous "Mr. Murphy" was about to enter the picture in the form of a freak April snow storm.

About a week before leaving for sunny Las Vegas and NAB, it was stormy in the Northeast. My antenna system had survived the most brutal winter on record. Repeated bouts with 70 mph winds, ice and snow were easily shrugged off.

Naturally, I was absolutely contemptuous

of that last feeble slap of Old Man Winter, with its lack of wind and seemingly ineffectual large-flaked wet snow.

My contempt turned to a mild concern as I noted the amazing adhesion of the precipitation to my wires and ropes. Mild concern changed to a horrid feeling at the pit of my stomach as a family member called me over to look out the window at the strange "white pipes" hanging from my trees.

Without any wind to shake the wires, the snow had built up on the lines to the point of looking like the old asbestos-covered steam pipes I'd remembered seeing in Grandma's basement as a kid.

I went to bed that night aggravated over

the prospect of having to climb up on the roof to "tighten things up" when I had so many business loose ends to attend to before leaving for the show. The dawn brought the sun shining into the shack through icy windows.

As is my habit every morning, I switched on the computer, the coffee pot and the old Hallicrafters SX-62 before jumping into the shower. Usually I'd be hearing the wild and wacky sounds of the 75-meter AM window as I coaxed the last few droplets of H₂O out of my ears.

That morning there was nothing but a mild hiss. I tried to convince myself that it must be the receiver. Replacing the tube in the '62 would certainly be preferable to the image I was trying to keep suppressed in my befuddled mind. I cursed to myself with increasing intensity as I switched to each antenna.

Finally, I twisted the knob on another coax switch and clicked on the ever-dependable Hammarlund 129X. I was impatient for the old beauty to warm up. As the crescendo reached the same dreadful, featureless hiss, I silently mouthed the mother of all expletives!

I remember the aftermath of an auto accident some time back. I was shaken by the impact, but once it was clear that there were no physical injuries I reluctantly ventured out to assess the damage to the car. The amazing transformation of my brother's beloved Z-28 was so shocking it hit me with more G-force than the accident itself.

Utter destruction

I had the same queasy sensation that April morning as I forced myself to stumble out the front door into the slushy snow. I was stunned by the utter destruction of my wire and pipe masterpiece. At first glance, the scene looked as if one of the Wright brothers' early airplanes had somehow been transported in space and time to crash into the roof of my humble domicile!

Needless to say I felt a total failure. Not a single one of my three masts had survived. Like the designers of Titanic, I felt that "compartmentalizing" the antennas on three separate masts, with totally independent end supports, would prevent such a catastrophic failure. I felt sure that at least one mast and antenna would survive just about anything — short of a total apocalypse. (Ironically, both my antenna system and the Titanic were done in by simple frozen water!)

The midday TV news made me feel somewhat better. I watched video images of utility company trucks and men scurrying all over Long Island repairing downed lines. Countless trees had been felled and utility poles snapped in half from the weight of that accursed white slop.

I couldn't go up on the roof that day but I did manage to gather up the drooping wires and ropes to prevent my mailman from being clotheslined.

One of the wires from my 40-meter inverted V had one of those heavy porcelain "dog-bones" snapping! It was becoming more clear that the fault Dear Brutus was not solely in my construction, but in the freak weather event itself! This realization was of little comfort as the days wore on.

Those last few days before leaving for NAB were so packed full of preparations for my trip that I probably wouldn't have had much time for hamming. However, the harsh reality that I couldn't transmit

continued on page 29 ►

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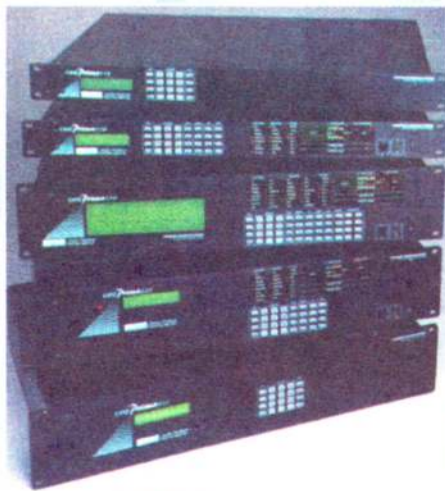
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World Radio History

CIRCUIT THEORY

Understanding Millman's Theorem

by Harold Hallikainen

SAN LUIS OBISPO, Calif. In the previous article in this series, we applied Norton equivalents to a simple three resistor circuit. Let's try generalizing the analysis to come up with Millman's Theorem.

Millman's Theorem is named after Jacob Millman. Born in Russia in 1911, Millman received a Ph.D. from MIT in 1935. He went on to write eight textbooks on electronics between 1941 and 1987, and was a professor of electrical engineering at Columbia University.

As you may recall from the previous article, we took the circuit of Figure 1.

will place across the current source) is the same as the Thevenin resistance (the resistance in series with the voltage source). We determine the Thevenin resistance by shorting out the voltage sources and opening any current sources in the circuit we are trying to simplify, then measure the resulting resistance.

For example, in the left portion of Figure 2, we short out V_1 , setting it to 0 V. We then measure the resistance from the top of R_1 to ground, getting R_1 ohms. Figure 3 shows the circuit of Figure 2 reconfigured to use Norton equivalents for each section.

This is pretty much where we left off

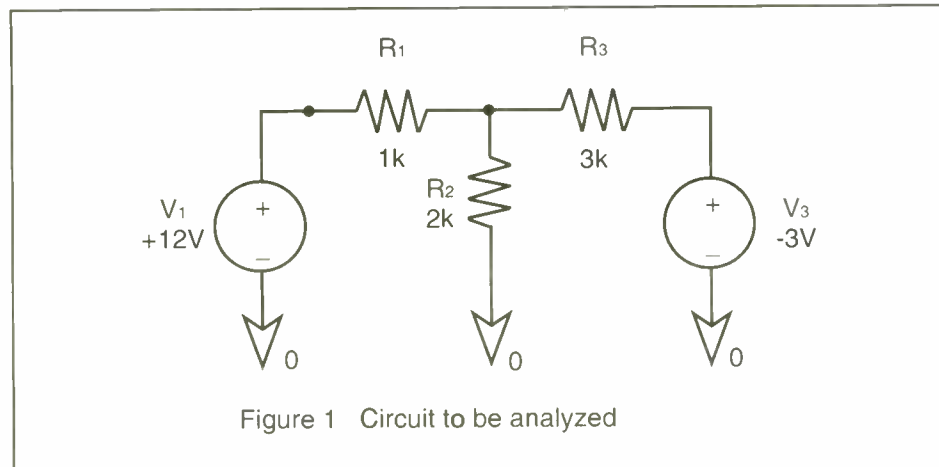


Figure 1 Circuit to be analyzed

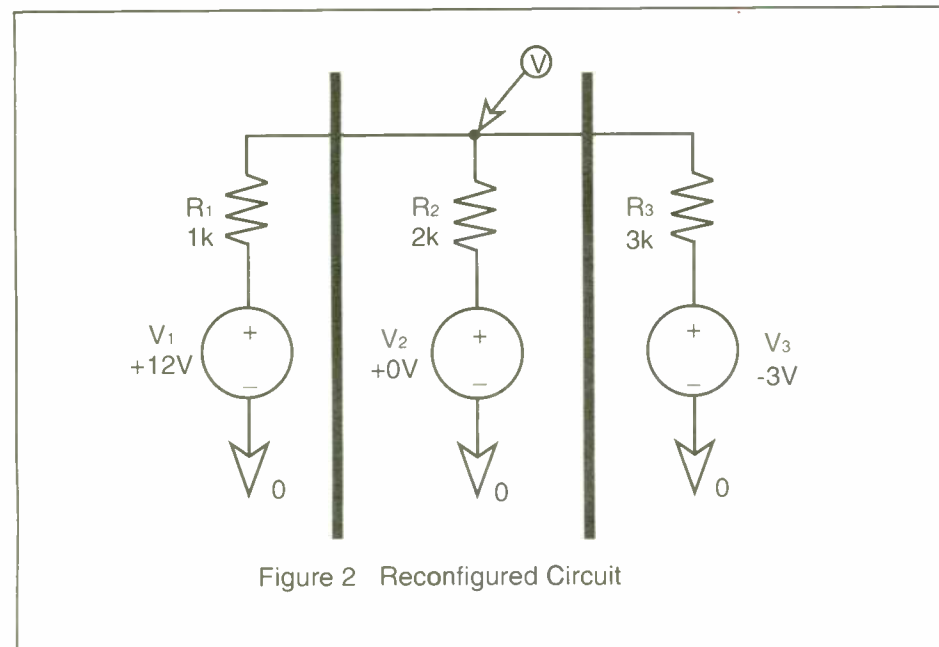


Figure 2 Reconfigured Circuit

reconfigured it as shown in Figure 2, then converted the voltage sources with series resistances to current sources with parallel resistances (Norton equivalents).

Note that the ground at the bottom of R_2 has been replaced with a 0 V voltage source (V_2) to ground.

Recall that a "piece of wire" can be replaced with a 0 V voltage source. Adding this voltage source makes each branch of the circuit identical (a voltage source with a series resistance).

Let's generalize the analysis by keeping the V_s and R_s , instead of substituting values.

Each voltage source with a series resistance is converted to a current source with a parallel resistance. The current is the "short circuit current" of the circuit we are "Nortonizing." We find that $I_1=V_1/R_1$, $I_2=V_2/R_2$, $I_3=V_3/R_3$. As the circuit is expanded, it is fairly obvious that $I_N=V_N/R_N$.

Further, as we determined last time, the Norton resistance (the resistance we

last time. We added the parallel current sources to get the total current and applied this to the combined parallel resistance to find the voltage at the junction of the resistances. Let's generalize it! The total current is:

$$I_1 + I_2 + I_3 \text{ or}$$

$$(V_1/R_1) + (V_2/R_2) + (V_3/R_3)$$

Further, the equivalent parallel resistance is:

$$\frac{1}{((1/R_1)+(1/R_2)+(1/R_3))}$$

Finally, the voltage at the resistor junctions is determined by multiplying the total current by the parallel resistance (Ohm's Law):

$$V=IR$$

$$V = \frac{((V_1/R_1)+(V_2/R_2)+(V_3/R_3)) * 1}{((1/R_1)+(1/R_2)+(1/R_3))}$$

Generalizing for any number of sources and resistances,

$$V = \frac{(I_1+I_2+I_3+...I_N)}{(G_1+G_2+G_3+...G_N)}$$

It would be interesting to try to derive Millman's theorem using other circuit analysis techniques.

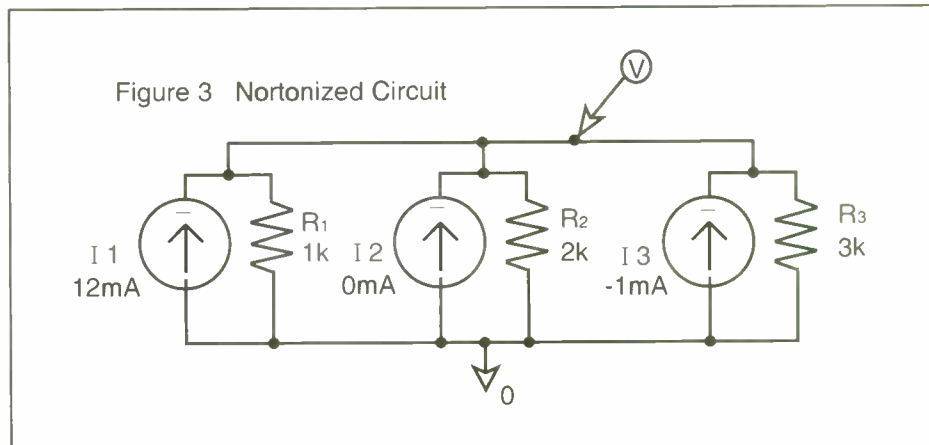


Figure 3 Nortonized Circuit

$$V = \frac{((V_1/R_1)+(V_2/R_2)+(V_3/R_3))}{((1/R_1)+(1/R_2)+(1/R_3))}$$

The last equation is Millman's theorem. It might be more easily remembered by considering its components. If we replace the R in $V=IR$ with $1/G$ (where G is conductance measured in Siemens) and replace V/R with I , the equation becomes:

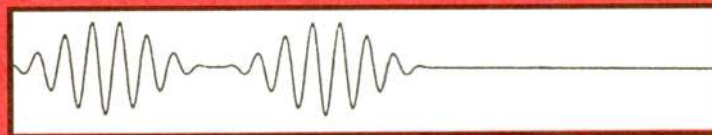
$$V = \frac{(I_1+I_2+I_3)}{(G_1+G_2+G_3)}$$

Let's see if we can derive it using superposition next month!

□ □ □

Harold Hallikainen designs transmitter control and lighting equipment for Dove Systems, a manufacturer serving the broadcast and entertainment industries. He also teaches electronics at Cuesta College and is an avid contra dancer. He can be reached at (805) 541-0200; fax: (805) 541-0201 e-mail: hhallika@slonet.org; or on the World Wide Web at <http://slonet.org/~hhallika>

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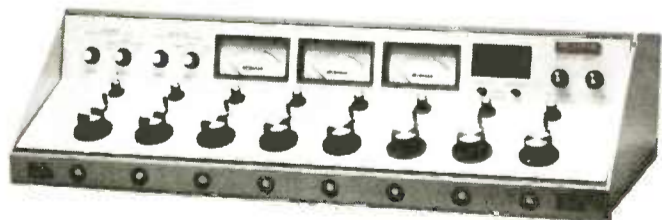
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Museum Houses Radio Oddities

by Lee Harris

NEW YORK New York's Museum of Television and Radio has amassed tens of thousands of radio broadcasts dating from 1924 to the present day.

Odd broadcasts

The collection includes all the obvious classics from the so-called "golden age of radio," but far more interesting to most radio professionals are the many local airchecks and odd broadcasts from radio's infancy.

The museum's computerized catalogue allows searches by title, subject, talent, dates or call letters. And as they say on those classic rock stations, "it don't have to be good to be a classic."

If you're looking for the earliest example of an EBS test, request the National Defense Test Day broadcast of September 12, 1924, anchored by none other than General John "Black Jack" Pershing speaking from the War Department Building in Washington.

AT&T strung together 18 stations coast to coast to demonstrate how the entire country (or most of it) could be notified of a defense emergency by radio.

There is also a fabulous collection of music radio airchecks from the '50s to the present day.

country (or most of it) could be notified of a defense emergency by radio.

Black Jack

Highlights include General Pershing conversing with commanders of various army posts located near the network stations. One crusty old general, who apparently knew Pershing from back in the 1880s at West Point, attempts to get Black Jack to join him in a tune they used to sing around the campfire during the Indian wars. Pershing chuckles, but refuses to raise his voice in song.

The quality of the recording is amazingly

good, and because the event was largely unscripted, it is a rare opportunity to hear

what people sounded like in normal conversation 72 years ago.

Another treat for civil defense fans is an equally impromptu performance by New York City Mayor Fiorello H. LaGuardia, broadcast on city-owned WNYC several days after Pearl Harbor. Sounding confused and comforting at the same time, the "Little Flower" informs his citizens that there's a possibility their city might be bombed in the near future, and he helpfully advises them to seek shelter in skyscrapers. "That's a safe place to be, don't ya see," explains hizzoner, LaGuardia, famous for reading the

matching strategy. The crowning element, rising high above the firmament would be a snow ski!

Next time, the coward's ascent and the amazing ski-tenna.

□□□

Al Parker writes about amateur radio and photography. He can be reached at (516) 681-6733.

"funny papers" on the radio during a newspaper strike, maintains an almost comic nonchalance throughout his address, signing off with, "Carry on, be cheerful, and I'll talk to you real soon." It makes an interesting comparison to the more widely available Winston Churchill "Blood, Sweat and Tears" address.

In the museum's console rooms, you do your listening on headphones at dual purpose video/audio stations. Radio programs are actually archived on videotape, often with several programs slotted on a single tape. The program will not always be cued to the program you desire, and finding what you're looking for can be frustrating.

Dental advice

On my last visit I requested a fascinatingly titled 1934 program called "Broadcasting as an Industry." Instead, I was treated to another 1930s offering: "The Dental Clinic of the Air." The topic *du jour* was "How the Pus Sac May Be Avoided." (By filling small cavities, in case you're wondering.) In addition to dental advice, the program offered a number of musical selections, including a rather unenlightened little ditty about race relations called "Stay in Your Own Backyard." I never did find "Broadcasting As an Industry," but half of the fun of going through the museum's collection is stumbling upon such treasures as "The Dental Clinic of the Air."

While you'd expect a broadcasting museum to have such historically noteworthy broadcasts, there is also

continued on page 31 ►

Antenna Farming Calls For Drastic Measures

► continued from page 24

made me realize just how important ham radio had become in the scheme of my life.

Dark transmitters

I must have looked a bit like Ray Milland in "The Lost Weekend" as I paced back and forth in my shack, my cold, dark transmitters taunting me. Thanks to a couple of indoor attic antennas, I could still listen. Not having any ability to transmit was like being Marley's ghost, able to observe human events but tormented by an inability to intervene! There wasn't even enough time to rig a temporary dipole before it was time to saddle up for Vegas.

It's hard to dwell on mundane or even profound problems when faced with the lights and excitement of Las Vegas. Combine the superficial energy outside with the dazzling NAB show inside, and "real-world" problems fade in the wake of blinding glitter. A friend reminded me to affix my call-sign to my company badge as I set off to lose myself in a sea of transmitters, microphones, computers, cameras, video special effects, recording equipment, meters and processors.

I journeyed to the exhibits of tube manufacturers like a pilgrim to Mecca. Visions of home-brew transmitters, modulators and amplifiers danced in my head. By the second day, only brief flashes of the tangled mess waiting at home managed to momentarily intrude into the ecstasy.

I met dozens of fellow hams who commiserated and helped me to see my tragedy as an opportunity to get it "higher and stronger." By the time of the special reception and cocktail party for hams attending the show, I was so re-energized I started sketching ideas for a new "antenna farm" on a cocktail napkin.

One chap looked over my shoulder at the drawing and shook his head,

whispering, "Man, your neighbors will hang you for that mess." All at once I knew that I had achieved the perfect design! I refined the plan on the plane home. Funny how it all seems so easy when you're seeing the process in the mind's-eye.

I had all the raw ingredients at home. A friend had bestowed a heavy-duty 50-foot push-up mast on me some time back. I had also acquired and tucked away for a rainy day a 500-foot roll of that great 12-gauge flex-weave, coax and a bunch of open-wire feeder.

The centerpiece of this monument wouldn't be a tower or some fancy

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READER SERVICE NO. 174

Finding Radio Oddities

► continued from page 29

fabulous collection of music radio airchecks from the '50s to the present day. Out of curiosity, I punched in the call-letters "WHB" and came up with a telescoped aircheck of Jerry Mason, rocking and rolling Kansas City in 1964. Just your average jock on your average day in 1964, nothing special, but a great example of what regular folks were listening to in the old Ford Fairlane.

If you want to know what it was like to get stuck working at an early FM rocker after you've already been a big deal on AM, call up an aircheck of Scott Muni working a Saturday afternoon shift on

WOR-FM, New York, in 1966. Recently departed from Top 40 giant WABC(AM), Muni sounds about as excited as if he had gotten a job dispatching taxis.

At least Scott had plenty of time for music (most of it consisting of bands that sound like knock-offs of the Monkees) because the spot load (like 1966 FM rock listenership) was a bit on the light side.

News folk can catch a full hour of news/talk KTRH(AM), Houston, captured on an October morning in 1978, including the CBS network news, and local anchor Gina Tedesco.

Compare it, if you'd like, to Don

Hollenbeck doing the local news on NBC owned and operated WEAJ, New York, on March 13, 1945. Unlike many of his contemporaries, Hollenbeck sounds astoundingly conversational as he delivers the latest war news, plus a few local stories and the weather forecast.

Despite the massive and reasonably well catalogued collection, radio definitely takes a back seat to television at the museum. During all of my recent visits, I've been the only person in the console room not watching television. Even museum personnel seemed a bit taken aback by my choice. One young staffer, noticing that I was sitting before a blank screen, asked if she could offer help in operating the equipment.

I also overheard a couple from Spain asking a semi-Spanish speaking museum employee if they could visit the

museum's radio studio. He told them to the best of his ability that there was no such studio. Actually, there is a fully equipped, state of the art control room studio one floor up from where this statement was made.

These little annoyances aside, the museum is a great way to relive those glorious (and sometimes silly) radio moments that made us all conclude that this was the business to be in.

The Museum of Television and Radio is located at 25 West 52nd St. in New York City. The collection is open Tuesday through Sunday, 12 p.m. to 6 p.m.; until 8 p.m. on Thursdays. Call (212) 621-6600 for information.

□ □ □

Lee Harris, former station owner/manager, is currently morning anchor at all-news WINS(AM) in New York.

65 Years Ago

Reprinted from Radio World August 8, 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.

Kits for Midgets

RADIO experimenters fortunately don't agree very well on controversial technical and merchandising subjects, so quite a few say they hope that the midget set craze will die out speedily, and radio thus will cease getting a black eye. A commentator in a periodical said that the midget set designers had caught up with the 1926 models.

But it is hard to present any argument strong enough to overcome a fact. And the fact is that the set-buying public is eager for midgets—the cheaper they are, the greater the eagerness. It may be thought that size has something to do with it, but if a console type were sold at less than the price of the midgets, then the consoles would reign, instead of being, as now, mere pretenders to the throne.

We believe that the demand for midgets should be filled without lament over difference in performance between a midget and a larger set. Nobody can stop the manufacturers from filling the demand. The strangeness of the situation lies, we think, in the presumption that anything like discouragement should be broached. Let's have midgets and midgets—the more, the merrier. Those who don't care for them should shout for midgets for the other fellow's sake.

