

*****3-DIGIT 605
 S103723 D08 9602
 THOMAS E BRAXTON 366
 MTS
 LUCENT BELL LABS/RM 2B-217
 2000 N NAPERVILLE ROAD
 NAPERVILLE IL 60563 1443



**Marti Electronics
 inaugurates new
 plant. See p.13.**

RadioWorld®

Vol 20, No 12

Radio's Best Read Newspaper

June 12, 1996

Tests to Start Regardless

*Despite Contract Disputes with Two Proponents,
 The EIA Says DAB Field Tests Will Proceed*

by Lynn Meadows

SAN FRANCISCO The Digital Audio Broadcasting field tests are ready to roll, with or without all the proponents.

As of mid-May, two proponents had signed the required field test contracts and the other two were still studying the wording.

The Electronic Industries Association has tried since March to get DAB proponents — USA Digital Radio, AT&T-Lucent, VOA and Thomson Electronics — to sign contracts agreeing to payment and terms for the field tests.

The latest deadline, May 10, came and

went without a single signed contract. A meeting held the following week did yield signed agreements from Thomson for the Eureka 147 L-band system and VOA for its satellite system.

But USADR, sponsor of one AM in-band, on-channel system and two IBOC FM systems had not agreed to the terms of the contract. AT&T/Lucent would sign by May 31.

Electronic Industries Association Director of Engineering Ralph Justus and one of the organization's top lawyers were on-call to be available 24-hours a day through May 23 in case either proponent wanted to

negotiate, said spokeswoman Lisa Fasold.

Contract negotiations began March 1, when contracts were sent out. Those contracts had a March 15 deadline. None of the proponents signed that contract. Instead, they raised several questions at a March 18 DAB subcommittee meeting.

In response, a special meeting dedicated to discussing the contract was arranged in early April. Later in April, revised contracts were sent out carrying a May 10 deadline.

On May 10, said Fasold, USADR and AT&T returned their contracts with a list of proposed changes. According to Fasold, USADR listed around 20 changes.

USADR sent the EIA a letter on May continued on page 11 ►

Random House President Harold Evans moderates the discussion on political satire during a broadcast of the publishing company's radio show. Panelists included Ed Koch, former mayor of New York, Harper's Editor Lewis Lapham, Michael Thomas, author, and New York Supreme Court Judge Burton Roberts.



See story page 38.

Dan Mason at Helm of New CBS Radio Group

Dan Mason began his radio career in Atlanta as program director for WZGC-AM-FM in 1975. In 1977 he moved to WPGC-AM-FM in Washington. The ensuing years saw him in San Antonio and Houston, Texas, with First Media, and eventually, in 1988, when First Media became Cook Inlet Radio Partners, he was named president.



Dan Mason

A native of Louisville, Ky., Mason was tapped by Group W Radio in 1993 to oversee its operations. He is currently president of the CBS Radio Group, overseeing 18 AM and 21 FM stations. In a one-on-one with RW Editor in Chief Lucia Cobo, Mason shared his perspective on the industry.

RW: The Telecommunications Act of 1996 merely set into law what was already a broadcast reality — ownership consolidation of stations and larger groups in the hands of fewer operators. Is the CBS Radio Station

Group on the prowl for more stations?

Mason: CBS is a growing company and it has been since it began in the 1920s. It will continue to grow. Do we intend to take full advantage of the changes brought on by the

Telecommunications Act? Absolutely.

RW: Do you feel there is a point where a broadcast company may have too many voices in one market?

Mason: Time will tell. This rule change has rearranged the deck so much that the answer to a question like that still has to be sorted out.

RW: How are you handling markets where CBS and Group W Radio used to compete? continued on page 13 ►

CCA Broadcast Transmitters

The Standard for Reliability Throughout the World.

Available FM Transmitters:

2.5 KW	20 KW
4 KW	25 KW
5 KW	27.5 KW
8 KW	35 KW
10 KW	45 KW
12 KW	

CCA Electronics, Inc.
 P.O. Box 426 • 360 Bohannon Road
 Fairburn, Georgia USA 30213
 (770) 964-3530 • FAX: (770) 964-2222

WINS(AM) Optimizes Its Signal

by Lee Harris

NEW YORK Not many AM stations would drop \$9 million on a new transmitter plant and tower with the end of the millennium approaching and an unknown digital broadcasting system waiting in the wings.

But if your station has the highest cumulative audience of any in the country (AM or FM) and is consistently among the top five billers in the nation, you just might approve the project after all.

All-news WINS(AM) New York did not set out to spend all that cash to improve its signal when the project began more than a dozen years ago.

Meadowlands challenge

WINS is the longtime flagship of Group W and is now the flagship of the CBS Radio Station Group. Since about 1940, the station had operated at 50 kW, directional-nights, with a four tower in-line array, located in Lyndhurst, N.J., about 12 miles west of Manhattan.

Over the years, booming construction in the once vacant swamps of the Jersey

continued on page 9 ►

NEWSWATCH

EEO Deadline Extended

WASHINGTON Stations can still comment on the proposed EEO Notice of Proposed Rulemaking at the FCC. The commission extended the deadline to July 1 and the reply comment deadline to July 31.

Marconi Nominations Open

WASHINGTON NAB member stations should have received the NAB open nominations kit for the NAB Marconi Radio Awards by now.

Nominations for the awards, which recognize excellence in radio programming and personalities, are due by June 17.

The 22 winners will be announced at the NAB Marconi Radio Awards Dinner and Show on Oct. 12 in conjunction with the NAB Radio Show in Los Angeles.

Colfax Buys Again

PHOENIX Colfax Communications Inc. announced the purchase of Phoenix-based Sundance Broadcasting Inc. for \$95 million last month.

Sundance owns and operates nine radio stations in three markets: four in Phoenix, two in Milwaukee and three in Boise, Idaho.

This brings the Colfax station count in Phoenix to six including KOOL-AM-FM which Colfax recently purchased from

Par Broadcasting. The others in that market are KZON-FM, KYOT-FM, KOY(AM) and KISO(AM).

The Milwaukee stations on the block were WMIL-FM and WOKY(AM); the stations sold in Boise were KARO-FM, KLTB-FM and KIDO(AM).

Green Leaving ABC

LOS ANGELES George Green, former president and general manager of KABC(AM) and KMPC(AM), is forming George Green Enterprises.

The company will specialize in facets of the advertising business including talk radio station consultation, radio syndica-

tion, sales training and traditional advertising account management.

Green, a 37-year ABC Radio veteran, retired in May and signed Capital Cities/ABC Radio Division as his first client.

MAB Annual Retreat

LANSING, Mich. The Michigan Association of Broadcasters will hold its 48th Annual Meeting and Management Retreat Aug. 19-21, at the Grand Hotel on Mackinac Island. The event is co-sponsored by Michigan Public Broadcasting.

The theme this year is "Exploring the New Broadcast Industry." The meeting will explore changes and effects of legislation and reorganization. Members will also be able to explore new ways to increase revenue. Registration is open to members and non-members. Call (800) 968-7622 for information.

Clarification

An article in the NAB wrap up issue (May 29) gave the mistaken impression that the commission had already streamlined the application process for various types of station changes like power and antenna height increases.

In fact, all that the FCC has done so far is issued a Notice of Proposed Rulemaking (MM Docket 96-58).

