

Focus on Consulting Engineers

What can a consultant do for you? RW takes an in-depth look at this special group of experts.

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Spin It!

Numark's affordable CDN-34 dual-deck pro CD player does a lot for radio jocks.

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Radio World

The Newspaper for Radio Managers and Engineers

March 3, 1999

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Radio and Fast Cars: Racing Matures



MRN's Jim Phillips (right) interviews driver Jeff Gordon.

by Randy Stine

DAYTONA BEACH, Fla. Auto racing is hot. So hot that four major radio networks are covering it this year. The growth of auto racing, particularly the National Association for Stock Car Auto Racing Winston Cup, has meant a big surge in the amount of radio coverage given the sport.

The seasons for several national racing divisions have begun already, and others begin later this month.

Between race coverage and weekly talk shows, networks provide hours of programming to thousands of affiliates each week.

Affiliate numbers have steadily climbed

for radio networks broadcasting NASCAR Winston Cup, Indy Racing League (IRL),

See RACE, page 14 ▶

The Car Receivers Of the Future

by Leslie Stimson

In the near future, radio will compete with even more types of media and recordable formats in the car than it does now. In this country, radio stations trying to reach the mobile listener already compete with compact discs, cassettes and to some extent, MiniDiscs.



Blaupunkt DigiCeivers

See RECEIVER, page 8 ▶

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◆ NEWSWATCH ◆

Radio Avoids Lease Fee

WASHINGTON Radio is not affected by a \$200 million spectrum fee for analog TV spectrum that the Clinton Administration has included in its budget proposal for fiscal 2000. But NAB President and Chief Executive Officer Eddie Fritts said, "To suggest that \$6.8 billion in public service is somehow inadequate for use of a sliver of the spectrum is nothing short of sheer folly."

Budget requests for the FCC and the National Telecommunications and

Information Administration are contained in the Department of Commerce portion of the proposal. The FCC has asked for \$230 million and a staff of approximately 1,975 employees. The request is \$38 million more than what Congress approved for the agency in fiscal 1999. If approved, the bulk of the increase will cover mandatory increases in employees' salaries and benefits, rent increases for the new building and moving costs.

The NTIA requested about \$72 million for fiscal year 2000. Just over \$35 million is earmarked for public telecommunications facilities, planning and construction grants.

Arbitron's Bouvard, Musgrave Upped

NEW YORK The Arbitron Company has reorganized to better serve major radio group clients and expand its international team. Scott Musgrave, vice president, sales, Radio Station Services, has been promoted to senior vice president and general manager of Arbitron Domestic Radio, taking over responsibility for the U.S. radio business formerly held by Pierre Bouvard. Bouvard retains responsibility for Arbitron's domestic and international business activities. Arbitron is expanding its international operations as more U.S.

clients move overseas and need information and software support.

Callahan Moves Up

NEW YORK Robert Callahan is the new president of broadcasting at ABC, Inc. Callahan is now responsible for the ABC Radio Group, comprised of 35 stations and the ABC Radio Networks as well as the ABC-owned TV stations and the national sales representation for those TV stations. Callahan has been president of the ABC Radio Group since 1996.

FCC Names Safety Chair

WASHINGTON The former chief of the FCC common carrier bureau, Kathleen Wallman, has been tapped to chair its public safety national coordination committee. In August, the FCC created a service and licensing rules for 700 MHz public safety spectrum. The FCC called for the creation of the committee to advise it on spectrum issues and to provide a national structure to govern coordinated spectrum use.

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AUDIOARTS ENGINEERING

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USADR's Plan for Digital AM

In October, USA Digital Radio asked the FCC to seek public comment on its petition to implement digital AM and FM broadcasting in the United States. The following are excerpts from its Petition for Rule Making.

VII. USADR AM IBOC DAB SYSTEM

A. System Description

The USADR AM IBOC DAB system contains the same four basic components as the FM system: the modem, which modulates and demodulates the signal; the codec, which source encodes and decodes the audio

streamed in an orthogonal fashion such that each carrier does not interfere with each adjoining carrier.

As discussed above, USADR will use the MPEG AAC codec in its IBOC DAB system. The AAC codec compresses the CD bit stream to a maximum audio

throughput requirement of the modulation and FEC coding techniques. In addition, special error concealment techniques employed by the codec help to ensure graceful degradation of the received digital signal.

As with the FM component of the IBOC DAB system, forward error correction and interleaving greatly improve the reliability of the transmitted information. Carrier by carrier equalization is used to insure that the phase and amplitude of the subcarriers

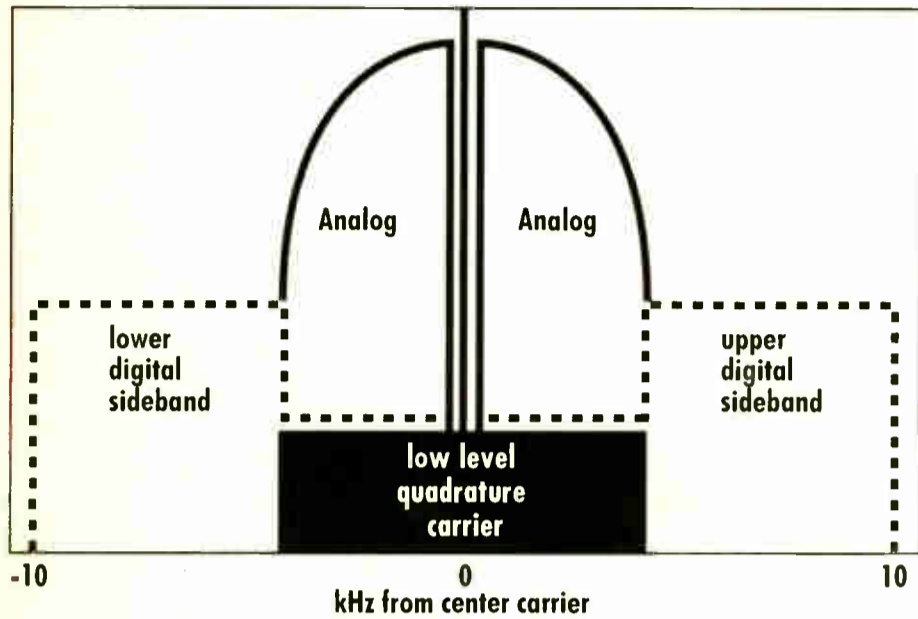


Figure 12: Hybrid AM IBOC Power Spectral Density

This is the fourth in a series. The previous part appeared in RW Feb. 17.

An Acrobat version of the full text of the petition is available online at www.fcc.gov/mmb/ and the text is also available at www.fcc.gov/Bureaus/Mass_Media/Filings/rm9395.pdf

signal; FEC coding and interleaving; and blending. All of these core functional areas have been designed and integrated to produce a system that complies with the primary functional requirements described above.

USADR evaluated several modulation techniques for the IBOC DAB AM system before selecting 32 Quadrature Amplitude Modulation ("QAM"). Because

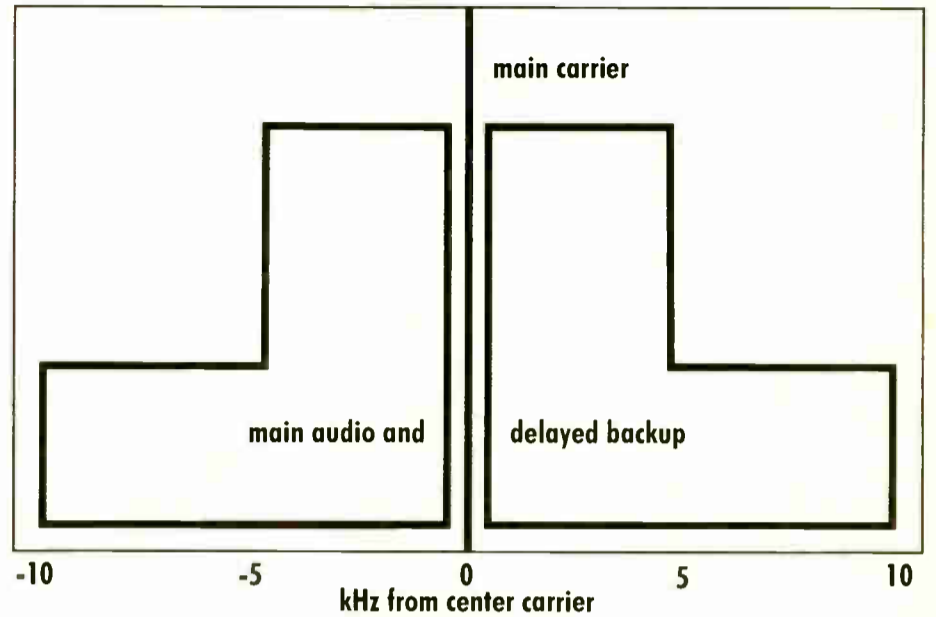


Figure 13: All-Digital AM IBOC Signal

rate of 48 kbps, delivering audio that the listener will perceive to be "FM-like." The system also operates at audio rates of 32 kbps and 16 kbps. 32 kbps rate provides more robust operation under interference conditions and delivers quality stereo. 16 kbps offers the most robust operation by delivering noise-free monaural digital audio. Use of the AAC codec meets the raw

is sufficiently maintained to ensure proper recovery of the digital information. The equalization has been shown to deal adequately with channel perturbances from grounded conductive structures and to improve reception. The combination of these advanced FEC coding and interleaving techniques, together with use

See FILING, page 6 ▶

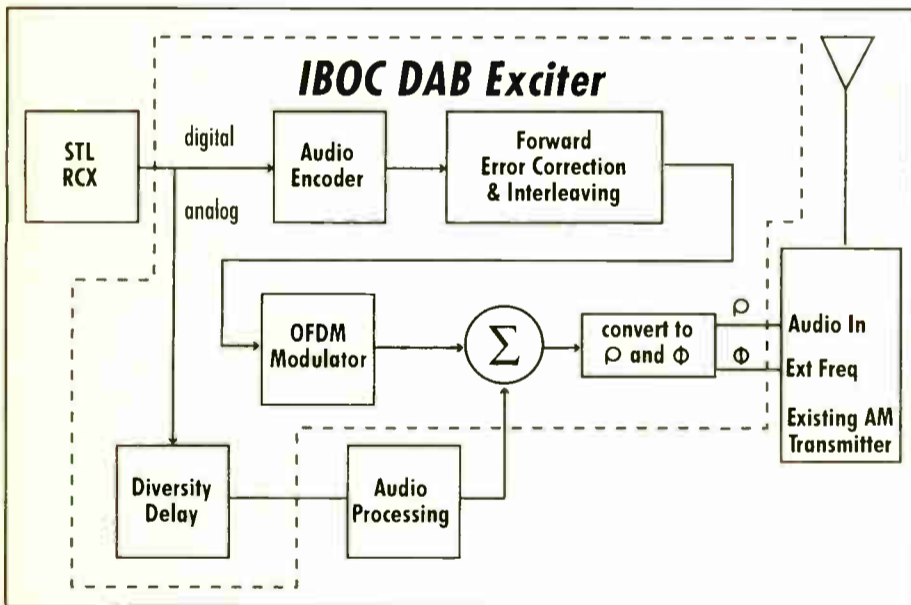


Figure 14: Hybrid AM IBOC Transmitter Block Diagram

Footnotes with source references and other details are omitted here but are available in the online version.

(This excerpt describes the USADR AM IBOC DAB System.)

32-QAM has a bandwidth efficiency of five bits per second per Hertz, it supports an information bit rate that is sufficient for transmission of "FM-like" audio quality in the bandwidth available. The AM system incorporates the same multi-carrier OFDM approach in which many QAM carriers are frequency-division mul-

WHAT COMES AFTER DIGITAL?

In the beginning, there were stone axes. Then came fire, the wheel, and the steam engine. Then came analog audio and then digital audio. What comes next?

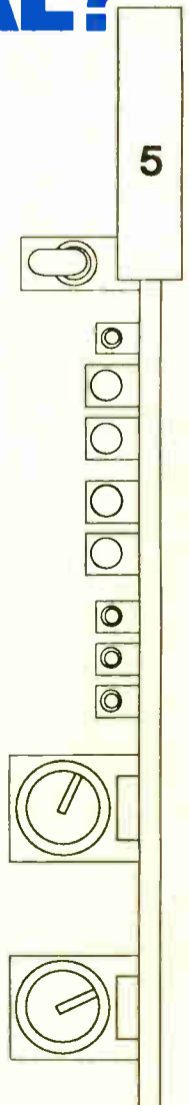
Certainly the stone wheel must have looked to the caveman to be the greatest discovery that ever could be. And to the simple farmer of the 1800's, the steam engine was the most modern contrivance that his mind could imagine. But neither was a terminal technology. Both have been replaced as time marches on.

Digital audio is also not a terminal technology. It is simply where we are now.

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NAB Pursues 'Spectrum Integrity'

Task Force Aims to Influence Debate Over Initiatives That Could Cause Interference

I'm intrigued by a new task force, just set up by the NAB Radio Board, to deal with the issue of "spectrum integrity."

The goals of the group and the timing of its launch give us a peek into how NAB hopes to influence — and perhaps fight off — certain radio initiatives developing at the FCC.

The Radio Spectrum Integrity Task Force is headed by Bruce Reese, the president and CEO of Bonneville International Corp. It will include radio operators from a range of groups and market sizes.

Jeff Baumann, NAB executive vice president, law and regulatory policy, told me the task force is an extension of the association's "traditional role" of safeguarding radio spectrum, so that broadcasters can compete by offering high-quality signals to the consumer.

"The NAB has been active in this area for well over 50 years," he said, pointing to "opposition to 9 kHz, strong concern over Docket 80-90 because of the potential for spectrum degradation, concern over the proliferation of FM translators, and ... concern over trying to improve AM."

Protecting DAB

"There is a strong feeling that if the radio broadcast industry is to remain strong, then spectrum integrity and the ability to provide the consumer with the best possible signal is more important today than it ever has been," Baumann said.

The task force, he said, wants to prevent a scenario in which radio stations are competing with 100 channels of digital satellite radio, using signals that are "riddled with interference," or struggling to make IBOC DAB work in the face of growing interference.

What do broadcasters see as threats to their spectrum integrity? You don't have to look far for the answers; Baumann and Reese are candid about them.

Baumann pointed to current proposals for technical streamlining, including limited negotiated interference in FM; the Class C0 proposal; the ACAMBA petition to allow use of FM translators by AM daytimers; pirate radio; and, most notably, new proposals for low-power radio, which is now looming as a real possibility.

Expect to hear a lot from NAB in coming months about how LPFM would damage spectrum integrity. Also look for much more discussion about the importance of protecting the future of digital audio broadcasting.



Bruce Reese of Bonneville chairs the new NAB task force.

"Culminating everything now is industry reliance upon, and support for, in-band, on-channel digital radio," Baumann told me. "There has been a concern for some time that things like negotiated interference, like creating more FM stations and looking at micro-radio, could somehow impact IBOC in an adverse manner.

"One of the most important parts of the task force mission is to make sure that broadcasters can deliver IBOC, and that IBOC is not destroyed or severely impaired by other interference

in the FM band."

Baumann expects the task force also will have an interest in satellite DARS, particularly the use of gap fillers and local origination.

He said the task force wants to advise the FCC, and if necessary, will oppose proposals.

"We envision that the task force would contract out some engineering studies, would review these, then would make recommendations to the NAB Radio Board as to how and what our various positions should look like," Baumann said.

Low-power threat

Are the recent stunning advances for low-power advocates a major reason for this initiative?

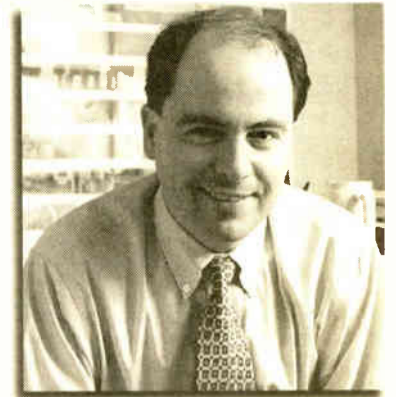
"There's no question that at the Radio Show in Seattle, there was a lot of concern among broadcasters about microradio, not only about its economic impact but its technical impact," Baumann said. "Certainly microradio is a significant fueling factor. But all the different things that are coming together at once indicated that the industry should review this with much more depth than just leaving it up to the Radio Board, which meets twice a year."

Task force chairman Reese has responsibility for 15 radio and two TV stations at Bonneville. He said the aims of the task force won't be fleshed out until its members have had a chance to give input. But he, too, worries that the ideas being bandied about would lead to more radio clutter.

Baumann and Reese both said the panel's primary mission is a technical one. But how will a panel of owners make these technical distinctions? Will engineers have a seat at the table?

"It will largely be made up of folks from the operator side, owners and operators," Reese said. "But the NAB has an outstanding technical staff, and every manager and owner who has talked to me about their feelings about the task force has said, 'If you need any

From the Editor



Paul J. McLane

engineering help, please feel free to call on us.' ... There will be a lot of technical discussion going on here."

Wait and see

I hope so. The NAB is right to pay close attention to interference concerns. Pirate radio and technical streamlining are legitimate concerns. Protection of DAB is a major issue, nothing to be dismissed. Reese and his colleagues deserve the chance to show their intentions.

But I worry that this panel might have more political aims: to fight off a new class of low-power stations simply because they constitute a threat to competition. Is it reasonable to expect that, if a good, purely technical solution could be found to accommodate new stations, this panel of owners would encourage their engineers to pursue it? Or have owners *already* decided they don't want such new stations, and are looking for an argument in the interference and DAB issues?

RW supports careful spectrum management, and we oppose unlicensed operation. But licensed low-power radio deserves a chance, if it can serve listeners better than existing services.

As I've noted before, radio's biggest problem today, even bigger than potential interference, is its programming. We must look inward as well as outward to make our medium secure.

I might feel better if NAB had also established a task force to look into protecting *program* integrity.

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◆ READERS FORUM ◆

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Review of a review

Dear **RW**,

Regarding "The Anatomy of a Product Review" (**RW**, Nov. 25, 1998).

The author's statements about the use of the electrodynamic loudspeaker point out another pitfall of product reviews — lack of thorough research covered by what might be perceived as a flippant remark. Such a gaffe could cause some readers to completely discount a review or at least color their acceptance of the rest of the author's work.

Electrodynamic speakers were found in most radios through World War II because permanent magnet material was not very practical in that size and not very permanent. A magnet could lose its field if it was handled roughly or dropped or if it got too warm, and old tubes made a fair amount of heat.

Electrodynamic speakers were reliable (I have one nearly 70 years old that still works) and the major reason for their use — they kept the parts count down. The field coil of the speaker also doubled as a choke coil in the filter circuit of the DC plate supply.

Saying a radio used the electrodynamic speaker then is no different than saying a computer uses an SVGA monitor now.

*Pete Deets
Staff Engineer
WMTV
Madison, Wis.*

KNX comments

Dear **RW**,

I enjoyed the articles by Bob Rusk in the Jan. 20 **RW** on KNX(AM). While no documentation exists to verify why the call letters were changed from KGC to KNX in 1922, I don't believe it was referring to an annex at the Spring Street Arcade building. One theory from a former KNX engineer is that the Department of Commerce changed the calls when Fred Christian



Steve Allen spun records at KNX(AM) in 1948.

moved the station from his Hollywood home to downtown Los Angeles.

Call letters at that time identified a given location for the transmitter, and when KGC moved, the government issued a new set of call letters in sequential order. Christian's company, the Electric Lighting Supply Company, was on West 3rd Street, but KNX was broadcasting from the California Theater on South Main Street.

The Spring Arcade building is/was a few blocks north and west of the KNX location. The L.A. library cannot yet confirm or verify if there was an annex to the Spring Arcade Building.

Fred Christian tried to run KNX from money made by selling radios and radio parts from his store. But KNX really took off financially when Christian sold KNX to Guy Earle in 1924. Earle ran KNX from the Los Angeles Evening Express Newspaper office in the Studebaker Building. KNX became known as "The Voice of Hollywood" during this time.

Earle began selling advertising time, which was not popular on the radio then. But by 1925, KNX showed a profit of \$25,000. Other L.A. stations saw commercial advertising as the key to making money. Guy Earle was also

Bring On Low Power

Proposals to create a new batch of low-power FM stations have produced an immediate rash of broadcaster criticism aimed at the FCC, and specifically at Chairman Bill Kennard, who seems determined to push the idea through.

We don't agree with this knee-jerk reaction to LPFM. There is much to like in the idea.

The federal government long ago took upon itself the task of regulating who can use this part of the spectrum. As long as that remains true, it should also be the task of the FCC to allow the greatest number of users, and the greatest diversity of voices, consistent with technical quality.

Consider the "traffic cop" argument, one that broadcasters themselves bring up quickly whenever the FCC proposes to regulate them in some new way: "The FCC should simply be a traffic cop," this argument states, "keeping traffic moving safely and smoothly on the spectrum."

We agree. And a traffic cop is not supposed to prevent new traffic from coming onto the road.

Some broadcast supporters, including friends of the NAB on Capitol Hill, argue that new competition will damage the economic prospects of licenseholders. Indeed it could, if existing stations don't serve their audiences well. But it's not the job of Congress to protect the economic interests of a certain group of existing broadcasters. The spectrum belongs to the public, and we sometimes forget that.

Competition is healthy. If new stations can do the job better than existing ones, let 'em rip.

A new group of stations will benefit communities, schools and other groups who can create voices of their own on the band. It will be good for radio employees, who can hope for more job opportunities, rather than fewer. It will be good for suppliers, who will have more customers to serve. A robust supplier marketplace benefits all radio buyers.

Most important, new stations will serve listeners better.