Aside from manufactured sets, how about kits? There is hardly a midget kit on the market. Maybe the home constructors aren't interested—but we have a hunch they are. A five-tube kit (with two stages of tuned radio frequency, tuned detector, one stage of audio, with pentode output, and 280 rectifier) could be put out, less tubes, to sell net to the builder at around \$20, including of course the conventional Gothic cabinet and the dynamic speaker.

We hereby encourage kit producers to get busy with kits for midget sets, for we believe there is an excellent market here, and the constructors who desire midgets will have an assortment of manufacturers catering to their needs, instead of next to nobody, as now!

If you agree with us, why not write us to that effect? We will show the correspondence to kit and parts manufacturers, and virtually force them (by the lure of prospective business) to get busy.

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See page 39.

Underwater Elvises Rock the Reef

by Alan Haber

BIG PINE KEY, Fla. In the Florida Keys, the water is fine, and so are the coral reefs, resplendent in their many colors and surrounded by plenty of fish, sponges, shrimp, crabs and other creatures of the sea.

The music is fine, too, especially when it is being broadcast by Sunshine State oldies station WWUS(FM) on Big Pine Key. Once a year, the music travels a bit lower than normal ... below the water to a couple of hundred divers and snorkelers gathered to experience the splendor that is the 100 kW station's one and only 12-year-old, six-hour-long Underwater Music Festival.

The festival positions WWUS "as a station that is concerned about the coral reef system here in the Florida Keys," said

The station has gotten into doing goofy things.

Program Director Bob Soos. "We're reinforcing our position as a station that really cares about our water environment."

July 13 was the day of the festival. With the air temperature around 87 degrees and the water temperature mighty comfy at around 86 degrees, between 600 and 700 divers and snorkelers gathered at the Looe Key Reef, south of Big Pine Key and five miles away from any land, to groove underwater to a choice selection of water-related tunes being broadcast by the station.

During the festival, the station coordinates with dive boats, all of which are equipped with underwater speakers that enable the divers and snorkelers to hear the station's programming while they are submerged. Additionally, other boats are run out to the festival from the local dive shops. The station assigns the boats specific locations to settle into along the Looe Key Reef line, which is about a third of a mile long.

According to News Director Bill Becker, who conceived the event to bring attention to both cultural issues and the natural attractions present in the Keys, and holds a Master's degree in marine biology, somewhere in the area of 100 boats converged above Looe Key Reef for the festival this year.

"It is very interesting," notes Becker. "It can be very quiet above the water and then, all of a sudden, you dip your ear below the water and the water is full of music."

Mark Davis, a scuba instructor with the Underseas Dive Shop on Big Pine Key, was one person who was digging the tunes below the water line. He has, in



WWUS hosted diving Elvises last year.

fact, attended the festival every year. "When you're diving, you hear bubbles and fish chomping and things like that," he said. "And then, when you hear music, you're just kind of smiling and, oh, it's just neat."

People who came to the festival this year were obviously feeling pretty comfortable: Becker said some were spotted floating on their sides with one ear in the water listening to music and the other ear out of the water.

Becker and Soos shared remote duties, broadcasting from a boat above the reef (the music tide turned to more of a reggae/steel drum-type of groove when Soos was on the air). People called into the station from other boats to report on water temperature and the festivities in

tow. In past years, said Becker, remotes have been done from below the water.

"I've done it with a helmet," he said, speaking into a microphone planted inside. "It can get pretty dramatic," he added, "but it's interesting to be talking underwater and the divers around you hear you."

While remote broadcasting this year, Becker reported on the number of divers and boats at the festival, described the sea conditions, communicated the water temperature and visibility, and asked people to watch out when motoring around the divers and snorkelers and to be careful when heading through the congested dive area.

Present at the event were personnel from the Florida Keys National Marine Sanctuary, of which Looe Key is a part.

Public service announcements (which air throughout the year) ran on the station during the festival. The PSAs act as "diver awareness messages or coral reef etiquette," according to Becker; the idea behind the festival is to increase awareness of coral reef conservation.

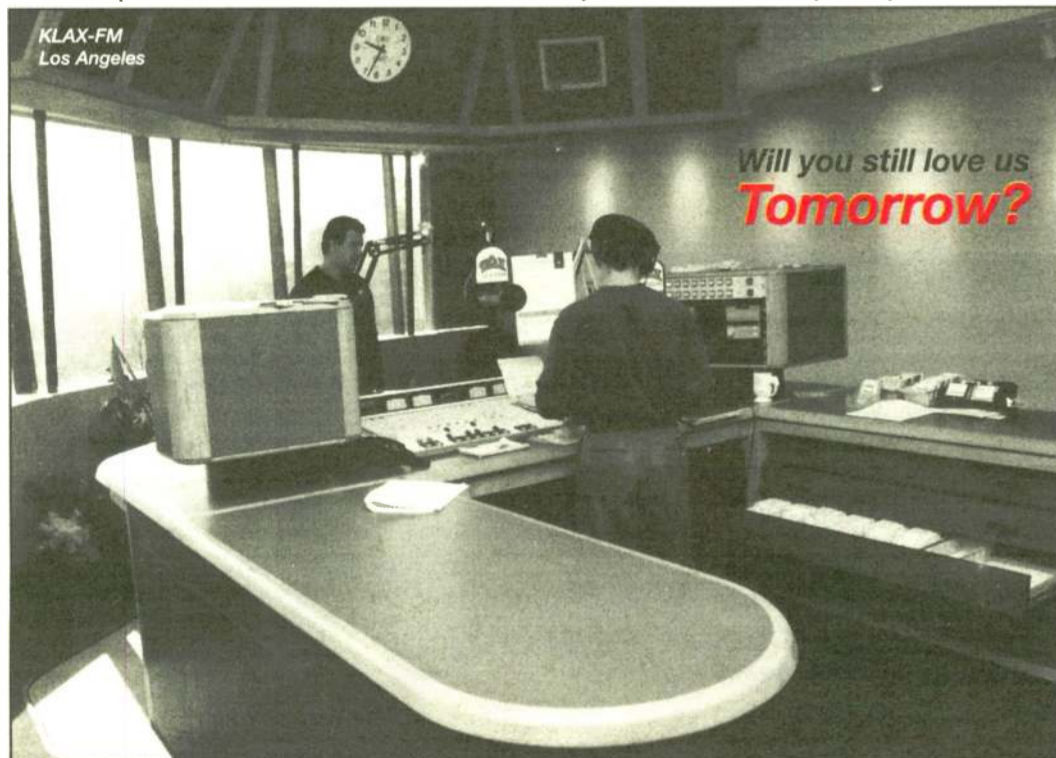
WWUS has come a long way since the first Underwater Music Festival was held 12 years ago in January. The festival attracts a lot of national media attention: It has been featured on NBC's "Today" show and on CNN.

The station has gotten into doing "goofy things" for the cameras, said Becker. To wit: the Diving Elvises, who appeared underwater four-strong last year (only one King made the festival this year) wearing their white outfits, gold jewelry and Elvis wigs, playing mock guitars. This year, the festival sported a timely Olympics theme, complete with Hula-Hoops arranged to look like Olympic rings, underwater flags, and an underwater "torch" sporting a Mylar "flame."

It'll be hard to top the Diving Elvises and some of the other unique features of the festival in this and past years, including the underwater conch shell blowing contest, underwater dance contest and underwater ballet.

Becker hints that an underwater dome, in which divers (perhaps of the celebrity variety) can be interviewed, may be next.

Soos is looking forward to next year's festival. "You think after you've been doing something this long that the novelty would wear off, particularly (when) you're talking 12 years now, but it has not," he said. "Each year, it's just as fresh as if we had done it for the first time."



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INTERNATIONAL UPDATE

Winning with Localism in Poland

by Charles Recknagel

KRAKÓW, Poland With the philosophy "radio is a local medium," RMF FM built the most successful nationwide private radio network in Poland.

The Kraków-based pop music-and-news station is listened to by almost one in three Poles over the age of 10.

Only one other network in Poland is more listened to: the public radio station Polish Radio One, whose full-service family format on long wave still attracts almost half of all Polish radio listeners.

Krzysztof Nepelski, marketing and research manager for RMF, said the

success of his network lies in its ability to stay close to local listeners while having a nationwide voice.

"Our listeners want the radio to speak about streets and shops they know," he said, as well as to bring them national and international news and to be a forum for national debates.

Balancing act

It is a delicate balancing act, but the station is able to make it work thanks to a heavy investment in up-to-the-minute technology.

The fully digital main station in Kraków broadcasts locally and uplinks its signal

to the Astra 1A satellite, which sends it on to 15 more regional stations around the country. Each regional station inserts local news, traffic reports and local ads into the national broadcast.

The network uses 67 120 kW transmitters nationwide, ensuring that the broadcasts reach every corner of Poland.

By mixing national and local programming, said Nepelski, "we bring listeners a traffic report that starts with the national scene of what is happening at the border or on the coast, and ends with their own local conditions."

The format is a first in Poland and rare in Eastern Europe, where public radio

stations dominate the national airwaves and private stations tend to be limited to single urban markets.

The only other nationwide private radio in Poland, Warsaw-based Radio Z, broadcasts a single program across the country.

The growth of RMF from an obscure local station in Kraków to a powerful national network parallels the history of private radio in Poland, and the station is redefining what radio means to Polish listeners as it grows.

The station began in 1989 with the backing of the Polish revolutionary trade union, Solidarity, which pushed the Communist Party from power that year.

Eight people from the local Radio Kraków built the first RMF studio with their own hands. Things were so improvisational that staff often slept in the studio and did morning broadcasts still dressed in their pajamas.

With an infusion of equipment from a French communications investor, RMF began to attract advertisers and to grow.

Its earliest format was music only, retransmitting Radio Fun from Paris, but that novelty quickly faded for listeners.

The station soon found its own voice as a news/music station focusing on the social and political changes sweeping post-Communist Poland.

By doing opinion polls in the streets and sending reporters into prisons to interview inmates with AIDS, it broke the mold of dull state radio programming and quickly became the most popular station in southern Poland.

In 1994, RMF went national after the Polish Ministry of Communications released its Communist-era monopoly on most radio and television frequencies.

Mobile station

Today, RMF broadcasts 24 hours a day from fully computerized facilities with a staff of almost 200 people.

The main studio complex in Kraków uses the 360 Systems Digicart digital storage system, and all its advertising is stored on computer. The on-air program is generated through a local area network (LAN) built around a UNIX architecture.

All the music played in RMF — a mix of European hit radio (EHR), adult-oriented rock (AOR) and alternative rock aimed at listeners aged 16 to 40 — is on CD.

RMF also has three recording studios with the latest in digital equipment where it has produced more than 15,000 commercial spots.

For listeners, the most distinctive piece of technology in the station is its high-profile mobile station (a Toyota jeep equipped with an 18-meter telescoping antenna).

Using digital technology, the mobile unit broadcasts with studio-quality sound, and last year it visited every province in Poland to add to coverage of local and regional events.

Marketing Director Nepelski said RMF plans to stick to its philosophy of being a nationwide local radio, but his definition of "local" shows no sign of limiting future growth.

The station now uplinks a programming package to local stations in Chicago and Detroit in the United States, both of which have large Polish-American populations.

□ □ □

RMF FM is on the World Wide Web at <http://www.rmfm.pl/>

Charles Recknagel, a journalist based in Prague, Czech Republic, regularly reports on the industry for Radio World International.

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World Radio History

ROOTS OF RADIO

Early Talk Radio Solved Problems

by Richard W. O'Donnell

PORT RICHEY, Fla. TV talk shows have been getting a lot of bad publicity lately.

The main complaint is that most of the shows glorify the low life. Also that there is too much emphasis on matters sexual, and that rarely is anything pleasant ever talked about. One of these shows actually set the stage for a murder.

Protests

In fact, protest committees have been formed nationally to bring TV talkers under control. Whether these efforts will succeed remains to be seen. When all is said and done, the ratings will probably resolve the issue.

Vintage radio, in its day, had some shows that could compare with our current TV talkers. The guest stars on the radio programs could not be seen, but the voices told the story, and usually pretty well.

Radio talkmasters of today, it should be noted, have been known to carry tainted subject matter, but most of this stuff is put on the air by the people who call in. The issue of the day, as designed by the radio host, has a lot to do with what you hear.



"Strike It Rich" host Warren Hull and contestant Eleanor Kane hear the good news on *The Heartline*.

Be that as it may, the current shows are not as interesting as the ones featured years ago. Take "Goodwill Court." Do you remember that one? The one-hour show went on the air nationally in 1936.

The idea was for people with legal problems to tell the nation about them, and a panel of lawyers would give them some sound advice.

The host, or mediator, was a chap named A.L. Alexander, a former newspaperman who hit it big on radio with his show. Often, both sides of the dispute would appear. No names were ever used, only initials.

Mrs. P would say, "That monster I married has everything we have tied up in his name, and he is always cheating on me. He's never home at night."

And Mr. P would respond, "I give her plenty of money to run the house, and she's off playing bridge when she should be getting my meals ready. I go out at night because I want to get a

decent meal at a restaurant."

At this point, mediator Alexander might try to bring about a happy ending.

"C'mon you two," he'd say. "kiss and make up. Think of the children. They need both of you."

If this attempt failed, the panel of lawyers got into the act and handled the divorce laws in the state where Mr. and Mrs. P resided, and told them how best to get their divorce or legal separation, as the case may be.

During its brief run on radio, the "Court" handled cases involving loan sharks, bookies, neighborhood disputes, drinking problems and malpractice, as well as other subjects.

The show, which quickly got high ratings, did not last too long on the air, primarily because other lawyers, who were not panelists, objected to having so many cases handled on a radio program. They were losing business. It was estimated that more than 5,000 people also wrote to the show for advice, and received such in reply mail from the radio lawyers. "Goodwill Court" lasted less than a year.

Alexander came back in the '40s on the National Network with a similar program. This one was called "Mediation Board." Social workers and educators replaced the lawyers on the panel. It lasted until 1950.

Then there was the "Goodwill Hour." That came on in 1937 and was popular for years. John J. Anthony was the host, and he did not require a panel of experts. He was the one who advised his radio guests how they could solve their problems.

What right did Mr. Anthony, as he was known, have to tell people how to solve their sad situations? Well, Anthony insisted he had several university degrees, and claimed, for awhile, that he was taught by Sigmund Freud.

Fascinating

When all was said and done, and after the "Goodwill Hour" had become a regular on Mutual, it was discovered the wise man was actually a high school dropout. By then, nobody cared. The show made for fascinating listening, first on Mutual and later on NBC.

"What is your problem Mrs. Q?" Anthony would ask.

"The man upstairs keeps playing his records loud," responded the good woman. "I like music, but how much swing can you stand? He keeps playing the same songs over and over again."

"Have you spoken to him ma'am?"

"I have. He just smiles and goes back to playing his records."

"Have you spoken to your landlord, ma'am?"

"I have, Mr. Anthony. The man just smiles at the landlord too, and goes back to playing his records."

At this point Mr. Anthony might suggest the poor woman move or buy earplugs or some such thing. He always came up with a solution of some sort, but he was also willing to concede there were some problems that did not have a simple solution.

Mr. Anthony also had the habit of telling his inexperience radio guests not to speak too far from the microphone or get too close to it.

"Don't touch the microphone," was another line he used quite a bit.

Sex, money, betrayal and all the usual

things were chatted about on the "Goodwill Hour." The conversation was laundered, but you did get the message.

"Strike It Rich" was another radio favorite that later made it to TV. The show arrived on radio in 1947, and was on Monday through Friday, weekly. Later, this radio would be simulcast and eventually end up on TV all by itself. Todd Russell and Warren Hull were the hosts during its run.

Basically, "Strike It Rich" was a quiz show with a sad song or two to sing. Guests always had a problem. A child might need an operation or a wheelchair was needed or fire had destroyed a new home a family

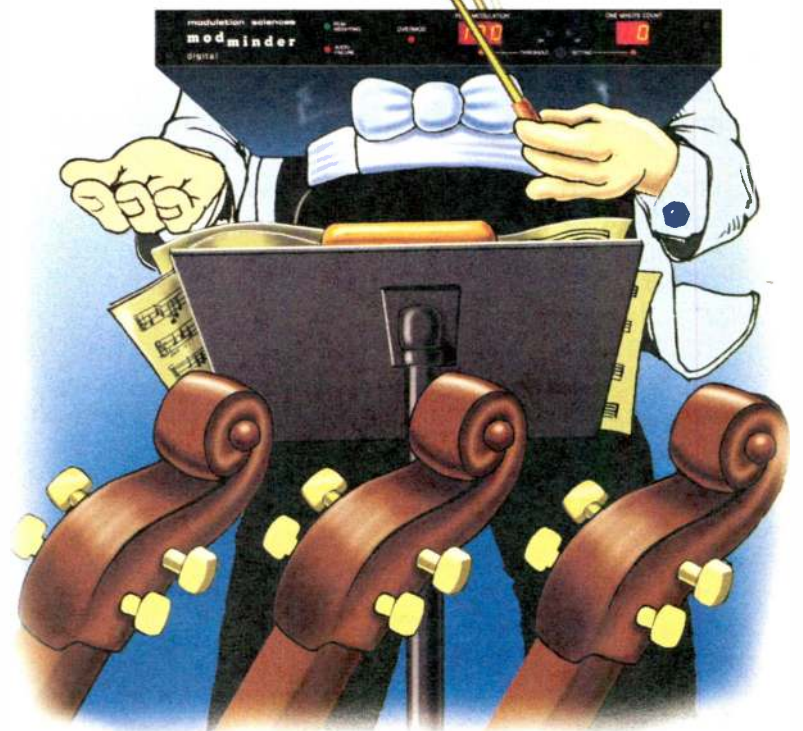
had bought with its last penny.

All the contestants had to do was answer relatively simple questions. In most cases, they would collect a hefty sum, more than might actually be needed. And there was *The Heartline*, a phone that listeners and others who were aware in advance, could use to call in with any extra help that might be needed. When a contestant failed to answer any questions and did not win the money needed to send a long lost son home to see his dying grandmother, *The Heartline* usually came ringing to the answer.

Despite its quiz show format, the sad stories were the prime reason "Strike It Rich" enjoyed such a long run.

For the record, "Strike It Rich" and the "Goodwill" shows did have a fair share of critics, but they never caused the uproar that is heard today over TV talk shows.

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As illustrated in the Sony Worldwide Networks master control studio on the right (one of seven Arrakis studios in the Manhattan, New York complex), Arrakis can provide complete major market studios with Arrakis consoles, digital workstations, video-audio switchers, furniture, and system prewiring.

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PERSONNEL LEVEL

Positive Attitude Enhances Career

by Sue Jones

BURKE, Va. Moving your career ahead can sometimes seem impossible. Often times we expect immediate results that do not come as quickly as wished. Building a foundation of strong work habits and positive frame of mind can enhance your current efforts and will serve you over your career span. The following repertoire of work habits will never diminish your efforts, but will always magnify them.

1. Perform every task no matter how small, the very best you can. Everyone has some part of their job that they

would rather not do. Perhaps it is an administrative or cleaning task. Some people believe the task is beneath them and take several approaches. Some

approaches works. Co-workers and managers will notice. The best approach is to accept it as part of your job and do it to the best of your abilities.

**All work is honorable.
Always do your best, because
someone will be watching.**

—Colin Powell

ignore it hoping that it will go away. It usually gets to be a bigger job. Some try to get someone else to do it. Some do it with a sour attitude. None of these

If you have the lowest paid position at the station and you are the newest employee, do every assigned task with cheer and enthusiasm even if you are

capable of a much higher level and higher-paid work. Management has determined that the task is needed and important. They need for it to be completed. The last thing they need is to have the task ignored or have an employee grumble and complain about doing it. They will notice if and how you accomplish the task. The choice of how management views your work attitude is within in your control.

The right approach

Colin Powell tells a story in his autobiography, "My American Journal," about a summer job he had during his college years. He was a porter in a Pepsi bottling plant. When he took the job he did not know what a porter in a bottling plant did, but he soon learned that he'd be mopping the floor. He needed the money for college so he took the approach: "If that was what I had to do to earn \$65 a week, I'd do it. I'd mop the place until it glowed in the dark."

His supervisor did not give him any feedback on his work until the end of the summer when he said: "Kid, you mop pretty good. Come back next summer and I will have a job for you." Powell responded that he wanted to work on the bottling machines the following summer. That's the job he got the next summer and by the end of the summer, he was deputy shift leader.

The early lesson he said he learned was: "All work is honorable. Always do your best, because someone will be watching." Needless to say, his approach to getting the job done right paid off spectacularly in his career.

2. Demonstrate initiative. Do tasks without being asked. Your career will advance more rapidly if you understand the standard tasks of your position and complete them without close supervision. Keep in mind that your boss has his or her job to do, plus overseeing your work and possibly others' work. If you constantly have to be reminded to do routine tasks, you become an added burden to your boss. Instead of being someone who can be counted on to get the job done, you become a problem.

Another way of demonstrating initiative is to do more than your position requires. Doing more than is required shows that you are willing and able to contribute more. Higher-level jobs pay more, but they also carry more responsibility with more tasks and details. If you are unwilling to do anything extra, you send the message to management that you do not want the added tasks and responsibility of a higher level position. The best way to get promoted is to demonstrate that you are capable of your current assigned tasks, with little or no supervision, and capable of more.

The day that you think or say, "It's not part of my job description," is the day that you stop your career advancement at your current position. If you fail to do the routine tasks of your current job in a timely manner, your job may be in jeopardy.