Index

FEATURES

- Amateurs Seek Sumptuous Signal**
by Al Parker 14
- Add More Space with New Drive**
by Richard Mertz 15
- Workbench**
by John Bisset 45
- Protect Signal from Reradiation**
by Tom Vernon 46
- Analyzing Circuits with Norton**
by Harold Hallikainen 48

STUDIO SESSIONS

- TensorTech Keeps the Tempo Going**
by Read G. Burgan 17
- Lexicon PCM-90 Is Radio-friendly**
by Ed LaComb 21
- Laptop System Allows Closer, Quicker Work**
by James Careless 21
- Eliminating Ground Loop Hum**
by Bruce Bartlett with Jenny Bartlett 22
- Spellcheckers Offer Odd Alternatives**
by Alan R. Peterson 28
- Expanding Digital beyond Analog**
by Mel Lambert 29

RUNNING RADIO

- NASCAR Taps Gentner for Races**
by Dee McVicker 32
- Ivy League Broadcaster Bills Big Bucks in JSA**
by Lee Harris 32
- Preventing Sensitive Situations**
by Sue Jones 33
- Stations Assess Syndication Needs**
by Bob Rusk 36
- Austrian Station Beamed from Afar**
by Susan Ladika 37
- Random House Offers Literary Radio**
by Frank Beacham 38
- Find International Stations on Web**
by Alan Haber 40
- Breakfast Show Started Day Right**
by Read G. Burgan 41

Lease a PhantomLite

for as little as \$281 per month*.

You know the world is crowded with digital audio systems. When you are faced with making a decision, it can be a confusing mess of features, reliability, and cost considerations that would frustrate any broadcaster. If you're looking for an answer that has the flexibility to give you total control, a gleaming track record to calm your nerves and a payment plan that won't break your checkbook, Harris and RDS have made it easy with the PhantomLite.

The PhantomLite is a trimmed down version of the reliable, industry benchmark Phantom system that has satisfied hundreds of radio operators over the past few years. The PhantomLite system has features that others would have you believe are either impossible, or are only available in the highest price range. For example, a single PhantomLite system can handle manual or automatic recording, network transfers, scheduling, logging, and other tasks all while it remains **completely** functional on the air, making you sound great.

Whether you will use your system in "Live Assist" mode, Satellite mode, or completely automated, the PhantomLite has all the horsepower that most stations need. It will handle audio switching and routing, automatic time-adjustment of commercial breaks, scheduling, logging, and a whole list of other tasks...and its functionality multiplies as you network systems together.

Call Harris today to find out how easily you could be "up and running" with a system that has already proven itself to be simple, reliable, and great sounding. And now, with our special lease rates available, it could be the best decision you've made all year.

TEL: 1-800-622-0022
FAX: 1-317-966-0623
<http://www.broadcast.harris.com>



HARRIS

rds



ASSOCIATES LEASING, INC.

© 1996 HARRIS CORPORATION

*Based on a 36-month lease of a basic PhantomLite system with a purchase price of \$7,995.00. First month payment is due in advance. Purchase option at end of lease term for \$1. Credit approval required. Other restrictions may apply. Limited time offer. 12-month and 24-month leases, also available.

Alliance Taps New Fund Source

by Lynn Meadows

WASHINGTON Heeding the call to find more money for public radio, the Listener Alliance for Public Radio may be the long-awaited knight in shining armor for budget-embattled public radio stations.

The group introduced itself at a press conference at the Public Radio Conference in May.

The idea is called "affinity marketing." Listeners support their local stations by purchasing specific products and services. They sign up for free, give the call letters of the stations they want to support and then just buy products as usual. A percentage of their purchases from specific companies then goes to the station they chose.

Consistent source

Walter McRee, founder and president of the Alliance, said that the idea is to find new ways to provide a consistent source of money for public radio.

"We know that the government is not

interested in being our permanent benefactor," he said.

McRee and other members of the board of directors wanted to make it easy for public radio listeners to support their favorite stations.

"We know that on average, only 10 percent of our loyal listeners, who love us despite our fundraisers, give to us periodically," said McRee.

A non-profit entity, the new Alliance is not affiliated with National Public Radio or the Corporation for Public Broadcasting. Board members anticipate all costs of the Alliance will be covered by participating vendors. That way the money received will be funneled directly back to the stations.

At the time of the conference, 11 public stations had joined the alliance: KUNM(FM), Albuquerque, N.M.; WBFO(FM), Buffalo, N.Y.; WRTI(FM), Philadelphia; WPBX(FM), Southampton, N.Y.; KGOU(FM), Norman, Okla.; KIOS-FM, Omaha, Neb.; WUKY(FM), Lexington, Ky.; WVPE(FM), Elkhart, Ind.;

WMRA(FM), Harrisonburg, Va.; WEKU-FM, Richmond, Ky. and KPBS-FM, San Diego.

Stations will pay a small annual fee. The scale runs from \$250 for stations with fewer than 25,000 weekly listeners to \$3,000 for those with 150,000 or more.

KUNM Development Director Mary Bokuniewicz said her station has been using affinity marketing with a long distance service.

No get-rich-quick scheme

She said that with just a few hundred listeners signed on, the partnership has generated \$5,000 in revenue this year.

"I know that the concept works. It's not a get-rich-quick scheme," she told attendees.

McRee played four promotional spots that the Alliance will supply to stations who join. Two are intended to introduce the Alliance.

"Wouldn't it be great if every time you filled your gas tank, made a phone call or bought a plane ticket, some of that money went to support this public radio station?" reads one spot.

The other two will be played after the Sept. 1, kick-off date. They list some of the supporters like MCI, The Gap and American Express and give an 800 number to call.

Listeners who call the number will give information about what station they want to benefit and some as-yet-to-be-determined database information.

After that, the Alliance will send the listener a catalog with material about participating vendors. A team in Boston and Cincinnati is creating the Listener Alliance Registration and Transaction Service which will handle the accounting for this program.

In addition to a tracking system, the challenge now is to convince vendors that this is a good idea.

The Alliance's promotional material lists several desirable demographics that many vendors are seeking. According to the booklet, public radio listeners are among the most educated and affluent of any national audience.

McRee is very excited about the potential of the Alliance. He said the program is not meant to be a threat to the traditional membership model and suggested that when a listener buys enough products to meet the membership donation, he or she should be given a membership.

The extra money from the Alliance might make the biannual membership drives less of a "nail-biting" experience for staffers, said McRee.

It is anticipated that stations with weekly listenerships between 100,000 and 800,000 could realize as much as an additional \$1 million annually. Stations with fewer than 100,000 weekly listeners could gain as much as \$200,000 in additional income.

Asked if commercial broadcasters might take a skeptical look at the program and see it as a "call to action" buried a couple layers deep, McRee said the spots maintain standard underwriting policies.

"It is a call to action for Public Radio," he said.

FCC Proposes Using Spectrum for LANs

WASHINGTON Spectrum watchers will be interested in a new proposal open for comment at the Federal Communications Commission.

Responding to two petitions submitted in May 1995, the FCC is prepared to open up 350 MHz of spectrum for a new category of unlicensed devices. The spectrum in question covers 5.15-5.35 GHz and 5.725-5.875 GHz.

The devices, called NII/SUPERNet devices, would provide short-range high speed wireless digital communications on an unlicensed basis.

Local network usage

The petitioners, one a consortium of companies known as WINForum, the other, Apple Computer Inc., foresaw using the spectrum for local area networks. The devices could transmit digital data 50-100 meters. Apple had also wanted the FCC to permit the new devices to cover distances of 10-15 kilometers or more for "community networks" and to facilitate wireless access to the National Information Infrastructure (NII).

In its Notice of Proposed Rulemaking, the FCC wrote that it found merit in the concept of longer-range community networks and is seeking comments on whether to permit operation up to 1 W of transmitter output power within the 5.725-5.875 band.