We in the radio industry have succeeded, if that is the correct word, in wringing a tremendous amount of profit out of a limited, government-protected slice of the spectrum. Ad sales are at record levels. But dissatisfaction with our product also is increasing. Formulaic programs with sound-alike liners make it easier for the listener to push radio into the background of their lives. New media hunger for our listeners. Unlicensed operators spring up, outside of the realm of regulation or control of interference.

Legitimate questions exist about how low-power radio will affect interference protection and the future of digital radio. The FCC must address them. But if a technical solution can be found that allows low-power radio stations to bloom, the commission should pursue it.

— **RW**

known for starting feuds: He once got KNX to broadcast a sensational murder trial live, even though the judge kicked out the reporter and technical crew every day.

*Jim Hilliker
a.k.a. Jim Vernon
News Director
KOCN(FM)
Monterey, Calif.*

rect system date.

Mr. Wire also talks about benign business desktop application suites like Microsoft Office. Many stations will be unaffected by the date-handling flaws of many of these applications, but more sophisticated spreadsheet and database users will experience genuine date calculation errors that might cause business difficulties.

He does not discuss automation, remote control, security, voicemail and attendance systems, which are more likely to present problems.

It's just not quite as easy as Mr. Wire proposes, and I suggest that all station personnel become familiar with the issues rather than take the simple course of ignorance.

*Tom Becker
President
The RightTimeClock Company
Miami*

Y2K simplification?

Dear **RW**,

Editor Paul McLane dedicated his column to Y2K (**RW**, Feb. 3), quoting the faulted wisdom of online columnist Guy Wire. Like many who try to simplify Y2K issues to consumer-level, Mr. Wire expresses opinions and suggestions that cannot be supported with fact.

The most blatant is the summary "... just set your PC's RTC back exactly 27 years." His intent is to take advantage of our calendar's 28-year repetitions.

To begin with, the cycle is 28 years, not 27. Second, it is not possible to set the clock back 28 years on the PC until the year 2008, as the PC cannot represent any date prior to 1980. Some other computing platforms might permit a system date of 1972-01-01, but the PC won't. Others promote advancing the date 28 years, which a PC can do today. But that risks date-expired applications and subscriptions; it is also unnatural and fraught with the potential of a well-meaning Sunday morning shift from "correcting" an obviously very incor-

Radio World

Vol. 23, No. 5 March 3, 1999

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Radio World (ISSN: 0274-8541) is published bi-weekly by IMAS Publishing (USA), Inc., P.O. Box 1214, Falls Church, VA 22041. Phone: (703) 998-7600, Fax: (703) 998-2966. Periodicals postage rates are paid at Falls Church VA 22046 and additional mailing offices.

POSTMASTER: Send address changes to Radio World, P.O. Box 1214, Falls Church VA 22041. REPRINTS: Reprints of all articles in this issue are available. Call or write Michael Crossett, P.O. Box 1214, Falls Church, VA 22041; (703) 998-7600; Fax: (703) 998-2966. Copyright 1999 by IMAS Publishing (USA), Inc. All rights reserved.

—PRINTED IN THE USA—

Next Issue of Radio World
March 17, 1999

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Excerpts of the USADR Petition

► FILING, continued from page 3
of an equalizer, allow the IBOC system to deliver "FM-like" audio in a mobile environment.

The AM system uses blend and time diversity in the same manner as the FM system. Time diversity between two independent transmissions of the same audio source is used to provide robust reception during outages typical of a mobile environment. When the primary digital signal is corrupted, the receiver blends to the back-up audio, which, by virtue of its time diversity with the primary signal, does not experience the outage. The blend feature also provides a means of quickly acquiring the signal upon tuning or re-acquisition.

The AM hybrid signal is shown in Figure 12. The hybrid AM IBOC DAB signal is comprised of the (5 kHz band limited analog AM modulation and 20 kHz of digital carriers. Quadrature digital carriers are added under the analog signal at a level that is sufficient to ensure reliable digital service, yet avoid harmful interference to the host signal.

Currently, the U.S. AM band allocation plan assigns AM stations 20 kHz total bandwidth with stations spaced at 10 kHz intervals. The USADR hybrid mode IBOC DAB system reduces the total analog bandwidth to 10 kHz to prevent interference to the digital sidebands which are placed in the remaining 5 kHz on either side of the analog signal. This change in total analog bandwidth will need to be adopted when an AM station moves from analog-only to hybrid mode. The change in bandwidth, however, will have no discernible impact on listeners dependent on the analog signal because AM receivers in use today typically limit audio bandwidth to less than 5 kHz.

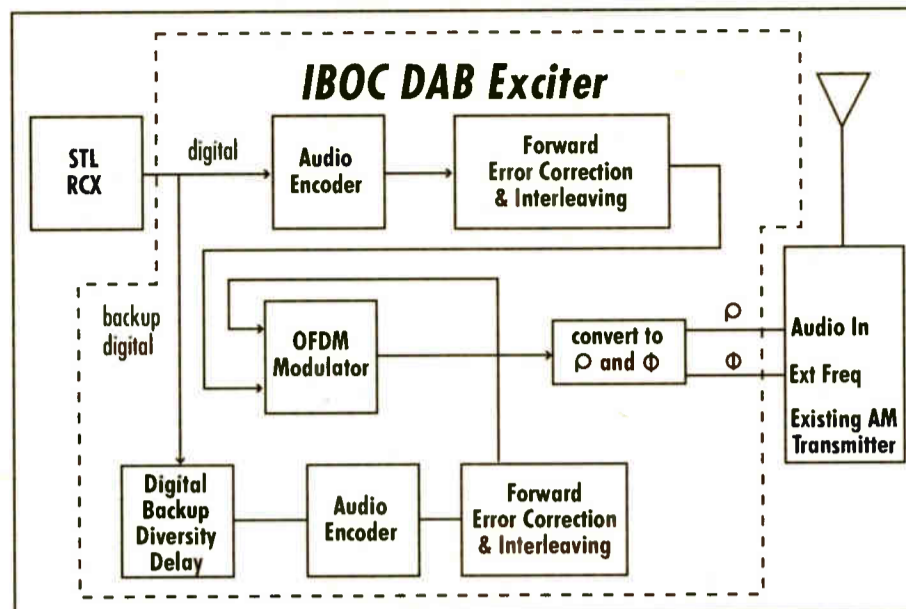


Figure 15: All-Digital AM IBOC Transmitter Block Diagram

As shown in Figure 14, the principal difference between the hybrid mode and the all-digital mode is deletion of the analog signal, the increase in power of the quadrature carriers that were previously under the analog signal and the addition of a low bit rate, digital back-up and tuning channel. The additional power in the all-digital waveform increases robustness and the "stepped" waveform is optimized for performance under strong adjacent channel interference.

A functional block diagram of the hybrid AM

IBOC transmitter is presented in Figure 14. The input audio source feeds a L + R monaural signal to the analog AM path and a stereo audio signal to the DAB codec. The DAB path digitally compresses the audio

A/D converted at IF, and digitally downconverted to baseband in-phase and quadrature signal components. The hybrid signal is then split into analog and digital components. The analog component is then digitally demodulated to produce a digitally sampled audio signal. The digital signal is synchronized and demodulated into symbols. These symbols are deframed for subsequent deinterleaving and FEC decoding. The resulting bit stream is processed by the audio decoder to produce the digital stereo DAB output. This DAB audio signal is delayed the same amount of time as the analog signal was delayed at the transmitter. The audio blend function blends to the analog signal during station acquisition and if the digital signal is corrupted.

For all-digital signals, low rate digital back-up channel path is shown with its own FEC. After deframing, the signal passes through a shorter interleaver with error correction. It is then applied to its audio decoder for use in the blend circuit.

B. AM IBOC DAB System Performance and Compatibility

1. Introduction

To verify that the USADR AM system design is capable of harmonious co-existence in both current and future environments, the system was modeled and simulated. The computer simulations focused on two areas of compatibility: effects of IBOC signals on existing analog broadcasts, and performance of the IBOC digital signal in an environment comprised of both analog and IBOC signals.

Because 32-QAM has a bandwidth efficiency of five bits per second per Hertz, it supports an information bit rate that is sufficient for transmission of 'FM-like' audio quality in the bandwidth available.

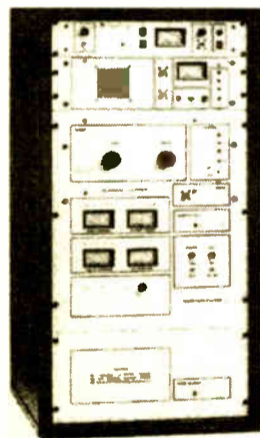
signal in the audio encoder (codec). The bit stream out of the audio encoder is encoded with the FEC block code and interleaved. The resulting bit stream is combined into a modem frame and OFDM modulated to produce a DAB baseband signal. Diversity delay is introduced in the analog AM path, passed through the

The first group of simulations measured the degradation introduced by adding DAB to an analog AM signal and the effects of co-channel and adjacent-channel interference on an analog signal from an IBOC DAB signal. These investigations revealed that the addition of IBOC DAB carriers to an analog AM signal should not signifi-

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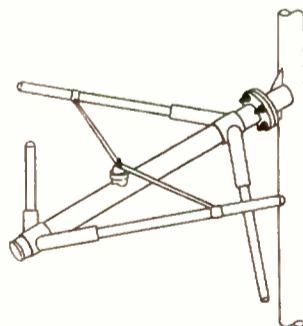
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AM IBOC Typical Receiver Block Diagram

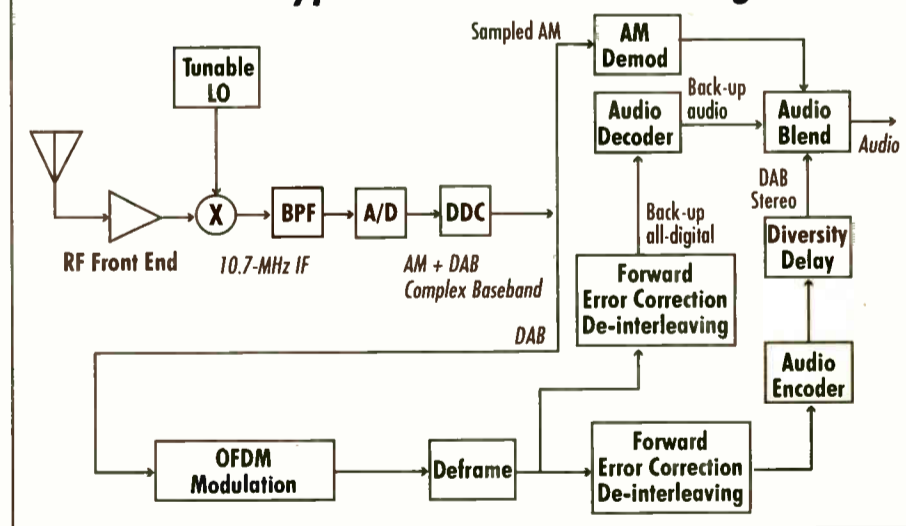


Figure 16: AM IBOC Receiver Block Diagram

station's existing analog audio processor, and band limited to 5 kHz. The processed analog audio is summed with the digital carriers in the IBOC exciter. This baseband signal is converted to magnitude x and phase ϕ for amplification in the station's existing analog transmitter (details such as data insertion and synchronization have been omitted here for simplicity).

The audio input simultaneously feeds the main channel audio encoder and the diversity delay. The signal then follows two identical signal paths and is encoded with the FEC block code and interleaved. The resulting bit streams are combined into a modem frame and OFDM modulated to produce a DAB baseband signal.

A functional block diagram of an AM IBOC receiver is presented in Figure 16. The signal is received by a conventional RF front end and converted to IF, in a manner similar to existing analog receivers. Unlike typical analog receivers, however, the signal is filtered,

cantly affect audio quality. Since the power spectral density of the existing AM analog signal, the hybrid IBOC signal, and the all-digital IBOC signal are very similar, the interference from the co-channel and adjacent channel IBOC signals to the analog is no worse than what presently exists. Thus, the analyses indicate that existing analog service should not be significantly affected by introducing IBOC DAB signals to the environment.

The second group of simulations investigated performance of hybrid and all-digital IBOC signals in the presence of various combinations of co- and adjacent-channel analog, hybrid IBOC, and all-digital IBOC signals. The simulations indicate the relative levels of co-channel or adjacent channel interference that can be tolerated by the digital portion of the hybrid signal. For the AM hybrid IBOC signal in a benign channel, the levels of co-channel and adjacent channel interference

See FILING, page 7 ►

► **FILING**, continued from page 6

that can be tolerated (19.5 dB to 28 dB for single or dual interferers) is similar to the protected SNR level resulting from a co-channel interferer (i.e. 26 dB). The degree of coverage depends on the number, type, and level of the interfering signals.

2. Analog AM performance in the presence of IBOC signals

Impact of digital signal on analog host AM performance

The AM hybrid system employs several techniques to minimize the interference from the digital carriers to the analog AM host signal. These techniques include:

- Placement of the digital carriers that are in the analog bandwidth (+/- 5 kHz) in quadrature to the analog signal.
- Appropriate setting of the power levels of the digital carriers that are placed within the analog bandwidth (+/- 5 kHz).
- Spectral sidelobe reduction to minimize leakage from digital carriers that lie on either side of the analog signal.
- Dynamic predistortion technique to "precancel" the interference that the digital signal places in the analog AM envelope detector of the receiver.

The first three techniques alone can limit the interference from the digital signal to its analog host to yield about 56 dB SNR (ref. 100% modulation) ... Dynamic predistortion can reduce this interference even further. Although this interference in new receivers can be made arbitrarily small, the interference in existing receivers is limited by the non-ideal IF filter asymmetry.

Preliminary experiments with automobile receivers using a previous 30 kHz AM DAB signal, without the benefit of dynamic predistortion, indicate that good SNRs can be obtained with most receivers. However, there are some receivers with significant IF filter asymmetry that are more sensitive to this problem. The present 20 kHz AM DAB signal is designed to reduce this interference even further.

Analog performance with co- and adjacent channel IBOC DAB signals

Hybrid and all-digital IBOC signals will be transmitted with power spectral densities comparable to existing AM analog signals. The interference from co-channel or adjacent-channel IBOC interferers will be comparable to the interference from present AM analog signals. Consequently, the IBOC DAB signal is compatible with the existing analog environment, and the constant white noise interference of DAB is likely to be less annoying than the present analog co- and adjacent channel interference at comparable D/U ratios.

3. Hybrid digital system performance

Performance in presence of Gaussian noise

Simulations were initially performed in Gaussian noise only, in the absence of other channel impairments and interference. The Gaussian noise tests were performed to ensure that the signal and noise levels were calibrated, and that the detection of individual digital carriers achieved near expected theoretical performance.

Tests determined the relative signal and noise levels required to achieve a 1% Block error rate, which is the rate at which the audio impairment is just barely audible. It is called the Threshold of Audibility ("TOA"). USADR defines the Carrier-to-Noise ratio ("CNR") as the ratio of the power in the AM main carrier to the power in a single digital carrier. This ratio is defined for calibration convenience, and is not the same as the SNR in a single digital carrier.

At the TOA, the CNR=58 dB for the 48 kbps audio codec, 56 dB for the 32 kbps audio codec, and 54 dB for the 16 kbps audio codec. These results confirm the expected performance so that there is confidence that the system is correctly simulated.

Performance with co-channel and adjacent channel hybrid interferers

Tests were performed to determine the TOA in the presence of co-channel and adjacent channel interferers. The levels of the three interferers (lower and upper first-adjacents, and co-channel) were adjusted relative to the desired signal resulting in a D/U for each. The minimum level of any of the three interferers was limited to 50 dB D/U in lieu of any other noise or channel impairments for these tests.

Results of the tests with a single significant interferer revealed that the TOA is reached with a single co-channel D/U of 19.5 dB for the 32 kbps codec, and 29 dB for the 48 kbps codec. Similar results for a single first-adjacent interferer indicated that the

second adjacent interference is due to the spectral occupancies not overlapping. Therefore, no further testing with second adjacent interferers was performed.

Tests with pairs of significant interferers determined the TOA with various combinations of inter-

ferers, and 31 dB for the 48 kbps codec.

Interference summary

It can be seen that the D/U ranges for determining the TOA above are roughly comparable to the D/U level of 26 dB presently used as the protection ratio for a co-channel interferer for AM analog reception. Therefore, simulation and analyses indicate that the IBOC DAB signal will be compatible with both existing and future radio frequency environments. Existing analog stations should not be adversely affected by the introduction of co-channel or adjacent channel interference. In addition, IBOC DAB signals should provide high quality DAB coverage over areas where the existing analog AM signal has an D/U of roughly 26 dB, or greater. Since the IBOC signal from the all-digital mode has higher power digital carriers in the center 10 kHz of the channel it will provide a substantially greater digital coverage than its hybrid counterpart.


In the next excerpt, USADR describes the equipment and regulatory issues involved in IBOC DAB.

The system reduces the total analog bandwidth to 10 kHz to prevent interference to the digital sidebands which are placed in the remaining 5 kHz on either side of the analog signal.

TOA was reached with a D/U of 20.5 dB for the 32 kbps codec and 25.5 dB for the 48 kbps codec.

Performance with a second adjacent interferer revealed that no impairment was measured when the second-adjacent was 30 dB larger than the desired signal (D/U=-30 dB). This high immunity from sec-

ond adjacent interference levels from co-channel and first adjacent interferers. For example, the TOA is reached when both first adjacents were set at a D/U of 25 dB for the 32 kbps codec, and 28dB for the 48 kbps codec. The TOA is reached when both the co-channel and a first adjacent were set at a D/U of 26 dB for the 32



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New Attention to Receivers

► RECEIVER, continued from page 1

How will the radio industry react to keep the listener's attention in the face of even more competition yet to come — new offerings such as subscription-based satellite digital audio broadcasting, digital video disc systems and the Internet?

Mobile electronics manufacturers already have introduced navigation systems and digital video disc players for the car. Right now, this technology is separate from the car receiver. Eventually, industry experts say, it will evolve and merge. Such systems, plus powerful Internet technology, will exist in the same box in the car, vying for listener's attention against AM and FM broadcasting.

Receiver makers are thinking about image transfer and high-speed, real-time data capabilities.

These trends were among those noted by exhibitors and attendees at the recent Consumer Electronics Show in Las Vegas.

New receivers, companies say, will offer more auxiliary data as graphics. At the same time, computers will continue to evolve. Eventually, the receiver and the computer will exist on the same platform in the car. That means receivers will include web browsing capability and offer real-time data services like stock, traffic and weather reports as well as reception of AM, FM and satellite-DAB signals.

The questions raised by such promises are similar to those that have arisen in the past, when such technology as RDS and radio coupons were proposed. They include: How do people want to interact

with their radio? Will drivers take time to look at their receiver when they are behind the wheel? Should they?

Digital radio

Receiver manufacturers are excited about the advent of both satellite DAB and in-band-on-channel DAB. They believe that radio must go digital to attract new, younger listeners, and retain current listeners, in the face of convergence of newer, digital-quality media in the car.

Receiver makers at the CES show told RW it does not matter to them whether satellite-delivered DAB or IBOC is developed first. It's more important, they say, for a single standard to be adopted for each technology to avoid brand confusion among consumers when the products reach retail shelves.

Alpine, Pioneer and Sherwood have signed agreements to build receivers for satellite radio provider XM Satellite Radio.

Satellite competitor CD Radio has not announced receiver deals.

Pioneer Electronics evaluated both XM and CD Radio's proposed systems before signing the agreement to build hardware for XM. Pioneer has confidence in XM because its part owner, Worldspace, has satellite digital systems serving Africa and the Middle East, with expansion of service to Asia and the Americas planned for later this year.

The FCC mandated both satellite

providers include interoperability in their receiver designs, so one unit can receive the S-band signals from both companies.

"It's not apparent how that's going to



work right now," said Russ Johnston, Pioneer vice president of marketing in the car electronics division. "We can launch product in the year 2000-2001 based on SDARS right now on paper. Until the satellites go up, the fall of this year and next spring, when we can do some real testing and development, it remains to be seen."

Several receiver manufacturers said they are watching the development of

both SDARS and IBOC technologies, to see which will be viable and will spark consumer interest.

"We are so hungry to get this digital technology into the car," Johnston said. "SDARS will give us the ability to get something into the marketplace. ... Our industry, of new technology, is in need of added-value feature content for our products. And we have to have some control over our destiny in introducing those technologies."

Chad Vogelsong, JVC national product/engineering specialist in the mobile electronics division, agreed.

"We're the only industry that, every year, you get more features and more bang for the buck, but the buck has to be lower. (We) need new technology such as DAB and local navigation. We need them to sustain our market."

At the same time, some manufacturers have not fully accepted the SDARS concept.

Recoton Mobile Electronics National Sales Trainer Eric Baker said the antenna, not the receiver, is a concern for his company.

"The inside (receiver) is going to look like what's already in the vehicle. ... People aren't going to want to put a big, old whatever-it-may-be on the outside of their car. It's going to be what's on the outside of the vehicle that is going to be difficult to overcome." SDARS proponents have talked of using a silver-dollar-sized satellite dish antenna mounted to the rear window.

Panasonic Consumer Electronics is cautious about both DAB technologies.

"A lot of people don't have problems with the formats offered today," said Gene Kelsey, vice president, general manager, audio group. "They don't have a problem with the advertising. They just have a problem with the fact that they don't feel their radio reception is as clean and clear as it should be."

But he said DAB technology probably would not make a difference in retaining some listeners. "Improving the quality of formats they're not interested in, or commercials they don't want to hear, is not going to make a difference to that customer base."

Those are the kind of customers likely to be willing to pay for SDARS service, he said. "As an outsider, I would have to say there's certainly a strong enough level that may not be within the desired advertising demographics that the broadcasters are looking for that would be strong enough to warrant some of the programming that XM and CD Radio are talking about."