Demonstrate initiative

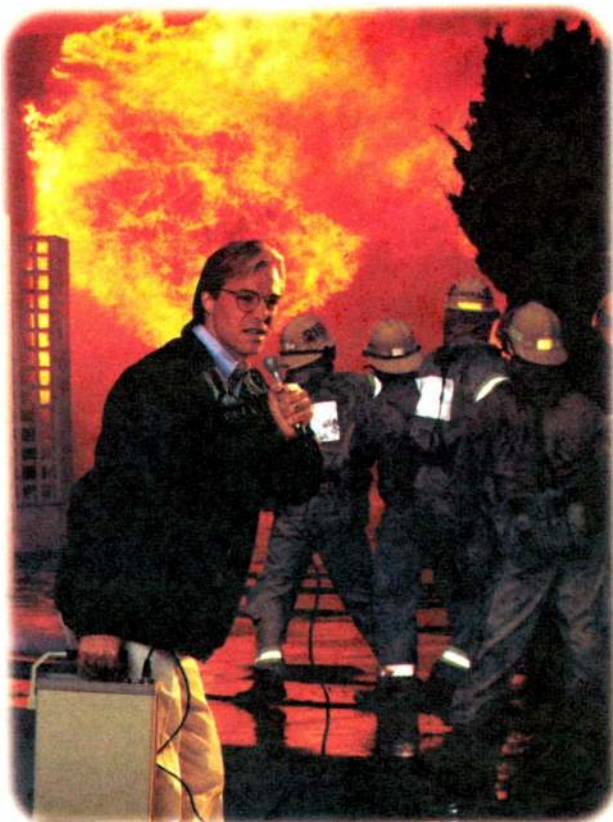
One of the best reasons to demonstrate initiative is career advancement. When a new position is available, your initiative and reliability can speak highly for you or can keep you in your current position.

Responsible managers will not promote those who have to be constantly monitored. Those employees have

continued on page 41 ►

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PROMO POWER

Annual Plan Energizes Promotions

by Mark Lapidus

WASHINGTON Budgeting for the promotion department. If you haven't already started to get it together for next year, you will be deeply involved shortly. Most stations hate going through this process. Why? Because they have no annual promotion plan. Instead, managers will take whatever was spent or made last year and add 5 percent. (Unless they're told to do "zero" budgeting again).

This is no way to run a business! Take matters in your own hands and put together your annual plan before you start any financial calculations.

Twelve months at a time

What is an annual plan? It's a 12-month, quarter by quarter approach that offers stations greater sales, promotion and planning and opportunities. With great annual planning, your sales team will finally have time to actually sell your promotions because the package will be developed months prior to any activity.

Plus, because you know what's coming up, the promotion department will be able to make intelligent decisions about fresh promotional opportunities presented as the year develops. You won't have to take on an awful sales promotion just because you don't have anything planned for third quarter.

Who creates the promotion plan? It is essential that the promotion director, general manager, general sales manager and program director be involved in every step of development. If one of these legs of the stool are missing, your annual plan is doomed to failure.

For example, if the general sales manager says, "Hey, guys I'm really sorry, but I've got to play golf with a very important client. You don't really need me for this promotion thing, do you? I don't care what I sell ... just give me up with some good stuff, okay?"

The result is predictable. Because the general sales manager hasn't "bought in" to the plan, he or she is likely to reject all or part of it as "un-saleable": "Hey...this might be terrific for programming, but no client wants to sponsor a morning show remote at Disney World. What were you guys thinking?" Make sure someone (maybe the general manager's assistant) is there to take notes.

Check the agenda

Where, when and what's the agenda? For your first meeting, block out an entire morning away from the station. This will minimize interruptions and give the meeting the importance it deserves. Prior to the meeting, issue this agenda: "Our first annual promotion planning session is this Tuesday from 8 a.m. to 1 p.m. in the conference room at Motel Six. Lunch will be provided. Bring with you any articles, newspaper clippings, calendars and your own concepts about what you'd like our station to be doing next year."

The meeting: Give each participant a copy of this year's promotional calendar and a blank month by month calendar for next year. Agree that each person has veto power over major promotions. If a program director loves a major station event he or she did, but the general sales manager says once again that he can't sell it, the event goes. The team will

have to come up with something else, or convince the general sales manager why it can be sold.

Review the year, writing down the

Carnival" when it's really dead in January; and second quarter could be the "World's Largest Yard Sale," where retailers and listeners alike display their

With great annual planning, your sales team will finally have time to actually sell your promotions.

events, contests and activities that deserve repeating. Next, tackle one major appearance event per quarter: Your first quarter event might be an indoor "Kids

wares in a flea market setting.

Only do one major event per quarter. More is unrealistic for most stations with a one or two person promotion department

and a typical sales staff. When you plan too many major activities, the sales deadlines begin to fall on top of each other.

After deciding the four "major" activities spend a few minutes helping the general sales manager develop potential product categories. If you discover that one of the events has only one or two product categories, develop something else.

After finalizing your four major events, fill in each quarter with your on-air contesting activities. While these too are "major" events, they do not typically require the planning and manpower of the previously described quarterlies. They can even air concurrently with most major events. Next come your secondary monthly promotions. These may be events like the "Chili Cook-Off," where you have little sponsorship activity and

continued on page 41 ▶

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National Lampoon Radio Returns

by Alan Haber

WASHINGTON From 1973 to 1975, hundreds of radio stations (around 600, more or less) across this great land aired a fish-out-of-water-like program composed of comedy bits of various lengths, shapes and styles performed by a lively group of genuinely twisted writers and comic voices. And then, suddenly, the show was gone from the airwaves.

Hour-long laugh-fest

Initially an hour-long laugh-fest, the "National Lampoon Radio Hour," an outgrowth of the National Lampoon humor magazine, quickly shrunk in half,

although, true to the magazine's undeniably twisted reputation, the name was not changed and, in fact, no mention was made of this change on the air.

The meek and easily offended need not listen. "The National Lampoon Radio Hour," the best of which has been released by Rhino Records in a three CD set titled "The Best of the National Lampoon Radio Hour: Buy This Box or We'll Shoot This Dog" (don't ask; it's a version of a joke that appeared on the cover of an old issue of the magazine), was in-your-face comedy, very inspired by the times in which it aired, and, somehow very much a throwback to the golden age of radio.

By that, I mean there was a generous use of music, sound effects and radio drama-like staging (not to mention good-old stereo panning) that went into the NatLamp Radio Hour comedy blender.

And, just as the classic radio dramas were able to transport listeners into their virtual lives, the "Radio Hour" made listeners believe they were traveling through Europe with a family of hillbillies in "The Immigrants," and hearing an interview with the real Marlon Brando (played wickedly and ever-so-accurately by the late John Belushi, who took over control of the show after the original seer, Michael O'Donoghue quit).

A typical show introduction kicks off

the first CD of the Rhino set: "The world's weekly wait is over," comes the booming announcer's voice. "Like magic, an invisible chain of sound once more circles the planet. The National Lampoon Radio Hour is ready again to girdle the globe with giggles."

Indeed the Lampoon did girdle the globe with giggles, and yuks, and other assorted funny bone-type things. "You don't have to look at pictures on the radio," a group of vaudeville-like singers imparted to listeners on the program. "It doesn't ruin your vision like a TV show." In fact, the singers noted, "You can get away with so much on the radio."

And the NatLamp folks did: "Saturday Night Live" vets Belushi and O'Donoghue and Chevy Chase and Gilda Radner and Bill Murray and Billy Crystal (doing his great impersonation of Muhammad Ali promoting the NatLamp Hour) and comedian Richard Belzer and more — many, many more — got away with a lot.

The wonderful Gracie Whitebread, for example, brought listeners the "Theater Times for 'The Ryan O'Neal Story.'" The NatLampers engineered this piece of edgy whimsy to sound just like a badly recorded tape you might listen to when calling up your local movie theater.

Following the sound of a telephone dialing, the tape picks up, sounding a bit garbled: "This critically acclaimed retrospective highlights the most memorable scenes from the work of one of the American cinema's most respected young actors. Showings will be at 7:30, 7:32, 7:34, 7:36, 7:38, 7:40, 7:4—" Then, click!

The frustrated caller tries again — twice, in fact, and, what do you know, the showtimes are now at odd times: 9:11, 9:13, 9:15, etc.

Parodies

You'll hear so much more, including a host of dead-on song parodies, featuring the sound-alike voices of your favorite singers, such as B.B. King ("Every Day I Feel Depressed"), James Taylor ("Highway Toes"), and Neil Young ("Southern California Brings Me Down").

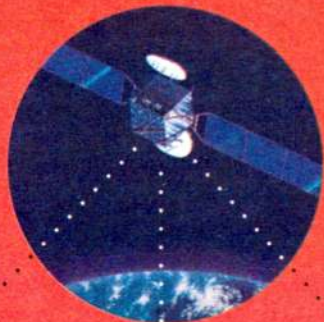
You'll hear Chase interviewing Belushi as Don Corleone, a "well-known entrepreneur and land developer." You'll thrill to the adventures of "Flash Bazbo, Space Explorer," presented in the style of old radio serials, complete with exciting background music and a host of sound effects.

You'll hear comedian and actor Richard Belzer in the guise of Father Joseph Vazinni, as religion comes under the NatLamp comedy microscope: "Funny thing happened to me in the confessional today, but, of course, I can't tell you what it was." You'll also hear the Belz, as he's known, as Dr. Ricky Johnson, a psychiatrist doing stand-up comedy: "But all seriousness aside," he says, "Life is one big joke. Either you get it or you don't. That'll be 25 dollars."

Yup ... either you get it or you don't. At some point, enough people didn't get it, because the "National Lampoon Radio Hour" was suddenly off the air, replaced by an interview program starring none other than Peter, Paul and Mary's very own Mary (Travers, not Richards).

"The show was great while it lasted," says former NatLamp (magazine) writer Brian McConnachie in the funny and informative book that accompanies this set. "Scripts + improv = good, well-balanced, entertaining fun."

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Boost Promotions with Annual Plan

► continued from page 39

all that's required is a broadcast and jock appearance.

Finally, the daily and weekly promotions and contests are laid out. Yes, many of these have sales application too! If your

morning show is doing a "Seven In Seven" contest every week of the year, sales may actually get somebody interested.

After the meeting, the Promotion Director assembles the annual plan and submits it to all attendees. A second meeting is scheduled

to air final concerns and tie up loose ends. At the conclusion, each person signs the cover sheet indicating that they were part of the process and that they will be responsible for this plan's execution. A signature may seem like a small thing, but it adds finality and importance to the plan.

What's next? The budget, of course! Now that you know what you're doing, it's time to figure out what it's going to cost and what you're going to make.

Future plans: After the first year, don't do this annually.

Instead, update your plan for twelve months each quarter. For example, in the second quarter, do the plan for first quarter of the next year.

When you get to September, convene your annual planning meeting and present the calendar. Your second year meeting should be a very short one. After everyone signs off, maybe you can all go play golf with that important client!

□ □ □

Mark was until recently vice president of marketing. Liberty Broadcasting. This 23-year vet would like to be vice president of Something again real soon! Offer him work today at (703) 764-3994.

After the first year, don't do this annually.

Enhancing Your Career

► continued from page 38

demonstrated that they have trouble completing the current assigned tasks and certainly are not ready for added responsibility. If you are passed over for a higher level position at the station and an external or internal candidate gets the job, don't get mad. Evaluate why you did not get the job. A good place to start that evaluation is your initiative.

3. Produce Results. If you are part of the sales group, make sure that you generate the sales expectations for your position. Consistently, make two extra calls per day to exceed your sales goals.

If you are the engineer, make sure that the equipment that you are responsible for is operating at peak performance level. Have a reasonable amount of extra parts on hand, as the budget allows, to meet the most common emergencies. Repair equipment as soon as possible. Have a contingency plan for how you will handle emergencies and problems. Look for ways to prevent

and/or reduce off-air time.

If you are the receptionist, treat every caller or visitor professionally, as if they are your best client or listener. They will be glad they chose your station. That goes a long way in keeping the ratings high.

Complete your work on time. If you are the traffic manager, and you are late or fail in completing the logs, your poor performance will impact other staff members. Not only is your work slow, but you are slowing the work of others.

The bottom line is: Performance counts. Incorporating these three career-enhancing habits into your working mind-set will not guarantee success and promotions. However, trying to build a career without them is like trying to broadcast without a transmitter.

□ □ □

Sue Jones is a principal in Bisset Communications, a communications management firm located in the Washington area. She can be reached at (703) 503-4999.



Is Your News Feed Eating Away Your Profits?

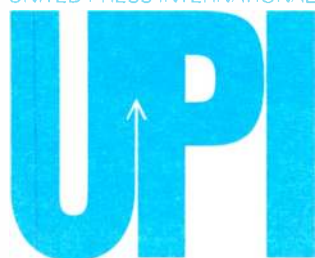
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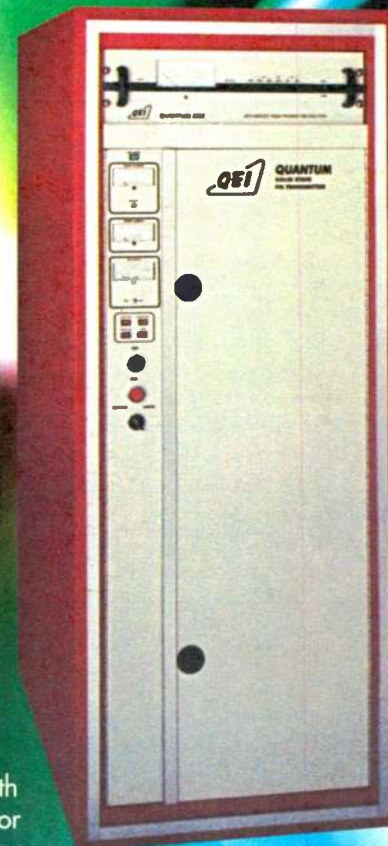
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Foundation 2000RE

Breakthrough Price \$6,995.00*

The following summary is excerpted in its entirety from a previous *Radio World* Product Evaluation by Bruce Bartlett with Jenny Bartlett. Reprinted here with permission.

Using the system

The Foundation 2000 really is easy to learn. In about 10 minutes I assembled the unit and connected it to my mixer. In another 15 minutes I had recorded and overdubbed four tracks of music, voice-over and sound effects. In another 90 minutes, I finished the quick-start tutorial that covered editing basics. The clear, concise user manual was a big help.

The cooling fan in the electronics unit is very noisy, so you might have to put the unit in another room. Fortunately, a long cable connects the electronics unit to the Edit Controller.

You can get up to speed quickly because the 2000 records, overdubs, plays and shuttles much like a tape recorder. There's no need for a keyboard, monitor or mouse. Some computer editors can slow your creative flow and make editing difficult, but the Foundation 2000 lets you breeze through projects.

Here's how you might put together a typical spot with a music bed, announcer and sound effects. Record stereo music on tracks 1 and 2, voice on 3, and effects on 4.

First, set tracks 1 and 2 to record-ready mode. Buttons in use light up. Tap Meter on the touchscreen; a row of meters appears so you can set levels.

Next, tap Tracks on the touchscreen to set the eight tracks. You can zoom in to see one or two tracks at a time. Hit the Record and Play buttons, and record the music bed. Repeat this process for tracks 3 and 4 to overdub voice and effects. Audio is displayed as a soundtrack on the touchscreen.



You might want to edit the voice track by doing an automatic punch-in (Auto Record). It's easier than with a tape recorder. Jog to the punch-in point, press In, jog to the punch-out point and press Out. Rewind to the top and hit Record. The 2000 will start recording at the In point and will exit record mode at the Out point.

Editing speech is a piece of cake. First you touch a blank area of the screen and set the voice track to record-ready. Zoom in to the desired resolution of the waveform (zooms are instant). Then press the Ripple button, which will slide audio to fill in the gap where you will cut out material. To cut out an unwanted sentence, jog or play to the beginning of the goofed sentence and press In. Jog to the end of the goofed sentence and press Out. Press Cut and the edit is done.

Edits are non-destructive because you can Undo and Redo them, six levels deep. Even if you accidentally record over a track, you can recover the previous audio by tapping Undo. Seems like magic the first time you try it. Edits are saved to disk automatically. When you turn off the machine and turn it back on, your work in process comes back up.

As you record or play back, the audio waveform scrolls past a stationary cursor. This is more intuitive than in a software DAW, where the cursor scrolls past the waveform. When you scrub quickly with the 2000, though, the waveform scrolling lags slightly behind the scrubwheel action. You might want to scrub by ear rather than by eye.

As for other features, the 2000 can instantly trim the start and end of an audio event. Cut, copy, paste and adjust overall gain in a track. Slide audio events in time. Store audio in a built-in librarian for later retrieval. Drop up to 500 markers to mark

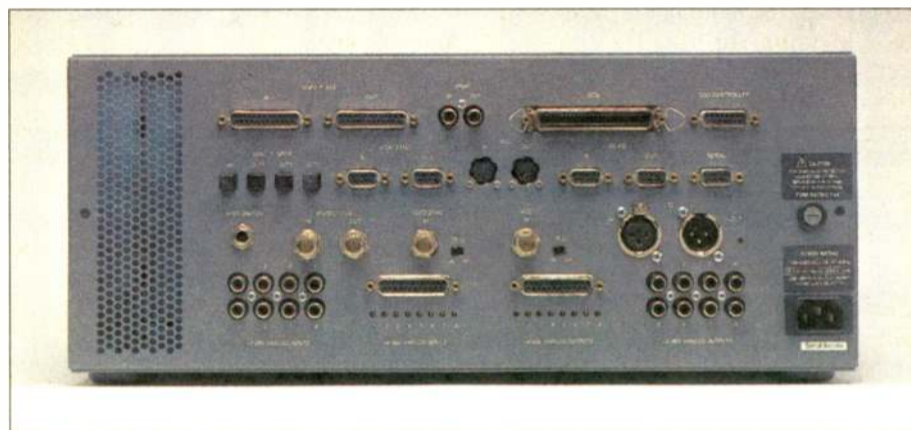
Product Capsule: Fostex Foundation 2000	
 Thumbs Up	 Thumbs Down
<ul style="list-style-type: none"> ✓ very fast ✓ ergonomic ✓ easy to learn 	<ul style="list-style-type: none"> ✓ noisy fan (see text) ✓ no programmable ducking (see text) ✓ occasional lag in soundtrack scrolling
<small>For more information, contact Budd Johnson in California at 310-921-1112</small>	

desired segments of sound. Find cue points instantly. Fade in, fade out or do real-time crossfades on all tracks at the same time. There's no wait for a crossfade to calculate. The system is not designed to duck music under voice, but you can do it with your mixer or with the optional plug-in mixer.

The Fostex Foundation 2000 is a pleasure to use. Although it costs more than a computer workstation, it lets you zip through projects with less fatigue. It's an easy transition for station personnel. And it's a fully professional system, free of bugs. Three station engineers I called said that it worked great and quickly paid for itself.

.....

Bruce Bartlett is a microphone engineer and technical writer for Crown International, 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.



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Studio Sessions

Reviewing the
Tascam DA-P1 DAT
Recorder
See page 51

Equipment and Applications for Radio Production and Recording

Radio Drama Is Alive And Well on VOA

by Alan R. Peterson

WASHINGTON As Lou Grant, he was a television producer and a city editor for a newspaper.

But in real life, actor Edward Asner says "radio is my first love."

Asner, along with actors Paul Winfield (Emmy winner, "Picket Fences") and Lincoln Kilpatrick ("Raisin in the Sun") participated in "Radio Theatre — Live!", a live-to-tape radio drama presentation co-produced by the Smithsonian Associates and the Voice of America (VOA).

High-caliber acting, modern recording and editing technology as well as the time-honored sound effects man combined to bring the radio play "Mr. Rickey Calls a Meeting" to life. The drama is scheduled for broadcast on VOA and National Public Radio in 1997.

Studio Sessions takes you on a field trip outside the studio to the Washington VOA Auditorium for a technical look at real live radio drama production, '90s style.

Asner plays Mr. Rickey, the manager of the 1947 Brooklyn Dodgers. He taps Jackie Robinson to be the first black major league baseball player and sum-

allure. I knew I had 'arrived' when I came to New York and did radio theater. That's why it's a pleasure to be here and work so cheap, for the artistic satisfaction," humorously commenting on the fact all actors receive basic AFTRA scale for their performance.

"And," he snuck in, "you don't have to shave for radio."

Technology on-location

The stage of the 500-seat auditorium was set with four EV RE20 mics for the actors and a single AKG C34 stereo condenser mic for audience reaction and applause. A Sennheiser 421 dynamic was further upstage at the live Foley position. All mics were split-fed to provide a recording mix and a house mix for the studio audience.

Mic and effect mixing was done through a Mackie 1604-VLZ board, patched into Urei LA-4 compressors and a pair of Yamaha digital processors. Sound reinforcement mixing was done in the back of the house on a Studer console with dbx limiting, then fed into the auditorium's amplification system.

Only recently did VOA extend a 24-line analog snake cable through the eaves of the auditorium for these sort of projects,



'Hey, You're Ed Asner!'; Rehearsing at VOA Auditorium

also, but I'm using this."

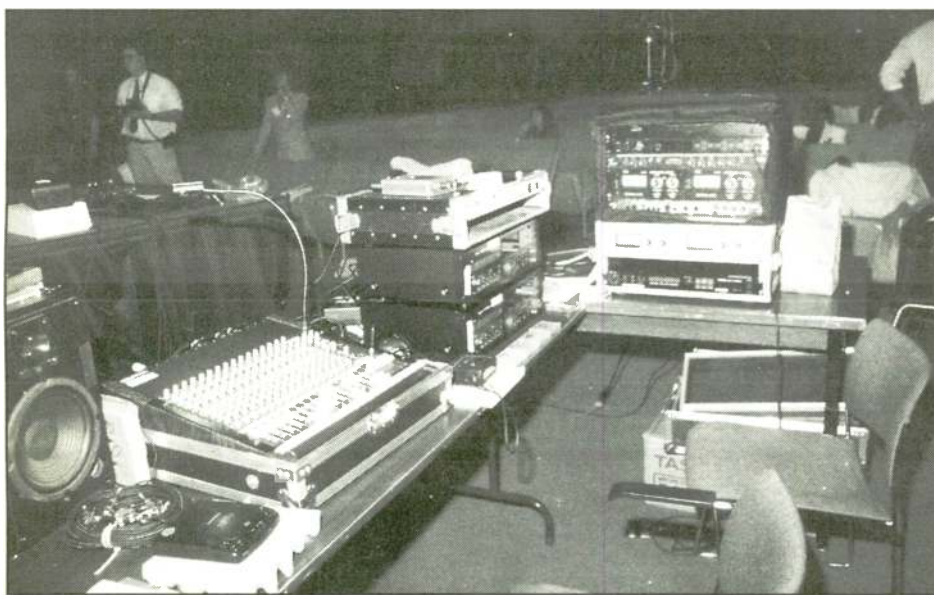
On cue, each character left his on-stage chair, delivered the lines, then sat again. Live Foley sound effects as well as effects from CD and DAT were performed in real time during the recording.