A common theme both in the NII/SUPERNet rulemaking and Senator Larry Pressler's recent spectrum bill (see page 6) is spectrum flexibility.

Minimum mandates

The NPRM proposes subjecting the devices to the minimum technical standards necessary, both to prevent interference to other services and to ensure the spectrum is used efficiently.

With that in mind, the FCC proposed setting only power limits, out-of-band emission limits and a basic "listen-before-talk" protocol standard.

One advantage of such wireless technology

would be the elimination of cabling expenses, delays and drilling. The technology would also enhance flexibility and mobility within LANs.

According to Apple estimates, the cost of wiring America's K-12 schools would be \$30 billion, while equivalent wireless connections would cost substantially less.

In its petition, WINForum (Wireless Information Networks Forum) championed what it calls Shared Unlicensed Personal Radio Network (SUPERNet) devices that can transmit digital information at rates of approximately 20 Mbps.

Apple indicated that its unlicensed NII band devices could provide data transmission capabilities of 24 Mbps or higher.

Both petitions point out that these NII/SUPERNet devices will be compatible with the High Performance Radio LAN (HIPERLAN) standard currently being developed in Europe. Apple stated that such compatibility would further the creation of a Global Information Infrastructure (GII).

Spectrum occupied

Over the past year, the FCC has received approximately 175 comments and 17 reply comments regarding this issue. Many relate to the fact that the spectrum under consideration already has other tenants.

WINForum's original request included the 5.10-5.15 GHz band. The National Telecommunication and Information Administration, however, struck that down because that band is currently used for air traffic control operations.

Other occupants of the 5.15-5.25 band include aeronautical radionavigation, aeronautical mobile-satellite, fixed satellites and inter-satellite services for both government and non-government operations.

The 5.25-5.35 GHz band is allocated to radiolocation service for primarily for government operations as is the 5.650-5.925 GHz band. Spectrum between 5.725 and 5.875 GHz is also designated for industrial, scientific and medical applications and unlicensed Part 15 devices.

"IF YOU DON'T YET OWN ONE AND YOUR COMPETITION DOES, WORRY."

Review in *Line Up - The Journal of the Institute of Broadcast Sound*
February/March 1996

unity
the world's best-sounding FM & AM processors

CUTTINGEDGE

TEL: (216) 241-3343 • FAX: (216) 241-4103 • E-MAIL: INFO@CUTTINGEDGE.ZEPHYR.COM

Circle (57) On Reader Service Card

Radio Timeline: Marconi to DAB

WASHINGTON What is that old line about putting the cart before the horse? I'm reminded of the old adage by the ongoing discussion about the future. The continuing debate about satellite digital audio radio and digital audio broadcasting and CD-quality radio is very beguiling.

On the one hand, you have the Europeans charging ahead with not only digital audio using Eureka-147, but also scoping out the ancillary data services and video transmission capabilities possible with that system. Technology is great, isn't it?

On the other hand, you have the original premise for wanting to move from analog FM to DAB FM: the elimination of multipath problems. After all, when we take this to the consumer, we as an industry have to be able to demonstrate to the consumer what value-added benefit he or she will immediately realize from spending X more amount of dollars to buy a radio receiver.

It is a lot like the infiltration of the PC into the home. It took a while, but when prices came down low enough and when the equipment and software was user-friendly enough, the benefits were immediately apparent. And then the sale of the PC for home use rocketed.

Obviously we, as an industry, are not rushing into the DAB fray. And that is good. As CBS Radio's Dan Mason points out, given our spectrum options, we must push for an in-band solution. But what he also points out is that programming was, is and always will be the key to our success as a business.

So maybe we wait a little longer for the onset of DAB in this country — that is fine — as long as we implement it correctly and focus on the benefits to our listeners and clients.

Especially for the technically oriented among us, it is easy to step over the line of technology "just because we can" vs. "How will it enhance our business and ensure our longevity?"

At RW we have reported and followed



Guglielmo Marconi

the rollout of RDS very closely here in the good old United States as well as abroad. The Electronic Industries Association just ended its campaign to outfit stations in the top 25 markets with RDS equipment. EIA is claiming success. Our own RDS Roll Call page lists more than 350 stations as being RDS-equipped and active.

But the consumer awareness of RDS and consequently its demand for it has lagged the industry.

We cannot afford to have that happen with DAB. It matters too

much, particularly to the AM band. While it may seem premature to say this, given that DAB rollout in the United States is still many years away, I would urge you to start thinking about how to position this technology so that when it is ready to roll, consumers will be too.

We could get a helping hand from the HDTV rollout — a sort of whetting of the appetite for all things digital — but we can't really bank on that. Get involved in the debate now.

★ ★ ★

There is another interesting story we'll be

tracking for you (in fact, look for it in the next issue of RW). The Federal Communications Commission adopted rules specifying that the license of any broadcast station that remains off the air for any consecutive 12-month period will expire as a matter of law, "notwithstanding any provision, term or condition of the license to the contrary."

Ouch. The first of such licenses will expire on Feb. 9, 1997, and that applies to any class of broadcast station, commercial or non-commercial, as well as remote pickup and auxiliary stations licensed to it.

Be forewarned. License expiration under these new rules will not be affected by a silent station's other FCC applications on file. In other words, it doesn't matter why you are off the air, if you are for 12 months, your license expires.

And of course, the new rules establish a process that is "simpler" than a revocation process previously used to terminate a broadcast license.

Also coming up in the next issue of RW is a very special interview with Guglielmo Marconi's daughter, Gioia Marconi Braga. As you know, in June of 1896 — one hundred years ago — Guglielmo Marconi took out patents in England for a new invention he called "wireless telegraphy." Soon after, the Marconi Wireless Telegraph Company was born, a business whose American operation would later become RCA, the Radio Corporation of America.

Marconi's great invention was the first transmission of coded messages through the air. It would be other inventors and geniuses — such as Lee de Forest, Edwin Armstrong and Marconi's employee, David Sarnoff, who would create the

One hundred years ago, Guglielmo Marconi's invention of the radio revolutionized communications and changed the course of history.

In honor of Marconi and other pioneers in global communications, Mrs. Gioia Marconi Braga, daughter of Guglielmo Marconi, and F.B.M. Research invite you to a special luncheon.

Guest Speaker Dr. Robert Lucky, of Bellcore, will introduce F.B.M.'s Dr. Gottfried Ungerboeck, 1996 Marconi Award winner.

Monday, May 20, 1996
United Nations, New York City, 46th Street Entrance
4th Floor - Dining Room #1
12:00 Noon - 1:30 pm

Lunch will be served

Please R.S.V.P. by May 16
Linda Spelling, Technology Solutions
212-636-2000, ext. 238



ARC-16: the logical choice for LMA and duopoly transmitter control.

The ARC-16 is available through:

BURK
TECHNOLOGY

**Put us
in your sites.**



HARRIS

Phone:
1-800-622-0022

BURK TECHNOLOGY • 7 Beaver Brook Rd., Littleton, MA 01460 • Phone (508) 486-0086 • Fax # (508) 486-0081 • email control@burk.com

Circle (83) On Reader Service Card

World Radio History

READERS FORUM

If you have comments for Radio World, call us at 800-336-3045 or send a letter to Readers Forum, Radio World, Box 1214, Falls Church, VA 22041 or e-mail 74103.2435@compuserve.com or MCI Mailbox #302-7776. All letters received become the property of Radio World, to be used at our discretion and as space permits.

GUEST COMMENTARY

Come March with the Microsoft Elephant

by Ray Miklius
Director, Digital Products
Broadcast Electronics Inc.