Subscription media

Will listeners pay for digital radio? Several manufacturers said they don't see a \$10 monthly subscription rate as a barrier to the success of SDARS. Younger consumers, they say, pay about that for pagers each month, and older consumers have accepted subscription media, such as cable and direct broadcast satellite TV.

Radio should go digital to improve its signal-to-noise ratio and increase the potential data transfer rate, manufacturers said. They agreed the potential of the new, integrated platforms requires a higher data rate, with more robust information, into the car. Future capabilities that receiver manufacturers are looking for include image transfer and high-speed, real-time data capabilities.

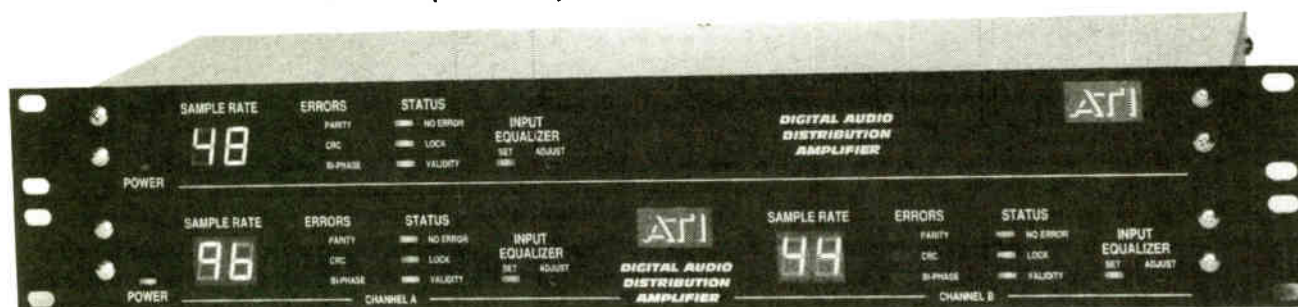
More immediately, receiver makers continue to trim the number of units

See RECEIVER, page 12 ►

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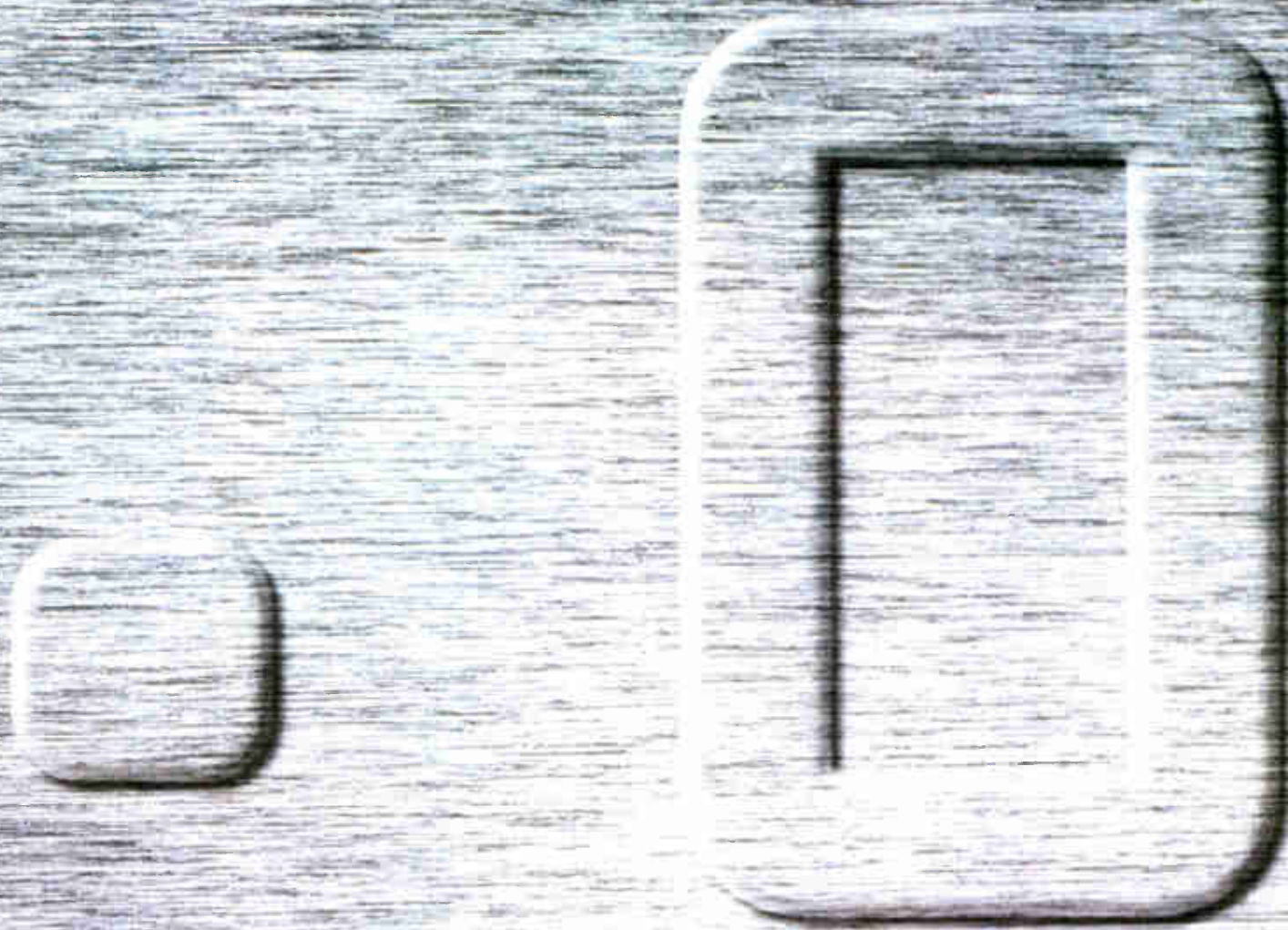
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Hot Car Receiver, Navigation Trends

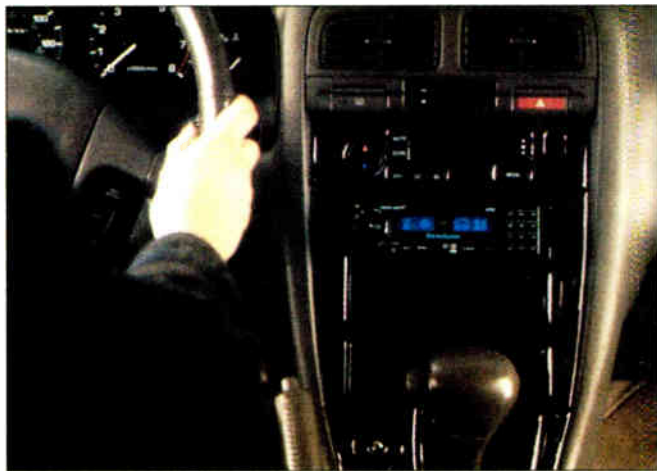
by Leslie Stimson

Several car navigation systems and car receivers were introduced at the CES convention, which drew approximately 90,000 attendees. Here are just some of the new products that are available to your listeners:

Blaupunkt DigiCeiver — Blaupunkt introduced three CD car stereos with color faceplates that it says are the first truly digital AM/FM tuners. DigiCeiver is the first consumer radio circuit to digitize incoming AM and FM signals so a digital signal processor can manipulate them. A high-speed A/D converter and DSP have replaced everything after the front-end circuits. This product won the Consumer Electronics Manufacturers Association "Best of Show" award in the mobile electronics category.

JVC EIKameleon Anti-Theft Receivers — Instead of having a detachable control panel to deter thieves, the KD-LX1 and KD-LX3 CD retracts the controls and turns off the LCD display when the unit is off so the receiver's face appears flat and blank. When the ignition is turned on, the appearance of the receiver returns to normal. Both models come with CD changer control functions. The LX3 also comes with a card-type wireless remote control for hands-free use.

Pioneer-Easy EQ — Incorporated throughout all multi-level single-CD units,



Clarion Auto PC

and selected cassette and MiniDisc players, Easy EQ provides five levels of audio faster than normal, storing extra music information in a memory buffer. When



JVC EIKameleon receiver

adjustment. Each preset curve can be modified for further control of the equalizer curve, which is automatically stored in the customer's own custom preset.

Panasonic G-Tech Car Stereos — The extra durable and anti-skip features of the three G-Tech models are designed for sport utility vehicles. These units contain an anti-shock system that spins CDs



Prestige by Audiovox PN-100 Portable GPS Vehicle Navigation System

providing access to custom information such as real-time traffic reports, numeric paging and e-mail alerts. Retail: \$1,299.

VDO Carin 440 Navigation Radio System — This system combines navigation with an AM/FM/CD head unit. The driver uses the radio's controls to select all menus and functions. Carin 440 provides directions visually, with pictograms on a monochrome dot matrix display, and audibly. Delivery of verbal directions is timed to vehicle speed. The map information is contained on CD-ROM.

Audiovox PN-100 Personal Navigator — This portable navigation system combines a GPS signal with map data to generate turn-by-turn instructions to any location in its database. Voice instructions are communicated to the driver before he or she approaches each turn. A LCD screen displays either a map, route information or a display of the next two upcoming turns.

the vehicle hits a bump, causing the CD player to mistrack, the system draws information from the buffer, to keep the music playing, even while the car travels off-road.

Clarion AutoPC — Powered by the Microsoft Windows operating system, the AM/FM and CD player/changer accepts voice commands. It includes a navigation system with optional global positioning system satellite technology. It can also interface with a cellular phone and FM subcarrier receivers. Accessories include a cellular phone cradle with modem to allow for voice-controlled operation, a wireless receiver

Auto Sound Makers Look for New Growth

► RECEIVER, continued from page 8 offered with cassettes, in favor of CD players and changers.


Unit sales of aftermarket receivers hit 9.4 million in 1998. The Consumer Electronics Manufacturers Association said the after-market auto category faces several trends that make it hard to grow.

More new vehicles are being sold with better audio systems, decreasing the buyer's motivation to upgrade later. More cars are being leased (about 25 percent), another factor in dampening upgrade purchases. Demographics shifts also cut into after-market sales. There are fewer people in the 16-24 age range, the traditional demo for car receiver purchases.

Manufacturers agreed the cassette

format is dying. They said that units with MiniDisc transports are not selling well in this country, although they are in Japan. Most manufacturers said the CD vs. MD debate presented a format confusion issue for consumers.



"I have a CD player at home. I have 350 discs. Why do I want to buy a car radio with a MD in it?" asked James Frazer, Blaupunkt engineering manager for the mobile electronics division. "Now, I go out and buy an MD for my home. Or, do I build a new collection of MDs for the car or do I get an MD recorder, to record my CDs to MDs? Consumers don't want to do that. What's the advantage unless there's a real difference between CD and MD?"



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systems. And the Omnia provides rock-solid peak control, awesome loudness and unlike the outdated processors, absolutely *no digital grunge*.

But when the Omnia.fm is incorporated into transmission systems sampled at 32kHz, overshoots can result from sample-rate-conversions and their attendant low-pass filtering. Until yesterday's systems catch up to the Omnia.fm, the unit's built-in Prediction Analysis Clipper will predict and eliminate overshoots. The result? All the benefits of the Omnia.fm,

without the inevitable flaws of 32kHz systems. Check out the oscilloscope graphs to the left and see the results for yourself.

And to make your decision even easier, contact your Omnia.fm dealer for a no-risk, sixty-day demo and money-back guarantee*.

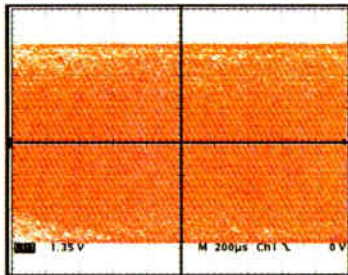
Here's how: Using program material, the Omnia.fm was set to process aggressively. Programming with substantial low frequencies and clean high frequencies was used to provide a good challenge for the control of overshoots. The analog Left Channel output was connected to a Tektronix TDS-744A digital storage oscilloscope, which was set to the infinite persistence mode. Each waveform was stored for at least one minute so that the display "fills in" with traces of audio waveforms.

The "flat" lines along the top and bottom of the filled in section represent clipper performance. Any "dots" that exceed the reference level of 0.650 volts are overshoots. The lower left graph shows "blips" representing overshoots 15 to 20 percent beyond the reference peak level of

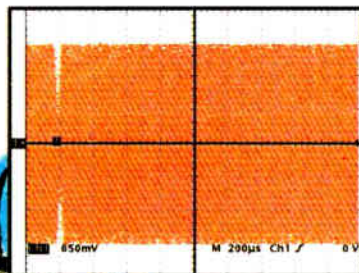
± 0.650 volts. The Prediction Analysis Clipper reduces overshoots in the sample-rate-converted signal path to an insignificant three percent.

For more information on the technical background of overshoot mechanisms, call us for a copy of our paper entitled "Omnia.fm: An Engineering Study." Or visit our web site: www.nogrunge.com.

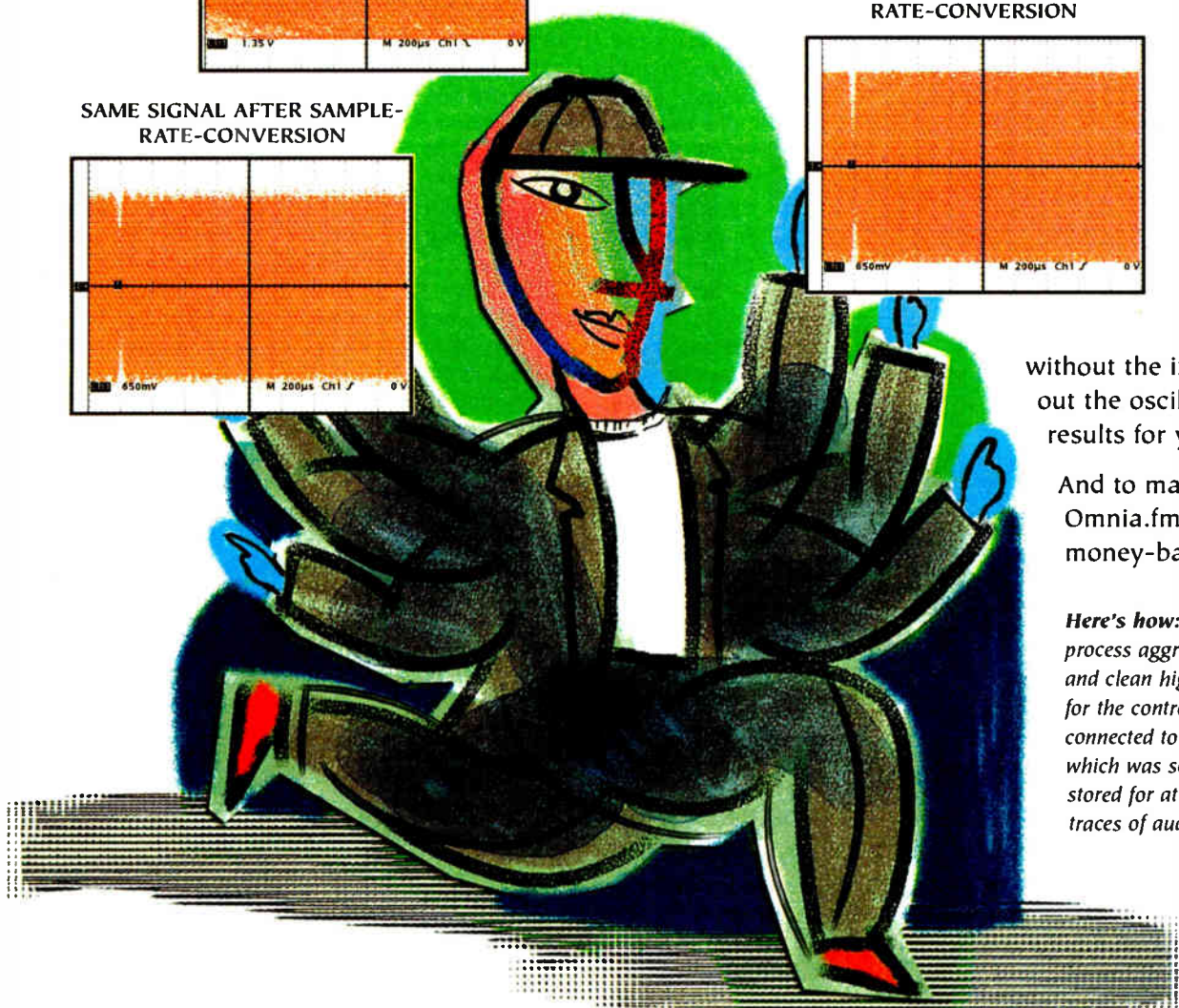
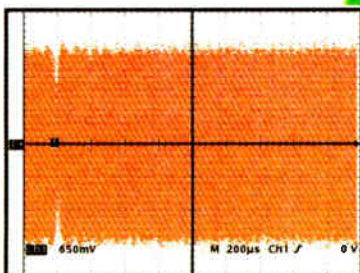
LEFT CHANNEL OUTPUT OF OMNIA.FM



LEFT CHANNEL OUTPUT WITH PREDICTION ANALYSIS CLIPPING AND SAMPLE-RATE-CONVERSION



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Circle (25) On Reader Service Card
 World Radio History

► RACE, continued from page 14 located in the heart of stock car racing territory, at the Charlotte Motor Speedway in Charlotte, N.C. PRN has been broadcasting races since 1974. According to PRN, it averages a half-million listeners (both men and women) per quarter-hour for Winston Cup races.

PRN Officials said affiliates should number 500 this season. "That's up from 300 just two years ago. The growth and interest in the sport has just been phenomenal," said Doug Rice, executive director of PRN. Stations pay rights-fees based on market size.

PRN takes a crew of 15 people to the track for race day preparations. That includes eight announcers, in what is normally an announcer-heavy sport. Networks typically need more announcers for a two-mile track than they do for a quarter-mile track to enable them to cover every inch of track. Three technicians will arrive by mid-week to test PRN's equipment and finalize the race day set up.



This year, the company has a new 48-foot custom trailer used to haul equipment and produce the races. "It's a studio on wheels. The production room is outfitted with a 32 channel Mackie console. In fact, we use a lot of Mackie products. For commercials and bumps we use the 360 Systems DigiCarts for hard-disk storage," said Rice. PRN uses both DAT and mini-disc recorders for interviews in the field.

The broadcast is mixed at the track and then shipped via ISDN to ABC Radio networks in New York. From there, ABC up-links the signal and makes it available for affiliates.

Indy cars

The Indianapolis Motor Speedway Network is in its 48th year of broadcasting races. Based in Indianapolis, the network has nearly 500 affiliates signed up for the Indy 500 on May 30 and Winston Cup's Brickyard 400 on Aug. 7. The network has permanent studios at the speedway in Indianapolis.

For the 10 IRL races it carries, network executives said they expect to have 55 to 60 affiliates. The network uses a barter system, with affiliates receiving anywhere from 15 to 20 minutes of local time per race, depending on the length of the race.

"We have the two biggest races of the year," said Julio Fernandez, director of broadcast operations for the network. "The Indy 500 and Brickyard 400 are the premier events on their respective circuits."

Typically, network technicians will arrive four days prior to a weekend race. "We have a 30-foot truck we move from track to track. It's self-contained with a production studio inside," said Fernandez.

The staff consists of six on-air personnel and six engineers. "For the races here at Indy, we'll have probably twice that number," said Fernandez. Announcers are at the start/finish line and in the four turns to ensure complete coverage.

"We use a lot of Sony RF gear and digital editing equipment," said Fernandez.

The Indianapolis Motor Speedway Network uses an RF mast on its truck to receive all announcer feeds by Marti. From the race track, an ISDN line is used to feed either NPR or ABC, which then up-links the broadcast to the Satcom C5 or Galaxy VI satellite.

Also located in Indianapolis is the Championship Auto Racing Teams (CART) Racing Network. The network plans to broadcast 20 of the 22 CART events this year. Officials estimate the number of affiliates this season at 145. Broadcast agreements are strictly barter, with affiliates receiving six to eight minutes of local time an hour.

"The bulk of our stations are located near the tracks that CART visits," said Darleen Park, vice-president of sales and marketing

for the CART Radio Network. "We don't subscribe to a ratings service, but from what we have been hearing from the affiliates has been very encouraging. They have seen their audiences grow," she said.



The CART Radio Network will usually have seven announcers to cover a race. "Sometimes you need more or less, depending on the size of the track," said Tom Michaels, lead announcer for

CART Radio Network.

Michaels will normally set up the network's equipment himself. "We don't travel with an engineer, since our equipment has been customized to the point that any one can set it up," he said.

The announce crew uses Shure SM-2 headsets, a Mackie CR-1604 mixer board, and DigiCart for audio storage. "The 360 Systems stuff is great to work with," said Michaels.

The broadcast is mixed right in the booth. "We get great help from a company called Broadcast Sports Technology. They provide all of our wireless communications from the pits," said Michaels.

From the booth, the audio path runs via ISDN, to an ABC-TV truck. "They broadcast all of the CART races on either ESPN or ESPN II, so they, in turn, up-link the

See RACE, page 16 ►

Don't be surprised if you find yourself looking for new office furniture.



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Racing's Broad Appeal

► RACE, continued from page 15
audio stream to Satcom C5," said Michaels. CART Radio Network affiliates can also call an 800 number to pick up the feed.

This is the second year of Winston Cup racing on WCTK (FM) in Providence, R.I. The station carries MRN and PRN broadcasts. WCTK said it was the first station in Providence to carry auto racing.

"We were extremely happy with the first year from both a ratings and sales standpoint," said Tom Devoe, general manager of WCTK. "We had mostly automotive specific advertisers last year, but this year it looks like we'll have a more diversified spectrum of advertisers." Devoe predicts WCTK will bill more than \$100,000 for the

36 Winston Cup races the station will carry.

Devoe said racing appears to have shaken its men-only and mechanic label. "It has turned into a very upscale sport. I think it is an emotional sport with a very large cross-section of loyal fans. That loyalty is also given to advertisers who support racing," he said.