To make things interesting for the studio audience, some physical performance was also necessary. In-character

confrontations were acted out for the audience while being spoken for the recording, but action was kept to a minimum so the performers would not move off-axis.

Two performances were recorded to DAT on July 24 and 25, and the tapes were sent to engineer Ray Guarna in California for final editing and mastering

continued on page 44 ►



The Recording Engineer's Position

mons heavyweight champ Joe Louis, actor Paul Robeson and Bill "Bojangles" Robinson to obtain their backing and support.

Geoff Cowan, director of the VOA, stated "Radio drama comes naturally to VOA," a tradition maintained since the days when John Houseman ("The Paper Chase") was director. It is a tradition also maintained by Winfield, who regularly performs before a mic doing books on tape, as well as Asner.

Asner said, "I did radio drama in high school and it still carries an enormous

For previous sessions, a cable was taped to the floor. Future expansion plans include digital cable or optical lines.

The Mackie output was sent into an out-board Lexicon A/D converter and on to the digital inputs of a Tascam DA-30 DAT recorder. At the controls, engineer E.L. Copeland.

"We're using a Yamaha SPX-90 to create the sound of someone in the hall on the other side of a closed hotel room door," said Copeland. "The Lexicon A/D is nice and clean and keeps nice bottom. I like the Apogees

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Actor Asner Stars in VOA Radio Drama

► continued from page 43

on the Pro Tools system. The finished product will air domestically on FM, on shortwave radio in China and globally over affiliated AM stations.

Live sound effects were the hallmark of radio drama during the Golden Years, and were equally important for the VOA performances.

Gary Spizler, VOA production specialist, sat high above the actors at a table covered with props and items to create the needed effects. The space around his

The audience knew exactly when to applaud during the play by the huge cardboard "Applause" sign Spizler held up.

elbows were filled with glass jars, water bottles, a briefcase, a deck of cards and a "crash box" filled with broken glass. A small door was mounted horizontally before his Sennheiser 421.

"Each character has a different knock," said Spizler.

"After the knock, the door opens just long enough to 'let in' that particular person. Boxer Joe Louis, for example; the door opens wider because he is a bigger man."

A round of drinks

The play calls for the effect of drinks with ice cubes, but no block of ice would survive the time on stage without melting. Spizler came up with a novel way to

achieve an ice cube clinking sound.

"I have shot glasses in this jar. Each glass is sealed so it floats. When the jar is filled with water on cue, the glasses float and clink together and sound just like ice cubes."

Spizler's role as Foley artist also means he must dance.

"Bojangles enters from the hallway and dances a little bit. I was going to tap some spoons on the table, but my hands are busy holding the sfx door open for him."

Instead, Spizler attaches flat metal plates to his shoes with gaffers tape and does a little fancy stepping himself. On mic, the effect is perfect.

The audience knew exactly when to applaud during the play by the huge cardboard "Applause" sign Spizler held up at the right moments.

The problem of "playing it too large" strikes DJs at live performances and radio actors alike.

Watch an air personality play to a crowd while simultaneously live on the air.

Even with amplification, he/she feels it is necessary to shout to the crowd to be heard.

The difficulty is due to the microphone position. It literally places the "ear" of the radio listener one foot away from the performers.

But when this happens, the back row of the live audience can lose part of the action.

In this case, a live audience of 500 would be present for the taping. How does a trained performer alter technique to play to a microphone and a crowd with equal intensity?

According to Asner, "It's not a problem. Most often, you automatically tailor it for the microphone."

I found that out on 'Mary Tyler Moore,' where it was the technicians keeping everything in check. They would tell us 'halve the level, double the intensity' and that seemed to work." That is the way he would play it for the VOA drama.

For Winfield, it is a little more difficult.

"I am a shameless clown, and love to take reaction from the audience; I stop when I hear them laughing. But I still play it to the microphones."

Still to come

VOA and the Smithsonian have three other radio drama performances scheduled for 1996.

"The Gin Game" will be taped in September and will feature Julie Harris and Robert Prosky. In October, Richard Dreyfuss ("Mr. Holland's Opus") and Kelly McGillis ("Top Gun," "Witness") star in "The Devil's Disciple." In November, Stockard Channing performs in "The House of Blue Leaves," all at the



Foley Sound Effects Man Gary Spizler

VOA Auditorium.

The combination of digital technology, impeccable acting and classic sound effects prove radio drama is alive and well 75 years later.

SHORT TAKE

Phonic Graphic EQ

WASHINGTON Most digital signal processors (DSPs) already have some form of graphic or parametric equalization function built in, but most studios will still want an outboard EQ. One worth looking into is the PEQ line from Phonic.

Top of the line is the PEQ-3600 dual-channel graphic equalizer. It features 31-band, one-third octave response, center-detent EQ sliders, switchable high-pass filters and a range selector switch to allow 6 dB or 12 dB of cut/boost.

Frequency response is 5 Hz to 60 kHz and THD is rated at 0.01 percent @ maximum output. The PEQ-3600 fits into two rack spaces and can be run in balanced or unbalanced modes. An overall Level control assists in matching levels within the system. The Phonic PEQ line of graphic equalizers is distributed in the United States by Hosa Technology, Buena Park, Calif.

For information about the PEQ product line, contact Hosa at (714) 522-5675 or circle Reader Service 6.

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Setting Standards for FTP Audio Transfers

by Rich Rarey

Part II of III

WASHINGTON In the last Public Domain, we discussed the innovative way Northwest Public Radio (NWPR) uses FTP transmission of audio files for broadcast.

News director B. Dale Harrison had some caveats when one considers the Internet for such purposes.

Washington State University, the owner of the seven-station NWPR, embarked on an ambitious project in the early 1990s to provide high-speed data and telephone connections to all campus offices and dorm rooms.

It was the availability of an older campus fibernet that made the NWPR station's data interconnection possible, so when the project was completed a few months ago, Dale Harrison was alarmed at the slump in performance.

Congestion

"We had a real problem," he said. "Everything had been fast as lightning, but when the campus project was finished, the whole net would crash from overload."

The system that had worked for a year and a half started to die from congestion. People who immediately had access to the Internet started using Netscape to browse it.

We had a real problem. Everything had been fast as lightning, but when the campus project was finished, the whole net would crash from overload.

It looked pretty grim for a period of two months, but fortunately, the university fixed the problem by putting in subnetting and added bandwidth to the Internet long distance carriers.

Local performance improved, and Harrison says the only remaining bottlenecks are the long distance backbones.

"We've seen a slow down in long distance transmission, as the Internet has become more popular," he said, "and noted there probably isn't enough present bandwidth to carry the traffic quickly."

Nonetheless, Harrison said there are compelling advantages to using FTP and digital workstations.

Big bucks

"I have to credit our management for spending the \$30,000 to \$40,000 for all the equipment," said Harrison. "We were going to buy the equipment anyway. The digital workstations saved thousands of dollars over buying comparable analog equipment. Management has backed FTP transmission and digital workstations because it worked, and they can hear the difference."

It was because of NWPR's success and gentle urging that National Public Radio (NPR) commissioned an FTP site in

October 1995. The express purpose of the site is for receiving audio files from reporters both in the United States and abroad.

The construction of the service was in several steps:

1. Build a password-protected FTP site on an Internet server.
2. Establish a set of base standards for sampling rate, bits-per-sample, file names and so forth.
3. Construct a simple-to-use mechanism for NPR technicians to dub the audio files to tape.



PUBLIC DOMAIN

4. Commission the site by distributing passwords, and write "serving suggestions" on how to use the service.

In reviewing the requirements for the site, it appeared that NPR already had the infrastructure and computer hardware in place.

There was a T-1 circuit — providing very fast direct access to an Internet hub for RealAudio data streams — the NPR

PC and Macintosh computers together, and other digital circuits connected the NPR Bureaus.

NPR system administrator Miles Oliver allocated 5MB of disk space on the Silicon Graphics web server, and he set up an account and password scheme to control access to the site.

The site is accessed from computers

Home Page (<http://www-npr.org>), external e-mail transmission and a PC with sound card in the Record Central (RC) equipment room, installed there to run scheduling software for NPR technicians.

Within the NPR headquarters, internal data networks connected VAX mainframe,

continued on page 47 ▶

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NPR Audio Over the Net

► continued from page 45

within and without NPR, using any FTP client application. Because we had limited disk space, we felt that, at least initially, the site should only contain files bound for NPR, and not act as a public radio repository of programs and news spots.

Setting the standards

The site constructed, we began developing standards for acceptable audio quality.

We began with the basic premise that the FTP audio files should be of significantly higher quality than a telephone line and much better than a Switched 56 circuit. From that, we established a baseline sampling frequency of 32 kHz and a 16-bit width, using no data compression.

This baseline yields a minimum 16 kHz frequency response, and is quite good for news spot material. We chose the WAV audio file type, because it was usually available as an output choice by Macintosh sound editors and was a native Microsoft Windows audio format.

In researching different audio file formats, we discovered sound data in the Mac AIFF format and the WAV format identical, with the exception of the byte ordering. As memory addresses climb, Motorola microprocessors store data with the most significant byte first. Intel microprocessors store data with the least significant byte first.

We were wary of lossy data compression schemes, many of which used only three bits to describe each audio sample, and had audible artifacts. In the real world though, there are instances where files must be sent with such data compression to reduce file size because of slow modem lines or other interference.

That's done

With baseline standards in place, we turned the task of making audio dubbing in the RC as quick and easy as possible.

The existing Compaq computer in the RC equipment room is shared among the three RC control rooms for feed scheduling, e-mail and on-line NPR engineering help. Its sound card analog inputs and outputs are fed through an active balancing box and into a BTS audio switcher. See figure 1.

Any device connected to a switcher output — anywhere in the building — can receive sound card analog audio, and any switcher source can be routed into the sound card line input.

The RC technicians regularly use Microsoft Office on-screen command buttons to activate various applications, so it was an easy matter to create another button with a descriptive icon.

When the "FTP" button is clicked, the Netscape Web browser is started with the FTP address and account information on the command line. Netscape then displays the FTP site in its smart graphical style. If any audio files are on the site, their filenames are displayed with the Sound icon.

We configured Netscape's Helper application setup to start our custom Audio Player when a Sound icon was clicked. It works like this:

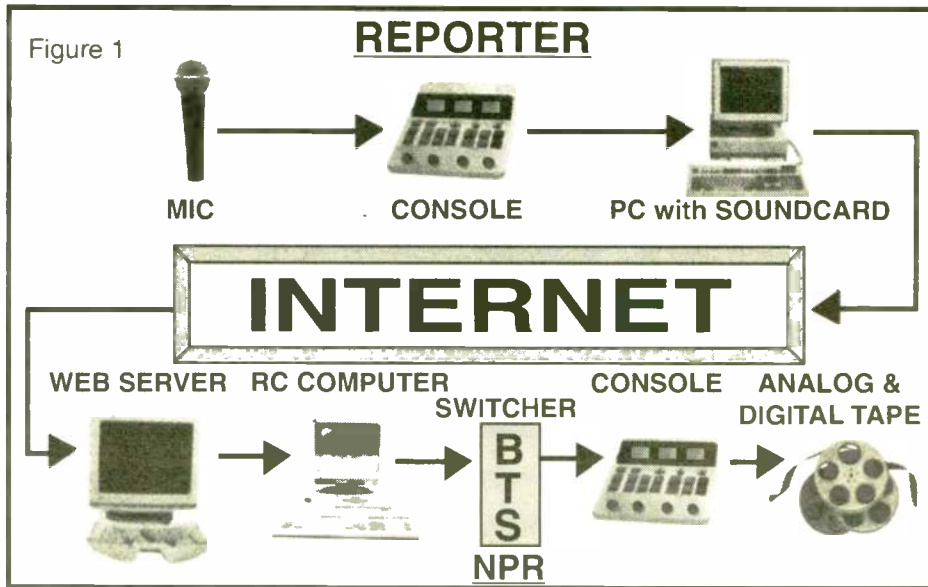
Netscape downloads the audio file from the FTP site as a temporary file. The data speeds on the internal NPR network are fast, so a 3.5MB file transfer takes about five seconds. Netscape then starts the

Audio Player. Once the sound card output is routed to a console or other device, the audio can be played, recued, or auditioned as needed.

In the next installment, we will put the remaining FTP pieces together, and examine the performance of the NPR audio site from both the human and technical aspects. Until next month, I remain your obd'n't eng'r.

□ □ □

Rich Rarey is technical director of "All Things Considered" on National Public Radio. He can be reached at rrarey@npr.org



If our marketing department had been as talented as our engineers, you'd probably be using a Prisma™ workstation right now.

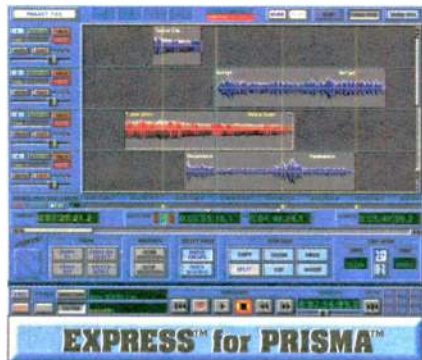
The alternative workstation.

Okay, granted, there are already a lot of digital audio workstations out there. Some are so expensive that you can only afford one for six editors. Some are little more than PC sound cards that can't lock to picture without timecode drift. Some are so complicated that after you've bought a Mac™, 5 add-in boards, a bus expansion box and 12 pieces of software, it almost nearly works most of the time.

That's why you should explore our radically different approach. Admittedly, we're guilty of spending far more time perfecting our products than advertising them. But today, a growing number of major post production facilities and recording studios are reaping the benefits of our meticulous engineering. They also rave about our great service and quick support — available worldwide via internet, fax, or phone without having to wait on hold for hours.

One hardware platform; three software solutions.

Prisma™ is our one-card hardware platform that frees up your CPU by handling all processing and signal flow on board. Its DSP capabilities are so massive that plug-ins aren't even an issue. Invest in Prisma hardware and then choose the Windows®-based software package that fits your applications and budget. Each has an elegant, hands-on interface that's free from frustrating drop-down menus, and floating window clutter.



Express™ presents a simple, 2-panel interface with all the tools you need on-screen — instead of hidden in a mass of annoying pull-down menus. Perfect for broadcast, commercial production, multimedia and small home studios.

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- Directly-draggable fades & cross-fades • Easy head & tail trim • Fast bi-polar waveform views
- Snap anything to markers, current position or other sounds • Compatible with & upgradable to Producer™ • Networkable

Express™ is a creative tool for broadcast and commercial production with a no-frills interface so simple to use that even a program director could learn it. It uses Producer's hot-key shortcuts to reduce the learning curve if you upgrade.

Producer™ takes the software recording studio paradigm to a new level. Its studio-friendly look and feel removes the impediments to creativity found in many current workstations.

StudioTracks™ XP has the tools you need for serious, heavyweight film and video post production, sound design, dialog editing and Foley work. XP stands for Cross Platform: StudioTracks runs on both Prisma and Spectral's even-more-powerful AudioEngine™ hardware, too.



Radically different from any other workstation software, Producer™ is a "virtual studio" with direct access to familiar audio tracking and mix-down tools including an automated mixer. Free from drop-down menus and nested windows, Producer's direct interface boosts productivity & creativity.

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- Automated fades, pans, mutes, aux sends • 2 EQs per mixer channel • Default cross-fades & butt-splices or custom via built-in editor • Markers
- Snap anything to anything • 3 waveform views incl. fast bi-polar waveform display • Grid can be set to bars/beats, frames etc. • Direct VITC lock
- Can add timecode burn-in to video • Networkable

*via linked CPUs

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‡The software program Formerly Known As Prisma Music. Our previous Marketing Department did it.



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Circle (191) On Reader Service Card

Prophet Systems Inc. announces

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Version 5

Live Show Interface (LSI)

The centerpiece of Version 5 is the new Live Show Interface (LSI). This new interface allows the DJ to run even the most high energy shows smoothly. Fully utilizing the power of Windows, the Live Show Interface features:

- ◆ **Drag and Drop Commercials and Songs**
Audio events can be easily moved around in the log using the mouse or touch screen. They can also be moved to the button bar and the holding bin.
- ◆ **Audio Source Management**
Version 5 allows the DJ to specify which audio card a commercial or song will play out of ahead of time. It is easy to pre-position sliders and to crossfade items. Plus, Version 5 actually allows six stereo audio events to play simultaneously for each control room!
- ◆ **Fully Touch Screen Compatible**
The Live Show Interface was designed from the ground up to be totally touch screen compatible.
- ◆ **Expanded Button Bar**
Forty-two pages of buttons for immediate access to 1008 liner, jingles, laugh-tracks, etc.—PER SHIFT! And you can have up to 99 shifts!
- ◆ **Auto Roll of Buttons**
Auto roll allows the DJ to mark buttons that will playback one after the other automatically. Mark up to 24 buttons which will all play back in order.
- ◆ **Quick Record**
Take phone calls, edit them with our wave form editor, and place the event on log...all in just seconds.
- ◆ **Holding Bin**
The holding bin is temporary storage for items that the DJ can't get to immediately. He can move them to the holding bin for easy retrieval later in the shift.
- ◆ **Macro Buttons**
Accomplish complex tasks in one click of the mouse with macro buttons. Tasks such as changing from manual to satellite or auto control, changing the active station, turning on and off sources or relays, etc. become effortless with Version 5.
- ◆ **Pause/Reposition**
Pause a spot or song, fast forward or rewind to a new point, begin play from a designated point using the pause/reposition button.

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- Jeff Hutton, KLTJ/KWMQ, Southwest City, MO, KTLQ/KEOK, Tahlequah, OK

Live Show Interface.

“ We're proud to show people our system. Everyone who has seen the system is impressed. Audio Wizard for Windows is extremely easy to use. It's unlike any other system that is out there. It will handle any format, even news. The Windows platform is easy to operate. It has been extremely stable which is important for a walk-away station. We're very pleased with the system and would definitely buy it again if we had to do it all over. This is the only system I've heard that sounds live. ”

- Norm Laramee, KKPT/KSYG/SRN, Little Rock Arkansas

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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.*

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The First Name In Digital Audio

PRODUCER'S FILE

Tascam Portable DAT 'Welcome Addition'

by Ty Ford

BALTIMORE I was ready for the Tascam DA-P1 (\$1,899) portable DAT machine even before it got here.

I've done a moderate amount of portable DAT recording with a Panasonic SV-255 and I was curious to see what improvements and amenities the DA-P1 would offer.

It has built-in mic preamps, phantom power and records 44.1 and 48 kHz through both analog and digital ports. While it does not have 32 kHz A/D converters, the DA-P1 will record audio from a 32 kHz digital source. However, it will not handle 32 kHz long play mode.

It records absolute time and, during digital transfers, will record ID numbers and ABS time subcode data.

Inside the case

The DA-P1 uses 16-bit linear recording with octuple error correction. Frequency response is quoted at 20 Hz to 20 kHz, ± 0.5 dB. The signal to noise and dynamic range are both listed at better than 90 dB. All of these figures and the THD of .0007 percent @ 1 kHz are for the line input. Expect less from the mic preamp.

The DA-P1 has XLR connectors for mic and line input and another set of RCA jacks for line in. A pair of RCA jacks serve as the SPDIF I/O.

There is a built-in AC adapter and charger that takes about two-and-a-half hours to fully charge the removable NiCad batteries. The manual suggests two hours of continuous recording with phantom power off, 100 minutes with phantom on and 180 minutes play only.

The Roswell DAT?

Here are the things I like most about the DA-P1. It is covered in some sort of alien skin which is both smooth and grippable. I don't know who on the design team came up with the skin, but it is sexy, sleek and very functional.

When attached to the shoulder strap and hung on the right shoulder, the DA-P1 is designed so a right-handed person can easily get to the transport controls and switches. The logic behind the button placement and functions is well thought out.

You can, for example, put the DA-P1 into record in the Start ID Write mode and use the record button to drop Start IDs wherever you need them, then using the Pause or Play button to get back into rolling record.

For single-point auto-locating with ABS (absolute time), press the reset button during playback to mark a spot. To get back to the spot, hold down the Stop button and press Play. You can auto-locate to a two-second preroll position before the deck last went into record by holding down Stop and Rewind, and also where it last went out of record by holding down Stop and FFWD.

Because the DA-P1 is designed with a two-to-three-second preroll, you probably will not be able to use it in highly time-critical playback situations. It also has problems understanding Skip/Pause commands during playback in the nine-second Start ID area of a tape.

Half the time the LCD screen registered that the machine had been ordered to the top of the preceding start ID, but it

paused before it got there.

The Skip Forward and Skip Back buttons are placed close to the Fast Forward and Fast Rewind buttons, but they are of a different shape. Once you memorize the switches and their locations, you will probably be able to operate the transport without looking at it, except to make sure you are actually in Record mode.



Tascam DA-P1 DAT Recorder

A small but fairly visible red LED on the face of the unit blinks while in record-standby and remains lit while in record. In a dark environment, a quick look at the deck confirms record status. In high light conditions, I had to shade the LED with my hand to see whether it was on.

In Auto ID, the nine-second Start ID is recorded in the DAT subcode when the user-adjustable threshold is exceeded. Because the code takes nine seconds, you can only place Start IDs at least 10 seconds apart.

On the DA-P1, the threshold may be changed to -42, -54, -60 or -66 dB, but it defaults to -48 dB each time the DA-P1

digital status of any digital source and output both consumer and pro digital streams to either XLR or RCA connectors.