QUINCY, III. We have watched the discussion of the use of Microsoft Windows versus MS-DOS operating systems in radio digital audio systems with interest.

Last month, Broadcast Electronics introduced in Las Vegas a Windows 95 version of AudioVAULT, so our commitment to the Windows platform speaks for itself.

Still, as we were the first major radio equipment manufacturer to develop a digital audio system running under the Windows operating system, I think it is time you hear "the rest of the story."

Radio is a business. That is why you have a proliferation of business applications in your building.

Radio is also undergoing a rapid ownership consolidation that will require you to ask your staff to do more with less. Your operations become more complex with multiple stations in the same building.

Multitasking digital systems are the only tool for what you want to do. Why dedicate a plethora of expensive PCs to run dedicated DOS applications, or crowd a control room with four or five monitors when one will suffice?

Digital audio systems are no longer simple cart machine replacements. You are asking technology to help your station operate more efficiently, to generate economies of scale and scope.

Your business is changing rapidly and you will need new technology to support it.

The development tools and support utilities that Windows 95 provides allows us, as a vendor, to develop the applications you will require, as well as the reliability you need, while keeping support costs low.

Integration of disparate tools is the next technical challenge we face. Windows 95 allows rational interfacing among all the products you use: from multitrack editors to newsroom systems to traffic and billing to music schedulers. Windows 95 will allow the next phase of development — paperless radio — to be implemented reliably.

Windows 95 delivers much improved network stability, driver support and throughput. It allows thousands of different networks, printers, modems and peripherals to be installed and supported easily.

Additional emerging technologies that will have an impact on radio — such as WAN, ATM, TAPI and the Internet — are or will be bundled predominantly as Windows tools.

All these benefits will impact your cost of competing in the new radio environment.

Purchasing a digital audio system is an expensive, long-term investment. Given this, why invest in an operating system that will require extra work to integrate with the rest of your systems?

We might try to avoid getting trampled by the Microsoft elephant, but the fact is that where Microsoft goes, many will follow; they are the technology leader.

Your risk of technical obsolescence is minimized if your system is based on a technology that will continue to be supported and enhanced.

Don't get me wrong, some great DOS software has been written. I applaud the creative approaches that many have used to overcome the limitations of DOS: Real-time multitasking kernels, DOS memory extenders and graphical libraries all make some DOS applications look and feel like Windows programs. But how much further can this go?

We are already seeing maintenance and support problems associated with many of these programs.

The further we push a static DOS platform to satisfy the changing needs of the radio industry, the greater the chance of sleepless nights.

The choice is fairly simple: Do you invest in an operating system that went through one of the most expensive, most thorough testing programs in the history of software (Windows 95), or a system where development has all but ceased (DOS).

Radio is not standing still, why should your operating system?

Bricks and Mortar

The ongoing debate here on the Opinion page about the role of the DJ in a station's success reminds us that similar debates have been waged before. Ironically, the on-air entertainer and the engineer are in the same boat: Technology and economies of scale could displace them.

We say ironically because it was the engineers and the entertainers of radio's Golden Age that catapulted the medium into the hearts and minds

of the nation. Lest anyone forget, however, it is a combination of a clean strong signal and appealing on-air content that are the bricks and mortar that hold any radio station together. Without these two important facets, no sales packages, no remotes, no audience ... in short, no revenue generation would be possible.

In the larger debate of radio's survival against satellite digital audio radio and digital cable radio, localism is worn like the shield that will save us all. It cannot save you, however, if you do not practice good local broadcasting.

The tools that technology affords us are many — but they are just that: tools. Many a successful large market station uses prepackaged formats and syndication as a backdrop to its more important local programming. A programming mix that usually includes strong local personalities working in the community and with the community on issues and events that matter.

A satellite-fed format can provide you a music format or an all-news package you cannot afford on your own, but it should complement your local talent and community involvement, not replace them.

With the advent of duopoly and mega radio group owners, the importance of a local broadcast identity for each station is more crucial than ever. Use the savings that technology and consolidation afford to nurture those other facets of your station: the talent and the engineers. Without these two key players, you'd have nothing to sell.

-RW

FM composite digital transmission

Dear RW,

I am writing this letter to clarify for your readers a misconception that occurred at this year's NAB Engineering Conference.

Another manufacturer, Intraplex, gave a presentation on "T1 Digital STL: Discrete versus Composite transmission." During this presentation, and in the corresponding paper in the NAB 1996 Broadcast Engineering Conference Proceedings, Intraplex asserted that the transmission of FM stereo composite over a T1 line cannot be done in practice because of the nature of the sample rate required to digitize the 53 kHz FM composite baseband signal. Their paper suggested that in order to sample FM composite at 16 bits of resolution, a minimum sample frequency of 112 kHz would be required, giving a bit rate of at least 1.792 Mbps. This would indeed exceed the data throughput of 1.536 Mbps available on a framed T1 circuit.

We do not believe that the authors of the paper were aware of the QEI CAT-Link system. The CAT-Link has been transporting digital, uncompressed, real-time, FM composite audio with resolutions up to 16 bits for over six years. All this while also sending up to four other audio channels, simultaneously. This method is patented (Pat. # 5,054,070), and has been adopted by stations in hundreds of markets, including all of the top 50. The CAT-Link is the only STL system to offer the broadcaster the choice of transporting FM composite, CD-quality discrete or AES/EBU digital audio without the use of audio compression and in real time.

Eric Alan Eckstein
QEI Corp.
Williamstown, NJ

Homogenizing radio

Dear RW,

Owners, managers, please keep convincing yourselves that radio will be even better and more profitable without the DJ. I just love it. I want to purchase a station in the future and this type of thinking will certainly make the purchase less financially painful.

As I travel around the country I enjoy listening to radio, both FM and AM. I love to question locals about what they like and don't like about stations.

I seems the most popular stations overall are the ones that still integrate with the listener. It doesn't seem to matter what the format is, all people listen to the radio for entertainment and information.

As a local station manager told me a while ago, he is already playing 10 hits each half hour and doesn't know what else he can do. He's right. I listen to the station for about 10 to 15 minutes and then off it goes. The only problem? I can listen to 10 songs in 30 minutes on my car's cassette player and they are the songs I want to hear, minus those obnoxious, mind-numbing liners.

Inexpensive, motor-mouthed, inexperienced jocks will also turn off listeners. For those at the NAB radio luncheon, remember what Charles Osgood spoke about. Shows like Don Imus, Rush Limbaugh, etc., are popular because they are fun to listen to. They are entertaining.

If only product didn't matter. Life could be so easy (another word for cheap). Keep on homogenizing radio. It will make it cheaper for me to get into it. Thank you.

Mike Seaver
Quincy, IL

Radio World

Vol. 20, No. 12 June 12, 1996

Editor in Chief.....Lucia Cobo
Managing Editor.....Whitney Pinion
Technical Editor.....Alan Peterson
Associate Editor.....Angela Novak
Staff Writer.....Lynn Meadows
Assistant Editor.....Christopher Nicholson
Technical Advisors.....John Bisset, Tom McGinley
Editorial Director.....Marlene Lane
Assistant Editorial Director/Audio.....Alan Carter

Radio World (ISSN: 0274-8541) is published bi-weekly by Industrial Marketing Advisory Services (USA), Inc., 5827 Columbia Pike, Suite 310, Falls Church, VA 22041. Phone: 703-998-7600. Fax: 703-998-2966. Second-class postage rates are paid at Falls Church VA 22046 and additional mailing offices. POSTMASTER: Send address changes to Radio World, P.O. Box 1214, Falls Church VA 22041. REPRINTS: Reprints of all articles in this issue are available. Call or write Giselle Hirtenfeld, P.O. Box 1214, Falls Church, VA 22041, (703) 998-7600. Fax: (703) 998-2966. Copyright 1996 by Industrial Marketing Advisory Services (USA), Inc. All rights reserved.