Many radio stations plan special coverage of races near them. The events range from huge tailgate parties to official pre-and post-race shows.

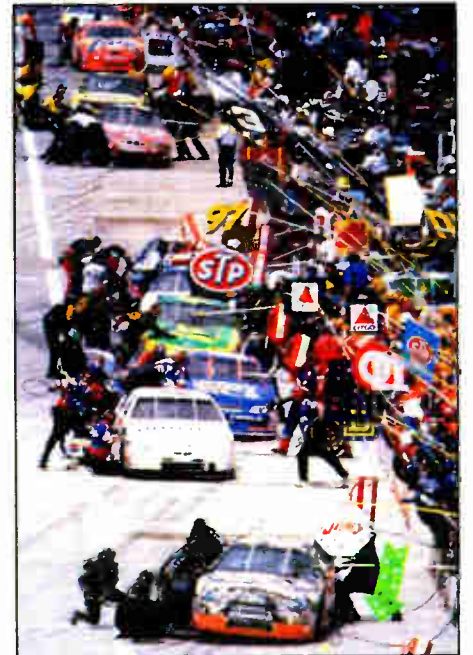
WTKA(AM) in Ann Arbor, Mich., will have three major broadcasts originating from Michigan Speedway, in nearby Brooklyn, Mich., this summer. The track hosts a CART event and two

Winston Cup events.

"Racing is so important to us and our audience," said Dean Erskine, the station's program director. "We offer driver interviews, race-day weather and official traffic reports to those coming in and out of the track. They usually estimate the crowd at nearly 150,000 people," he said.

The station has no problems drawing advertisers to buy time for the races. "We sell billboards for the traffic and weather reports and they get scooped up fast. This is an advertiser-driven sport on the track and in the media. Sponsorships by local beer distributors and car dealerships are what we see most," said Erskine.

WTKA has its own broadcast trailer at the track. "It's outfitted with mixer boards and cart machines. We have people in the garages before the races to Marti back reports. We then use a Scoop



Reporter and a telephone line to get it back to the station," Erskine said.

The station has a staff of four announcers at the track. "It's a big deal to us. The races are always sold out and just to be a part of that is important," said Erskine.

The station's commitment to auto racing is strong. It is an affiliate of MRN, PRN, and the CART Radio Network.

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BUSINESS DIGEST

CEO for BE

QUINCY, Ill. The top job at Broadcast Electronics now belongs to John Pedlow.

The radio equipment manufacturer, known for its AudioVault audio-management system and its transmitter lines, has appointed Pedlow as president and chief executive officer.

The job had been open since Jack Nevin left BE last year. Doug Davis was interim president for four months; he will now return to his duties at BE's parent holding company.

Pedlow served most recently as a top manager at Alpha Technologies, a manufacturer of products for the cable TV and telecom markets.

New Emmis CFO

INDIANAPOLIS Emmis Communications Corp. has appointed Walter Berger as executive vice president and chief financial officer.

Berger has financial, management and operating experience. Most recently he served as group president of LG&E Energy Corp., a diversified energy services company.

Du Treil, Lundin & Rackley Move

SARASOTA, Fla. Consulting Engineering firm du Treil, Lundin & Rackley has moved into new corporate headquarters in Sarasota.

The firm specializes in the technical concerns of AM, FM and TV stations. DLR's clients include national networks and stand-alone stations. The firm also provides engineering services for clients overseas.

The firm dates to 1941, when A.D. Ring was established, the firm evolved to A.D. Ring & Associates, and in 1988 merged with the consulting engineering firm du Treil-Rackley. The new, merged company moved its headquarters from Washington, D.C., to Sarasota in 1992.

Workbench

Radio World, March 3, 1999

RW Tape Cookbook Expands

John Bisset

The intent of Figure 1 is good: Place your RFR signs behind the fence, so vandals have a more difficult time stealing them. However, the clear plastic wire-tie securing the sign in the corner ensures that after a few months of the sun working on the plastic, the tie will break and the sign will be on the ground.

Remember, if you do any outside work with wire-ties, do it right the first time: Use only black ties, which resist the UV rays of the sun!

★ ★ ★

Stu Albert, a full-time production house chief engineer for Street and Smith's Productions, manager of a contract engineering business and handler of frequency coordination in Charlotte, N.C., read with interest Ken R.'s Tape Baking Tips in the Oct. 14, 1998, issue of **Radio World**.

He was reminded of a similar article in **RW** back in October '95 by Rich Rarey entitled, "Bake the Flakes Back Into Tape." Both articles give hope to the countless archives of magnetic tapes found throughout the country at both broadcast and production facilities afflicted with "Sticky Shedding Syndrome."

The problem stems from a chemical imbalance of the bonding agent used



Figure 1: Place signs inside the fence to deter theft — but don't use clear plastic wire-ties!

between the oxide and the binder. The trouble mainly shows up in tapes manufactured in the 1970s, so we're talking about a massive amount of recorded material.

Ken is close to nailing the recipe for rebonding rust to mylar: by heating the bonding agent (glue) to 130 degrees for eight hours.

However, in Rich's earlier article, he noted that Ampex Corp. actually patented a process (that apparently anyone can

use) that calls for a "reliable, even heat source that can maintain 50 degrees Celsius (about 121 degrees Fahrenheit), plus or minus a few degrees."

If you have a huge library — like the tens of thousands of tapes in Stu's NASCAR footage library at Street and Smith's Productions in Charlotte — and plan to make this a career, you may want to check out the Blue M industrial lab oven, the same model that Ampex uses.

As Rich pointed out, the key is reli-

able, regulated heat. A friend of Stu's, Jack James from Quantegy (formerly Ampex) said a convection oven could work, except for the problem of getting down low enough in temperature.

Regardless of the heat source, Quantegy's George LeForge reports the baking process works well — even on 3/4-inch videotape in the plastic shell! George said the improved binders and bonding agents used over the past decade help explain why today's VHS and Beta tapes hold up so well.

Baking tips

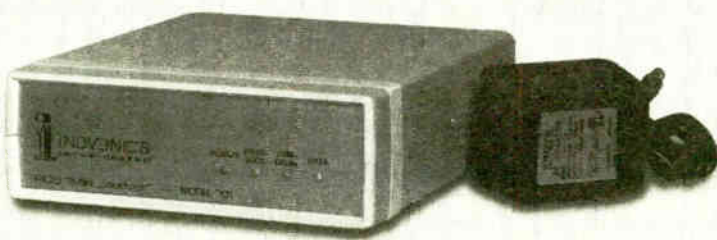
If you're ready to "cook," here's Stu's version of Rich's recipe:

- Only load the oven about 50 percent to allow for even heat circulation.
- Leave the tape on the reel (no, plastic tape reels won't melt at 121 degrees F).
- Separate multiple tapes with a spacer, again, to allow for even air flow.
- Start with the tapes in a cold oven. Slowly increase the temperature to 121 degrees.
- Monitor the temperature regularly by observing a candy thermometer placed in the oven. Don't trust the temperature setting of the oven. The low heat level is critical.
- Bake! 3M recommends 10 hours; Ampex (now Quantegy) recommends eight hours for multiple tapes, four hours if you are doing a single tape in the oven.
- Gradually cool the tapes to room temperature by leaving them in the oven and turning off the heat off
- When finished, you should have at least a few weeks of renewed life, maybe

See WORK, page 27 ►

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Rotary Three-Phase Converters

Charles S. Fitch

This is the fourth in a series of articles explaining the National Electrical Code. The previous part appeared Jan. 6. All articles to date are available at www.rwonline.com

Last installment we promised to take a small detour in our National Electrical Code (NEC) discussion to look at a unique device, the rotary three-phase converter, and use this review as a way to outline the benefits and banes of three-phase power.

The rotary three-phase converter is a most useful tool in broadcasting, allowing site flexibility, quick implementation of three-phase devices and some notable cost efficiency in many circumstances. When to use a rotary converter is most often an economic judgment call.

But first, a little history.

According to his contemporary notebook, on Oct. 17, 1831, Michael Faraday, son of a blacksmith and former apprentice bookbinder, performed a simple but profound experiment. This effort was part of his work to determine the relationship between magnetism and electricity.

Motion of the magnet

Using the comparatively primitive electrical materials available at the time, he wound several feet of thin, insulated wire around a paper tube and connected the ends of the wire to a galvanometer. Next he took a bar magnet and passed it into the open end of the tube through the area of the wire coil. What he observed would have a profound effect on history.

As the magnet was advanced into the coil, the needle of the galvanometer swung toward one side of the meter, and as it was pulled out, it swung to the opposite side.

When he stopped the magnet, the needle swung to rest at center zero.

Faraday rightly surmised that it was the *motion* of the magnet through the coil that induced the current in the coil. He summed up this concept in his laws of electromagnetic induction.

In short order, this principle was shown to be reciprocal. Inducing a current into a coil could produce motion of a metal that was now magnetized. From this came the alternating current (AC) induction motor.

AC electric motors have many uses in the electrical systems of the modern broadcast plant, but none more unique than that of single-phase to three-phase

became apparent: this new and complex technology would cost a lot. Economy measures had to be designed into the technology if it were to grow and prosper.

One of the first problems at hand was that single-phase motors had trouble starting themselves. Small auxiliary "pony" motors were sometimes used to start the big motors. Early Singer sewing machines had large flywheels to allow the operator to start the motor under load. A single-phase winding arrangement also lacked multiple "power points" around the orbit of the motor to smooth out the applied torque. The practical result was

power outputs were created simply by physically offsetting (depending on design) the magnets or coils in the rotary generator.

Some early systems were five-phase, 10-phase — yikes, too many wires. Finally the three-phase system, with power phases spaced at 120 degrees offset from each other, evolved into a standard supported by manufacturers, including Westinghouse Electric.

In the world of transmission, the multiphase system also was an early example of multiplex time sharing such that more power could be sent down the same wires. This was possible because the current points of the different phases would not crest at the same time, keeping the total instantaneous current under the maximum the wire could handle.

In 1999 the largest user of three-phase power in a broadcast plant is the transmitter. Of what value is it to us in this instance?

The benefits are three-fold.

First, three-phase power is easier and more efficient to filter. Because the high-voltage supply in a modern transmitter is the largest consumer, the use of smaller inductors, capacitors, etc., lowers our purchase and maintenance costs. Such use also helps reduce internal resistance (IR) losses that show up on the electric bill but never get on the air.

Second, we enjoy better site power regulation because the transmitter and other three-phase components draw current evenly on all three supply conductors. This helps maintain load balance.

Third, motors such as blowers and water pumps start better and run better (less consumption per horsepower) on three-phase.

Cost Item	Rotary Converter Installation	Three-Phase Utility Power Installation	Single-Phase Transmitter Install
Three-phase Power Line Construction		\$25,000*	
Electrical Construction Cost Increase for 3-φ		\$4,000	
Transmitter Single-φ Power Supply Increase Cost Over 3-φ			\$12,000
Rotary Converter Purchase Price	\$5,000		
Increased Power Costs Over 20 Years	\$175,000		\$30,000
Maintenance of Rotary Converter	\$5,000		
Total Differential Comparative Costs Over 20 Years	\$185,000	\$29,000	\$42,000

* This is a highly variable cost depending on terrain, whether the poles can support a third wire, whether the utility passes through all costs, etc. This is the lowest figure for multiple miles of construction that I've ever been given so we'll use that number here.

converter, the focus of this article.

Down here in the trenches of technology, many of us wonder why we need three-phase power, anyway.

Cost savings

After Faraday's discovery, the technology of generation — basically rotating a magnet in a coil — and the transmission of AC started to evolve. One fact quickly

that much bigger motors were needed.

Today the solution for starting is a capacitor and starter winding arrangement. At the time, a central, off-campus solution was deemed more desirable. Also, these early electrical engineers realized that motors could be made smaller and more useful by having additional power feeds that were incrementally "phase offset." These phase offset

So what?

If three-phase is so wonderful, why doesn't the power company supply it everywhere? And why do we need a three-phase converter?

The power utility is in the cost efficiency business, just as we are. Generation is always three-phase, as is

See NEC, page 21 ▶

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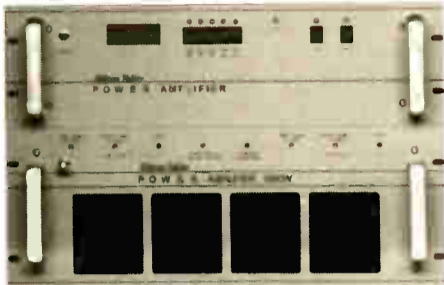


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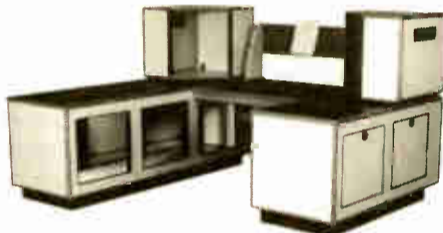
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READER SERVICE NO. 124

When You Need a Real Expert

Changes in Radio Industry Put New Emphasis On the Role of the Consulting Engineer

Bob Rusk

When a radio station takes a dip in the ratings and cannot find the niche to get back on top, a programming consultant might be called in to help turn things around. The expertise that the consultant offers sometimes can make the difference between winning and losing.

On the technical side, consulting engineers play a less visible but equally important role. They can help a station track down a problem that is interfering with the signal, plan the relocation of a transmitter site or handle the paperwork for a power increase.

Consultants do not take the place of contract or staff engineers, who are responsible for the day-to-day maintenance of station facilities. Indeed, a consultant often is brought in to assist a station's local engineering staff.

"Consulting engineers have industry knowledge that many times goes beyond what station engineering personnel can handle," said John Marino, vice president of science and technology at the NAB. "These days, station engineers may be too busy to deal with all of the issues, and may not have the specific knowledge to deal with FCC matters."

Joseph M. Davis, a partner in the engineering consultancy Cavell, Mertz &

Davis, said. "A local engineer might run across a project involving these issues only about every five or 10 years. We deal with them on a daily basis. Since the (FCC) rules change so quickly and the consultant is aware of exceptions and waivers to the rules, that's where our value lies."



Rick Jones

In this era of ownership consolidation, consulting engineers have become more valuable players, according to Ed Miller, president of the Society of Broadcast Engineers. "Consulting engineers have taken on more responsibilities for more stations. Stations may not have the resources that they had before, with a

chief engineer per station. Now there may be a single engineer per six or seven stations. As a result of this diminished manpower, the phone rings more frequently at the consultant's desk."

Consolidated engineering

Miller said the number of consulting engineers working in radio has "remained stable," but the SBE does not break down its data to determine how many members identify themselves as consultants. SBE Executive Director John Poray said the society had 5,241 members as of Dec. 31, 1998. It marked the sixth consecutive year of membership growth, and the SBE is on track to top 5,500 members by mid-1999, Poray said.

Gary Blank is the chairman of the Alliance of IEEE Consultant's Network. The IEEE is the Institute of Electrical and Electronics Engineers. Blank expects the number of consultants working in radio to increase. Consolidation, he said, has forced some engineers to form their own consulting firms.

"With all the restructuring, downsizing and forced early retirement, more and more engineers are branching out on their own," Blank said. "Some of them leave a broadcast company and then come back as a consultant, which is a more economical arrangement."

Rick Jones, owner of the consulting firm System One Communications, said consolidation has definitely been good for his business.

"We're staying extremely busy," he said. "Our forte is with AM systems, and right now many owners are reconditioning their AM sites."

Even though "a lot of consultants are out there," he said, there is enough business to go around.

"Group owners tend to use different consulting firms in the various cities they operate in," Jones said. "It's not a case of just one consulting firm that is picking up most of the work."

Pre-purchase advice

One of the most important services the consulting engineer provides today is to evaluate the technical operations of a station prior to acquisition, said John J. Mullaney of Mullaney Engineering Inc.

"It is in the best interest of the major players to conduct periodic evaluations of all their stations to ensure that they are operating at the maximum possible level," he said. When a station does decide to apply for an upgrade, he said, the consulting engineer can ensure that pitfalls are avoided.

Mullaney recalled the case of one station that put off filing an application with the FCC. Because of a rule change in the intervening months, he said, "The station is no longer able to use the tower site it had been using for 10 years. They now have to build a brand-new, 500-foot tower, and they never intended to do that."

Consulting engineers provide an important service to stations that are moving to the new AM expanded band. One such station, sports-formatted WQSN in Kalamazoo, Mich., recently switched from 1470 kHz to 1660 kHz. Station owner Fairfield Broadcasting Co. is now operating another station, talk-formatted WKLZ, on 1470 kHz.

The consulting firm Munn-Reese Inc.

installed duplexing equipment that allows both stations to use the existing 1470 kHz antenna system.

"Munn-Reese was particularly helpful to us in getting 1660 kHz on the air in a relatively short period of time," said Stephen Trivers, president of Fairfield Broadcasting. "We operate four radio stations, and they have helped us with other projects as well. They have a lot of expertise."

As an added value to its clients, Munn-Reese publishes a monthly newsletter that covers topics such as rule changes at the FCC and technical advancements in the industry.

"The newsletter is very helpful, particularly for someone like me who has lim-



Doug Vernier

ited knowledge in those areas," said Trivers.

Another owner, Waitt Broadcasting Inc., recently enlisted the services of consulting firm V-Soft Communications to submit a power increase application for KOTD-FM in Plattsmouth, Neb. The station has requested FCC approval to switch from Class A to Class C3 designation and boost from 6 kW to 25 kW. That would put a 70 dB signal into downtown Omaha, said V-Soft President Doug Vernier.

Commenting on the benefits of working with a consultant, Waitt Broadcasting Vice President of Operations George Pelletier said, "The technology has changed so much. You used to just get a map with a circle on it that gave you an idea of what the coverage might be. Now you get very sophisticated color-coded dBu. The nice thing about that is, we can check different tower heights and different wattages to see how to maximize the population that we can cover."

Technical advances

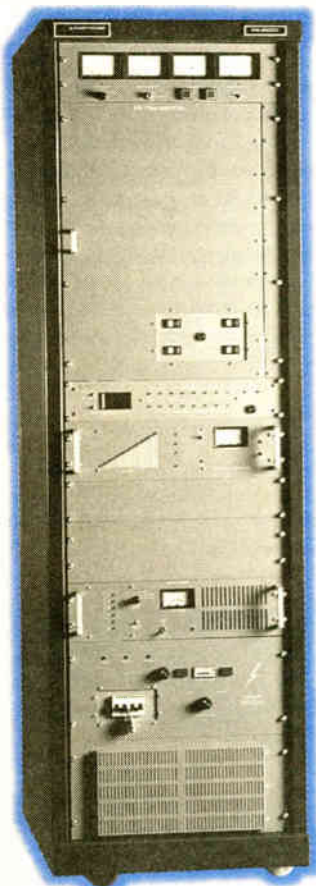
Consultants and technical data suppliers are in a good position to monitor the issues that are on the minds of radio engineers and managers.

Many of the largest radio group owners are paying close attention to — and investing in — the development of digital audio broadcasting, and many engineers are pleased to see it. They expect DAB to play a major role in radio in the new millennium.

"Our clients are very excited about in-band, on-channel DAB technology and are looking forward to implementing it," said Stuart Graham, president of Graham Brock Inc. technical consulting. "IBOC is the thing that most people are talking about."

Hank Brandenburg, executive vice
See FOCUS, page 23 ▶

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Choices and Costs of Consulting

Bob Rusk

Selecting a consulting engineer is a lot like going to the doctor. It's not necessarily something you want to do, but there comes a time when you are forced to call one if you can't diagnose and fix the problem yourself. Just finding the right consultant, at the right price, can be a daunting task.

Maybe you need a specialist, or perhaps a general practitioner will do. Whatever the case, chances are it will be easier and less expensive to fix what is wrong if the problem is tended to before it gets out of hand and causes other, more serious damage. A classic example of this would be components that fail when a tower is struck by lightning. If the damage is not immediately repaired, other components could fail and adversely affect the strength and quality of the signal.

"Unfortunately, station management is (frequently) unaware of problems until things are really in disarray, or not working at all," said Wayne S. Reese, president of engineering consultancy Munn-Reese Inc. "Then firms like ours are called in to mend many old fences. This can be very costly."

For instance, Reese said the cost of retuning a directional antenna system could run anywhere from a few thousand dollars to the mid-five figures.

"It depends on how complex the system is and how old the proof is," he said. "A station might require a complete proof of performance. Those can easily run \$20,000 to \$50,000."

Cost factors

There are situations when a proof of performance could reach into six figures, said Gary Cavell, a partner in the engineering firm Cavell, Mertz & Davis.

"The cost has a lot to do with how much trouble it is, local environmental factors, and if the local engineer would be available to work with us. The more time and bodies we provide, the more expensive it is.

"You've got the initial work to see

what can be done, the paperwork fee, and the proof of performance itself," said Cavell. "For an AM directional station,

you can be talking \$100,000 to \$200,000 easily."

For new stations, or when major upgrades are called for, that would not include the cost of the transmitter, tower or other hardware.

While it is a good idea to get several estimates before selecting a consultant, "many don't like to give hard estimates until they know more about a project," Cavell said. "AM station tuneups are one of the most difficult things to do, principally because you are dealing more with the environment than the array itself. Power lines or a water tower down the street can affect things, or perhaps you can't get access to

places where you need to measure."

Tim Sawyer, owner of T.Z. Sawyer Technical Consultants, agreed that it is impossible to give exact quotes without first knowing the specifics of a particular station's needs. He bills each project based on time and materials utilized, plus any additional expenses incurred on behalf of the client station. However, based on past projects, he offered some ballpark figures.

To prepare an AM construction permit application, he typically charges \$1,800 to \$3,800 for a daytime pattern and \$2,200 to \$4,800 for a nighttime pattern.