According to the Orban manual, the consumer output is the most generic form of SPDIF with SCMS copy-protection coding removed. Each time the DA-P1 was put into record while attached to the Orban SPDIF RCA connector with "consumer" output selected, a variety of things happened.

Noise

Sometimes there would be varying levels of white noise appearing on either or both channels, and sometimes there would be no problem whatsoever. Even though I was using the RCA output jacks, the problem was solved by switching the Orban to Professional mode.

Oddly enough, when the 7000 was toggled back to Consumer mode, there would be no noise problem as long as the DA-P1 continued in record mode. Even stranger, the white noise — which had been quite loud — was barely audible upon playback.

I then fired up my Panasonic SV-255 DAT machine, recorded some audio and transferred it to the Tascam DA-P1 to make sure there was not some strange connectivity problem. Everything was fine.

The lesson learned is that while the DA-P1 has an RCA jack specified as a SPDIF input, it did not like the consumer version (minus SCMS) that the 7000 was putting out. Instead, it preferred the professional (AES/EBU) version that was delivered to the SPDIF RCA output jack.

Obviously, making judgments about a digital bitstream based only on the connectors can get you in trouble. And you should always check to make sure the "gazintas" and "gozoutas" are compatible before writing the check.

Conclusions

At its price point the DA-P1 is a welcome addition to the pro audio world. It is flexible, lightweight at just over three pounds with battery, easy to use and sounds good. If I could make changes in the DA-P1 design, I would have a mode in which the battery would be charging while the unit was operating on AC.

It is covered in some sort of alien skin which is both smooth and grippable.

The analog/digital input mode buttons are not far out of reach, nor are the switches for 44.1/48 kHz sample rate, phantom power and mic/pad/line.

The DA-P1 manual suggests that the 20 dB pad be used when analog inputs are so hot that full-scale meter readings occur at readings of "5" or below on the input sensitivity controls. This was proven on one of my many live sound surfaris.

As an afterthought, having a mic preamp clip light would be a nice thing to have, but following the directions worked just as well.

Over the shoulder

Again, for the right-handed user, the DA-P1 is very easy to work with in over-the-shoulder mode because all of the jacks — with the exception of the power jack — are mounted on the right side.

Because there are no jacks or protrusions on the side opposite the front panel, the DA-P1 can be operated face up as well as top up. The DA-P1 has a standard quarter-inch stereo headphone jack with an average headphone amp.

It also has a switchable limiter that is only moderately brutal. I used it while recording voice tracks and some acoustic guitar. It sounds a bit choppy when pushed hard, but if you like the sound of gain reduction, you might actually like the effect.

Like many DAT machines, the DA-P1 also has an Auto ID mode that works when recording from the analog inputs.

powers up.

The Auto ID function does not work during digital transfers. Instead, all of the data and existing Start IDs from the source tape get transferred. You can manually add or delete Start, Skip or End ID marks by accessing the Write Start ID, Write Skip ID or Write End ID modes

and pressing the record button during recording or playback.

Like most rack-mounted studio decks, the DA-P1 also does automatic renumbering.

Margin Reset is a handy feature that lets you know your highest recorded peak level. A 0 reading means you have recorded the highest possible level without distortion. A blinking 0 means you have exceeded the maximum safe recording level.

The Hold switch on the front panel freezes the push buttons in their current state, preventing accidental moves in and out of Record or Play. If buttons are pushed while in Hold, the LCD panel shows the word "hold."



The LCD also displays a condensation warning and three-segment battery life readout. When the last segment begins to blink, you are looking at about 10 minutes left to go.

Record now ... almost

After inserting a new blank tape, the manual suggests that you hit Rewind. After the tape stops, hit Record.

The DA-P1 lays down a data track and starts recording Absolute Time, which takes about 10 seconds. What this means is that you cannot just jam a new DAT tape in the machine, hit Record/Play and be off recording.

While doing some digital transfers with my Orban DSE-7000FX workstation, I ran into a very interesting phenomenon. The 7000 has the ability to analyze the

Product Capsule:	
Tascam DA-P1 Portable DAT Recorder	
 Thumbs Up	 Thumbs Down
<ul style="list-style-type: none"> ✓ Mic preamps ✓ Phantom power ✓ Plays 32, 44.1 and 48 kHz 	<ul style="list-style-type: none"> ✓ Can't charge and operate simultaneously
<small>For more information, contact Tascam at (213) 726-0303 or circle Reader Service 116</small>	

Options for the DA-P1 include the CS-D1 carrying case (\$125), CB-D1 battery charging box (\$75), PS-D1 AC adapter (\$125) and BP-D1 (\$100) NiCad rechargeable batteries.

□ □ □

Ty Ford's "Advanced Audio Production Techniques" can be found at <http://www.bh.com/jp/24080082.htm> or call (800) 233-9604.

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READER SERVICE NO 16

USER REPORT

American Gets Scoop from Harris

by Paul Donovan
Director of Engineering
American Radio Systems

BOSTON The year was 1972 and it was my first remote broadcast.

I nervously connected the remote mixer to the wires on the telephone block with the station's call letters written out on it. At precisely 10:06 a.m., we went on the air live from a local shopping mall. I ran outside to my car to take a listen and was horrified by the tinny and distorted sound. The telephone company in the area could not provide a temporary equalized broadcast loop.

Antarctic remote

For years we put up with barely intelligible remotes. The remotes sounded like we were in Antarctica, when instead we were only two miles down the road.

Through the years I sought ways to improve fidelity and eliminate the two- or three-week lead time. RPUs seemed like the solution until the taxi radio calls got on the air and the transmitter would not stop blowing fuses. Most recently, I have relied on multiline telephone or ISDN-type devices to produce a reliable broadcast quality product.

Station management was still hampered from doing broadcasts without the proper planning and notice to the telephone company. My life was complicated with remote setup problems because we cannot always send highly skilled technicians to the remote.

Some of the people who set these remotes up have trouble operating their clock radios, let alone an ISDN CSU/DSU. My knees are worn out from begging the phone company to get service installed for our many "By the way, we forgot to tell you" and "Didn't you get the memo?" remotes.

It was at the Spring '96 NAB Convention that I was first introduced to the A.E.T.A. Scoop Reporter from Harris. The folks at the Harris booth showed me this little box that looked like a mixer and was connected to a regular telephone line.

Its controls were so simple that any one of my children could operate it. When I put on the headphones, I tensed up ready to hear some scratchy, tinny sound. What I heard was astonishingly terrific. I was told that the Scoop Reporter was dialed into a radio station several states away. I immediately ordered a pair.

Broadcast from afar

Radio talent has discovered telecommuting over the past few years and many of our stations' shows are originating from afar on a regular basis via ISDN service. When I returned from the NAB, I was greeted with the news that the ISDN line for our most recent talent addition would probably not be ready in time.

The talent is about 250 miles away so she cannot just hop in the car and drive in. "No problem," I said. "We can just use the telephone that she already has." I called Harris and the delivery of the Scoop Reporters was expedited.

We tested everything the day of the

broadcast. Everything sounded fine on the test, but I was worried how the show would sound when it finally got on the air. I forgot to mention that the co-host for the show is located in our main studio.

Visions of long pauses created by delay times and the unit codec being trashed by the station processing flashed through my mind.



The A.E.T.A. Scoop Reporter from Harris

I began to see visions of myself bagging groceries in a supermarket, telling tales of my old radio career. What had I done? I decided to leave the radio station and listen to the broadcast elsewhere. This

way I could hear the show the same way all of the other listeners would. I headed out and drove to the nearest supermarket. After picking up an employment application, I sat by the radio and waited.

It was now broadcast time. First came the recorded show opening and then the local talent came on the air. When the remote talent appeared, I could not believe my ears. She sounded like she was right in the studio.

When the pace of the banter picked up, I could not perceive any problems with delay time. The quality was so good that I was having trouble picking out whose voice was originating from where. Not only had the Scoop Reporter saved the broadcast, but my career as well.

As I mentioned before, the Scoop Reporter is compact and simple to operate. The mixer has two mics, one line input and a headphone jack. The unit operates full duplex so providing reverse

cue or IFB is a snap. At 24.4 kbps you will get 7 kHz fidelity, and the scoop reporter is capable of up to 8.4 kHz response where telephone facilities of 28.8 kbps are fully deployed.

The Scoop Reporter will negotiate the best baud rate for the phone service you are on. Just like your computer, if you do not like the baud rate you ended up with, hang up and try again. We have never had trouble achieving a decent baud rate and fidelity on the first try.

The codec uses a code-excited linear prediction algorithm (CELP), which is optimized for speech only. Because most stations only originate voice at their remotes, this is no problem at all.

Flawless performance

It is now approaching mid-July and the Scoop Reporter has performed flawlessly since the beginning of May. I recently ordered a second pair of Scoop Reporters, as my first order is constantly tied up with this show. Once the new units arrive, we will begin to enjoy the flexibility of doing spontaneous broadcasts with real studio quality.

As the name "Scoop Reporter" implies, I see some serious quality actualities for our news department as well. Many thanks to A.E.T.A. for producing a real problem solver that we can really use.

For more information from Harris, contact Chuck Maines in Indiana at (800) 622-0022; fax: (317) 962-8961; or circle Reader Service 96.

USER REPORT

Bext LC-STL Proves Itself at KKIQ(FM)

by John Buckham
Chief Engineer
KKIQ(FM)

BELMONT, Calif. The Bext LC-STL is a system that will delight the value-conscious, but quality aware broadcaster with its price and numerous features. We have two STL links running at KKIQ(FM) and both have been up over two years — in less than hospitable environments — having caused absolutely no problems and greatly exceeding my expectations.

The LC-STL composite aural transmitter is available in 1.5, 6 and 15 W versions. You pay for the power you really require. All of the transmitters will run on 12 V DC for backup or unusual applications, such as solar-powered mid-hops, allowing for added possibilities at undeveloped sites.

Complete testing

The LC family of STLs are all frequency synthesized — allowing for easy frequency changes — and you do not need to remove the top cover: the frequency selectors are right on the front panel behind a screw on an aluminum plate. You may never need to worry about this because Bext completely tests each STL system on your frequency before shipment.

Bext also has an optional digital

encoder/decoder that is available. It allows up to four channels of 15 kHz audio to be sent to your transmitter, perhaps two for your stereo programming, one for your SCA and one for remote control data.

Speaking of outputs, the LC-STL receiver has three composites: one is fixed level, another is adjustable via a trim pot on the rear apron, and a third is an inverted polarity output. The third output is invaluable to operate a booster system (where you may wish to feed the booster via an ICR). It will allow you to more closely match the modulation envelope of your main transmitter.

On the front panel you get an intuitive bar graph display that is selectable between various operation perimeters, including a unique peak hold function that makes adjustment of audio and power easy. Both of our systems have Lexan veneer on the front and rear panel that resist dirt and fingerprints well.

Service is a breeze with the units being modular. Both the receiver and transmitter include a fan for cool operation in the most demanding environments.

Installing the unit was just like any other STL system. The RF output is a standard N connector, the composite inputs are the usual BNC connectors and the power cord connects via the now standard IEC connector/fuse block. Both the receiver and transmitter

are three rack spaces high. Once the power is applied there is a delay of about 30 seconds while the PLL locks up and RF power becomes available.

Both the STL systems are used as ICRs at KKIQ to feed boosters for the KKIQ signal. These boosters are required due to the terrain within the KKIQ service area. One of the hops is 19 miles and the other is 21. We have never had any noise or fading with either system. One reason for this is the excellent sensitivity of the receivers. While bench testing, I was able to get 60 dB SINAD with just a -71 dBm test signal. This is far better than Bext specifies in its manuals.

Noteworthy accomplishment

The Bext receiver proved itself again when a wayward multipoint distribution transmitter put a huge spur out on our ICR frequency. I was alerted to this when one of the links had become somewhat noisy, but still provided just adequate S/N ratio. When we investigated this change in performance we shut the transmitter down, only to find the interfering signal down just 7 dB from the main carrier fully capturing the transmitter; and the system was still working providing a useable signal. A most noteworthy accomplishment for any composite STL system.

I have been happy with all of the Bext purchases — transmitters, exciters, STL systems and link receivers — I have made. As the need arises, I will buy more.

For more information from Bext, contact Michelle DeFazio in California at (619) 239-8462; or circle Reader Service 118.

USER REPORT

Bomar Customizes with Intraplex

by Paul T. Dixon
Network Chief Engineer
Bomar Broadcasting

MARION, Ind. The Bomar Network operates four stations in four different cities out of our Marion, Ind., studio — WMRI(FM), Marion. WEZV(FM), West Lafayette. WYEZ(FM) Bremen (South Bend) and WLEZ(FM), Terre Haute.

We decided on the use of T-1 as the medium to connect the stations. We also liked the flexibility and capability of the Intraplex multiplexer to transport the audio, voice and data circuits.

There is a full T-1 interconnect between each station and corporate headquarters in Marion. At each location there is an individual backup system. Whether broadcasting directly from Marion or West Lafayette, each station feed goes through distribution amps and individual automation, then to the multiplexing system.

The Marion station directly feeds its own audio processor and STL. All the other stations get their feeds from the Intraplex multiplexers and the automation system controls the local commercials and IDs via data from the network control in Marion.

Intraplex data and voice modules are also utilized, enabling us to expand our capabilities. Data cards are attached to the network multiserver with five RS-232 high-speed ports. Operating at a 19,200 baud rate with our computer information gives the Marion DJs total control of the system.

Utilizing a separate data port for the WEZV automation computer connection allows Lafayette DJs to view their actual log. We are also sending serial data to the remote monitoring computer display in the Lafayette studio from a 16-channel network air monitor switcher/encoder, giving the Lafayette announcer the ability to monitor each station. A separate voice port is utilized to send telephone line data to the Lafayette Studio; this tells the announcer from which station a telephone call is coming.

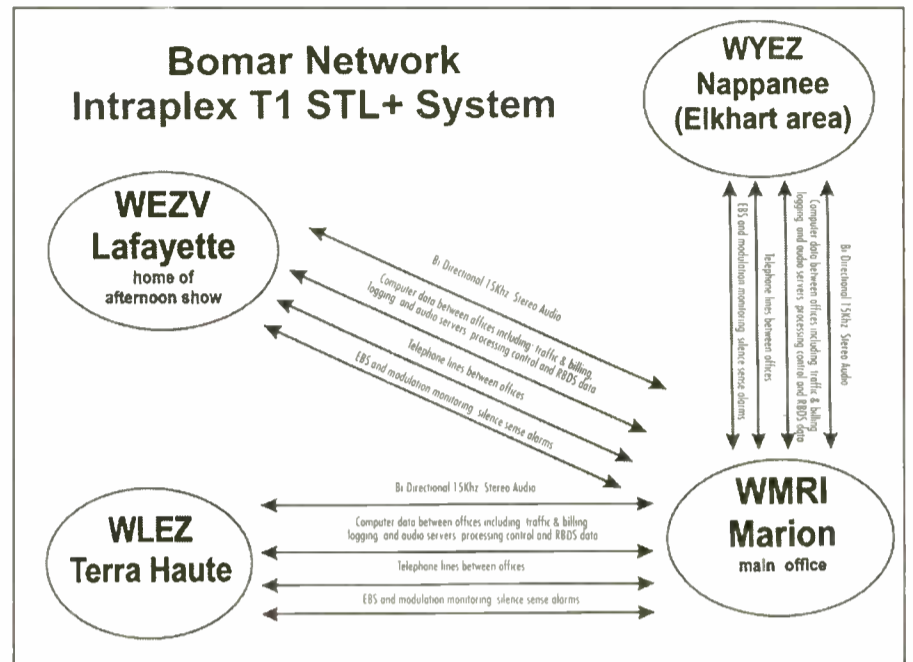
The network music runs through the Lafayette studio enabling that studio to be live from midnight until 6 a.m. and 3 p.m. to 6 p.m. Once the music arrives in Marion, it again runs through our Marion net studio as a single source and out of the studio through distribution amps to each station's automation system.

The outputs of each automation system then feed its respective station through the Intraplex T-1 system. The Marion station directly feeds its own Urban Optimod processor and STL. The other stations get their feeds through the Intraplex PT/PR-150A cards. Each station has some type of

backup music available at the transmitting site.

All commercial production is done in the Marion production facility. The DAT tape is then either backhauled through the

The Intraplex VF-5 card does many things. The Channel 1 audio input sends both the monitored EBS station to Marion and a SPDT relay that sends DTMF tones for commercial start information. This relay's control signal is also sent on one of the Intraplex DA-121 channels to operate a like relay in Marion. The EBS audio is normally closed so that we always have the audio back in Marion to satisfy FCC rules.



Intraplex T-1 System, shipped through the Internet, or shipped back to the Marion studio.

The commercial logs are put together at each office. The skeletal information is produced a week or so in advance in the Marion traffic office. This puts the correct liners and top-of-the-hour IDs for the correct DJ and spot block length info into the skeleton for a particular day. This way the basic traffic info is already done and the commercials are all that are needed from the local traffic office.

The skeletons are then sent to and retrieved by modem, Internet or the direct Intraplex T-1 link. These daily logs are retrieved each afternoon in Marion. They are checked to assure all breaks are filled and length is correct. Once this is done they are loaded into the right Sentry automation computer.

I must make it clear that each station has its own local studio and EBS tone generator that can be switched onto the air locally or by remote control. This is an FCC requirement.

Utilizing T-1 and the Intraplex multiplexers has given us a system that is customized to our use. We were able to put this whole network together by ourselves, thus giving us the system we wanted and not a "canned" system we had to work around.

For more information from Intraplex, contact the company in Massachusetts at (508) 692-9000; fax: (508) 692-2200; or circle Reader Service 179.

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World Radio History

TECHNOLOGY UPDATE

SOUND AMERICA

SAVANNAH, Ga. The R/SVP phone from Sound America has just been updated to include switch selectable input levels.

The R/SVP phone is an enhanced version of the classic 2500 series Touchtone desk set that is exceptional in reliability and sound quality. It permits coupling audio into and from the telco system via 1/8-inch mini jacks and features a dual-level electret mic that replaces the original carbon element in the handset.

In the past, the R/SVP external audio input was designed to accommodate an earphone or external speaker output from a cassette recorder. That meant using a 20 dB pad between a remote mixer and the R/SVP to feed -10 dB into the network.

Now, simply lifting off the unit's faceplate accesses a board mounted switch that allows selecting either cassette (8-50 ohms) or line level (800 ohms, +8 dBm) input.

The R/SVP can now be used by sales staff to audition spots for sponsors and instantly be put to use as a telco interface on a remote.

For more information from Sound America, contact the company in Georgia at (912) 238-1771; fax: (912) 238-1750; or circle Reader Service 47.



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Circle (52) On Reader Service Card

USER REPORT

Telos Changes Thinking at WKSS

by **Jeremy Savage**
Vice President of Operations
WKSS(FM)

HARTFORD, Conn. As the operations manager of a competitive radio station, a great deal of my energy has been spent keeping WKSS(FM) technically able to connect to major events, celebrity interviews and last minute broadcasts, all at high quality.

For many years, I got by with a three-line frequency extender, or 15 kHz phone lines, to the point of the broadcast or to a remote satellite downlink site. Now that I am equipped with a Telos Zephyr, the

way I think about any remote broadcast project has changed.

I purchased a digital audio codec only after I carefully analyzed its cost-effectiveness and how I would use it. For the applications I needed, any digital audio codec on the market would have been fine.

In fact, I tested three major models extensively in month-long tests and found this to be true. They were all capable of delivering various levels of quality bi-directional audio. What separates the Telos Zephyr from other units is its ease of use, connectivity to other units and functionality.

I tested the units in real-life situations. Obviously, the simpler a unit was to set up and use, the better it was for me.

The Telos Zephyr has a built-in terminal adapter. The unit is one piece, without a cable between the adapter and codec.

Easy to read

The Zephyr walks you through the setup between adapter and codec (done on one screen with easy-to-read controls for navigating the screen). The front panel indicators are easy to understand and the rear panel audio outs and ins are as simple as a Shure mixer to connect.

The cost of a digital audio codec and terminal adapter is not inexpensive. However, the Zephyr price tag is comparable to most units. For the money, it is loaded with features. Included are a headphone jack and line/mic level, switched input audio jacks, computer control, bi-directional data transfer (via the RS232 port), remote contact closures and built-in terminal adapter. It can also save up to 40 autodial numbers and settings.

While you might need a pair of codecs for local station broadcasts, most of the time you need a codec to connect up and talk to any other codec around the world. A couple of factors affect the compatibility between codecs.

Which coding scheme are you going to use? The Telos Zephyr is capable of G.722, Layer II and the unique Layer



The Telos Zephyr

III. You can communicate with any other codec with these three schemes. Plus, you have the added ability at Layer III for broadcast-quality mono audio transfer between two Zephyrs — using only one of the B channels on the ISDN line.

Additionally, the IMUX scheme used by the Zephyr is an option on most other major codecs. If you are looking to operate at 112 kbps or 128 kbps you can — even when communicating with other non-Telos codecs. We communicate with a MUSICAM system, a Comrex system and the Telos Zephyr without a problem.

Split channel mode

The Zephyr is also able to transmit two separate signals to two different sites. I have seen this feature used by two sister stations broadcasting from one concert venue at the same time.

While Layer III coding is unique to the Zephyr, the savings achieved using one B channel for high-quality audio pays for the unit over time. Telos has also designed the Zephyr to be easily upgradable.

ISDN is now available just about everywhere you need it. Universal Studios has it, your weather service utilizes it, your voice guy does sessions over it, and those exclusive interviews that are done via satellite can now be done on ISDN. The phone company can install ISDN circuits cheaply in less than a week.

When you add up the money saved by using ISDN (compared to analog lines or overnight mail) and couple it with speedy ISDN installation, it is apparent you can not only afford a digital audio codec, you need to have it.

The Telos Zephyr is a feature-packed, easy-to-use, digital audio codec. In fact, after I got stuck in traffic on my way to an event, my promotions manager was able to successfully set it up in about 10 minutes.

You will be thrilled having such a versatile and necessary broadcast tool in your rack and in the field.