—PRINTED IN THE USA—

**Next Issue of
Radio World
June 26, 1996**

Pressler Reveals Spectrum Bill

WASHINGTON Get set for a Federal Communications Commission yard sale.

A newly introduced bill would require that the FCC "exhaustively license" all available spectrum by selecting bands of unallocated frequencies and auctioning them.

The idea is one of many included in the discussion draft of a "grand spectrum" bill that Senator Larry Pressler, R-S.D., introduced in May.

Pressler, chairman of the Senate Committee on Commerce, Science and Transportation, wants to address what he calls the "ill-conceived, inflexible and inefficient" federal policies governing spectrum use and allocation.

"The spectrum is one of America's most valuable natural resources," Pressler said. "However, this resource is being wasted because we use a 1930s regulatory system to attempt to manage it."

Permanent authority

The discussion draft bill would expand and make permanent FCC authority to auction spectrum frequencies. That authority was initially granted in 1993 and will expire in 1998.

Pressler held four hearings on spectrum this spring as homework for this bill. He repeatedly heard how helpful spectrum flexibility would be for licensees. The new bill would grant

spectrum licensees the right to use the assigned spectrum for any services that are technically feasible.

"The government — not consumers — largely decides who uses spectrum fre-

CEO Eddie Fritts commended Pressler for undertaking a comprehensive approach to spectrum reform. He said the NAB was pleased to see spectrum discussed in the policy rather than the budget arena.

The NAB must be intrigued by Pressler's solution for the move to digital television. One 6 MHz Digital Television

The discussion draft bill would expand and make permanent FCC authority to auction spectrum frequencies.

quencies, what they are used for and how they are used," said Pressler. "This is central government planning at its worst."

The bill would consolidate federal spectrum management by eliminating the National Telecommunications Information Administration. That administration's spectrum management duties would be taken over by the FCC.

Another provision calls for the creation of a Base Relocation and Closing Commission. The commission would determine how the federal government should relinquish 25 percent of its spectrum holdings below 5 GHz so they could then be auctioned.

Block grants

To expedite public safety spectrum allocation, the bill would give spectrum block grants to the states. They could allocate it within state boundaries for public safety uses like police and emergency transmissions.

The National Association of Broadcasters was reserved in its comments about the bill. NAB President and

(DTV) channel would be assigned "non competitively" to every current NTSC broadcast licensee.

The licensee could accept the DTV license and pay a deposit fee or return it to the government and continue to broadcast in the analog bandwidth.

Broadcasters who accept the DTV license would pay a fee with installments over 15 years. The total fee would be the market value of the license. That would be determined by an auction of unused broadcast television frequencies conducted by the FCC.

If broadcasters returned their old analog spectrum to the FCC at the end of 15 years, their total payments (less interest) would be returned. For each year afterwards that the broadcaster kept the analog spectrum, the deposit to be returned would decrease by 20 percent.

"Rather than reacting precipitously to any one part of the bill, we look forward to conducting a comprehensive analysis and entering into discussions with the senator and his staff about the many complex issues presented," Fritts said in a statement.

Chancellor and Cox Make Big Block Buys

DALLAS For now, group owners are buying "in blocks" as recent announcements by Chancellor Broadcasting and Cox Broadcasting suggest.

Chancellor (Nasdaq:CBCA) announced it planned to acquire eight radio stations in Florida from OmniAmerica Group for an aggregate price of \$178 million. The purchase price included \$163 million in cash and \$15 million in Chancellor Class A Common stock.

At the same time, Cox Broadcasting announced it will acquire all of the stock of NewCity Communications Inc. based in Bridgeport, Conn., for \$250 million. The deal will add 18 radio stations and two LMAs to the Cox collection for a total of 37 (25 FM, 12 AM).

With eight new stations from OmniAmerica, Chancellor will have 43 stations in 16 markets. The move is a follow-up to the company purchase of Shamrock Broadcasting in February.

"We will seek to aggressively improve the results of these stations as we have done with the Shamrock stations which is evident by our recent first quarter results," said Chancellor President and CEO Steven Dinetz.

Three of the OmniAmerica stations (WXXL-FM, WJHM-FM and WOMX-FM) are in Orlando, Fla. Chancellor

already owns WOCL-FM in that market. Two others (WAPE-FM and WFYV-FM) serve Jacksonville, Fla., and the other three (WEAT-AM-FM and WOLL-FM) service West Palm Beach, Fla.

"This acquisition is an exciting step in solidifying our position as the leading radio broadcaster in Orlando, one of the country's top-five fastest growing markets," Dinetz said.

The NewCity merger assures Cox a place in Orlando too. NewCity has four stations in that market including WDBO(AM), WZKD(AM), WWKA-FM, and WCFB-FM.

NewCity also has stations in Bridgeport, Conn. (WEZN-FM); Birmingham, Ala. (WZZK-AM-FM and WODL-FM); Atlanta (WJZF-FM); San Antonio, Texas (KKYX(AM), KCYY-FM, KCJZ-FM); Syracuse, N.Y. (WSYR(AM), WYYY-FM, WBBS-FM) and Tulsa, Okla. (KRMG(AM), KWEN-FM and KJSR-FM).

"We intend to be major players in the exciting environment that surrounds radio after the recent telecommunications deregulation," said Robert F. Neil, executive vice president-radio, Cox Broadcasting. Dick Ferguson, NewCity president and chairman of the NAB Radio Board, will stay on at Cox.

NEW! Now in stock! Contact your Harris Representative today!!!



Mix It Up!

with *StereoMixer*, Henry's new 8-input stereo mixer!

- ∞ Mix four stereo sources!
- ∞ Mix eight mono sources!
- ∞ Combine stereo and mono sources!
- ∞ Get a mono output from stereo sources!

StereoMixer is the perfect solution when you've run out of channels on the console, or if you just need to create a sub-mix. Whenever you need a "set-and-forget" audio mix, **StereoMixer** is ideal!

Harris Corporation
Broadcast Division
TEL: 800-622-0022
FAX: 317-962-8961
<http://www.broadcast.harris.com>



HARRIS

© 1996 HARRIS CORPORATION

Compatibility, Confidence, and Cost Savings



- The ideal solution for remote broadcasts, ad hoc networks, voiceovers, distribution of commercials, backup to satellite and microwave links, and many other applications.

- Designed by Telos specifically for radio applications over ISDN and Switched 56.

- Clean, uncluttered front panel for simple operation. Full metering, call duration timer, headphone jack, and mic/line inputs.

- Built-in input protection limiter. When your talent screams, your audio does not distort.

- Zephyr has an ISDN integrated terminal adapter designed for the non-technical operator. You can even place a standard voice-grade call to a Plain Old Telephone Service (POTS) telephone.

No product lets you connect so easily to more sites via digital phone lines than Zephyr.®

Zephyr has Layer III which delivers 15kHz mono audio on just one of the two digital channels of an ISDN circuit. You save

just one ISDN circuit and one Zephyr. In stereo mode, Layer III and Zephyr preserve critical stereo information for superior

Why buy an ordinary codec, when for about the same price you can have a Zephyr?

Zephyr will communicate with these codecs and more!

**CDQ1000
CDQ2000
CDQPrima**

**Comrex DXP
Comrex DXR
Comrex DX200**

**Micro 56
Micro 66
RE 660/661**

Contact us for complete compatibility details. Some codec modes of some codec models may not be presently supported.