Explaining the wide price difference between day and night patterns, he said, "Daytime calculations of the protected and interference contours are pretty straightforward and easy to do. The typical day-

See CONSULTING, page 24 ▶

To save money on fees, collect as much information as possible in advance.

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▶ FOCUS, continued from page 22
president of information services company Dataworld, said, "IBOC is certainly the big issue looming on the horizon. Some of the other proposals and recommended rule changes for the AM and FM bands will be subordinate to that. A decision on IBOC needs to be made before some of these other things can be evaluated."

SBE President Miller agreed that DAB will remain the most important technical issue in radio well into the next century.

"It will be a process of years to get everybody up to speed," said Miller. "It's going to be a learning curve, it's going to mean new equipment, and the updating of systems that are in place now. This will have a significant impact and won't be a short-lived transition."

With a qualified consulting engineer just a phone call away, however, radio stations will be better equipped to make the long transition as painless as possible.

► CONSULTING, continued from page 23
time study looks at other stations on the channel and adjacent channels within 500 kilometers (310 miles) of the proposed (transmitter) site or new station. About five to eight other stations are usually studied to ensure that the proposed station does not cause interference to or receive interference from existing stations.

"Nighttime studies," Sawyer said, "require considerably more time to evaluate as the whole North America region is considered. Typically calculations are done to determine the protection requirements of 50 to 100 stations, including all domestic and international stations — Canada, Mexico, Cuba, the Bahamas, pretty much everything down to about the equator. This large area of study is required because of

skywave propagation of the radio signal during nighttime hours."

While AM stations require a complex series of computations, FM applications are easier to complete. As a result, Sawyer's charge for a commercial FM station runs \$1,800 to \$2,500, or \$1,500 for a non-commercial FM.

Consolidation

In this era when groups are combining the facilities of multiple stations, Sawyer said his charge for completing the paperwork required by the FCC to add a second station to an existing transmitter site would be in the \$3,500 to \$4,000 range. Adding a third station would probably be an additional \$2,000. As a rule of thumb, Sawyer said consultants generally charge

between \$100 and \$200 per hour, but some may be willing to work for a flat rate fee.

While some consultants concentrate on doing the filings to present to regulatory agencies such as the FCC and FAA, others also get involved with the "nuts and bolts" of a project, Cavell said.

"In more complex cases, we help the local engineer with antenna and transmitter selection," he said. "In some cases, we get involved with on-site transmitter installation."

In these cases, the consultants fees go up accordingly. Factors such as years of experience and cost of living also contribute to what a consultant charges. An engineer based in Washington, D.C., for example, might charge more than one



Ben Evans

who operates in a smaller city, where operating costs may be lower.

As a result of consolidation, many station managers today are "bottom-line driven" and can be unwilling to spend the money needed to properly complete repairs or upgrades, Cavell said. But when it does become necessary to call a consulting engineer, there are ways to keep the costs down.

"Have an idea of what your needs are and have information available, such as your tower registration," said Richard Mertz of Cavell, Mertz & Davis. "The costs are generally lower when we don't have to go digging through FCC files and other sources. When stations call us with their technical problems, they are familiar with the plant — where the transmitter is, and what's around it. It can take a lot of time to draw that out of certain people. Others are very forthcoming and that makes it easier for us to advise them; that will save them money and help get the problem solved quicker."

See CONSULTING, page 25 ►

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Decrease costs, *increase profits* and run your station more efficiently. Outside of drive time, why pay your talent to sit around *waiting* to talk? A Scott digital System can put all your songs, spots and prerecorded Voice Trax together smoothly and easily—without anybody in the air studio!

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Scott Breakthrough: Free Software!

Thanks to Scott Studios' new *free* Voice Trax Via Internet (VTVI) software, announcers can phone in shows with studio quality from anywhere. All they need is a good microphone, mic pre-amp and processor, Internet connection, any Windows® computer with sound card and Scott Studios' *free* VTVI!

Simply schedule your station's music. With the touch of a button, your log and latest local copy points are automatically e-mailed to your announcers. And Scott's VTVI works seamlessly with all music schedulers and traffic/billing programs.

Live tags, trivia and copy are displayed automatically on the screen. Announcers don't need a clumsy copy book or liner cards. They can talk as early as they want before songs fade and over intros or in the clear. VTVI is so simple to use: a touch of the space bar triggers the next song or the next spot. Voice Trax are recorded with the computer's regular sound card with exceptional digital quality.

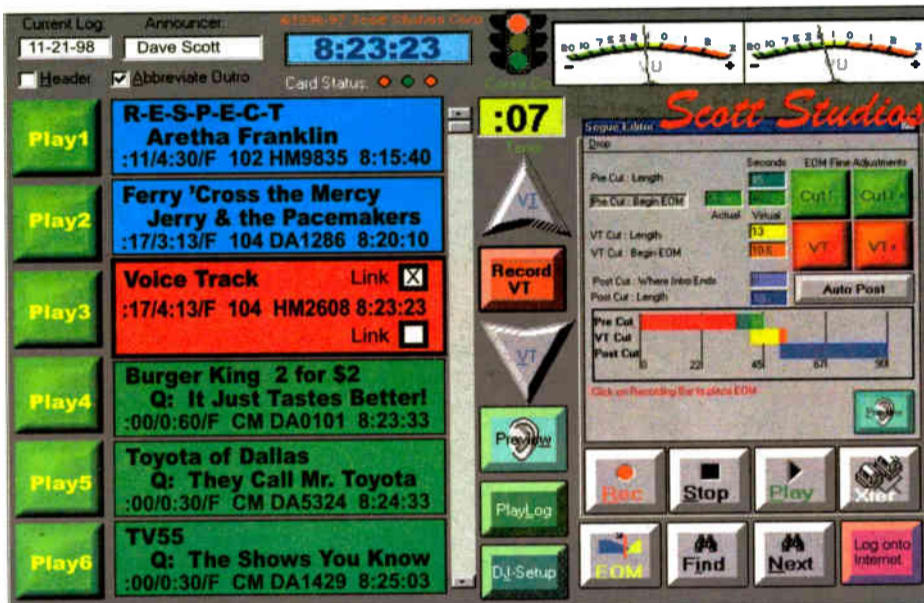
Unlike live radio, any or all of the Trax can be reviewed and possibly improved by re-recording. With the VTVI's Segue Editor, announcers can fine-tune their timing of song intros, back sells and donut spots without re-recording.

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VTVI includes Scott Studios' exclusive Voice/Music Synchronizer. Whenever the announcer mentions song title or artist, he or she turns on the link so the back sell or intro plays *only* with the correct song.

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Scott's VTVI lets you record every possible time check, or do a range of alternate recordings mentioning the time in any Voice Trax. The Scott NT System picks the right one at air time. You can also record all the seasonal temperatures and let Scott's optional temperature announce equipment play the right one at air time.



Here's Scott Studios' Voice Trax Via Internet (VTVI) software, shown with the optional Segue Editor. VTVI allows a distant announcer to pre-record a 4 hour show in about 15-20 minutes with nothing more than a Windows computer with an ordinary sound card, an Internet connection and a good microphone.

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When the announcer is done, a click on the VTVI Auto-Send button dials the Internet over a standard phone line and uploads the entire show to your Scott Studios digital audio system automatically. Transfer does take a long time, but your announcer can be answering e-mail, writing copy or creating promos on the VTVI computer while the show transfers.

VTVI isn't limited to music announcements. It gives high quality audio to recorded spots, remotes, weather, stock reports, news and election returns.

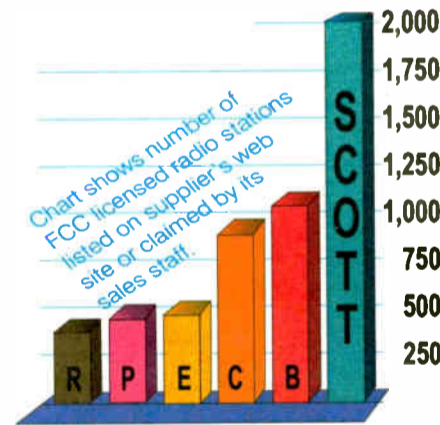
Your station will sound great with Scott VTVI! The only thing you need is an Internet connection on each end, a \$29 a month FTP transfer site and the Scott NT System with Remote Recording Router.

Voice Trax play seamlessly without anyone back at the station. And if the announcer forgets to record something, or if songs or spots get changed at the last minute, Scott's Voice/Music Synchronizer automatically substitutes a generic Voice Trax with the same voice for the day and hour of that break.

3 VTVI Models: Good, Better, Best

Scott Studios also offers a \$500 VTVI+ that sends your distant announcer telescoped song intros and endings via the Internet. With VTVI+, a telescoped aircheck can be previewed and fine-tuned in the context of starts and ends of songs and spots.

Or with VTVI Deluxe, your announcers record their Voice Trax *while listening to song and spot intros and endings* in context!



VTVI is just one of several ways Scott Studios digital systems can improve your sound *and* your bottom line.

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The PE: To Be or Not to Be?

Doctors are MDs, nurses are RNs, and some engineers are PEs.

PEs — Professional Engineers — have met education and experience requirements and passed rigorous state-administered tests.

A PE license is not required for most engineering matters, including practicing before the FCC. The license is necessary, however, when human health and safety matters are involved.

"That includes radiation measurements on broadcast stations," said Garrett Lysiak, PE, president of Owl Engineering Inc.

Gary Blank of the IEEE, another PE, said, "Although the PE is required in many instances nowadays, many clients say having one doesn't matter to them one way or the other. Having the PE doesn't necessarily make you a better qualified engineer. It just means that you've passed another exam. It's a good hurdle and is a feather in your cap. I've met some engineers who don't even have a bachelor's degree and are outstanding engineers."

— Bob Rusk

► CONSULTING, continued from page 24

Once you know what services a consulting engineer can provide and have some idea of the costs, how should you go about selecting a consultant? Stuart Graham of Graham Brock Inc. suggested contacting other stations and asking if the general manager or staff engineer could recommend a consultant. An FCC attorney may also be able to offer some names.

Making a choice

Look in the *Broadcast Equipment Exchange* section in the rear of **RW**, which includes a helpful listing under Consultants. Another option is to place a free "help wanted" ad on the SBE Job Line at www.sbe.org.

Once you make contact with the engineer, ask some specific questions, according to Gary Blank of the IEEE.

A good consultant is vendor-independent, i.e., doesn't sell the hardware.

"Ask about their training and experience, how long they have been in business, and what work they have done," Blank said. "These are leading questions and usually get straight answers."

Benjamin Evans, a partner in the consulting firm Evans Associates, said it is important to ask the consultant if he or she has a broad-based knowledge of broadcast engineering, including the emerging digital technology.

Evans offered these additional tips:

✓ A good consultant is vendor-independent, i.e., doesn't sell the hardware, software or equipment that they recommend. Many vendors will set up a consultant service, often offered at give-away prices, so they can sell you the equipment or receive commissions from equipment providers. Some of these consultants tailor their recommendations to the equipment they represent.

✓ A good consultant works exclusively for your best interests. Beware of the consultant who tries to force you to work with them, because chances are they are really working on their own or someone else's behalf. A less-than-reputable broadcast consultant will call a station owner out of the blue and suggest that they move the transmitter, change frequency or make some other change to the facility and promise greater coverage for the station as a result. This consultant likely will insist that they handle all required engineering work for you. Often the change the consultant recommends is designed to benefit a station owned by them or a client of theirs.

✓ A good consultant is responsive to your needs. The consulting firm you hire should have many levels of support, from field technicians to staff consultants to senior partners. Everything a consultant does — from the services they provide to the recommendations they make — should be based on the specific needs of the client.

✓ And don't forget to ask a consultant for references. "Call as many as you can," Evans said. "You're entitled to this information. After all, it's your project."



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The 1945 Westinghouse "Little Jewel" is also called the "Refrigerator"

radio. With the handle folded down, it may resemble the Westinghouse refrigerator shapes of the mid-1940s.

This AC-DC set operated with batteries on the go or AC-power at home, receiving the AM band. The model numbers H124 to H127 varied to indicate the color of paint on the Bakelite cabinet.

Westinghouse started building radios in the early 1920s, although they were sold through RCA until 1930.

This is one in a series of photographs featuring classic and less well-known radios. The pictures and descriptions are by collector Bill Overbeck, president of the Delaware Valley Historic Radio Club, who has made every effort to ensure accuracy. To contact him, send a self-addressed, stamped envelope to P.O. Box 847, Havertown, PA 19083.



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FIRST PERSON

A Remote in the Bahamian Sun

Allen J. Singer

What's the cheapest way for a Cincinnati radio listener to visit the Bahamas? Ask the 10 lucky listeners and guests who won trips on "Bahama Mama Monday," Jan. 11, 1999.

The winners joined the Warm 98 Morning Show as they broadcast live from the Breezes Resort in the Bahamas on Friday, Jan. 15, and Monday, Jan. 18. The Friday afternoon personality broadcast her show live from the pool along with the contest winners. What we heard in Cincinnati sounded like a nonstop party: fun music, interviews with happy winners and descriptions of the resort.

Our remote required that Arametha Curry, the events coordinator at Super Club Breezes Resort in Cable Beach and our contact person, have two phone lines installed at the deck overlooking the pool. That was all we needed for a successful remote.

Across the sea

Our Comrex HotLine, which needed only one phone line, worked beautifully. Setup was easy and connection was a snap; we never once lost our signal during the 15 hours we were connected on Friday and Monday. The entire broadcast sounded superb, and we were quite happy with our HotLine.

The remote required WRRM's two

engineers, chief engineer Kevin Surgeon and myself, to remain at opposite ends of the remote. Kevin set up the equipment at the remote and remained on standby during the broadcast. I hung around the studios, made sure we didn't lose our signal and helped the board operator push the



Randi Douglas and Jim Smith of the Warm 98 Morning Show

right buttons on the Integrity console.

We didn't experience many problems at the remote. The only air problems occurred in the station's booth when the board operator had to juggle with keeping track of the remote, playing commercials and songs, recording and playing the weather, playing the news and starting and stopping the music beds.

The Integrity uses a mix-minus feed, and each channel simplifies the task with a REM (remote) button to feed talkback. The problem was that the remote heard everything from that console; varying levels of volume from each source were audible. In the future, we plan to install a

compressor to keep talkback levels consistent in the jock's headphones at the remote site.

Kevin sent the bulk of our remote gear to the resort via FedEx. Included were wireless mics, a receiver, a power conditioner, a Shure mixer, a Crown amp, small JBL speakers, a Symetrix headphone amp and ear bud headphones. He packed the most important items — the HotLine, a mic and headphones — in his

broadcast, Cincinnati experienced a deep freeze, resulting in the cancellation of several flights from the Cincinnati Airport, including the flight of our key personnel. They found a later flight leaving from Dayton, Ohio, but they arrived in the Bahamas very late Thursday night. A quick check confirmed that the HotLine and phone lines worked, but our heroes didn't get to bed until about 2 a.m. and were not well rested for Friday's broadcast.

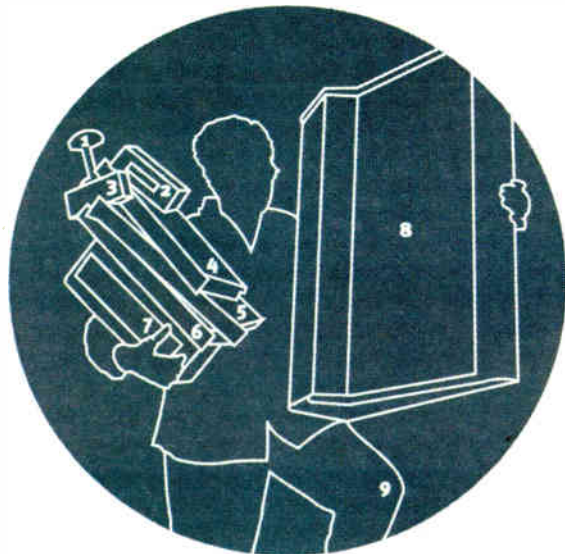
The next twist occurred Sunday afternoon, when Kevin checked the remote spot to make sure everything was still OK. After inspection, he discovered that the phone lines had been removed by the hotel's engineers. A couple of phone calls resulted in the phone lines being reinstalled. Had he not checked, Monday's broadcast would have been done from the hotel room.

As a precaution, Kevin tested the HotLine in the hotel room's telephone data port and found that the connection still worked and sounded fine.

Planning ahead for an out-of-city or country remote can help you to avoid problems. If you leave the country, you will need to take your gear through customs at least a week before you leave so you can get that paperwork squared away. (You'll also need a passport or birth certificate.)

If you're going to need specialized gear, pack *everything* you need — necessary equipment, batteries, extra wire, soldering iron and tools — in your carry-on luggage. The rest of the stuff can be sent via FedEx to guarantee your equipment will be waiting for you at the remote site.

If you plan ahead, hope for the best



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- 4 DI-1000 telephone hybrid
- 5 DI-2000 telephone hybrid
- 6 DA-4x4a distribution amplifier
- 7 CT-6 large clock / timer
- 8 RS-12a millenium console
- 9 MRS BRAVERMAN, company spokesmodel



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Not a bad setting for a remote.

carry-on luggage in case the equipment didn't make it in time.

When we went to the Bahamas last year, the luggage containing the important remote gear experienced a half-day layover in Atlanta, requiring the remote to be broadcast over the phone from the hotel room until the afternoon, when the equipment arrived.

It's ice

Aside from Kevin forgetting to set his hotel room alarm clock right and almost missing the remote, there were no problems. Our second phone line helped us contact each other before the remote began. We used a two-line Comrex last year with so-so results, but the sound quality was less than great and connection was cumbersome. The HotLine uses a high-speed modem, so it connects by itself. Kevin reported that his equipment took about 15 minutes to set up and break down without incident.

Sometimes, the absolutely unexpected will happen. During the week before the

and expect the worst, you should be able to skate through the remote and enjoy your free time away from the station.



Allen J. Singer is assistant engineer for WRRM(FM) and WVAE(FM) in Cincinnati. He previously was employed by Harris Corp.

Tropical Remote Gear:

Two JBL Control 1 Speakers
 Comrex HotLine
 Electro-Voice 257 mic
 Marantz PMD222 cassette deck
 Sony MDR-7506 headphones
 Audiometrics PLM power conditioner
 Telex Soundmate AAR-10 transmitter
 Shure U4D UHF mic receiver
 Crown D-75 power amp
 (2) Shure U2 UHF wireless mics
 (2) Telex AAR-10 Soundmate receivers
 (2) Veratron Earbud headphones
 Symetrix SX204 headphone amp

Pros/Cons of Rotary Converters

► NEC, continued from page 21

Manufacturers' experience indicates that, with proper attention to current levels and device sizing, exceptional efficiency can be achieved. Also, because of the simplicity of this converter, you can expect it to provide a long and useful life with low maintenance.

In the final analysis, the decision to use a rotary phase converter is one of cost. Because the life of a transmitter installation can be 20 years and, in the case of our 25 kW FM rig, it runs all the time, let's look at the decision grid with some relative

numbers (see chart, page 19).

The downside of rotary converters of the "manufactured" type is their modest voltage regulation between L1 and T3 and L2 and T3. Regulation comes into acceptable levels when the unit is loaded between 60 percent and full rated output. This is one of those rare cases where there is no benefit to buying an "oversized unit."

In the example shown in the chart, the lowest overall lifetime cost is to do it right and pay to have three-phase power brought into your facility by your power provider.

If the project that requires three-phase is well capitalized and is considered a long-haul investment, the most prudent and cost-effective strategy is to

install three-phase electric service from the utility.

With proper attention to current levels and device sizing, exceptional efficiency is achieved.

If you don't have the upfront funds or circumstances are indecisive, the rotary converter is the lowest entry-level

course of action, at \$5,000 or so.

If you know that three-phase power will never or can never come to your site, a single-phase transmitter (if available) at the appropriate power level is the best course of action, at a \$12,000 construction premium. This includes electric upgrades and transmitter premium.

Next episode we will get back on course and return to our discussion of the main panel and grounding.

■■■

Charles S. Fitch, W2IPI, is a registered professional consultant engineer, a member of the AFCCE, a senior member of the SBE, lifetime CPBE, licensed electrical contractor, station owner and former director of engineering of television stations in Connecticut and Massachusetts. Reach him at FitchPE@home.com

Renewing Old Tape

► WORK, continued from page 17

more. Some reports claim the renewed bonds are stronger than the original.

- Make sure the machine you play the renewed tape with is in good shape, with a clean pinch roller, capstan, clean heads, and no gouged or grooved tape guides which could snag the oxide.

- Re-bake as needed, but Stu recommends making a copy the first time to a fresher tape, or archive backup medium.

Thanks, Stu, for your thoughts. Tens of thousands of videotapes, huh? That's a lot of racing!

★★★

Randall Keils, from WMUK(FM) at Western Michigan University, has modified his Tascam 112 and 122 cassette machines to eliminate the 0.4 second mute that occurs when the Play button is depressed. Lavern Siemens of Golden West Broadcasting inquired about this problem in a *Workbench* column late last year.

On the early 122s (early 1980s unbalanced I/O) Randall lifted one end of R-157 from the circuit board. This defeats the 0.4 second mute when Play is initiated.

The 122 MKII mutes by switching Q-103, and its right channel equivalent, with U-106, a "digital transistor." Lifting any leg of U-106 should defeat the Play mute function.

In the Tascam 112, Q-106 is switch by U-016. Lifting U-016 should defeat the muting. Randall writes that because there is a bunch of logic upstream of U-016, you can have fun experimenting with the options.

Randall closes his letter by encouraging the purchase of the service book for these machines. Ask your Tascam dealer.

■■■

John Bisset has worked as a chief engineer and contract engineer for more than 20 years. He is a district sales manager for Harris Corp. Reach him at (703) 323-8011.