For more information from Telos, contact Rolf Taylor in Ohio at (216) 241-7225; fax: (216) 241-4103; e-mail: info@zephyr.com; or circle Reader Service 159.

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USER REPORT

MUSICAM Reaches Out in Seattle

by **Tim Vik**
Assistant Chief Engineer
KCIS(AM)-KCMS(FM)-KLYN(FM)

SEATTLE It is not every day a station gets the opportunity to use the latest technology to extend its reach. But that opportunity presented itself to KCIS(AM) and KCMS(FM), two Seattle stations broadcasting separate Christian music formats, and sister station KLYN(FM) in Lynden, Wash., near the Canadian border.

Earlier this year, KLYN moved its transmitter site, and station management decided it was a good opportunity to broaden the station's audience to include 2 million listeners in the Vancouver, British Columbia, area.

At the time, we decided to take a more cohesive approach to the programming of all three stations by tying together more programs, both live and produced. The ideal chance to do just that came with the Promisekeepers Conference, a spiritual event we decided to carry in its entirety on all three stations.

Because that entailed sending the programming from Seattle to Lynden for 10 hours a day on three consecutive days, we knew we had to have the best quality available to keep listeners from tuning out.

We decided to use T1 and chose the MUSICAM USA Prima 210 codec to

maintain a superior sound.

It made sense to put in a T1 line because we could save money by tying in the three stations' phone and computer systems along with the programming. We could centralize a lot of the operations, including the sales staff calls, and save money at the same time.

The extra capacity afforded by T1 also allowed us to go for the maximum bit rate to achieve high quality digital audio. When it came time to buy a codec, there were not a lot of options that could provide the higher bit rates and produce the fewest coding artifacts. The CDQPrima fit the bill.

With the MUSICAM coding in the Prima, we send audio at 384 kbps. Audio compression experts have said that at 256 kbps, coded audio sounds good and at 384 kbps — mastering quality for recorded audio — it is virtually transparent. But for us there was another important reason to send audio at the highest possible bit rate.

With an Enco hard disk system and a Dolby Digital STL, we needed to be concerned about cascading compression algorithms.

At 384 kbps, it is possible to go through many more encodes (MUSICAM USA says up to 15) and not produce artifacts.

We wanted the best sound for the music we were broadcasting on all three

stations, so Prima was the best choice.

Installation was simple and smooth. We had a short deadline before the conference started, so we didn't have

enough time to get as familiar with the software and menu choices as we would have liked. It was only six hours from taking delivery to being on-air, and everything went well. A bigger display and keypad would be good additions for future models.

We also know there are software
 continued on page 62 ▶

USER REPORT

MSI Meets Exact Needs

by **Roy Humphrey**
Chief Engineer
WWVA(AM)-WOVK(FM)

WHEELING, W.Va. WWVA(AM) has quite a history in the world of radio. Our Jamboree is a famous, live country music show that has been broadcast over the station since 1933. Our skywave draws listeners from all over the country and brings country music fans in droves to the Capital Music Hall, where we have several stations — including our FM contemporary country WOVK(FM) — and plan to house eight stations in total.

When we put in a new transmitter earlier this year, we also upgraded to the latest processing. I decided it would be best to keep the processing at our studios in the theater for a cleaner sound and to ease in any adjustments we might make.

That meant I needed to find a way to get the composite signal up to our STL on the roof so it could travel to the FM transmitter several miles away.

The station had some positive experience using **Modulation Sciences** equipment — we have its Data Sidekick — so we decided to put in the CLD-2500 Wired STL.

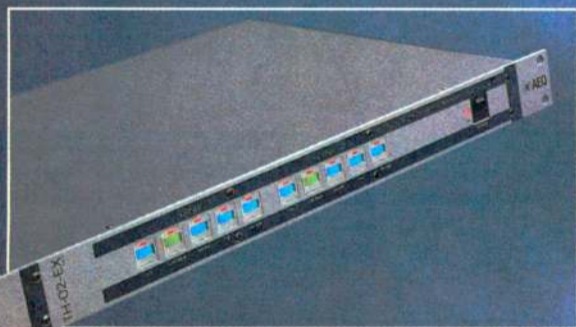
The Wired STL solved a problem for us in a simple and pragmatic way. We keep the processing unit in the engineering office near the studios above the theater's balcony. We ran about 300 feet of cable to the STL on the roof and that was all there was to it.

Modulation Sciences has made the CLD-2500 extremely straightforward and simple to use. Now, with our new equipment, WOVK sounds cleaner than ever. With the new studios we are building and all the activity of broadcasting from a music hall, it was a relief to have one less problem to worry about.

The CLD-2500 was exactly what we needed and it did the trick.

For information from Modulation Sciences, contact the company in New Jersey at (800) 826-2603; or circle Reader Service 113.

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USER REPORT

Comrex Nexus Simplifies Remotes

ISDN Helps L.A. Broadcasters Improve Sound Quality While Overcoming Linkage, Cost and Congestion

by **Fred Holub**
Chief Engineer
Spanish Broadcasting System

Los Angeles Earlier this year, our numerous remote broadcasts on KLAX(FM) and KXMG(AM) became much simpler, yet at the same time their quality improved dramatically. It was March 1996, when we made the decision to abandon our assortment of equalized program lines, dial-up lines with frequency

extenders, and radio links. We now broadcast the majority of our revenue and promotional remotes using a pair of Nexus ISDN units from Comrex Corp.

The compact, easy-to-use Nexus solved a number of problems. Like many major markets, Los Angeles suffers from severe congestion on the 160 MHz and 460 MHz RPU frequencies. Due to our mountainous terrain, radio links are problematic here. Also, in Southern California and other places, the cost of

telco program line costs has skyrocketed while the quality has declined.

ISDN availability

Meanwhile, a switched data service known as ISDN became available. Here in Los Angeles, ISDN is offered by both Pacific Bell and General Telephone at rates that are a fraction of those for equalized broadcast loops, with much shorter lead times for installation and better reliability.

A major advantage of ISDN is that a single line can carry full-fidelity audio in both directions. We use this capability to send a mix-minus studio feed to our



The Comrex Nexus

remote venues for our PA systems, eliminating problems such as poor reception and feedback that can occur when feeding a PA off air. We can delete some or all commercials from the PA mix and use the reverse channel capability for IFB purposes, or for our remote talent to take phone calls off-line.

The phone company installs a pair of wires that can be routed around the site and connected with standard modular connectors — just like a regular dial-up phone line. Special information is also provided that is required to configure the Nexus for that particular ISDN line.

After we decided to go with ISDN, our decision to buy the Nexus units from Comrex was an easy one. Our main considerations were ease of operation and low cost. We do not originate any music from our remote sites, so we did not need stereo capability. On the other hand, our production values emphasize a very tight on-air sound, so we wanted the shortest possible transmission delay.

Furthermore, we liked the fact that the Nexus combines a codec and terminal in one box with no bulky, fragile multiconductor data connector. The G.722 algorithm is fast and has the advantage of being the most accepted standard worldwide — an important benefit to KLAX, a Spanish-language station that occasionally takes ISDN feeds from foreign countries, as well as the United States.

Easy setup

Setup of the Nexus is relatively easy. As mentioned earlier, the local telephone company provides us with information including the type of Central Office equipment serving our line, the phone number for the line (also called an LDN), and a service provider identification (SPID).

This information is entered into the Nexus by means of a keypad and is stored in a non-volatile memory, permitting the unit to be configured in advance.

Also at this point, we select our desired data transmission speed. The Nexus supports rates of 56 or 64 kbps for 7 1/2 kHz audio response, and 112 or 128 kbps for full 15 kHz audio bandwidth using a technique known as bonding. Be aware that bonding uses both of the B channels available on an ISDN line, so if our call is a toll call, the added audio quality will double the amount of the toll charges.

In conclusion, we at KLAX and KXMG are extremely satisfied with our two Comrex Nexus ISDN units.

For more information from Comrex, contact the company in Massachusetts at (508) 263-1800; or circle Reader Service 137.

ONE WORLD



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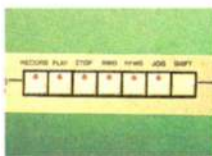
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USER REPORT

Gentner VRC-2000 Is Useful Tool

The VRC-2000 from Gentner Communications Is A Useful System for Remote Applications

by Glenn Finney
Good News Network

AUGUSTA, Ga. The VRC 2000 Remote Control System from Gentner Communications is a voice-response system for basic transmitter site remote control and monitoring.

Although the VRC-2000 is an older product, it is still currently sold and serviced by Gentner, and many are available on the used equipment market. The VRC is a viable product if installed and set up properly.

We have five VRC-2000s installed at our FM transmitter sites for basic remote control, alarming and data logging. The VRC was chosen as a "standard" a few years ago by our primary network programming provider, the Moody Broadcasting Network. Although more recent models are becoming available, we chose to stay with the VRC, so our staff has to learn only one set of commands, regardless of location. We also maintained the same channel assignments at each station, where practical.

Original upgraded

The VRC-2000 is Gentner's second generation product. Its original site control product, the VRC-1000, was somewhat limited in vocabulary and channels. Any old VRC-1000s can be fully upgraded to VRC-2000 with basic modifications. Recent improvements include a lower cost data interface (modem), and plug-in sockets on all IC and EPROM chips.

The system consists of a single rack space control unit housed in an RF-shielded chassis with rack mounting tabs. The basic package includes a telephone line surge suppresser and "D" connectors for the do-it-yourselfer. Command channel relay, pre-wired terminal strips, current sensors, temperature sensors, battery backup unit and internal modem are available as options.

Even though the system is somewhat dated, it has some neat features only recently found on "industrial grade" voice reporting systems, including touch-tone operation, three security levels, 16 status and analog metering inputs, and more.

The VRC has some peculiar aspects, having earned it an interesting reputation. The first thing you discover about the unit is the synthesized voice. The voice is a cross between Darth Vader and the Cylon warriors of Battlestar Galactica. Most folks do not care for it, but when it calls you at 2:30 in the morning, you know it is for real. Pronunciation of the letters "g" and "t" seem to be a problem for it, so we added a Unit Number Identification after the call letters in the site ID setup.

It is programmed with a standard touch-tone telephone, but we have found the use of the PC-based setup software is not optional. The setup software (DOS or Windows) instructs your Hayes-compatible modem to dial the programming sequences, saving time and trouble. It also provides a permanent record of all programming.

The use of the supplied telephone line surge suppresser is also not optional. We have repaired or replaced the surge suppressers several times, usually with no damage to the control unit. However, we added another stage of coil phone line protection in front of the unit that acts like a choke coil during a transient. We

The VRC-2000 is a viable product if installed and set up properly.

also added an active phone line suppresser made by Oneac. These commercial-grade protectors are usually available from your local telephone company.

Code-initiated channels

Each status, metering and command channel is initiated by a three-digit code, then verbally identified with up to two words for the channel assignment and two additional words for the action or engineering units.

Sequences of commands, or macros can be programmed for initiation by the operator, but not by an event. This is one of the more serious shortcomings of the unit. You can do some basic sequences by wiring into two or more status channels, each of which can make a decision and issue a command. However, you will need to program some intentional delay time into the status channels.

Perhaps the best aspect of the system is the ability to shut down a transmitter in the event of an overpower situation. Although our transmitters have modern

automatic power control, we program a high limit that attempts to reduce the power back to a preset level. If it does not respond in a reasonable time, then the transmitter plate circuit is turned off.

The VRC-2000 has a built-in memory protection battery, but if you want the unit to call out in the event of a power outage, you will need uninterruptible power. A computer UPS will keep the unit active for several hours. As with any microprocessor-based device, the unit

seems to be much more reliable when a small UPS is installed.

The system supports five outbound telephone numbers for alarming, and will dial using DTMF tones. Up to 30 characters and pauses can be used.

Little modification

We have tried not to make custom modifications to the units. We did disconnect the room monitor microphone, which is just about useless next to a transmitter anyway. We then wired a 3.3M resistor in series with the condenser microphone wire, which then accepts an unbalanced line-level input pretty well (without modifying the circuit board). This allows us to remotely monitor the actual audio from the modulation monitor at the site.

Overall, the VRC-2000 remains a useful tool for the station other remote applications.

For more information from Gentner Communications, contact the company in Utah at (801) 974-3615; or fax at (801) 977-0087; or circle Reader Service 227.

TECHNOLOGY UPDATE

ENERGY-ONIX

HUDSON, N.Y. Last year when Energy-Onix introduced its STL-1 and STL-2 digitally controlled, frequency agile, composite STL systems, its target market was individual and small group owners.

With the flurry of station purchases creating duopolies, triopolies, etc., the STL-1 and STL-2 provide multiple station owners a single back-up system to secure the cash flow for all their stations in the market.

These STLs instantly tune to any frequency within a 20 MHz band in 10 kHz steps. This gives the operators of duopolies a single solution for a main or emergency back-up STL. The STL-1 and 2 are compatible with existing digital encoders and decoders.

Frequency agility aside, the STL-1 and 2, and the 10 and 17 W systems offer precision LED modulation meter with peak indicator, full metering of all operational parameters and are remote control ready.

The remote control feature allows users the flexibility of not having to drive to a remote transmitter site to put their back-up STL on line.

A user can simply initiate the system via remote control or put an automatic switch over circuit in place to bring the back-up STL on line.

Stereo separation, THD, audio response and signal-to-noise are comparable with most STLs on the market and better than others. The system also features 3 SCA inputs, a composite MPX input and mono input.

For more information from Energy-Onix, contact Ernie Belanger in New York at (518) 828-1690; or circle Reader Service 93.

Thank You, Everyone...

...for helping make the 1996 NAB Show one of the most successful in Inovonics' 20 years of participation.

Our 1940s photomural brought a bit of nostalgia to those who could recall the earlier, less complicated days of radio. We now offer poster-size prints of this historic scene free for the asking! To get yours, simply write or contact us 'electronically.'



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USER REPORT

Zercom Fits the Bill at EHC

by E. Hayes Callaghan
President & G.M.
EHC Sports

STRUM, Wis. During the fall of 1992, the need to purchase a dependable, light-weight remote unit became necessary. The play-by-play division of EHC Sports was expanding to accommodate the schedules of three competing stations in Western Wisconsin: WCFW(FM), WBIZ(AM) and WEAQ(AM), in order of priority. It became apparent, that in order to branch out, some rugged remote gear would be needed.

Enter the **Zercom Max-Z II**, a two-channel unit with the ability to play back pre-game coaching interviews while serving two announcers.

Sound investment

The cost of the Max-Z II was affordable. With a play-by-play load of more than 80 events that season, the unit paid for itself in its first year of operation. The days of depending on sound mixers and telephone couplers were through. Even the popular remote cases of the early 1980s, which most stations were using, became secondary in sound quality and general efficiency to the Zercom Max-Z II.

The annoying hum that can be caused by a competitor's transmitter at close range could now be eliminated. With the built-in rechargeable battery, it can hold a charge for up to 24 hours, thus bypassing any RF interference when using the AC cord.

As a safety feature there is a battery indicator light that blinks when there is an hour of power remaining. Most sporting events last two to three hours, and in four years of use I have yet to see my battery indicator fail.

The Zercom Max-Z II continued to prove its worth in much more demanding broadcast conditions. In addition to the steady diet of college, high school, and amateur sports that EHC Sports covers, we have found the Max-Z II to hold its own on the frozen lakes of the upper midwest.

Since the mid-80s, I have found the most challenging sporting event to produce and broadcast to be the International Ice Racing Association circuit races, held on frozen lakes in Wisconsin, Minnesota, and Thunder Bay, Ontario.

Early years

In the early years, coverage consisted of me using a stick mic through a Marti unit with binoculars from the starting line while scanning the race track for more than four hours. Talk about boring.

Eventually, EHC Sports turned it into a six-man crew coverage unit, complete with reporters live on cell phones in the far reaches of the track, a reporter live on a portable Marti in the pits, and the centerpiece in our broadcast central van was the Zercom Max-Z II.

With yours truly on a headset, analyst Herm Johnson and statistician Dave Hanson sharing a hand-held microphone, the Max-Z II was able to accommodate our main broadcast team throughout the four-hour broadcast. Former IIRA series champion John Menard called our coverage the best yet. I feel the versatility of the Max-Z II made it possible.

In March 1994, the University of Wisconsin-Eau Claire played host to the NCAA Division III Women's Basketball Final Four. EHC Sports was contracted to broadcast the game back to WARA(AM) in Attleboro, Mass. Minutes later, a representative from Capitol Ohio in Columbus called and wanted a feed of the game.

The folks at WARA were able to send a feed back to Columbus, but it prompted me to think about upgrading my inventory to handle two separate phone feeds simultaneously from the arena. The burden on the on-air operator would be lifted and there would be a cleaner feed for both parties.

Enter the Zercom Max-Z, big brother to the Max-Z II, with four inputs, two digital clocks for real time and broadcast time length, and a dedicated line.

I am now able to feed one station through the dial-up line, another by connecting the Max-Z II to the Max-Z through the dedicated line, and use the other unit's dial-up line to feed the second station. Plus, the Zercom Max-Z allows me to use a crowd mic in addition to three headsets. That means we can close the broadcast booth windows and still have crowd noise during those frigid nights of football.

Getting better

Since adding the Max-Z, EHC Sports has increased its broadcast schedule to well over 100 sporting events each year. We have now added Wisconsin stations WKTY(AM) in LaCrosse and WMNE(AM) in Menomonie

to the list of stations requesting our services, and it keeps getting better.

Bravo to Zercom and its Max-Z line of broadcast remote units. It has provided the backbone of our ever increasing play-by-play load at EHC Sports. We have broadcast from professional sports arenas in Minneapolis, Milwaukee, and Madison, Wis., while including hometown events in places like Strum, Wis., and Alma, Mich. The Zercom line has been with me all the way.

To top it all off, when I needed service during the fall of 1994, a replacement unit was at my doorstep within 18 hours of my request. It was fixed within a week and Zercom refused to charge me a penny for all its trouble.

For more information from Zercom, contact Daniel Horn in Minnesota at (800) 950-4260; fax: 218-765-3900; or circle Reader Service 138.

USER REPORT

Moseley Products Meet Signal Strength Challenge

by Scott Fenstermaker
Assistant Chief Engineer
WFBQ(FM)-WRZX(FM)-WNDE(AM)

INDIANAPOLIS Say the co-host of your morning show comes in and wants to do a remote. Okay, no big deal, right? Now say he wants to do that remote annually from one of the top recording studios in the city. Throw in that this morning show is the nationally syndicated Bob & Tom Show, and just for fun, add artists like Peter Frampton, Hootie & the Blowfish, John Mellencamp, and Patty Smyth.

What you have there is a challenge. Economically, how do you get full bandwidth stereo audio from the recording studio to the radio station three miles away? Well, the usual remote gear — the Moseley RPL-4000 TX or RX system is good. But, for this application where audio quality is the primary goal, we needed something more.

Big names

Bob & Tom, based in Indianapolis at WFBQ(FM) and now syndicated on 15 stations around the country, have been bringing their audience this annual "Live Day" show for eight years. The show consists of eight to 10 hours of live music, comedy, and commercials. The guest list has included some of the biggest names in the music industry.

Presented with the challenge of bringing audio from the best of all sources — a recording studio — and getting it to our studios, we had to rule out ISDN with its inherent A/D-D/A delay. Bob & Tom wanted to be able to roam wireless from the voice booth out into the studio to interview artists between performances. On the other hand, installing a stereo pair of telco lines every year is not a pretty financial picture.

We eventually settled on sending a composite STL signal using a Moseley PCL-505c. Unfortunately, even at this short distance, we were unable to maintain full quieting due to signal fade (too many trees and buildings in the signal path). Four years ago, we found the new Moseley DSP-6000 Digital STL system. We called the folks at Moseley, and they assured us the DSP-6000 would solve our problems and shipped a set to us.

Because we are currently using a pair of Moseley PCL-6010s for our main/backup

STL path, we pulled an older set of PCL-505cs off the shelf. After checking with our local frequency coordinator, we switched frequencies and performed the very simple modifications suggested by Moseley (adding a jumper or two to allow the wideband data through, and we also touched up the receive sensitivity; we later found this to be very important).

We then connected it to the DSP decoder. The only modification needed for the PCL-505c transmitter was a change of deviation from 60 kHz to 50 kHz, and we did a quick tune-up and bench check. We connected the DSP-6000 encoder to the PCL-505c and moved the set out to one of our remote vans.

Critical aim

Next we replaced the UHF Yagi antenna, normally mounted atop the Wil-Burt pneumatic mast on our remote vehicle with a Scala 950 MHz grid antenna, and drove the three miles to TRC Studios in Indianapolis. We raised the mast only about 15 feet due to the increased weight of the grid antenna. Aiming of the antenna proved critical even at this short distance, but the front panel LED indicators (decoder) showing bit errors, audio levels, etc., made the setup simple.

While we were extremely happy with the signal strength, we were amazed at the crisp and clean audio received back at the station. Thanks to the DSP-6000, we now had a noise-free, 16 kHz digital stereo audio path to the station with no discernible delay and no outrageous telco bills.

The "Live Day" show has always been one of the highlights of the year for the Bob & Tom Show, and everyone involved with the show is pleased with the sound quality of the DSP-6000. In fact, one of our affiliates new to the "Live Day" show, KSHE(FM) in St. Louis, Mo., called in to the studio during this year's show to find out why we were playing a John Hiatt CD when he was live in the studio with us. But as we explained, what he was hearing was live...a tribute to John Hiatt as well as Moseley. He was very impressed, just as we were the first time we heard the Moseley DSP-6000 audio.

For more information from Moseley, contact the company in California at (805) 968-9621; fax: (805) 685-9638; or circle Reader Service 200.



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USER REPORT

Marti Still the One For Great Empire

by Clifford W. Koch
Corporate Engineer
Great Empire Broadcasting

WICHITA, Kan. I have installed Marti STL systems for 30 years. The transmitter models ranged from STL-8 to STL-10 and STL-15C.