Need to call a site that only has Layer II or G.722? No problem. Zephyr is backwards compatible with all Layer II implementations, such as MUSICAM. Connecting to another Zephyr site? Now you really have options!

because the transmission cost is half that of other schemes which require both channels for broadcast quality.

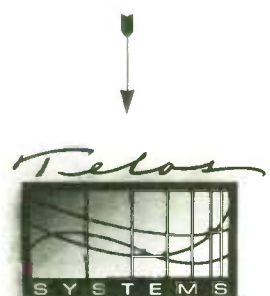
A split channel mode allows you to transmit two different mono programs to two separate locations using

musical events. And in all modes, Zephyr is full duplex for two-way transmissions.

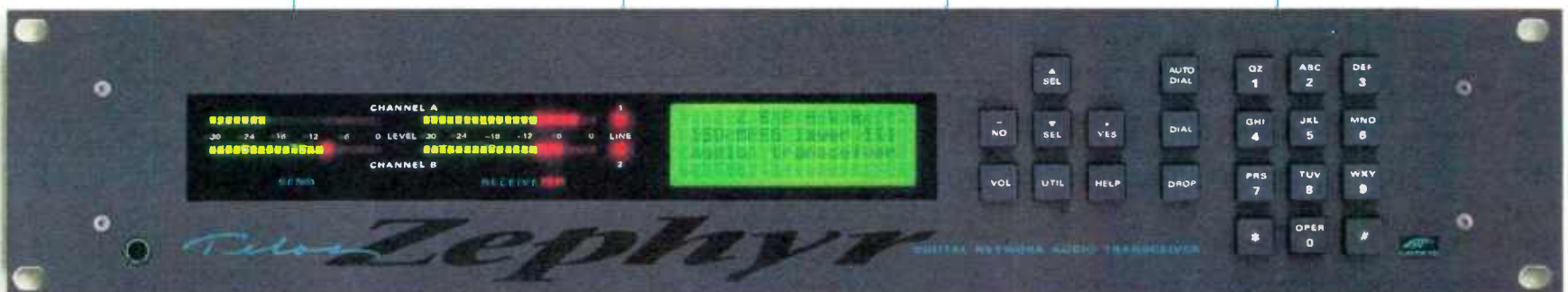
Telos quality and value result from more than a decade of exclusive dedication to products for the broadcast-to-telephone interface.



only from



2101 Superior Avenue
Cleveland, Ohio 44114
+1.216.241.7225
FAX: +1.216.241.4103
email: info@zephyr.com



The Best Way to Hear from There™

Telos Zephyr DIGITAL NETWORK AUDIO TRANSCEIVER

Telos Systems, the Telos logo, Zephyr, and The Best Way to Hear From There are trademarks of TLS Corporation. All other trademarks are property of their respective holders.

Find us on the World Wide Web at <http://www.zephyr.com>

Circle (79) On Reader Service Card

World Radio History

Radio Plays Part in Olympic Test

Atlanta Traffic Advisory Test System Integrates High Speed FM Subcarrier System

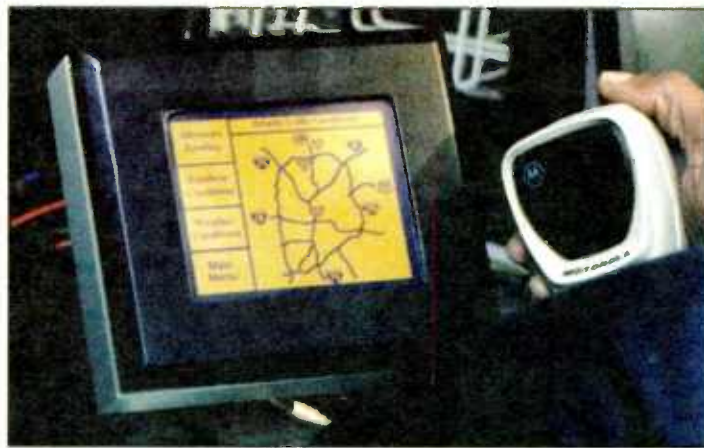
by Lynn Meadows

ATLANTA Radio may not be the hottest technology on the Information Highway, but it is playing a significant role on real life highways and byways in Georgia.

By the July 19 kick-off of the Olympic Games in Atlanta, the Georgia Department of Transportation (GDOT) will be in the middle of testing the most state-of-the-art traffic advisory system in the country.

The Southeast Region Team coordinated by Scientific-Atlanta is directing the Atlanta Driver Advisory System (ADAS), a radio-controlled driver advisory system. ADAS, funded with a \$7.2 million grant from the Federal Highway Administration, is only one part of the entire traffic advisory system under test.

ADAS is being installed in 100 delivery vehicles supplied by Federal Express and 100 road-side assistance and other vehicles supplied by the GDOT.



ADAS Mobile Unit

The vehicles are being outfitted with FM subcarrier radios, 220 MHz narrowband transceivers and GPS receivers.

The subcarrier system used in the tests is called the Subcarrier Traffic Information Channel (STIC).

Developed by Mitre and licensed by Scientific-Atlanta, STIC is one of three systems currently being considered by the National Radio Systems Committee to become the official high speed FM subcarrier standard.

WRFG(FM) at Clark Atlanta University is providing the subcarrier channel for STIC. The channel will offer drivers traffic speed levels and incident reports as well as weather and event notices.

With information on construction delays, accidents and congestion, drivers will be able to choose the best route.

The highway information will come from Atlanta's Advance Traffic Management System developed by TRW for GDOT.

Over 400 video detection cameras are being installed on Georgia high-

Drivers will be able to choose the best route.

ways primarily around Atlanta. Computers attached to the cameras will make sense of the information received.

For example, if the posted speed limit is 55 mph and the cars are only going 10 mph, the GDOT officials will know there is a backup on that road.

The information is relayed not only to the test vehicles, but to kiosks throughout the state, to hotel rooms, and to other places travellers might need it.

For now, the 220 MHz transceivers installed in the 200 vehicles will provide a simulated driver emergency signal capability for evaluation purposes only.

FHA Engineering Systems Manager Shelley Lynch said that an additional 250 local buses will have GPS receivers.

Information on the bus route schedules will be available at the kiosks with a touch screen.

Radio has another role in the advisory system: new signs along the highway will notify drivers to turn to AM 530 when the lights on the sign are flashing.

Nobody expects the system to fix traffic problems, said Lynch, but with it, GDOT will have many more resources to help spot trouble areas quickly.

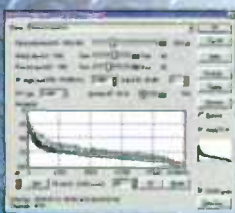
"We hope it will help during the Olympic period," said Lynch. She said that the FHA is optimistic that parts of the system will remain after Sept. 30, the test's scheduled stop date.