Submissions for this column are encouraged, and qualify for SBE recertification credit. Fax your submission to (703) 323-8044, or via e-mail at jbisset@harris.com

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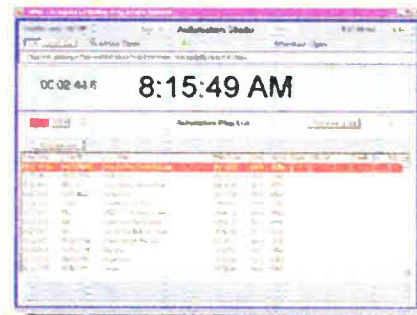
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Radio Basks in Record Sales

Laurie Cebula

If anyone were to question the importance of sales to the radio industry, RAB '99 should put that to rest.

The Radio Advertising Bureau's 19th Annual Marketing and Leadership Conference in Atlanta set attendance records, buoyed by an industry that

lion in revenue.

The buzz topics: convergence, streaming audio, marketing concepts for Internet radio, partnerships and the future of radio in the wide world of Web sites.

delivered during the opening ceremony of the convention, RAB President and CEO Gary Fries said, "The Internet will be part of radio's future."

He said radio should look forward to

Several workshops and sessions were dedicated to the topic. In fact, the special focus at RAB '99 was Internet 2000. The show featured the unveiling of Arbitron/Edison Media's latest study, "Radio and E-Commerce," and an exhibition alley dedicated to audio streaming and companies in the business of

See RAB99, page 40 ▶



More than 2,300 attended RAB '99 in Atlanta.

enjoyed 12 percent sales growth last year.

More than 2,300 attended to explore emerging possibilities in new media marketing, trends in management and the effects of consolidation in the business of radio, which last year attracted \$15.4 bil-

Attendees heard that radio stations should take seriously their commitment to their Web sites and provide quality content to audiences and effective marketing tools for advertisers.

In his "State of the Industry" address,

the future of opportunity. "Don't just go along for the ride. (Radio industry members) have to build the future instead of resting on the laurels of the past," Fries said.

Net radio was hard to miss here.

Market the Millennium At Home, on the WWW

Kelly Orchard

How to integrate the advertising and cross-promotional possibilities of the new millennium with radio marketing? RW posted the question to a number of stations around the country.

Many stations have plans to upgrade and fine-tune their Web sites to take

increased revenue shares and holding onto or gaining ratings — are these stations able to think about promotions that extend into the future? Absolutely.

Kim Kelly, promotion director at KCBS-FM, Los Angeles, uncovered a sales tool for sponsorship opportunities. She received historical data from the Cultural Affairs Department with the city

city and will feature events, news and other historical moments in Los Angeles over the past century.

In addition to soliciting sponsorship from a variety of local businesses, the local history spot could serve as a tool for local advertisers to gain support from national companies. The universal theme of world history entering a new millennium lends itself well to a national, broad advertising campaign.

Kelly offered one example. "This feature program could incorporate co-op for food manufacturers and can be sold to grocery store outlets," she said. For example, Campbell's or Proctor & Gamble could sponsor a millennium minute, then follow or tag the spot with a sales message on a product available at the local supermarket.

Gain a mass appeal

Kellie Shipp, marketing director for Jacor stations KKCW(FM) and KKRZ(FM) in Portland, Ore., expects the promotional efforts of Jacor radio stations in the coming years to involve TV, billboard, lots of street marketing and a more aggressive marketing campaign.

"Electronic billboard advertising and aggressive marketing campaigns appear to be the buzz of the industry, especially in the bigger markets where budgets allow for outdoor advertising and extensive marketing strategies.

"Being the last year of the 1900s, we will roll into the new millennium with some exciting marketing and promotional ideas that will involve partnership in the Portland community," she said.

See MARKET, page 33 ▶



Promo-minded KCBS-FM airs local history to cash in on the millennium.

advantage of the emerging Internet world of e-commerce.

How far in advance are the stations planning? In these days of consolidation — while owners and managers are concerned about the next acquisition,

of Los Angeles to create the "millennium minute." Kelly said it makes sense for any radio market to promote the history of their city as we head into a new century.

The "millennium minute" will be a 60-second radio spot on the history of the

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 SS 8.2 Active crosspoint switching with 8 stereo inputs, 2 stereo plus 2 mono outputs.	 3X2B Active crosspoint switcher with 3 stereo inputs and 2 stereo outputs.	 SS 2.1/TERM Passive switching/routing with two stereo inputs to one stereo output or vice-versa.
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Cross Promotion in Radio, E-Commerce

▶ MARKET, continued from page 31

At KKCW and KKRZ, Shipp said street marketing strategies involve efforts to be in close contact with local audiences. Shipp defines "street marketing" as "going to topical events and meeting and greeting the audience, taking the station out to as many events as possible where they will gain the most impressions on a mass appeal level."

According to an Arbitron study of new media released late last year and its new Fall 1998 survey, on-line radio listening continues to rise. Of the 15 radio stations called upon from Florida, New York, Texas and Los Angeles, every one responded with strong opinions of their need to promote their radio station on the Internet by updating their sites and linking to others.

Some stations offered a personal e-mail service attached to their station Web site address. KZZO-FM in Sacramento, Calif. uses this approach. Some stations offer a chat room for conversing with other listeners while listening online to on-air broadcasts. Chancellor station WWDC-FM in Washington, D.C., has a request link that the on-air host refers to during request hour.

"Call me with your request or e-mail me at www.dc101.com," is generally the host's message. The station will launch a new site soon, and will stream RealAudio using many of the comedy bits and parody songs that listeners request.

Media 'mileage plan'

Jacor recently signed on with Fairwest Direct, the developer of a new computer software program. The program encourages a "mileage plan" for media. It works like an airline mileage plan; listeners can earn points by tuning in to the station for the password or access code of the day, then log on to their computer using the code to earn the points. These points are added up, and are redeemable for prizes at participating sponsors or for cash awards from the station. The more often a person listens *and* logs on, the more potential to earn points.

"There are a variety of ways to promote this," Shipp said. "And, of course, once a station is signed on, they own the exclusive rights to the program in their market."

Jacor, in Portland, is one of the first companies to sign up for this technology. The stations plan to execute this method before May of this year.

Another promotional tool that has generated listener response on the air, at remotes and during other special events, is the cash box. The concept can be developed into a millennium promotion or any other promotional theme.

The cash box is a digital box with a telephone interface. In its debut in Victorville, Calif., the cash box generated a line of players eager to push the buttons and play the game. A secret telephone number or date is programmed into the box, which is mobile for remotes. Unlike the typical "Wheel of Fortune" type of promotion, customers fill out a card with their guess and dial in their response. The machine sounds a buzzer for an incorrect entry and sirens go off for the correct one.

The cash box can also be connected directly through the on-air console. Listeners are given clues to the secret

millennium date or telephone number. They can dial in their guess at live remotes, which not only encourages

directly with their touch-tone phone.

This creates a live interactive contest, and, when developed by the program-

We will roll into the new millennium with marketing and promotional ideas that will involve partnership in the Portland community.

— Kellie Shipp

traffic but also develops a database. They can also play on the air with the radio personality by dialing their guess

and promotions departments, can be a great tool to increase time spent listening. Similar to the Fairwest Direct

principal of encouraging listeners to earn valuable merchandise or cash by tuning in more often, the cash box is teased regularly to encourage listeners to gather more clues to the winning number.

Like the computer interactive game, the cash box can be customized by each promotional need. At remotes, the listener fills out a form that requests name, address and other demographic information along with a "guess." The forms are used to create the data base for the station to send birthday cards, newsletters and other direct-mail ad campaigns.

■■■

Are you using your online presence to generate new promotions for your station? Tell us about it. Send e-mail to radioworld@imaspub.com

Kelly Orchard is a radio consultant.

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New York's Legendary WCBS-FM

Bob Rusk

"Every brand-new day should be unwrapped like a precious gift." Harry Harrison says to the audience as he begins another shift as the "Morning Mayor" on oldies station WCBS-FM. It's his trademark expression and is sure to warm the hearts of loyal listeners who are facing near-freezing temperatures and nasty weather.

"We've got the coffee on or a spot of tea or hot chocolate, whatever you like." he continues in his booming voice, "Nippy again ... 36 degrees right now."

Harrison has been waking up WCBS-FM listeners since 1980. A fixture on the New York airwaves, he is one of the keys

to the station's immense success.

Other familiar voices on the station include Dan Ingram and "Cousin Bruce" Morrow. Then there's the music, a captivating blend of oldies that ranges from 1950s doo-wop to 1980s pop.

Marconi winner

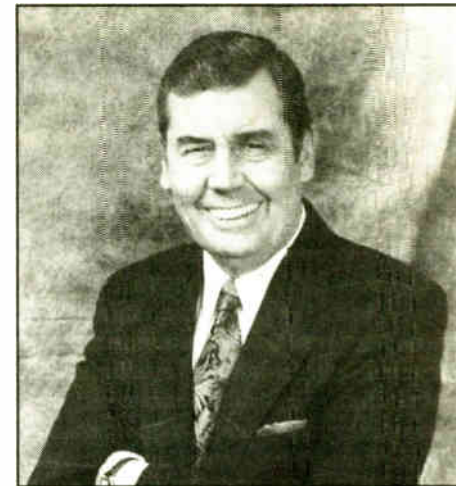
The station, in its 26th year as an oldies powerhouse, consistently ranks near the top of the New York radio ratings. Highly regarded throughout the industry for decades, this year WCBS-FM received the prestigious, NAB Legendary Station of the Year Marconi Award.

It was the fifth Marconi presented to the station. In the past, WCBS has won

as Major Market Station of the Year (1997) and Oldies Station of the Year (1993, 1991, 1990).

The secret to the station's success is "pretty simple," according to Marie Mason, vice president and general manager of WCBS-FM. "We have a consistent, reliable, unique product. That's not common in New York," she said. "If WCBS-FM went off the air tomorrow, I think people would be truly upset. There's that type of attachment to it."

In the Summer '98 Arbitron ratings, WCBS-FM placed fifth overall in the market with a 4.2 share and a weekly cume of 1.6 million listeners in the 12+ demographic. In the station's key 25-54 demo-



Harry Harrison is the morning man on WCBS in New York City.

graphic, it ranked third with a 5.3 share and a cume of nearly 1.1 million listeners.

WCBS-FM had enjoyed a decade-long reign at the No. 1 spot in the 25-54 demo, but has lost some ground in the last two years to tropical-formatted WSKQ-FM and adult contemporary WLTW-FM, Mason said.

Mason, who is unrelated to Dan Mason, president of the CBS Radio Group, believes that WCBS-FM can recapture the top spot.

"It really depends on the complexity of the market," she said. For example, if WSKQ gets a formidable competitor and slips in the ratings, WCBS-FM could move up from three to two, Mason said.

Great hits and more

While WCBS-FM mainly plays the greatest hits of the 1950s and '60s, Program Director Joe McCoy occasionally mixes in songs that are rarely heard on other stations today. The previously unreleased version of "Strangers in the Night," by Diana Ross & The Supremes, on the CD, "Motown Celebrates Sinatra," is an example of the rare songs in the station's mix.

"We're sometimes out-of-the-box," said McCoy. "We're not a cookie-cutter oldies station. We don't just have a 300-song list. We play music that I feel is indigenous to New York. We will take chances. If you have a reason to play something, you can probably play most anything if you set it up correctly."

McCoy, who has been PD at the CBS-owned and -operated station since 1981, said, "You have to use research and gut at the same time. And put a new ribbon around the product to find a way to keep people listening. If you're going to do the same thing over and over again, and play the same songs over and over again, you're never going to grow. You've gotta be creative."

Format consultant E. Alvin Davis said many factors contribute to the success of WCBS-FM. "Perhaps most important is how skillfully and masterfully it has tailored its product to (the) market. WCBS-FM created an evolutionary product that is derivative of the market's legendary top 40 stations of the '60s, WABC(AM) and WMCA(AM)," Davis said.

"WCBS-FM features legendary '60s air talent, jingles that resemble the PAMS packages from WABC's heyday and considerable amounts of reverb, like WABC (used). WCBS-FM has also done a wonderful job of understanding who its audience is, where it lives and tailoring it to Brooklyn and the New Jersey suburbs, rather than White Plains, Scarsdale and midtown Manhattan."

And, apparently, when New Yorkers pack up and leave for other parts of the country, many still yearn for the sound of

See WCBS, page 35 ▶

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Cousin Brucie Still Spins the Hits at 61

Bob Rusk

It's one thing for air personalities to have their own parking space, but "Cousin Brucie" Morrow has his own street. He is, in fact, the only disc jockey in New York to have a street named after him.

The honor was bestowed upon him in 1994, when Mayor Rudolph Giuliani proclaimed West 52nd St. Cousin Brucie Way. The sign is located at the corner of 52nd St. and the Avenue of the Americas in midtown Manhattan, directly across from Morrow's WCBS-FM studio.

it better than "Bruce."

In 1961, "Cousin Brucie" moved up the dial to WABC(AM), where he stayed for 13 years. His next stop was WNBC(AM). (WFAN(AM) now occupies the frequency.) Morrow joined WCBS in 1982.

'Cousin Brucie's Yearbook'

He currently hosts two shows at WCBS. "Cousin Brucie's Yearbook" on Wednesday from 7 to 10 p.m., and the 7 p.m. to midnight show, "Cousin Brucie's Saturday Night Oldies Party."

While Morrow is best known for



Bruce 'Cousin Brucie' Morrow

hugely successful live entertainment company, SFX Entertainment — of which Morrow owns a piece.

"I'm a major stockholder," said Morrow. "Bob Sillerman and I have done wonders together. We started with one small station — WALL(AM) in Middletown, N.Y.," he said.

In addition to keeping an eye on his SFX stock, Morrow serves as president of Variety, the children's charity and enjoys spending time with his family. And, at 61, he plans to keep spinning the hits at WCBS-FM.

"I'd never want to give up 'CBS-FM,'" he said. "I love it too much."

▶ WCBS, continued from page 34
"CBS-FM. Pat Alder, who works part-time at KGY(AM) in Olympia, Wash., listens to the station whenever she travels back to her native New York.

"I love the weekend hosts, Dan Ingram and 'Cousin Brucie' in particular," she said. "They have no equal in Washington state. I incorporate bits and mannerisms from them



into my own show. The last time I was in the city, I taped hours of WCBS-FM to bring home and play in my car," said Alder. "You should see the looks I get in traffic. WCBS-FM is what an oldies station should be."

That's music to the ears of McCoy. He said, "To have someone compliment us in that way is very special. We hear from a lot of transplanted New Yorkers who grew up with WCBS-FM. Though there are oldies stations in the towns where they now live, they still like 'CBS-FM and hold us in high esteem."

Bob Rusk is a regular contributor to RW.

While Morrow is best known for his on-air work, he has long been a powerful behind-the-scenes player in broadcasting.

Like the station he broadcasts from, Morrow is a legend. He made his Big Apple radio debut in 1959 at WINS(AM), which was then a rock and roll station. At that time, he was known as Bruce Morrow. One fateful night an elderly woman wandered into the studio and asked, "Hey, cousin can you give me 50 cents?"

Morrow dug down into his pocket and found some coins. Fifty cents wasn't a bad price to pay for his new moniker. He liked the friendly sound of "Cousin" and decided "Brucie" fit

his on-air work, he has long been a powerful behind-the-scenes player in broadcasting. In 1977, he and business partner Bob Sillerman formed the Sillerman-Morrow Broadcasting Group and began buying radio stations. They later created Multi-Market Radio, another group owner.

Sillerman then went out on his own to form SFX Broadcasting, and SFX and Multi-Media merged. Last year, SFX was sold to Hicks, Muse, Tate & Furst. Since that transaction, Sillerman has been operating the

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PROMO POWER

What Message Is Driving Your Radio Station?

Mark Lapidus

"Today is not your day. Tomorrow is not looking good either." Another sign I've recently seen said "The answer is no." Sadly, these signs appeared in full public view in offices or managers at radio stations. One hung above a promotion director's desk. The other was on a program director's door. I realize these signs are meant to be jokes, but they also clearly indicate these people are, as many say, "kidding on the level."

Many in promotion and programming clearly don't understand they have clients. No, I'm not talking about advertisers. I'm referring to fellow employees, most of whom are salespeople, whom they should be serving rather than ridiculing. What makes a salesperson a "client?" A client is often someone who can bring benefit to the person or organization with whom they interact. My dictionary says a client is "a person who engages the professional services of another."

If you've got "get out of my office" signs hanging around your radio stations, your organization is most likely being driven by your sales department. You have not created enough of plan for them to utilize, so they have to create their

own agenda which probably will not meet your or your audience's needs.

When a programming and promotion department drive a radio station, sales departments know exactly what promotions they may sell, where added value

How should a seasoned professional deal with the constant flow of sales people at the door? Welcome them inside and make them priority number one.

may be placed, and when the proper times and meetings are held when all other requests may be handled. Promotion and program directors drive a radio station by creating an annual event/marketing plan that's filled with listener benefit and sales/marketing opportunity.

Let's return to the harried managers mentioned above who are beset by sales requests. Rather than choosing to

acknowledge that good salespeople are the ones responsible for a station's income, they position them as untrustworthy snake-oil salesmen. Rather than providing them with the tools they require to bring in the largest shares of

Your attitude toward them will make them alter their attitude about you. It's amazing what mutual respect does for a relationship.

Multiple solutions

If you are planning annually, you'll likely have multiple solutions to their request. Here's an easy example. A salesperson needs a large-ticket giveaway. When your annual plan and updated calendars are distributed, they can easily look at the calendar to see what's available. The plan tells them how many promos and liners they receive. The only discussion they need to have with you is about whether or not the prize has merit and when you're able to execute the contest.

Those who are uncomfortable with a full open-door policy, because they handle multiple stations and therefore an extra-large staff, may wish to schedule office hours so that those with requests know when they'll be welcomed. The best office hours for sales people are first thing in the morning and last thing in the day. In the middle of the day, the good ones are out selling. Twice a day is effective because there are last-minute opportunities that happen regularly.

Instead of placing sarcastic signs in your office, try posting the funniest daily comic from the newspaper or the Web. You'll have people coming in your office for a laugh instead of a confrontation.

Mark Lapidus is president, Lapidus Media. For programming and marketing consultation, e-mail lapidus@erols.com

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READER SERVICE 41

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READER SERVICE 67

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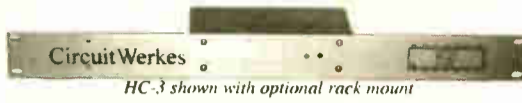
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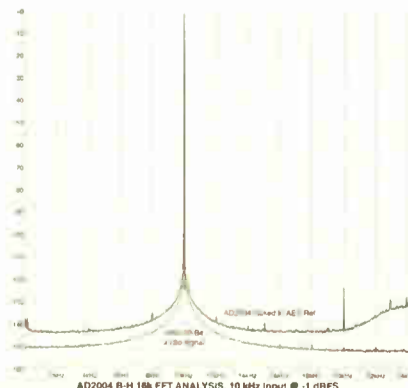
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READER SERVICE NO. 121

ONLINE RADIO

Freebies = Online Income

Kim Komando

One universal key to making more money with your Web site is to generate the most traffic. Volume counts online. Your busy site appeals to advertisers who are trying to reach those massive audiences of computer users and radio listeners. The rates you can charge are also determined by how many hits your site averages.

Sound familiar?

It's the same principal we have used to sell radio for years: More listeners on your stations translate to more potential customers for advertisers and a wider reach in getting the ad message out to the greatest number of people. One way to determine how to increase traffic on your site is to learn from companies that are successful at it.

Conducting traffic

Look at the companies that are considered classics of Internet success, like Netscape's Netcenter or Yahoo! The way to make money online seems clear.

where on the site — for \$24 per 1,000 impressions. Although the cost per impression is higher, you are only guaranteed 125,000 impressions per week. That makes the actual cost \$3,000 per week.

As you can see, the pricing game for banner advertising can be tricky. Chances are, your site can't guarantee anyone 500,000 impressions per week. And even if it could, it's doubtful that a station's advertisers would be willing to fork over an extra five grand a week, or even three grand a week, to be seen on your Web site.

Nevertheless, if you want to start exploring banner advertising on your own site, \$10 per 1,000 impressions is probably a good starting point. The key is to monitor visitor activity on your site closely, so you can give potential advertisers a reasonable expectation of how many people will really see their advertisement.

Make sure your Internet presence provider has the software tools in place to provide you with a meaningful interpretation of your site's activity. Or, if you are

and get away with it. Naturally, exactly how much you can charge depends on your particular product and market, as well as the number of visitors on your site who relate to that market.

Users buy content

There is another way to make money online. Many have tried this approach, but few have succeeded at it. You can charge your audience directly for some of your online content.

It's easy to see why this is such a tough sell. In radio itself, this content-for-sale principal is not popular. For example, a small market has been carved out for com-



Kim Komando

mercial-free digital cable radio subscriptions. However, the vast majority of listeners still would rather make the one-time

See KOMANDO, page 40 ▶

Most radio listeners prefer to tune in for free, rather than pay for content. The Web is no different.

Instead of charging people to visit your site, you give everything away for free. Then you charge other companies to advertise on your site.

This is the same model that has driven radio and television for decades. The question is: Is there major money to be made selling advertising real estate on your site?

Of course, the answer depends on your station and your site. More specifically, it depends on how much online traffic your site is able to generate.

Online advertising rates typically are based on the number of impressions or the number of times your site displays a particular advertisement in a given period. And believe me, to make any money from online advertising, your site needs to generate plenty of traffic.

Consider Netscape's Netcenter Web portal site. This site gets about 60 million visitors a week. To place an advertising banner on Netcenter's main page — one that rotates with any number of other advertising banners — you have to pay a mere \$10 per 1,000 impressions.

That doesn't seem like so much for one of the Internet's most popular sites, does it? The only problem is that with its incredible volume of visitors, Netcenter is able to guarantee you 500,000 impressions per week. That means the true cost to place one of these banner ads on the Netcenter site is \$5,000 per week.