As a user of STL systems, I offer this article to possibly help the rapidly moving broadcast industry, as you may be looking for station acquisitions or have a construction permit and you have equipment decisions to be made.

Discrete systems

I use the discrete system where possible. This requires two Marti-10 transmitters and two Marti R-10 receivers. I have discrete systems installed at KFDI-FM, WOW-FM, KTTS-FM and KWKH-FM.

I use discrete systems for a number of reasons. The first is that they allow the use of four subcarriers — two per each STL-10 transmitter. They also allow the ability to stay on the air if one STL transmitter should fail.

Third, the STL receiver R-10 bandwidth is less than a composite receiver, so the

noise level is lower. Finally, discrete systems do require the processing and modulation of your station's main transmitter to be adjusted at the transmitter where the processing and stereo generator must be installed. This can be important in your decision when purchasing STL equipment.

I offer this article to possibly help the rapidly moving broadcast industry.

Using a discrete STL system, two channels of audio are transmitted from your studio to the transmitter site to be connected to your processors and stereo generator of your FM station.

When using a composite system, the processing equipment and stereo generator are located at the studio.

It is transmitted from the studio to your transmitter site, already processed and ready to connect to the transmitter exciter input.

Studio adjustments

It is true that a composite system processing, pilot injection and separation controls can be adjusted at the studio. Modulation can also be adjusted while watching your station modulation monitors. However, this is not always accurate.

Station modulation monitors have an RF amplifier to amplify the station carrier level to a level needed for the monitors to work.

This amplifier sees manmade noise as well as your carrier. The 100 percent modulation peak indicator may indicate modulation of 100 percent due to noise

the RF amplifier of the modulation is receiving in addition to your station frequency.

The only accurate location to set modulation is at the transmitter site with the modulation monitors connected to the transmitter transmission line sample output connector. Most modern FM exciters have a modulation indicator built in.

It does require two people to accurately adjust a composite STL system. One person is needed to verify main transmitter modulation at the transmitter site and another is necessary at the studio site to make adjustments.

With the discrete system, one person can make all the adjustments at the transmit-

ter site, provided you have a modulation monitor at the transmitter location. This is an additional cost, but it is accurate.

Type approved

We do have some Marti STL-15C transmitters in use at KVDO and KWKH that were installed when the FCC ruled that all STL transmitters must be type accepted. Note that all STL equipment Marti produced was FCC type approved.

One other tip on adjusting STL transmitter modulation: If your station's STL transmitters have the VU meters on the front, the meters should not exceed the -17 VU level during normal programming because the STL transmitters use pre-emphasis, just like your FM transmitter.

The ballistics of the meter movement will not give a true modulation indication when modulated with a 15 kHz audio frequency. If you overmodulate an STL transmitter, you will notice a loss of bass and an increase of treble in the sound of your program.

I have not used the Marti digital MD-2E encoder or the MD-D decoder yet. I know it will operate within the

specifications, but we will probably wait until all equipment is straight digital from the console output to the transmitter input, eliminating all the D to A and A to D converters.

I have known George Marti since 1967 and I like the courtesy of all the Marti company employees. I was concerned when Broadcast Electronics purchased Marti that this courtesy may not be the same, but I have done business with them in the past year and have found the courtesy and help of the employees to be unchanged. If you need help or honest advice, give them a call.

I have been in the broadcast industry for 47 years and companies like Marti make it a pleasure.

For more information from Marti, contact Ron Pohler in Texas at (817) 645-9163; or circle Reader Service 117.

PROBLEM: I need back-up STLs for my stations. But I don't have a huge budget.



SOLUTION: The STL 1 from Energy-Onix. It's a Digitally Controlled, Frequency Agile, Composite STL System.

The frequency adjustment is right on the front panel. It's as easy as tuning your car radio.

That means you or your engineer can instantly tune the STL-1 to any of your STL frequencies.

So, even if you are running four stations from the same studio site you will only need one STL-1 as a back-up.

The STL-1 has exceptional audio quality, it can be monitored by remote control, and it is RBDS compatible.

Best of all it's priced low enough to make even your accountant smile.

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TECHNOLOGY UPDATE

TFT

SANTA CLARA, Calif. In many markets it is difficult to find a sufficient number of STL channels. The ongoing consolidation of transmitter sites under recent LMA and duopoly rules makes finding needed STL paths virtually impossible.

Therefore, a solution which provides additional program capacity on existing STL systems, as well as adding digital quality, spells welcome relief to many station owners.

The TFT DMM92 system is just such a breakthrough. The DMM92 is plug-in compatible with virtually any existing composite STL system.

Once attached to such a composite STL system, it can handle four 15 kHz program channels, two 3 kHz voice channels and provide additional room for two analog MUX channels above the digital information, all within the constraints of a single existing channel. AES/EBU inputs and outputs are standard, and a 32 kbps data channel can be supported. Apt-x audio compression is built-in, while Musicam encoding is available on an external basis.

Using the latest digital technology, the TFT DMM92 will immediately add 10 dB or more audio S/N to the STL chain and 20 dB or more of additional RF fade margin. This can increase useable paths by many miles.

The TFT DMM92 Digital STL System can instantly solve many of the program transmission problems facing broadcasters today.

For more information from TFT, contact the company in California at (408) 727-7272; or circle Reader Service 27.

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710 ENCODER: Just \$995 and **no computer required!** The non-volatile memory holds 16 separate frames of program and format identifiers, alternate frequencies, radiotext messages and traffic or emergency flags. A built-in data interface lets you upgrade later to full dynamic operation for revenue-generating paging, GPS, coupons, contests, etc.

510 DECODER: Connects to your existing FM Mod-Monitor. The front-panel LCD display shows RBDS injection level and allows you to scroll through and read all the data groups. An RS-232 port gives unlimited access to raw RBDS data for telemetry and other in-house functions.

Inovonics, Inc.

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TEL: (408) 458-0552 — FAX: (408) 458-0554



USER REPORT

Fibox Is Flawless at WFYI-FM

by Steve Jensen
Director of Engineering
WFYI-FM

INDIANAPOLIS We were moving the studios for WFYI-FM to a new building. We needed audio and remote control telemetry to run between the old and new buildings.

Cabling from the new location would run under the parking lot, up the microwave tower, across the tower bridging and into the microwave room of the old building. The total distance was about 600 feet.

Due to cost considerations, copper cabling was contemplated. Video and audio copper tie lines between the buildings had been used for other applications with mixed results. Special grounding techniques and isolation transformers had to be used. Problems arose when lightning struck near the tower. Fiber was an answer to many of these problems.

No signal loss

The Lightwave Systems Fibox is a two-channel digital fiber optic transmission system for audio signals. With 20-bit linear A/D and D/A conversion, signal degradations caused by distance, copper wire, ground loops and interference (EMI/RFI) are eliminated.

Fibox accepts line-level or microphone-level input signals, digitizes these inputs,

multiplexes the two channels and transmits all information down a single fiber optic cable. Transmission distances of over two miles are possible with no signal loss.

I found an ad for the Fibox system and gave Lightwave Systems a call. The sales staff was helpful and sent me additional information. They were able to configure a system I could use at an affordable price.

I was impressed when the system arrived. The boxes were attached by a tongue and groove method. They slide together and form a 19-inch rack tray. Mounting ears are then attached to the box ends.

Features include: phantom power, mic/line input switch, overload indication at +20.0 dBu (THD = +1 percent), gain potentiometer for mic input, audio phase and ground lift switches, power connections, audio XLR connectors, 48 kHz sampling, as well as fiber connections. The Fibox operates at 12 V. Its construction and capabilities make it possible to operate in the field for remote production applications, as well as in studio STL applications.

The Fiboxes are connected together with a pre-made wiring harness. In our system we made use of eight boxes, four receive and four transmit boxes at each end. A total of six transmit and six receive Fiboxes can be connected at each

end. Because all the signals are multiplexed, only two fiber strands were used in this system. Each Fibox comes with a complete data sheet plotting several operating parameters. The system we are using has analog audio inputs and outputs with AES/EBU digital inputs/outputs available.

Large fingers

A couple of problems occurred installing the system. We initially had a problem sliding the Fiboxes together. Some were easier to slide together than others, but once we read the instructions, the installation went a lot smoother. If the boxes are not slotted properly you can encounter some sagging.

I also do not like handling the circuit boards outside the box or attaching the wiring harness.

The wiring harness is pre-made for the Fiboxes. Each cable is cut to length, which in tight quarters, or if you have large fingers, make it difficult to connect to the boxes.

The total Fibox system went into place very easily and has been working flawlessly for the last four months. Lightwave Systems has checked with us to make sure the system is working properly.

For more information from Lightwave Systems, Inc., contact the company in Texas at (214) 741-5142; fax: (214) 749-1917; or circle Reader Service 115

MUSICAM Reaches Out

► continued from page 57
upgrades that can be downloaded directly via ISDN.

Prima does everything we want it to do and it sounds absolutely wonderful — it's like being there live. It has a very low noise floor and distortion.

Prima is also flexible, with many built-in automatic features that will allow us to accommodate a wide variety of tasks. We plan to add ISDN for short-form programming, and we are satisfied with Prima's sound at the lower bit rates used for ISDN.

Prima was the station's first codec and we've been extremely pleased with its performance. The bottom-line is: if you're going to be spending all day with encoded digital audio for long-form programming — like we did for the Promisekeepers Conference — it has to sound good.

For more information from MUSICAM USA, contact the company in New Jersey at (908) 739-5600; or circle Reader Service 87.



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Circle (212) On Reader Service Card

USER REPORT

Telfax Eases Remotes

by Doug Cooper
Radio News Director
ISU Extension
Communications Services

AMES, Iowa Girls basketball. Joe's Hardware store and a presidential press conference. What do they have in common? These are just a few of the places broadcasters have been using the Telfax Communications GX-440 Phone Remote Mixer over the past few years.

A dial-up phone line is still the quickest, least expensive way for stations to get a remote broadcast on the air, and the GX-440 makes it easy.

Connect the GX-440 cable to a standard modular phone line jack, use the keypad to dial out and communicate with the studio through the headset. Connect a portable radio to the monitor jack and you can listen to the air signal. Internal NiCad batteries make it possible to broadcast up to ten hours on one charge, or the unit can be operated using the supplied AC power adapter.

This unit is so easy to operate that no one on your staff will be intimidated. Sales people, sports personnel, and even the general manager can be educated in about five minutes on how to set up a remote. The unit

features four microphone inputs, two high-level (tape) inputs, and four headphone outputs. The more technically advanced will appreciate the low-frequency extender interface, audio-limiter circuit, the recording output (line or mic level) and squelch/mute functions.

Another advanced feature of the GX-440 is its two-line capabilities. This comes in handy if you want to receive closed-circuit information in your head-

set, or for feeding a second station using an additional phone line. A high-level output for feeding ISDN interfaces and dedicated lines is available and a cellular telephone interface

can be purchased as an accessory.

All this is in a 1 1/2-inch x 6-inch x 9 1/2-inch package and it weighs in at only three pounds. It is great for airline travel. Pack it in your briefcase like I did on a trip to Russia, and you can carry it on board and not have to worry about losing it. And if you left your AC power adapter in Minsk, just call Telfax and they will do their best to overnight a new one.

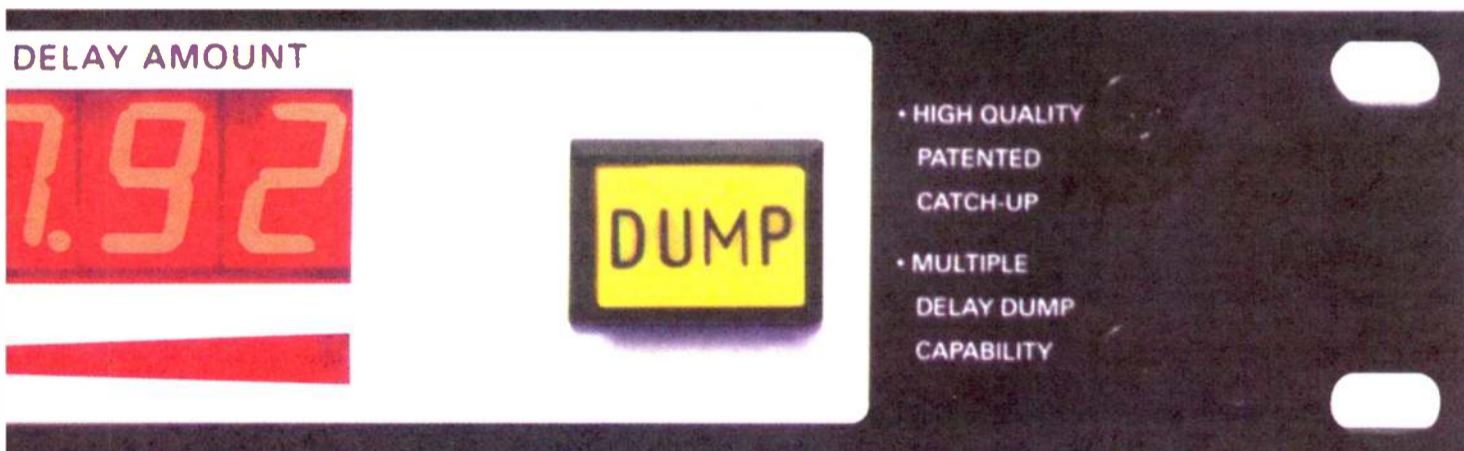
For more information from Telfax, contact the company in Iowa at (515) 233-5967; fax (515) 296-9910; or circle Reader Service 160.

This unit is so easy to operate that no one on your staff will be intimidated.

THE ONLY TALK SHOW DELAY THAT CAN MAKE THESE STATEMENTS.

Bad words, **#@\$^&*%!** like bad news, often come in threes. The new Eventide BD500 is the only obscenity delay in the world that can eliminate them. Now, when you hit the Dump button, you don't lose the whole delay and the obscenity **%#~!@*\$!** protection that goes with it. You can divide the total available delay time into not one, or even two, but several discrete segments. You still have protection even after dumping two consecutive **&*%\$#@#!** no-no's.

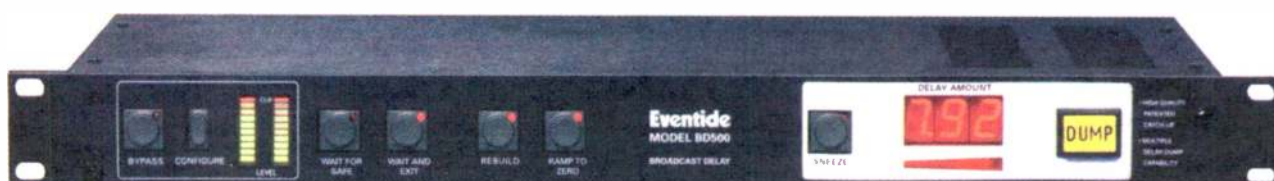
You also get the cleanest, quickest delay catch-up you can buy. Because there's only one way to maximize audio quality and still catch-up rapidly after a delay dump... and Eventide owns the patent. Over the years, several other brands of delay have come and gone. But the simple fact is that the catch-up methods others use must be painfully S-L-O-W to avoid serious audio problems.



And, because you may not be using that analog console forever, the BD500 is also the only broadcast delay that's digital-ready with optional AES/EBU digital audio inputs and outputs. It's stereo, of course. A convenient new "sneeze" button allows the talent to sneeze, cough, etc. without being heard on air, and without dead air. All front panel switches (except configure) and all status indicators can be remoted (both RS-232 and dry contacts are provided.) Plus, only the BD500 gives talent both a digital readout of delay time and a "quick read" LED bar graph that shows "you're safe" at a glance.

For all these features and quality, you'd expect top-of-the-line pricing. But surprise! The BD500 costs thousands less. It's the best value ever in a broadcast talk show delay. Exactly what you'd expect from the people who invented digital broadcast delays in the first place. Call your distributor, Eventide direct, or check it out on the Web at <http://www.eventide.com>

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World Radio History

MARKETPLACE

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Z-32.32r Digital Detangler

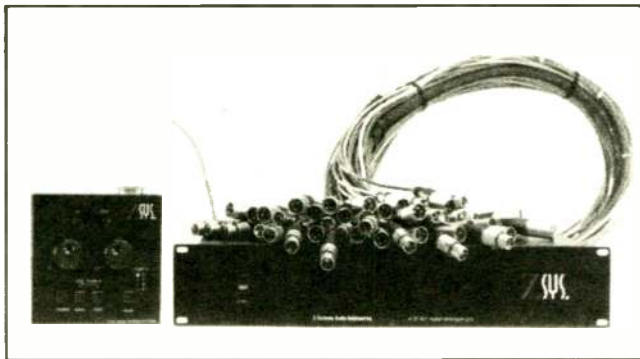
The Z-Systems z-32.32r Digital Detangler is designed to work with digital audio signals (AES/EBU & S/PDIF).

The z-32.32r is an automated patchbay, router and distribution amplifier all in one package.

It features 32 AES/EBU stereo pairs in and out, giving engineers the power to physically interconnect all of their gear without having to unplug and rearrange cables.

Once all digital audio sources and destinations to the z-32.32r are hooked up, the connection pattern is then established by the touch of a few buttons.

For more information from Z-Systems, contact the company in Florida at (352) 371-0990; fax (352) 371-0093; or circle Reader Service 76.



VMR-12 Unit from JPS

The VMR-12 Voice Modulation Recognition Unit from JPS is packaged in a 19-inch wide EIA standard rack-mounted Eurocard cage equipped with a backplane board. A power supply module and up to 12 VMM-1 VMR modules are plugged into the card backplane.

Each module provides the next generation of reliable speech detection techniques and is

capable of accurately detecting speech, including the elusive first syllable from a variety of audio sources.

Compared to conventional squelch/VOX designs, the speech detection algorithm on each module is less dependent on the voice signal's absolute level and is more tolerant of noise. The DSP firmware on each VMM-1 module provides a clear performance improvement over conventional analog syllabic rate detection circuitry.

For more information from JPS, contact the company in North Carolina at (919) 790-1011; fax (919) 790-1456; or circle Reader Service 97.

Field-serviceable Studiophones

Audio-Technica is now shipping new field-serviceable versions of its closed-back ATH-M40 and ATH-D40 precision studionphones.

The new models allow elements, cables and earpads to be replaced in the field if necessary. A small Phillips screwdriver is the only tool required.

For more information from Audio-Technica, contact the company in Ohio at (330) 686-2600; fax (330) 688-3752; or circle Reader Service 139.

Digital Audio Adapter

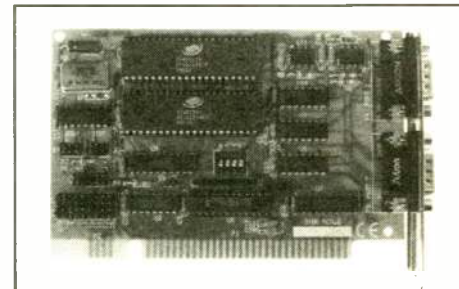
The new SX-34 digital audio adapter from Antex Electronics offers systems integrators broadcast-quality audio with MPEG compression.

Featuring multichannel, ultra-high fidelity, direct-to-disk, digital sound sampling and reproduction, the SX-34 offers users the ability to enhance their applications with high-performance digital audio record and play functions with industry standard MPEG Layer I/II and other compression formats.

For more information from Antex, contact Robert Bird in California at (800) 338-4231; fax: (310) 532-8509; or circle Reader Service 180.

SeaLevel Datashark I/O Card

This two-port, high-speed serial I/O interface for ISA bus systems provides two RS-232 serial ports that support data rates up to 460 kbps, making it ideal for high-speed analog and ISDN modem applications.



The Datashark's high-performance serial ports are designed to provide reliable data transfer in these and other applications, such as ISDN operating at 128 kbps, where high-speed asynchronous serial communications are a must.

For more information from SeaLevel, contact the company in South Carolina at (864) 843-4343; fax (864) 843-3067; or circle Reader Service 75.

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World Radio History

CD PLAYER...WTS

Sony CDP-XIII ES CD player, new. \$250. C Davies, AIPH, 1622 Chestnut St, Phil PA 19103. 215-567-7080.

COMPUTERS

Want To Sell

Lynk 5250 emulation cards (2), ISA compatible w/DOS/Windows software, use w/IBM System 36, S/38 or AS/400 twinax networks, new, never used, \$150 ea; IBM 5364 Baby 36 system w/4224 printer, 5160 PC/XT console, assorted lengths twinax cable, used w/JDS 1000 traffic system, gd cond, BO +shpg. M Humphrey, WPLY, 1003 Baltimore Pike, Media PA 19063. 610-565-9000, mark@y100.com

Want To Buy

Tandy 6000 HD with at least one floppy drive. Mel Crosby, 408-363-1646.

CONSOLES

Want To Sell

BE 8BEM-100 8 chnl mono, \$750, u pick up. Dave or Harold, KUVR, Box 465, Holdrege NE 68949. 308-995-4020.

Harns 80 stereo console, \$1000; LPB 8 chnl stereo, \$1200; Sparta 8 chnl stereo, \$500. D Rose, KDUC, POB 432, Barstow CA 92312. 619-256-2068.

Radio Systems ESA-10 stereo console, 10 pots, gd cond, \$1800. G Arroyo, 407-830-0800.

Auditronics 110B Grandson II, works, complete, \$800/BO. 615-646-1510.

Soundcraft Spirit Folio 10 chnl portable w/slide faders, \$295. G Wachter, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-817-1030.

Spotmaster 5 chnl mono, several, \$300. J Parsons, Parsons Sound, 2781 Fayson Circle, Deltona FL 32738. 904-532-0192.

RCA 4 input remote mixer, 1950s vintage solid state, cosmetically clean, electrical cond unknown, missing pwr cord, \$50. Ed, N.S.S., POB 1417, Patchogue NY 11772. 516-654-8306.

Soundcraft 600, 32x16, w/patchbay, 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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Want To Sell

Portable disco w/2 CD, 2 cassette, \$1000. D Rose, KDUC, POB 432, Barstow CA 92312. 619-256-2068.