We've Strengthened Our Cast

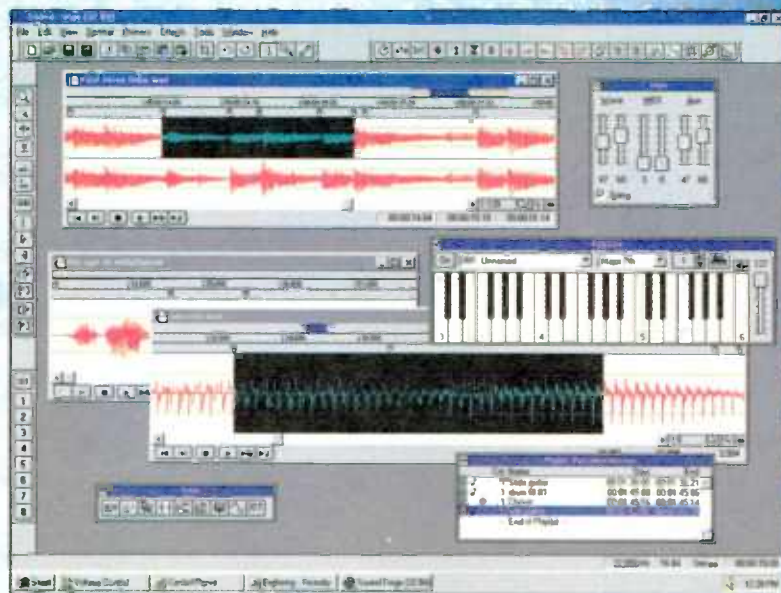
Sonic Foundry's Sound Forge™ 3.0

Whether you're a musician, sound designer or multimedia developer, full-featured sound editing for the Windows® platform has never been easier. Sound Forge offers editing, application of audio-processing effects, creation of loops and regions, and generation of playlists. An expandable plug-in architecture tailors Sound Forge to any application. Both a 16 Bit (Windows 3.1 or Windows for Workgroups™ 3.11) version and a 32 Bit (Windows® 95 or Windows NT™) version are included.

Noise Reduction Plug-In

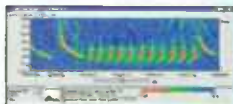
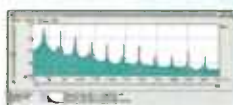


Now there's no need to slave away filtering noisy recordings. Sonic Foundry's Noise Reduction Plug-In is designed to automatically remove background noise such as tape hiss and electrical hum. Click Removal is also included, allowing you to eliminate clicks and pops automatically.



Spectrum Analysis Plug-In

And if you need to identify that particular frequency component, you'll find the Spectrum Analysis Plug-In a great addition.



Spectrum Analysis includes Spectrum Graph and Sonogram display for easy frequency (or pitch) identification.

Batch Converter Plug-In

The Sonic Foundry Batch Converter Plug-In is a time saving utility for those needing to convert tens, hundreds, or even thousands of sound files to a different format automatically. All Sonic Foundry plug-ins require Sound Forge 3.0.

Sound Forge XP

Sound Forge XP, a general purpose sound editor provides the same easy to use interface found in the professional edition. Sound Forge XP is intended for sound designers, multimedia developers and hobbyists requiring a powerful yet affordable sound editor.

For more information

call Sonic Foundry at

1 800 57 SONIC (577 6642)



100 South Baldwin, Suite 204, Madison, WI 53703
Tel: (608) 256 3133, Fax: (608) 256 7300
CompuServe: 74774,1340 or GO SONIC
Internet: sales@sfoundry.com, Sonic Foundry, and Sound Forge are trademarks of Sonic Foundry Inc. Other products mentioned are trademarks of their respective manufacturers.
<http://www.sfoundry.com>



Stations Weigh the Options: Buy, Sell or Else

by Lynn Meadows

FALLS CHURCH, Va. Even before the passage of the Telecommunications Act helped accelerate the consolidation of the radio industry, brokers were warning single-station owners "buy, sell or else."

But the large groups have not swallowed up all of the stations in the top 150 markets. Several local owners and operators expressed mixed plans and opinions about what the future could hold in light of massive deregulation.

Opinions on whether to buy or sell were mixed. All concluded that they would consider selling if the price were right. That price varied, however. As one owner explained, his "right price" would depend on somebody setting "awfully stupid."

I've got an offer for you

WFMZ(FM) President Richard Dean in Allentown, Pa., is getting offers regularly from people interested in his station. He said multiples of 18-20 times cash flow have been offered.

"If we didn't enjoy what we were doing, we'd be crazy to stay in," said Dean.

Dean has heard the warnings about the need to buy or sell.

"In this particular case, we're continuing what we're doing," he said. "I probably would not be buying."

Broker Robert Mahlman of The Mahlman Co. said that in terms of consolidating, "The big markets are gone." According to Mahlman, owners in small and medium markets need to be making decisions now.

Mahlman said that there are between six and 10 large institutions looking to expand into medium markets. Their goal is to buy enough mid-size properties to go public. Public money is much cheaper than going to the bank.

Mahlman estimated that an owner would need holdings in five to eight markets before going public.

One broker warns that there is nothing — besides scruples — to stop a well-financed company from underpricing ads and driving other stations out of business.

But John Casciani, owner and operator of WNUC(FM) in Buffalo, N.Y., said he expects the mega-groups will push ad prices up. Because groups are paying huge multiples for stations, explained Casciani, they will have to get a return relatively quickly to justify their purchases.

Late lift

In Buffalo, where rates have been notoriously low, Casciani said the big companies have the muscle to command rates that stations should have been getting all along. Casciani has raised his rates which are still below those charged by the big groups in town.

"We can do very nicely and still allow smaller deals," he said.

While brokers have approached him periodically, Casciani said he did not plan to sell. He said he would eventually like to sell and anticipates that down the road, some groups will find their mammoth size too cumbersome and spin off some of their properties.

With new and more expensive deals being announced weekly, the pace of consolidation might feel frenzied.

"I don't feel any urgency at all," said Cary Camp, owner and operator of KLKL(FM), KDKS - FM and KOKA(AM) in market 126, Shreveport, La.

Camp said stations in the top 10, 20 and 30 markets may feel a sense of urgency, but he said the big companies will



have to finish gobbling up the top markets first.

One broker said that an owner's best shot is to

expand in and dominate his or her own market.

In some situations, he said, competitors who have hated each other are now trying to cooperate or set up an LMA.

Three-station owner Camp takes a different approach. In his view, an owner whose stations are all in the same market

is at the mercy of the economy of that market. Camp said he plans to expand into other markets, but will stay within 250 miles of Shreveport.

In market 53, Jacksonville, Fla., Greg Perich, owner and operator of WJXR(FM), has seen a steady stream format and owner changes in the past years.

Last one standing

"We're the last stand-alone FM in the Jacksonville market and beyond," said Perich. Despite several offers, Perich said

he is not interested in selling.

Instead, he plans to expand both in Jacksonville and beyond. Perich said that one of the major advantages of being a local owner and operator is the ability to react quickly to local events.

Dorsey Newman is the owner of two AMs in Huntsville, Ala., market 113. He said that not much has happened in light of the Telecommunications Act in his neighborhood.

He expects most of the coming activity to take place in the top 100 markets.

"I'm looking at other properties that we might acquire in the future," he said adding that those plans are long term.

In Myrtle Beach, S.C., market 185, Arlyce Posey, owner and general manager of WSCA(FM), also anticipated purchasing activity to start in large markets and move to smaller ones.

Posey echoed observations made in other markets that the Telecom Act may have enhanced local station values.

"I would sell if somebody came with the right price," said Posey.

WINS Signal Project

► continued from page 1

Meadowlands made it increasingly difficult to maintain the directional pattern. WINS was eventually forced to roll back its daytime power to 30 kW to keep the pattern within tolerances.

Expensive engineering studies were undertaken to determine the best means of optimizing the WINS signal. Many options were considered including relocation of the transmitter site.

After about a decade of consideration, the final plans were drawn up. They called for separate day and night patterns off a brand new four tower parallelogram array to be constructed on the same site as the existing in-line array. This presented some major engineering challenges.

First, Westinghouse had to buy and shut down a couple of stations that would interfere with the new signal: 1010 kHz co-channel KSYG(AM) in Little Rock, Ark. (taken dark about a year ago) and adjacent channel WRNJ in Hackettstown, N.J. (still on the air at 1000 kHz).