Pay per impression

Netcenter offers a number of other advertising opportunities, each with a separate price tag. For example, you can get into the general rotation — meaning your ad is likely to pop up just about any-

bold enough to operate your own Web server, make sure you have the same. Software not only can record the number of visitors, but it can allow you to collect demographic information, record the length of time spent at your site, record the users in a specific zip code or region, and offer many more useful marketing tools for addressing target markets.


Solicit sponsors

Another option for online advertising is sponsorship of a particular area on your site. For example, you might have an area devoted to new music sponsored exclusively by a local record store.

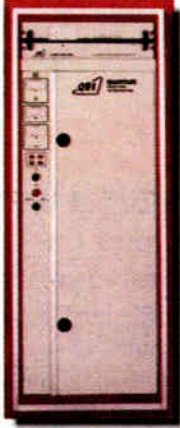
The dynamics here are a bit different, because the value to the advertiser doesn't just come from having their banner ad seen on your site. Instead, the value comes from having their name associated with a particular topic or content area. Another advertiser advantage for this sort of sponsorship is that the audience is extremely well-defined. If yours is an "everything to everyone" site like Netcenter, it's hard to identify for a potential advertiser the audience you actually are delivering.

On the other hand, if you run the top rock station in your area, it's not so tough to pinpoint the audience that's visiting your new music area. Demographics or characteristics of that audience can be reasonably accurate, and potential markets can be defined. For example, new rockers are likely to be interested in concert and ticket information, nightclubs, acne medicine and contests that involve a backstage pass to meet a new rock star.


The bottom line: You probably can charge more for exclusive sponsorships



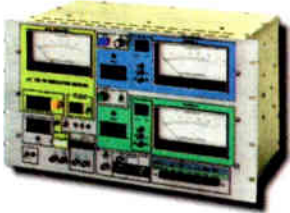
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Cashing in on Radio's Net Value

► RAB99, continued from page 31

turning a radio station Web site into a profitable new dimension for radio advertising.

The Arbitron study indicates online computer users want information, above all, from the Internet; and local information, more than anything else, from their favorite radio station Web site. The diary keepers polled indicated they want to see local news, coupons from local businesses, song titles and artists and the ability to see an advertiser's products in more detail on station Web sites.

"Raise the perception of value before rates. Without question, the

speakers here this weekend are saying that," Fries said during a press meeting at the convention. He said radio stations should be shaping the communities in which they thrive, and that this dedication to local businesses and politics has always been a responsibility of the medium.

Fries said newspaper editors and print media journalists have long realized the value of serving on local governing boards, getting involved with local merchants and building a presence and familiarity with local audiences.

Fries also said figures show an unmatched growth period for 1998 in



Gary Fries gives the State of the Industry Address at RAB '99.

advertising sales revenue. RAB reported a 12 percent increase in revenue, which increased from \$13.8 billion for 1997 to \$15.4 billion last year.

Radio executives continue to pursue big clients to increase the medium's ad share. Fries and RAB Marketing Coach Judy Carlough have plans to meet with Wal-Mart executives to explore marketing alliances with radio. Fries and other industry leaders said partnerships in advertising opportunities, and realizing the value of customer satisfaction are keys to the future of marketing radio.

Traffic Adds Ad Revenue

► KOMANDO, continued from page 39

investment in a radio and be able to tune in for free whenever and wherever they choose. The Web is no different. There's so much free content available online, people are reluctant to pay for anything extra.

Online pornography, for example, was once billed as the only sure-fire way to make money online. The strategy was to create a porn site and then charge people to visit it. Thanks to all the hype, there are now more porn sites than the market can possibly support. The result is that many porn sites now are free, as long as you subscribe to a particular age-verification service. These age-verification services charge a small fee, some of which is shared with the participating porn sites.

Wall Street test

One of the only major Internet sites that has met with success in charging for content is The Wall Street Journal site. It has two things going for it: brand recognition and exclusivity.

The WSJ site delivers exclusive content that people can use to make money. Visitors to that site essentially are saying, "Show me the money." Furthermore, they are willing to pay to see it.

Does that mean you can charge for your content? Maybe, but not necessarily. If you are considering charging for your online content, just put your idea through the WSJ test.

The first question: Do you have major brand recognition in your market? The second: Can you provide exclusive content that your listeners aren't likely to find duplicated elsewhere on the Web? Finally, you should ask: Is that exclusive content so useful or beneficial to your listeners that they would be willing to pay for it?

If you answer "yes" to these questions, you may have the makings for one of those rare Internet success stories.

Are you making money by charging for online content? Tell us about it. Send e-mail to radioworld@imaspub.com

Kim Komando has a nationally syndicated computer talk radio show, and writes Online Radio for RW. Reach her at www.komando.com or visit the show page at www.weststar.com

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Studio Sessions



Ten
Stupid
Things
Page 42

Radio World

Resource for Radio Production and Recording

March 3, 1999

PRODUCT EVALUATION

Numark Is Alternative CD Deck

Alan R. Peterson

When considering a dual-deck CD player, the natural inclination is to gravitate toward the Denon DN-2500. After all, it is one of the most familiar decks available, it is reasonably priced (\$1,800 list) and who has never heard of Denon?

Still, there is an alternative to ponder: the Numark CDN-34 dual-deck professional CD player, which brings a lot to the table in a less-expensive (\$1,150 list) package.

Despite its reputation as a "disco" product that would place it squarely in a dance club rack instead of in a radio studio, the CDN-34 brings several features along that make it a contender. With the ability to loop and stutter, the CDN-34 would be suitable for use in production rooms and for airing "club mix" shows in the studio.

Looks close

There is no question that the Denon deck had a lot to do with the inspiration of the Numark deck. The Numark CDN-34 also is a two-piece device consisting of a control head and a transport mechanism. Both have a large jog/shuttle wheel and oversized Play and Cue buttons on the control head.

Obvious differences are the brushed aluminum control head (the Denon is black), the slightly smaller dimensions of the Numark components and the absence of a numeric keypad, as found on the Denon.

The control head couples to the transport mechanism with a pair of long 8-pin mini-DIN cords, one for each deck. The mini-DIN resembles the connectors you see on PS/2 computer keyboard and mouse cables. Note these are not interchangeable — you cannot use computer cables in place of the Numark cables.

The angle of the mini-DIN connectors almost obligates you to mount the transport to the left and the control head to the



The Numark CDN-34 gives you two decks in one box.

right. Reversed, the cord would bend backwards against the plug, and if the two units are separated by a lot of space

or an awkward wiring trench, the strain may affect the integrity of the control cables after a while.

Going once around the control head, we find two buttons to the left of the backlit LCD display: SING and PROG. Without reading the manual, you may think the SING button is a vocal canceler for Karaoke performances. Sorry, it means "single" and will play only one song from the disc without tracking into the next cut. Similarly, PROG is for "program," which lets you arrange a playlist of cuts from the same CD.

Time has come today

The Time button switches the display between count-up, count-down and time remaining on the CD. A flashing bar display shows a graphic representation of time remaining, for the benefit of deejays that need to see a "record running out" to take action.

Cueing up tracks is simple. Three white buttons — two with arrows and one with a +10 legend — speed you to

See NUMARK, page 48 ▶

Photo by Alan R. Peterson

PRODUCT EVALUATION

Stone-D001: For Radio and More

Keith Spencer-Allen

The Stone-D001 broadcast console from Amptec Digital Technology is a very practical digital console, meeting a range of broadcast requirements that have gone unaddressed by many other digital console manufacturers.

If you have never heard of the company, don't feel bad. Amptec is a Belgian company that began as a service and installation company, primarily active in the broadcast area. This activity led it to the design and modification of products to meet customer needs.

Work on the Stone digital console began three years ago with sales beginning in the middle of 1998. Development of the Stone-D001 was structured around a number of radio-appropriate philosophies. Amptec strove

to retain a conventional control surface with a high degree of analog familiarity, meaning the inclusion of dedicated

controls to make operation more suitable for production and on-air use.

See STONE, page 46 ▶



The Amptec Stone-D001 Digital Console

MACKIE
Professional Audio Systems
www.mackie.com

Ten Stupid Things Radio Stations Do

Ken R.

Ken R. produces classic and contemporary radio jingles from his company in Toledo, Ohio, for hundreds of on-air and Internet radio stations. Every now and again, he gathers his observations of what goes on at radio stations and ascends his soapbox.

This time, Ken R. gives stations a reason to stop, turn around and look at themselves for a few moments, with "Ten Stupid Things Radio Stations Do Every Day."

Yes, there are Ten Stupid Things that radio stations do to themselves every day. Read down the list and see if any sound vaguely — or blatantly — familiar.

One: Stations make their salespeople waste time running around picking up tapes at various recording studios and agencies. This must be why my own company gets an average of three people in suits per day dropping by.

Let's look at the numbers for a moment. A medium-market salesperson making \$40,000 a year must value his or her time at about \$19 per hour. A runner can be hired at minimum wage, saving at least \$20,000 per year. Surprising, isn't it?

Two: Programmers get so wrapped up in the intricacies of their formats that they believe the slightest alteration of

their precious music rotation will result in huge ratings changes. Only the largest changes make a meaningful difference.

While congratulating yourself on increasing Recurrent songs to three per hour, the masses out there are saying, "Oh yeah, Star 108. Aren't they that country station?"

Nobody cares if you can expertly talk up to the 'post' of a song.

"No, they play oldies now."

If you are going to make a change, make it a big one and stick with it consistently. Do not constantly tinker, because it just confuses the help.

Three: I have heard many technically proficient on-air jocks who evidence absolutely no signs of humanity. Frequent time checks, weather capsules and copious call letter mentions will only get you so far.

People respond to something real, something about themselves. Maybe a reflection of where they live or something they can think about and relate to. And guess what: Nobody cares if you can expertly talk up to the "post" of a song.

Program directors most certainly have

severe format restrictions, but why not inject a little humanity into the proceedings if you want to?

Four: Some smaller stations — usually run by sales managers, or general managers who used to be sales managers — let commercials sit right down on top of the format and squish it.

Detach yourself from the station for a

moment and listen objectively to those 18 to 20 minutes per hour of screaming local car dealers, value-added ("giveaway") remotes with sponsor interviews that drone on forever, or the tradeout spots which smother the station with monotonous regularity.

Five: There are managers that believe "Everyone knows who we are, so we can just advertise on our air." Wake-up call: your town churns about 20 percent of its population every year.

In the days when there was just a handful of stations in a market, you might have gotten away without a lot of outside advertising. But now, even in Market No. 70, there are at least 20 signals competing for attention. Billboards and TV ads can be paid for with real money, not just traded out. You get better placement that way.

Six: Some stations can overdo it with the self-promotion. Cross-promoting other dayparts is a good idea, but there are stations I have heard that slam those call letters 12 times in a row.

This is especially irksome when listening to the Rush Limbaugh show, and I hear promos for the show *on* his show. My reaction is, "Give me a break, I'm already listening. Will you get off my back?"

Seven: Meaningless service breaks are a problem on many stations.

It doesn't happen often in major markets, but I am sure you have heard a traffic report that went, "Well, nothing much going on out here, but if you see an accident, call us and let us know — it's a free call on your Brand X cellular phone. This dependable traffic report has been brought to you by Johnson's Furniture. With reports every ten minutes, I'm Matt Gizinski ..."

So what just happened? A 60-second traffic report with no actual traffic news. It filled time and sold a spot, but otherwise it was a waste of time.

Eight: Speaking of time-wasters, some stations still lack a clear identity. By that, I mean a short, catchy phrase that everyone out there can grab onto.

"Oldies 97." "Young Country" or "98 News" are all easy to understand and are credited during ratings time. But what exactly does it mean when you say, "A better variety of contemporary music and a mix of your favorites from the '60s and '70s with less talk and fewer commercials"?

Your research team may tell you this is what people want, but please, it is time to

dump these too-long sloganesque liners.

Nine: If there are five stations in the building, why force the poor receptionist to rattle them off each and every time the phone is answered? The call signs end up getting mumbled anyway.

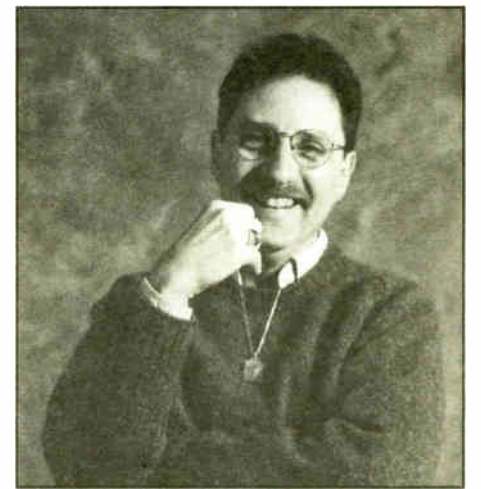
For however long your broadcast group intends to hold onto the stations, why not answer the phones with the name of the group? "Good morning, Greene Broadcasting" is much better than sitting through, "Good morning, K-Glop, K-Blab, Country Frog, Sports 1470 and The Rock of Cucamonga."

The latter is a nice aerobic workout for the receptionist, but the former is more efficient.

Ten: Speaking of the phones, why do stations do this?

Call one and ask for Mr. Jones. You get put on hold and must endure the message stating how important your call is. Then the receptionist picks up again five minutes later as if he or she has not spoken to you yet and says, "Good morning, K-Glop, K-Blab, Country Frog, Sports 1470 and The Rock of Cucamonga. Can I help you?"

You politely say you have already had this conversation, were already treated to the "important call" phone message and



Ken R.

would like to speak to Mr. Jones.

"No, sorry, Mr. Jones is on vacation."

Perhaps a note or a magnetic dot-board close to the receptionist desk would bring this practice to a quick end.

On a secondary thought, voice mail has a place in the world: when a one-way message needs to be imparted. But most stations overuse it. How often have you been lost in endless menus that require you to know an extension number, or the ones that cycle you right back to the original message when you first entered the system?

I know I was only going to list 10 Stupid Things, but...

Eleven: How about calling back those job applicants? Ignoring them is just inconsiderate. Those people thought highly enough of you to spend eight hours a day or more with you. They don't want to be pests, but they would like to know that you have received their tape and résumé or their application.

An acknowledgment letter would be better than nothing, but a callback from a secretary or receptionist does not take a lot of time and is in your best interest.

Pretend you are a client — or perhaps a listener — of your own radio station. How do you think you would like to be treated?

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- Bob Hamilton, New Radio Star

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- Dave Oliva, Radio And Production, May 1997



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PRODUCT EVALUATION

Speed CD Dubbing With Plextor

Tom Vernon

A lot of behind-the-scenes work must go into creating each installment of a syndicated music program, such as the World Cafe.

In addition to the post-production of interviews and live performances, CDs need to be loaded into the hard drive in real time and saved as WAV files to be incorporated into the show. This last part has always been a very tedious and time-consuming process. Until now.

The folks at Plextor in Santa Clara, Calif., have devised a hardware and software solution to the digital audio extraction bottleneck.

By using the UltraPlex UltraSCSI CAV CD ROM drive and Plextor

Manager software, high-speed digital audio extraction at up to 32X is possible. In practical terms, this means that a four-minute song from a CD is loaded into the hard drive as a WAV file in about 40 seconds.

The popular slang for this activity is "ripping," while the more proper term is digital audio extraction. High speed digital audio extraction takes the process one step further by transferring files at some multiple of normal CD speed. No matter what you call it, the end result is that Red Book audio files are translated to WAV files without processing them through a sound card.

At first, you might not think that this is such a big deal. After all, you copy files from a CD-ROM directly onto your hard

drive, and Red Book audio is just another digital file. The difference lies in the fact that Red Book standards call for data to be read in one continuous stream, while CD-ROMs are usually read in successive small chunks. Not every CD drive can extract digital audio from a CD, and special software is needed as well.

Installation of the UltraPlex drive and software is pretty routine. You can purchase the drive as either an external or internal device. Our demo unit was external, so once the SCSI cable, AC and audio were connected, I checked the termination DIP switch and was done with the hardware.

After the usual contortions with CONFIG.SYS files, I installed the software, which comes on a CD-ROM. The total

time from opening the box until we were up and running was about three hours.

World Cafe field tests of the UltraPlex and Plextor Manager software were extremely positive. It is somewhat like a microwave oven. Once you have one, you wonder how you ever got along without it.

Our test machine was running Windows 3.1. This limited us to an older version of Plextor Manager which allowed selection of only one track at a time. The Windows 95/NT version of Manager permits you to select multiple tracks for batch processing.

Even with the one-track limitation of 3.1, we realized enormous time savings over our old real-time dubbing methods. Operating the software is simplicity in itself. Insert the CD in the UltraPlex, select the desired track in the audio capture window, and click on the Capture button. A bar graph will display your

See PLEXTOR, page 45 ▶

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◆ PRODUCT GUIDE ◆

Products for Radio Production

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

BLUE Microphones

Baltic Latvian Universal Electronics (BLUE) has three new solid-state microphones for vocal and live-music recording.

All mics are Class A discrete microphones with transformer outputs and hand-built large-diaphragm capsules. From left to right: The green Kiwi



microphone (\$2,200) provides cardioid, omni and bi-directional response with the BLUE B7 single-backplate large capsule. The Blueberry (\$1,200) cardioid microphone has a single-membrane, tunable, large-diaphragm capsule. The Cranberry (\$1,400) uses the same capsule as the Blueberry, but in a removable "lollipop" enclosure atop the electronics case. The lollipop can be replaced with the BLUE B1 small capsule element (\$500) as a purchase option.

All microphones have 22 Hz to 22 kHz response, require 48 V phantom power and come with a hand-built wooden microphone cases. Optional accessories include elastic shockmounts, wrap-around pop filters and high-definition microphone cables.

For information contact BLUE in California at (818) 986-2583 (BLUE) or circle Reader Service 143.

Cakewalk Pro Audio 8

Cakewalk Pro Audio 8 is a combined music and audio software package suitable for radio jingle production, multitrack audio editing and mixing, and production music creation.

Key features new to Cakewalk Pro Audio 8 are 24-bit/96 kHz audio, vector-based audio mixing and an enhanced 32-bit mix engine. The software also supports AVI, QuickTime and MPEG video formats for syn-



chronizing audio to video soundtracks or authoring radio station Internet production with streaming video.

The enhanced 32-bit mix engine allows multiple audio track playback

and real-time effects. Vector-based non-destructive mixing lets the user draw Volume and Pan automation decisions directly onto the audio clips.

Cakewalk Pro Audio 8 is also available in a Deluxe edition that includes a two-CD collection of video clips, audio and MIDI loops, multimedia tutorials and utilities. Retail price of Cakewalk Pro Audio 8 is \$299, with the Deluxe edition priced at \$399.

For information contact Cakewalk in Massachusetts at (617) 441-7870 or circle Reader Service 157.

Fostex 8-Channel Multitrack

Fostex has expanded on the idea of the original FD-4 multitrack recorder with the new eight-channel FD-8 Digital Multitracker.

Rather than depend on proprietary recording systems, the FD-8 uses commercially available large-capacity SCSI storage products designed for computers, such as Syquest Syjet removable disk drives. These offer the user the preferred choice of recording medium and can be obtained at most any office supply store or computer retailer.

The FD-8 records linear (non-compressed) audio in Mastering mode, or uses Advanced Digital Audio Acoustic Coding (ADAC) to dynamically maximize the available recording time according to the number of tracks in

use. The recorder offers eight tracks plus 16 virtual tracks for a total of 24 tracks in Mastering mode.

A jog/shuttle wheel with Scrub helps locate edit points. Each input channel has three-band EQ and two Aux sends. The FD-8 is capable of simultaneous two-track recording in analog mode and eight

tracks when taking a digital input via an ADAT-compatible optical connector.

The Fostex FD-8 is \$899, not including the external SCSI storage device and media.

For information contact Fostex in California at (562) 921-1112 or circle Reader Service 148.



► PLEXTOR, continued from page 44 progress, but this typically comes and goes before you notice.

I have heard rumors that high-speed extraction required compact discs to be in pristine condition. That did not seem to be a problem here. Several of our old CDs were retrieved from the trash. These had been in use for quite a few years, and had an assortment of dirt, bad scratches, and an occasional pizza thumbprint. Numerous tracks were recorded and played back without a hitch.

Truthfully, there were some badly damaged tracks that could not be extracted in the Plextor drive. But these were damaged to a point where they would not work in our Denon 961 CD players either.

Plextor provides great documentation for both Manager and the UltraPlex drive. The 80-page drive manual is divided into 13 chapters. Each begins by concisely defining your task, your objective, and your method. The manual should get you through any eventuality, but if not,

the Plextor telephone tech support is prompt and courteous.

Summary

High speed extraction technology is, and will become, increasingly important to broadcasters. In addition



to the production needs of shows such as World Cafe, broadcast automation systems rely on hard drives with digitized audio for much of their program content.

There are some companies that provide dub-to-drive services, but their libraries are sometimes limited to the

needs of popular formats like oldies, country, and CHR. Stations with more esoteric formats like adult alternative may have to fend for themselves. Also, special programming or regular playlist updates may quickly or more economically be served in-house.

For fast turnaround when loading music into a hard-drive storage and playback system, digital audio extraction is the quickest way to go. Check into the Plextor UltraPlex and start moving faster.

Find out more about the UltraPlex or any of the Plextor product line from the company at 4255 Burton Drive, Santa Clara, CA 95054.