Alesis SR16 drum machine, \$195. C Davies, AIPH, 1622 Chestnut St, Philadelphia PA 19103. 215-567-7080.

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CRL SMP-850 & SG-800A mod processor & stereo gen in excel cond, \$1000/both, \$550/ea. J LeVeon, WAVX, 119 Tillson Ave, Rockland ME 04841. 207-594-9283.

Want To Buy

UREI or Teletronix LA2A, LA3A, LA4A, 1176, Gates, RCA, Collins, Altec, dbx 160/165, all types, working or not. T Coffman, Rolltop Music Studio, POB 17203, San Diego CA 92177. 619-571-1645.

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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

Neuman U-87, Sennheiser 421, AKG 451-E, Shure SM-7, T Coffman, Rolltop Music Studio, POB 17203, San Diego CA 92177. 619-571-1645.

Shure 561's, several, new & used, \$10-50. A Wodel, ILCC Telecom, 1209 N 7th St, Esterville IA 51334. 712-362-4119 (eves).

RCA 77D near int cosmetics w/fresh ribbon, shock mount yoke, \$900 +shpg. Ed, N.S.S., POB 1417, Patchogue NY 11772. 516-654-8306.

Telefunken CMV prototype, 1 of 2 known to exist, sounds incredible, \$1500. 615-646-1510.

Want To Buy

RCA 77 & 44, Neuman, Sennheiser, EV, Altec, Coles. T Coffman, Rolltop Music Studio, POB 17203, San Diego CA 92177. 619-571-1645.

AKG 224E, any cond, would consider pair, C Yengst, WAWZ, POB 9058, Zarephath NJ 08890. 908-469-0991.

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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. 619-320-0720.

MISCELLANEOUS

Want To Sell

300 best country songs 1975-76 on reel, \$150; servo motor for Ampex AG440-C, has little click in motor but works, \$250. H Sewell, Oakridge Music Recdg Svcs, 2001 Elton Rd, Haltom City TX 76117. 817-838-8001.

Blonder-Tonge audio/video TV modulator, VHF chnls, \$99. G Wachter, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-817-1030.

Henry Match Box IHF-Pro audio box, like new. A Wodel, ILCC Telecom, 1209 N 7th St, Esterville IA 51334. 712-362-4119 (eves).

dbx 166A comp & limiters, \$400; M85 MK 2 cassette deck for parts, \$100; mic 64225 hand held needs rcvr, \$100; Telex WT200 (3) no mics, \$35 ea; KC 100 voice control key change, \$150; dbx 1BX 111 range expander, \$50; Rec-O-Kut record lathe, \$350; tubes of all kinds; UREI 1176 LN limiters (2), \$1500 ea; Sony CD player, nearly new, no rack mount, \$250. H Sewell, Oakridge Music Recdg Svcs, 2001 Elton Rd, Haltom City TX 76117. 817-838-8001.

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Collins IC 6 audio console; CG-25R 25 Hz gen; (5) Otari ARS-1000 open reel machines; Wegener 1816-24 freq agile sat rcvr. C Mandel, KAMP, 626 Main St, El Centro CA 92243. 619-352-2277.

DB 350 band pass cavities tunable 115 MHz to 175 MHz, \$85 ea; RFL M500 oil filled dummy load, continuous 500 W, intermittent 1500 W, \$275; Sencore FC51 freq counter w/manual, \$275. W Moring, WSCI, 2187 Wappoo Dr, Charleston SC 29412. 803-795-9401.

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McCurdy parts: (12) SM115-6 mic switchers, (9) AM478T amp cards, (13) XP277 preamp/matrix control, (21) AP276 preamp/matrix control, PS852 +/-15 volt pwr supply, B.O. C Price, WTB, 1500 Airport Rd, Oxford AL 36303. 205-831-3333 ext 118.

Lyrec tape timers (3), \$300 ea; (7) Seike/Spotmaster tape timers, \$175 ea; (5) Spotmaster TP1B cart winders w/timer, \$225 ea; (5) Spotmaster TP1B cart winders, no timer, \$50 ea. Mel Crosby, 408-363-1646.

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Marantz PMD201 portable cassette recorder, less than 50 hrs, will trade for anything of equal value. J Ronn, WSOT, 2268E Apple Ave, Muskegon MI 49442. 616-777-2845.

Panasonic Pro SV-3700 DAT, low time, gd cond, \$975; Sharp Pro DAT, table top mdl, xlr in/out, \$495. G Wachter, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-817-1030.

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Scully 280, in use, will sacrifice, BO. S Morse, Sam Morse Prod, 19 12th St, Carle Place NY 11514. 516-334-5216.

Sony Mini Disc M2-RZ, walkman size P/R, mic jack, line in, 6.5 hrs PB, lithium battery pack, \$375 firm. Rick, Be Productions, 542 Laramie, Wilmette IL 60091. 708-693-2597.

Sony MD101 mini-disc, new, never used, still in box w/remote, \$795/BO. Ken R, 1806 Madison, Toledo OH 43624. 419-243-1000.

studer A807 VU+K, low hrs, RS232, mic pre, BO. H Klane, EAW Inc, One Main St, Whitinsville MA 01588. 508-234-4295 x145.

Tascam DA30, less than 100 hrs, original boxes, manuals, etc, \$750. M Schackow, Mark Schackow Recdg, 307 4th Ave E, Lemmon SD 57638. 605-374-3424.

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Sony D-3 DAT rcd, 2 batts, digital interface, cables, \$700; Fostex R08 8 trk ADAT MIDI, SMPTE, RS422, SMPTE on trk 9, \$2100. C Davies, AIPH, 1622 Chestnut St, Phil PA 19103. 215-567-7080.

Spotmaster 505D tape cartridge PB, gd cond, \$140; Tapecaster 600P, gd cond, \$100. W Moring, WSCI, 2187 Wappoo Dr, Charleston SC 29412. 803-795-9401.

Tascam BR-20 (2), practically new w/remote control, \$1680 ea. M Pelleya, WDNA, 4848 SW 74th Ct, Miami FL 33155. 305-662-8889.

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

Ampex AG602, unmounted, \$250; rackmount for 600 series, \$30; (2) Samsonite cases, 600 series, mono, brown, gd cond, \$50 ea; Samsonite case for 600 series, stereo, grey, gd cond, \$50; 601 tube type in case, \$200; (7) Ampex 7.5 ips alignment tapes, unused, \$20 ea, BO; various used Ampex capstan & reel motors, working, as is, \$50 ea; Microtran table top degausser, like new, \$150; AL 500-2 recorder, as is, \$100; (2) AG440A mono FT, as is, \$150 ea; AG440 mono FT, play only, \$100; Scully 282-4, 4 trk 1/2" tape, \$800. Mel Crosby, 408-363-1646.

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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. 619-320-0720.

Want To Buy

Tape machine for PB of 2 trk stereo tapes w/displaced or staggered heads. P Chance, Imperial Analog, 925 Clinton St, Philadelphia PA 19107. 215-574-8147.

Otari 5050B MK II or III r-r w/stands (4). Sandy, 317-598-0239.

Tandberg, Teac or Sony 1/4 trk, 2 or 4 chnl tape deck, 3-3/4 ips in working cond. for PB only; Revox A77 motor, 3-3/4/1-7/8 ips & 1/4 trk PB, heads in gd working cond. L Josephson, Radio Foundation, 1 W 89th St #5E, NY NY 10024. 212-595-1837.

Ampex machines, record electronics, mixers. W Gunn, Box 2902, Palm Springs CA 92262. 619-320-0720.

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

Comrex 2XP 2-line encoder, case scratched in places, \$700. R Links, Links Sound, 1656 California St, Berkeley CA 94703.

QEI 400 Cat Link STL, TSL digital audio transmission system for use on T1 telephone circuit, excel cond, negotiable. L Bryant, WXLK, POB 92, Roanoke VA 24022. 540-774-9200.

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Symetrix 108 8 line bdc't telephone system, \$1295; Switched 56 CSU/DSU, 4 wire, for Zephyr & other Codec's, \$195. G Wachter, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-817-1030.

1989 Super Roving Radio remote studio, 25'x6'x12', red, new sub floor & carpet, grey int w/counter tops, 30' pneumatic mast, a/c, exc tires, chaser lights on sides & handle, vgc, no equip, used approx 5000 miles, \$20,000. M Martindale, KVON, 1124 Foster Rd, Napa CA 94558. 707-252-1440.

GE Exec II paging system, Kustom Konsole, 4 chnl w/tone & voice, 20 spirit pagers on 154.625, remote base xmtr, complete system, \$300. P Russell, Bowdoin College, Sills Hall, Brunswick ME 04011. 207-725-3066.

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Marti M-3-60 xmtr, 1950s vintage, cosmetically clean, tubes & meter light up, \$50. Ed, N.S.S., POB 1417, Patchogue NY 11772. 516-654-8306.

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SATELLITE SERVICES/EQUIPMENT

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STATIONS

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Elkton KY 500 W AM station & real estate totalling 4.43 acres, in city limits. M Sidebottom 502-265-5636 (day), 502-265-5143 (night).

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Old Gospel music on LPs or CDs. Southern Gospel only. 912-384-9857.

STUDIOS

UREI 1681 stereo 8 chnl console; Ampex ATR 700 10" r-r; Tapecaster & Sparta carts; Techniques SL1200 TT's; JBL limiter; JBL 4312 monitors, \$5,999. H Panosian, 103 Lori Lane, Broomal PA 19008. 610-356-1110.

TAX DEDUCTIBLE

Non-commercial, non-profit NCE FM, needs all type of equipment, will pick-up or pay shpg, tax deductible certificate issued, ID Byars, Warren Cty Educ Foundation, 2101 Myers Cove Rd, McMinnville TN 37110. 615-668-8451.

Non-profit organization seeks equip contributions for non-commercial FM, studio equip, furniture, STL equip, fully tax deductible w/documentation at the rate you set, will pay shpg. Dave, 518-370-1414.

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Potomac Instruments FIM 21's or FIM 41's in decent cond, will calibrate, no junk please, gd prices pd for gd units, fax desc, age, price to Bill Sacks 703-534-7884.

Want To Buy

Operating manual for Hickok 605-A tube tester, xerox OK. B Leslie, Pro Recording Svcs, 13709 Mapleleaf Dr, Cleveland OH 44125. 216-662-1435.

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3CX10,000A3	5U4G
3CX10,000A7	5V65OC
3CX10,000H3	6AS7G
3CX15,000A3	6BM8
3CX15,000A7	811A
3CX15,000H3	833A
4CX250B	833C
4CX250BC	EL34
4CX250BM	SV811-3
4CX250R	SV811-10
4CX350A	TH5-4
4CX350AC	TH5-6
4CX400A	TH6-3
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Want To Sell

Rek-O-Kut Micro-Poise 12" tonearm, stereo wiring & headshell, late model for single 7/8" mounting hole, excel cond, \$50 +shpg. B Leslie, Pro Recording Svcs, 13709 Mapleleaf Dr, Cleveland OH 44125. 216-662-1435.

Russco CD500 3 speed, many to choose from, \$50 +up. J Parsons, Parsons Sound, 2781 Fayson Circle, Deltona FL 32738. 904-532-0192.

Technics SP-25 TT, 2 speed, Audio Technica ATP-12T tonearm & Ortofon cartridge, Pro-base mounting board, complete, \$200 +shpg. R Links, Links Sound, 1656 California St. Berkeley CA 94703.

Techniques SL1200MK2 TT's, \$350 ea. D Rose, KDUC, POB 432, Barstow CA 92312. 619-256-2068.

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Weekender seeking FT on-air position, 3+ yrs exper at #1 AOR station in OKC. Dave, 405-634-8024.

Young lady w/gd on-air, prod & copywriting skills, talented, ready for work. Shanna, 405-524-2166.

Seeking station engineer position, FCC general radiotelephone operators license, exper as PT engineer at WHEM-FM, military & federal government hf, microwave, data, fax & PC controlled equip maintenance. T Holloman, 645 Ripley Ave, Eau Claire WI 54701. 715-831-1199 (home), 715-838-9595 (WHEM).

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Mature male looking to manage country formatted station in a southern state. 30 yrs exper in sales & management. Jay, 616-777-2845

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Salesperson needed for small growing market. Salary/commission. Contemporary country, heavy sports, news format. Resume to: WRGC, Box 1044, Sylva NC 28799.

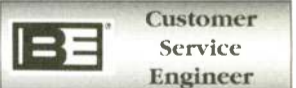
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Circle (121) On Reader Service Card

ACTION-GRAM

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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.

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 - I Mfg distributor or dealer
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- II. Job Function**
- A Ownership
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*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.

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Gates FM-1C 1 KW on 97.7 MHz. \$1500. Gates BC500-K 500 W AM on 1380 kHz. \$1500. u pick up. Dave or Harold. KUVR. Box 465. Holdrege NE 68949. 308-995-4020.

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Harris FM20H3 20 kW. on air now. \$15000. E Moody. KJEM. 216 N Main, Bentonville AR 72712. 501-621-3880.

Harris FM300K 300W solid state. amp only. factory reconditioned in 1992. removed from service 5/96. \$2500. J Travis. WCLK. POB 506. Bath NY 14810. 607-776-4151.

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Collins 830E-1A 5 kW FM xmtr. (2) cabinets. 250 W driver & 5 kW PA. \$3500. 4CX500 final tube. 50 hrs. \$500. Rotogen 3-phase gen 30 amps 230 volts output. Randy. KDKD. 2201 Antioch Rd. Clinton MO 64735. 816-885-6141.

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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.

Want To Buy

Gates BC1-T & Gates Studioette console manual & schematics. J Bromley. 9505 Bryn Mawr Cir. Ft Smith AR 72908. 501-648-9138

Prices on used AM 1000 W xmtr & antenna for bdcig in Honduras. J Boyer. 704-262-6384.

McMartin AM/FM xmtr. any model. exciter or stereo modules. Goodrich Ent.. 11435 Manderson. Omaha NE 68164. 402-493-1886.

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◆ BEST OF ALL THEY ARE ECONOMICALLY PRICED!



"The Transmitter People"

Energy-Onix

518-828-1690

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752 Warren Street, Hudson NY 12534

Circle (122) On Reader Service Card

ABOUT OUR EMPLOYMENT SECTION

HELP WANTED

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

POSITIONS WANTED

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

Mail to: **BROADCAST EQUIPMENT EXCHANGE**

PO Box 1214,
Falls Church, VA 22041
Attn: Simone Mullins

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
 - A. Commercial AM station
 - B. Commercial FM station
 - C. Educational FM station
 - E. Network/group owner
 - F. Recording Studio
 - K. Radio Station Services
 - G. TV station/teleprod facility
 - H. Consultant/ind engineer
 - I. Mfg. distributor or dealer
 - J. Other _____

- II. Job Function**
- A. Ownership
 - B. General management
 - C. Engineering
 - D. Programming/production
 - G. Sales
 - E. News operations
 - F. Other (specify) _____

Reader Service											
AUG 21, 1995 Use until NOV 24, 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		
008	030	052	074	096	118	140	162	184	206		
009	031	053	075	097	119	141	163	185	207		
010	032	054	076	098	120	142	164	186	208		
011	033	055	077	099	121	143	165	187	209		
012	034	056	078	100	122	144	166	188	210		
013	035	057	079	101	123	145	167	189	211		
014	036	058	080	102	124	146	168	190	212		
015	037	059	081	103	125	147	169	191	213		
016	038	060	082	104	126	148	170	192	214		
017	039	061	083	105	127	149	171	193	215		
018	040	062	084	106	128	150	172	194	216		
019	041	063	085	107	129	151	173	195	217		
020	042	064	086	108	130	152	174	196	218		
021	043	065	087	109	131	153	175	197	219		
022	044	066	088	110	132	154	176	198	220		

Copy & Mail to: Radio World, PO Box 1214, Falls Church, VA 22041, or FAX to: 703-998-2966

ADVERTISER INDEX

This listing is provided for the convenience of our readers. Radio World assumes no liability for inaccuracy.

Page No.	Advertiser	Reader Service No.	Page No.	Advertiser	Reader Service No.
25	360 Systems	30	1	Harris	8
57	AEO	92	28	Henry Engineering	214
6	ATI	88	54	Henry Radio	32
19	Actual Radio Measurement	74	44	Holaday Industries	151
62	Applied Construction Technology	212	45	Inovonics	171
36,37	Arrakis	11	61	Inovonics	172
14	Audio Broadcast Group	49	59	Inovonics	132
30	Audio Broadcast Group	174	30	J Squared Technical Service	79
58	Audio Processing Technology	112	65	J&I Audio/Video	101
2	Audioarts Engineering	28	52	JK Audio	56
66	Audisar	103	52	Jampro	35
71	Auditronics	33	52	Jennings Technology Corp.	16
28	Autogram	234	12	Kintronic Labs	208
19	Avcom of Virginia	78	67	Marathon Products	105
67	BBH Software, Inc.	106	14	Marti	29
19	BSI	94	60	MicroCon Systems	152
34	BSW	190	35	Modulation Sciences	230
39	BSW	199	52	Monroe Electronics	40
12	Belar	228	56	Moseley	72
46	Benchmark Media Systems	194	33	Murphy Studio Furniture	170
19	Broadcast Devices, Inc.	54	38	Musicam USA	31
4	Burk Technology	68	24	Musicam USA	10
30	CAE	58	40	NPR Satellite Services	51
30	CartWorks	100	22	Neutrik	209
46	Cellcast/Artran	114	20	OMB America	149
30	Circuit Werkes	140	27	Omnitronix	70
3	Clark Communications	48	23	Orban	229
19	Coaxial Dynamics	15	26	PR&E	50
19	Comet North America	36	32	PR&E	150
31	Comrex	130	67	Pikes Peak Satcom	104
19	Comrex	57	52	Pristine Systems	77
20	Conex Electro-Systems	169	48,49	Prophet Systems	211
15	Continental Electronics	69	41	QEI	71
28	Cortana	20	8	Radio Computing Service (RCS)	128
64	Crown Broadcast	13	13	Rane	9
29	Cutting Edge	110	19	S.C.M.S.	14
29	Dataworld	90	16	Scott Studios	89
54	Dataworld	12	52	Shively Laboratories	98
50	Denon Electronics	231	30	Silicon Valley Power	17
52	Digital Link	19	11	Sine Systems	188
68	Econco	107	46	SoundAmerica Corp.	119
28	Econco	18	47	Spectral Inc.	191
18	Enco Systems	129	68	Svetlana Electron Devices	26
44	Energy-Onix	131	10	TFT	168
61	Energy-Onix	192	46	Telefax Communications	60
69	Energy-Onix	122	7	Telos Systems	108
63	Eventide	232	17	Tiessecci Snc.	109
28	Excalibur Electronics	34	69	Transcom Corp.	121
42	Fostex Corp.	67	41	UPI	9i
21	Full Compass Sound	189	30	Universal Electronics	154
55	Gentner	52	46	Videoquip	39
43	Ghostwriters	120,220	72	Wheatstone	53
28	Gorman Redlich	99	46	Will-Burt	37
65	Hall Electronics	102	52	Zercom	134
9	Harris	148			

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Free Subscriptions are available upon request to professional broadcasting and audiovisual equipment users. For address changes, send current and new address to RW a month in advance at P.O. Box 1214, Falls Church, VA 22041. Unsolicited manuscripts are welcomed for review - send to the attention of the appropriate editor.



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.

5827 Columbia Pike, 3rd Floor Falls Church, VA 22041 • PHONE: 703-998-7600 • FAX: 703-998-2966

Select from these categories for best ad positioning:

- Acoustics
- Amplifiers
- Antennas & Towers & Cables
- Audio Production (Other)
- Brokers
- Business Opportunities
- Cart Machines
- CD Players
- Computers
- Consoles
- Disco-Pro Sound Equip.
- Financial Services
- Leasing
- Limiters
- Microphones
- Miscellaneous
- Monitors
- Receivers & Transceivers
- Recorders
- Remote & Microwave Equip.
- Repair Services
- Satellite Equipment
- Software
- Stations
- Stereo Generators
- Tapes, Carts & Reels
- Tax Deductable Equipment
- Test Equipment
- Transmitter Exciters
- Training Services
- Tubes
- Turntables
- Positions Wanted
- Help Wanted

Classified Advertising Rates Effective January 1, 1996

	1x	3x	6x	12x
1-9 col inch (per inch)	\$65	62	58	52
10-19 col inch (per inch)	59	56	52	47
Distributor Directory	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.




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Advertise in Radio World and reach 18,000+ subscribers.

Call Simone at 800-336-3045 today!

Ext.154




THE AUDITRONICS 2500 SERIES THE LAST SMALL CONSOLE YOU'LL EVER HAVE TO BUY



Some people believe small means limited. At AUDITRONICS we believe small is a challenge. That's why we have again defined a new standard of excellence by combining impeccable design, precision manufacturing, and value pricing in a full featured, compact audio console. The 2500 Series is loaded with all of the "me too" features found in the competition's "wannabe world class" consoles. Plus the 2500 Series delivers much more, including:

- **SOLID STATE SWITCHING** of all signal paths
- **DC CONTROL** of all level functions
- Telephone **CONFERENCING** capability
- **20dB HEADROOM** maintained throughout
- Easily accessible wiring on **MOTHERBOARD CONNECTORS**
- **ACTIVELY BALANCED** input, patch points, and floating outputs
- Linear **CONDUCTIVE PLASTIC** 100mm faders (P & G Standard)
- Comprehensive **A/B EXTERNAL LOGIC** control
- External line selector with **CUE AND HEADPHONE ASSIGNMENT**

And remember, AUDITRONICS is the company that still supports the first console it ever sold -- over 28 years ago. So you no longer have to compromise with a "wannabe". With the 2500 Series you get the real thing!

THE ONLY WORLD CLASS CONSOLE AVAILABLE AT "wannabe" PRICES.

AUDITRONICS 3750 Old Getwell Road, Memphis, TN 38118 (901) 362-1350 FAX (901) 365-8629

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 (53) On Reader Service Card
World Radio History