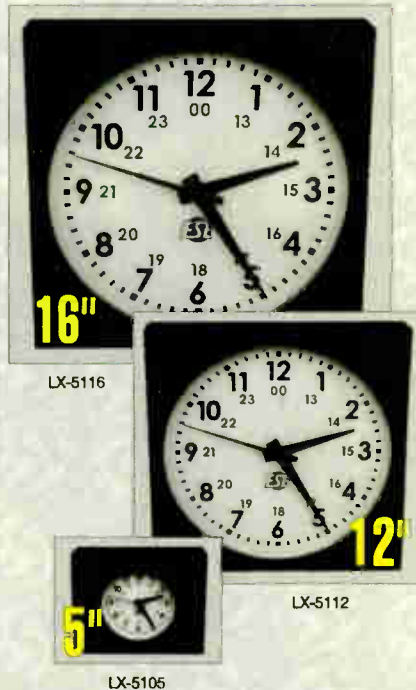
◆◆◆

For information contact Plextor at (408) 980-1838, fax (408) 986-1010, check the Web site www.plextor.com or circle Reader Service 14.

Tom Vernon is a multimedia consultant working in Philadelphia. He can be reached at tlvernon@blazenet.net or by calling (717) 367-5595.

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Belgian-Made Digital Radio Board

► STONE, continued from page 41

While there certainly are ample choices to be had in digital consoles manufactured domestically, the Amptec Stone-D001 shows that digital consoles are indeed accepted on a global level by radio broadcasters with an eye toward the future. It may be possible the best console for your operation may be a product from a distant shore.

Flexible system

While Amptec carried the goals of ease and familiarity through the operational aspects of the design, it managed to make a large number of options available via a central menu LCD screen. The

Stone-D001 also has the ability to store and recall multiple console setups as scenes.

The installation interface is flexible enough to allow the connection of analog and digital signals without significant restrictions.

The Stone-D001 is more of a digital mixing system than a single product. A user may select one of three different frame sizes, a choice of three input modules — mono and stereo — with or without equalization, and a wide range of other master modules.

The largest frame is the freestanding "studio frame" that has provision for a maximum capacity of 28 mono or stereo

inputs, while the same hardware and software system can create consoles of just two or four inputs in the form of desktop mixers.

The mono and stereo input modules offer essentially the same features — routing to two stereo busses and eight groups, three-band fully parametric equalization, four Auxiliary sends, Solo functions, Pan for mono inputs and Balance on stereo inputs, and long-throw motorized faders. Each module has both analog and digital inputs.

It all looks self-explanatory, but the clever bits are not so obvious. Focusing on the mono module, a single analog input accepts line or microphone level

and feeds a 24-bit A/D converter. The digital input is AES/EBU- or S/PDIF-compatible and can accept sample rates between 32 and 48 kHz. Each input has a 20-bit sample rate converter.

This makes the Stone very flexible in terms of installation and the use of XLR connectors for most I/Os adds to this flexibility.

Input modules

Channel input gain is controlled by a single pot that sets independent levels for analog and digital inputs, depending upon which input is selected to feed the channel.

As with all the rotary pots on the console, gain is altered by a continuous-rotation encoder control, with the values shown by a ring of LEDs at the knob base. The manner in which the LEDs come on reflects the nature of the control. In the case of gain, the LEDs light as the level increases; on other controls the setting is indicated by a single LED that chases around the circumference of the control.

While some manufacturers bring all the EQ parameters of a single band to the control surface simultaneously, Amptec opted to keep all three EQ bands up at the same time, with access to the functions prioritized logically. Each band has a single knob and an alphanumeric display.

Turning a knob alters the cut or boost at the frequency shown in the display

Development of the Stone-D001 was structured around radio-appropriate philosophies.

window. If you press the knob while turning it, the center frequency is altered. Pushing the knob twice before turning alters the Q (width) of the equalizer.

After a few minutes of practice, these tricks become fairly intuitive. Visual clues reinforce the selected status, such as the LED rings showing wide or narrow Q factors. Although the bands are labeled High, Mid and Low, they are all variable 20 Hz to 20 kHz, ± 15 dB.

There is also a separate high-pass filter, with frequency and slope set on a per-channel basis.

More features

The four Auxiliary sends appear on two knobs using a similar approach to the EQ: Auxiliary 1 level is set by turning the upper knob, while Auxiliary 2 set by pushing the same knob while turning it. Auxiliaries 3 and 4 can be set up as a stereo send. In this case, turning the knob sets the level while pushing and turning sets the balance between the sends.

The lower section of the module features the Pan control, Solo and Mute buttons while three LEDs indicate signal presence, nominal level and overload status. The Solo button can offer pre-fader, after-fader and solo-in-place operation as selected on the monitor module.

The fader is motorized and groups of faders can be linked via the central menu to act as VCA groups. It is also possible

See STONE, page 47 ►

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► STONE, continued from page 46
to use them to reset levels when a scene memory is recalled.

Each input module has a digital direct output that can be used to create a clean feed signal directly from the module. This is handy when using the channel direct outputs to feed the digital inputs of a multitrack recorder.

Remote start functions are handled by the REM button near the fader. The button can be set to do nearly anything desired, and its precise function and relationship with the fader is set via the central menu on a per-channel basis. For example, it can be set up as a talkback button to the channel direct output.

The Stone-D001 requires certain modules to function — the Control module plus Monitor, Communications and Master modules are essential. Mono or Stereo group modules, Auxiliary Master modules and/or a second Master can be added as required.

The Group modules are similar to the input modules in many of their functions, but they lack the front end and EQ. All Group modules can have an optional compressor section that provides Threshold/Ratio and Attack/Release on two knobs. These are operated with the same press-and-turn methodology as on the EQ and Auxiliary controls.

Automation and control

All modules, except the input and control modules, have large LED meters that show only the output level of the module or some dedicated module level, such as Solo in the case of the communications module.

One of the features of the Stone DSP is what Amptec terms the "dynamic range control system" (DRC), where the 32-bit floating point internal levels are rescaled at all digital outputs to fit within the 24-bit AES/EBU standard. The intention of this is to automatically prevent any overloading without the use of compressors.

All the standard broadcast console features are available, including talkback, oscillator, on-air button, full control of multiple speaker pairs and the ability to simultaneously source monitor inputs from two external sources or five internal sources.

The control module allows access to password-protected settings programmed at installation, user setups, and operational settings stored in scene memories. The latter two are storable on a PCMCIA flash memory card and accessed as if they were in console RAM.

Using a data wheel, directional cursor controls and the LCD display, it is possible to access a wide range of console functions and options. Facilities such as a Mid-Side stereo mic decoder, the function of the remote switch, adjustable audio delays and direct output types are all accessible on a channel-by-channel basis.

It is possible to edit scene memories by selecting the parameters or channels to be included on a feature-by-feature basis. The scene memories are stored and recalled through dedicated buttons at the foot of the module.

Reliability

Lastly, a set of 10 user keys on the control module allow for the selection of programmed settings. Specifically useful is the ability to show all the "hidden" control settings on the console, both the knob settings and displays.

Based upon user feedback to its initial units, Amptec has added precise features to the control section. Amptec also addressed

reliability concerns in several ways.

Four slow-running fans maintain a low-velocity airflow through the console interior. Each of the frame sizes has a backup

the ability to change settings.

The greatest difficulty in creating a digital console for radio use is deciding how to implement operational functions.

It may be possible that the best console for your operation is a product from a distant shore.

power supply to ensure continuous running in the event of an AC power failure.

The distributed nature of DSP across the modules means that a DSP failure would be limited to a single module. Similarly, a central computer problem will not stop the passage of audio, just

Amptec took pains to maintain an analog feel, without losing the flexibility digital consoles can bring.

The balance between active and hidden controls is about right, while the ability to work the mixer without necessarily referring to the LCD display is a bonus.

The wide selection of modules available, with further designs and options imminent, adds to the flexibility of the Stone-D001.

This versatile approach taken to the console interface — both in analog and particularly in the potential for digital upgradability in both hardware and software — makes the Stone-D001 a very usable console in a rapidly changing global radio environment.



For information from Amptec Digital Technology contact Nick Kwanten in Belgium at 011-32-11-28-14-58, fax 011-32-11-28-14-59, on the World Wide Web at www.amptec.be or circle Reader Service 40.

Keith Spencer-Allen is a free-lance consultant, writer and recording engineer based near London, and a frequent contributor to Radio World.

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Dual-Deck Player Samples, Loops

► NUMARK, continued from page 41

the desired cut. The CDN-34 will cue right to the beginning of the audio event, rather than merely to the index number. The jog/shuttle wheel lets you nudge the cut to the exact point you want to begin from. Wheel it up, then press the large red Cue button.

It should be noted here that all buttons, except for the Play and Cue, are the same soft rubber click-action membrane buttons we are used to seeing on most of today's audio equipment. I believe I would have preferred the soft buttons for Play and Cue as well.

In the heat of performance, jocks will not simply press a button, but are likelier to "stab" it with some force. This is the same reason on/off buttons on consoles are made to be jock-proof. A button with some springiness to it could save a few knuckle injuries and be more forgiving when it comes to downtime.

Here's the pitch

There are three different ways to change the pitch and tempo of the CD. The Pitch slider alters overall pitch and tempo ± 12 percent. The jog wheel can push or drag the playback speed while the disc is playing, then return to actual pitch when no motion is sensed on the wheel. Finally, there is a pair of Plus and Minus keys that do what the jog wheel does. The pitch change ballistics are slow, simulating the gentle ramping

behavior of a turntable.

When beat-matching one song to another, the Numark CDN-34 allows the operator two visual references. The first is a green LED, fed by a low-pass filter that detects bass drum beats and high-peak audio. The LED flashes in time to the dominant beats of the music.

The second is a BPM Tap button. Hit it once and the display changes from Pitch Percentage to Beats Per Minute. Hit it repeatedly on the beat and the display calculates an average BPM figure. The more often the button is tapped, the more precise the averaging.

The fun buttons on the Numark unit are the Loop In, Loop Out and Reloop/Stutter buttons. Anytime during playback, hit the Loop In button. The red Cue button will flash for a few moments as the time location is memorized by the CDN-34. When the Loop Out button is pressed, the deck goes into a looping mode, playing back the memorized segment. There is no time limit to the length of the sample, and playback of the segment can be tweaked with the Pitch Change controls.

This feature is fun and addictive. While one disc is playing, another can be locked into a loop mode and triggered percussively at will by the Reloop/Stutter button. Mixing both decks together creates interesting audio.

The potential for abuse is enormous, of course, and therein lies the fun. One of

the more annoying mixes I came up with was a blend of "I'll Be Missing You" by Puff Daddy with a drum and banjo Charleston loop from a CD of '20s vintage music. The pitch slider and sample retrigger button made it easy.

The good and bad

For all it has going for it, the Numark CDN-34 is a good value. The anti-shock transport unit keeps CDs tracking properly even when the dance floor is shaking or the sub-bass is rattling the room. A lot of control is offered to the user from the control head, and the drives cue up very quickly for last-second music decisions. The street price of the CDN-34 would be less than \$1,000.

Still, there are concerns that make me believe this deck is better off in a permanent rack location with gentle operators than as a mobile, transportable unit. The sample I examined had the power-button cap pop off as I turned it on. I could not find any locking screws for securing the laser heads when transporting or shipping the unit.

The sheet metal faceplates of both the transport and control boxes seemed thinner and less robust than what one might find on the comparable Denon dual CD deck. The plastic transport trays resemble those on consumer/home types. For a player intended for heavy use, this does not inspire confidence. There is no way to start

Product Capsule:

Numark CDN-34 Dual-Deck CD Player

Thumbs Up

- ✓ Fast cue-up
- ✓ Sample/loop feature
- ✓ Large display
- ✓ Versatile pitch-change options

Thumbs Down

- ✓ Light construction
- ✓ No console interface
- ✓ Play/Cue buttons not rubberized


For more information contact Numark Industries in Rhode Island at (401) 295-9000 or circle Reader Service 28.

the decks remotely from your console without cracking the case and tack-soldering a GPI across the Play switch. There is already the issue of the Cue and Play buttons mentioned earlier.

Finally, Numark and other manufacturers make audio mixers that are field-serviceable, with faders and controls that are easily replaced. The CDN-34 should have a similarly easy access path to the laser heads when it comes time for maintenance.

If you have a need for a dual-deck CD player, do not intend to travel with it, and can't swing the bucks for the Denon player, you may wish to check out the Numark CDN-34. It will give you the performance you are after and keep a little cash in the budget.

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TECHNOLOGY UPDATE

Virtual PCX Lets PC Do Work

Alan R. Peterson

As processors in today's computers become faster and more powerful, it is possible to hand intensive processing tasks, normally handled by the audio interface, off to the host CPU. These tasks have included multiple streams

sively add more audio workstations to a network, the option of using the sound capabilities already built into computers and simplicity in programming — developers can now write a single application that is easily modified for a wide range of uses.

Virtual PCX functions will vary with the amount of RAM and the processor

audio standard. MP3 support will be added later this year.

Three software modules will be available: two are out now, with the third due in May. VX Play is a simple audio play module capable of linear and compressed file playback. The module can be embedded in any Windows application.

VX Session can mix multiple files to a stereo soundcard. This module supports fade-ins, fade-outs and crossfades and is also capable of compressed file playback.

Coming in May, VX Studio mixes multiple linear and MPEG files in software. It will be capable of simultaneous, independent recording and playback.

There is limited time-stretching and pitch-shifting functions and DirectX plug-in effects can be used.

Audio quality varies widely with the type of sound card used. To complement the Virtual PCX process, Digigram is releasing two new audio interfaces: the VX222 PCI bus card and the VXpocket. The VX222 has 24-bit converters, balanced analog XLR I/O, AES/EBU and S/PDIF digital I/O, and a S/N ratio of better than 90 dB.

The VXpocket is a Type II PC card for laptop audio with balanced mic or line level stereo inputs, analog stereo outputs and S/PDIF I/O. Signal-to-noise is nearly 90 dB.



For more information contact Digigram in Virginia at (703) 875-9100, on the Internet at www.digigram.com or circle Reader Service 66.



Virtual PCX will port the capabilities of Digigram soundcards, such as the PCX11 shown here, to the host computer.

and encoding/decoding of MPEG files, often handled by the DSP and RAM contained on the audio interface.

Digigram has developed a suite of audio resource modules that take the processing power of a PCX card and port it to the computer. This means applications written for Digigram PCX cards can now run on all soundcards — even inexpensive “blaster” clones — that use the Microsoft WAV standard, with the host PC providing the horsepower.

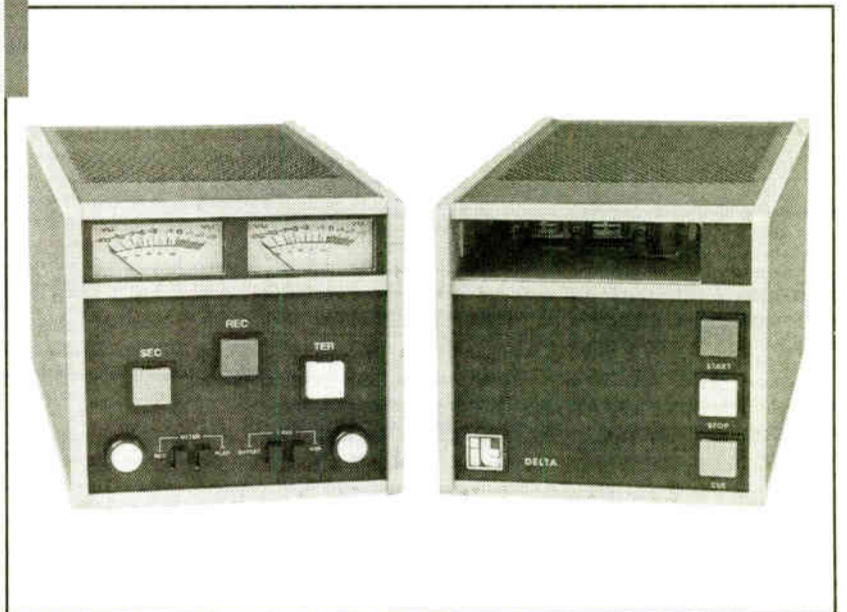
The advantages include the use of less-costly audio cards, the ability to inexpen-

speed of the host computer. For example, a Pentium 133 with 48 MB RAM and a conventional IDE hard drive — to handle playback of four simultaneous MPEG streams without overtaxing the CPU.

On a higher-end Pentium II 300 with 64 MB RAM and Fast IDE drive, simultaneous four-stream MPEG playback and one-stream MPEG recording is possible, while placing only a 25 percent load on the CPU.

The Virtual PCX modules support MPEG Layers I and II, as well as the low sample frequencies of the MPEG-2

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TECHNOLOGY UPDATE

Finalized DVD Format

DVD may soon have a legitimate place in audio storage and production for broadcast.

Under the chairmanship of Victor Company of Japan, the DVD Forum approved Version 1.0 of the DVD-Audio format. DVD-Audio is now the fifth approved format, following DVD-Video, DVD-ROM, DVD-RAM and DVD-R.

The DVD format offers seven times the disc capacity of the compact disc. When combined with the advances in sound recording technology made since the introduction of the CD in 1982, the advantages become clear.

DVD-Audio is intended to support a wide range of digital audio options. Sampling frequencies range from 44.1 kHz to 192 kHz, with intermediate rates of 48, 88.2, 96 and 176.4 kHz. The ability to capture 192 kHz/24-bit digital audio means a new resolution and presence is possible in digital recording.

DVD allows multichannel playback with up to 74 minutes of six-channel, 96/24 audio on a single-sided, single-layer disc.

One advantage DVD offers to broadcasters — especially those streaming program audio over the Internet — is

the ability to include visual content and liner notes about artists. Companies such as RadioWave.com and RCS provide interactive on-line radio services, where artist information, cover art and tour dates can be retrieved during song playback. Similar non time-sensitive content can be embedded into the DVD-Audio disc during manufacture.

It may soon be possible to include such content on the station level as well. Stations running local “best of” shows on weekends can author programs to DVD-Audio disc. While the audio portion plays back on the air, Internet listeners can peruse graphics, photos and host appearance dates.

The new Version 1.0 specifications are the end result of discussions that began in January 1996. The DVD-Audio Format Book — the official detailed specifications of the format — will be made available to authorized companies in the spring.

Information on the new DVD-Audio format can be obtained at the Office of the Secretary, DVD Forum, in Japan at 011-81-3-5444-9580.

— Alan R. Peterson

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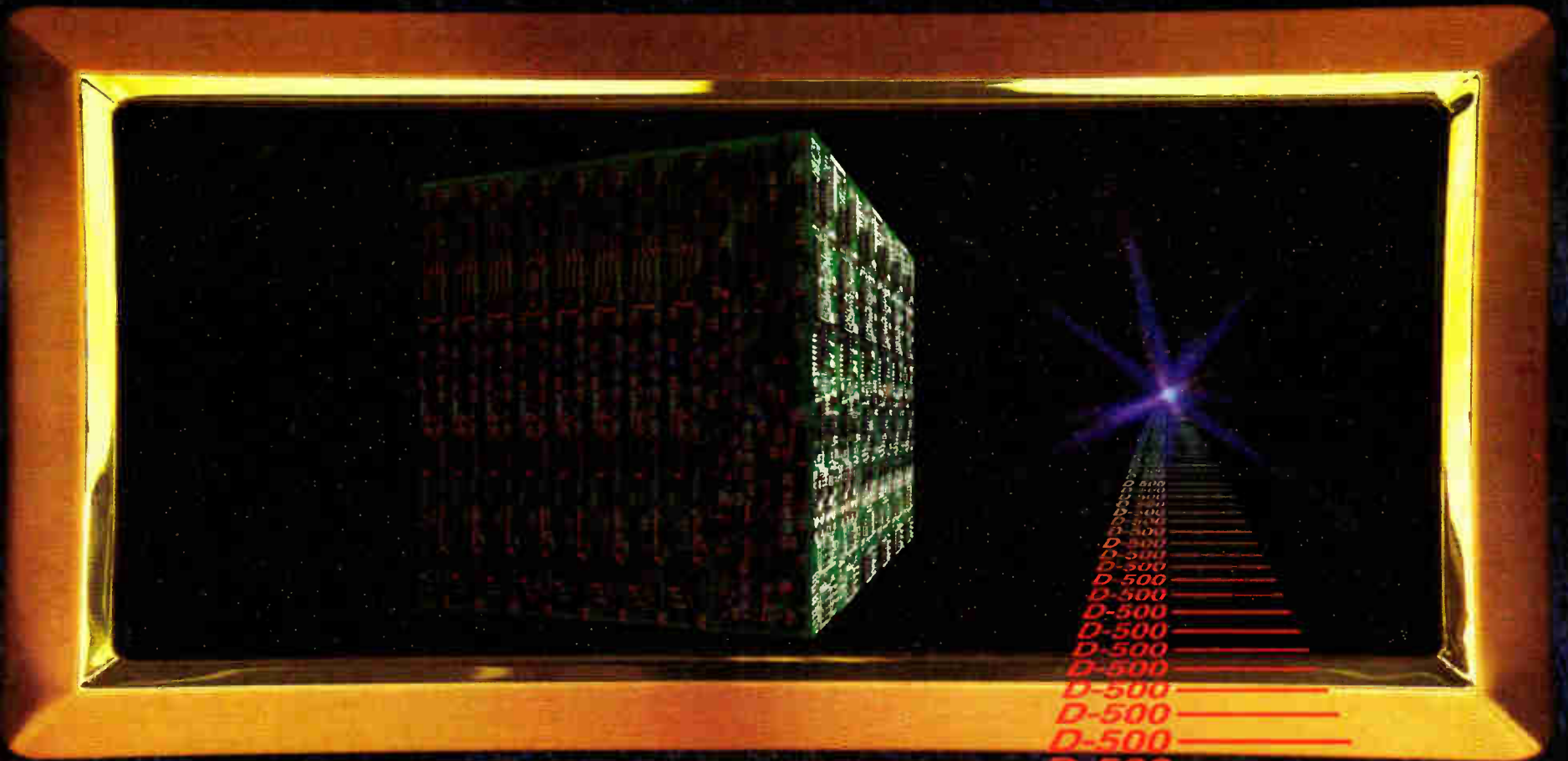
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