Because the new array would be constructed on the existing site, there was a debate over how to protect site workers from radiation hazards. The matter was solved by an arrangement with WABC(AM).

WINS hooked up a 10 kW transmitter to the WABC auxiliary antenna in nearby Lodi, N.J. WINS operated off this site at 7 kW nondirectional during midday and weekend construction periods. The signal was not bad, considering the power reduction.

Share and share alike

The auxiliary transmitter will remain in place after construction. In return, WABC will set up an auxiliary transmitter at the WINS site, diplexing into one of the four new towers. The towers were purchased through Stainless — that also erected the towers under the contractual arrangement.

As a result, the transmitter building will

be a bit on the crowded side. In addition to the WINS main and standby transmitters (a new Harris DX-50, and an MW-50) and the 10 kW WABC rig, there is an auxiliary facility for WNEW-FM, WINS sister station. The FM antenna for WNEW-FM was supplied by ERI.

The phaser for the project was designed and built by Kintronics.

A six-bay FM antenna has been



Assembling the WINS Tower

clamped to one of the new 400 foot AM towers. This site would only be used in the event of trouble at the Empire State Building, where WNEW-FM has both main and alternate main antennas.

There is no room for backup program origination facilities at the transmitter, but there is a direct link from the studios of Shadow Traffic a few miles away in East Rutherford, N.J. In a pinch, WINS personnel could work out of the Shadow facilities.

Another engineering challenge had nothing to do with electronics. The Jersey Meadowlands are protected wetlands, and all construction requires clearance and review from the Army Corp of Engineers.

While cooperative, the Corp was over-

seeing such arcane matters as making certain that weeds were replanted in the exact location where they had been dug up to lay cable.

The environment inside the transmitter building was also a consideration, resulting in a major asbestos abatement project. All told, WINS called on the services of more than a dozen subcontractors including environmental consultants.

Constant construction

Like most major undertakings in broadcasting, this job is running a bit behind schedule. The snowiest winter in memory made the already swampy tower site even less accessible to heavy equipment.

The final phase of the project calls for laying a new ground system over the existing grid and knocking down the three remaining towers from the old array. Only when this is accomplished can final tuning of the new array begin.

Final tuning is perhaps a bit of a misnomer. With the constant construction in the Meadowlands, the pattern will still require frequent adjustment. Project Chief Bob Moore and WINS Director of Engineering Operations Mark

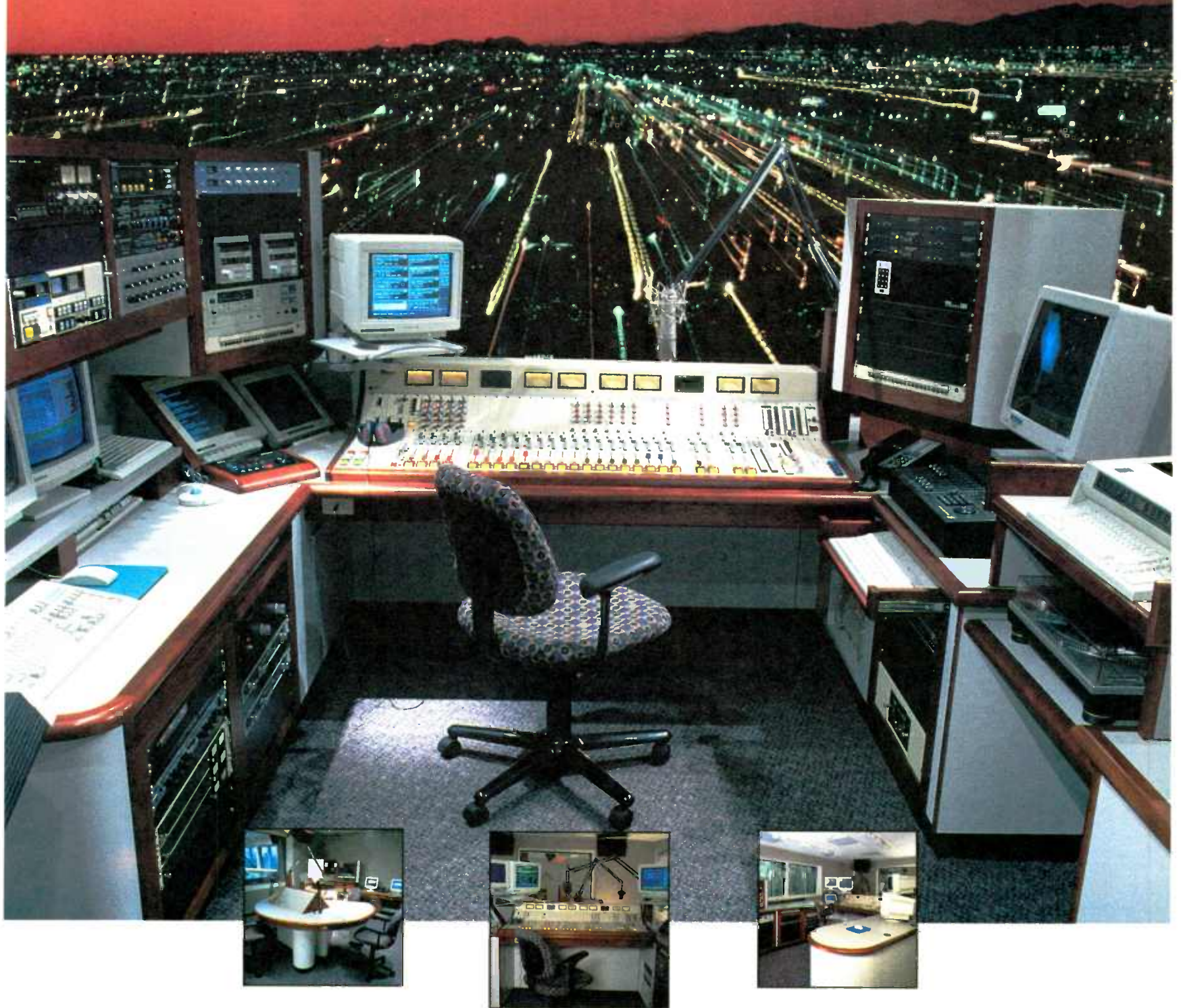
Olkowski hope to flip the big switch early this summer.

What does WINS gain from this massive expenditure of cash, time and manpower? The new pattern should add more than one million New Jersey residents to the station's primary contour and shore up some dead spots in the existing pattern.

The expanded and reliable signal delivery should help WINS maintain its status among the nation's top five billers, and there is enough redundancy to ensure that the all-news station will be on the air in the event of an emergency.

Meanwhile, management is hoping there will not be any more big checks to write until it is time to upgrade to digital.

A ROOM WITH A VIEW.



Great studio systems start with vision. Take WKHX/WYAY for instance. When Cap Cities/ABC decided to build a new home for Atlanta's country powerstations, they wanted to build the finest radio complex possible. So they called the studio experts at PR&E.

PR&E consulted with management from project concept all the way through the design and installation of the client's new technical complex. Our team worked hard with their engineering staff to implement all the technical details of their vision. The result? One of the smoothest functioning broadcast facilities in the country.

Planning new or upgraded studios doesn't have to be overwhelming. Just call the experts at PR&E and find out how easy and affordable a fully-integrated, state-of-the-art radio studio can be.



WHERE GREAT RADIO BEGINS

PACIFIC RESEARCH & ENGINEERING 2070 LAS PALMAS DRIVE CARLSBAD, CA 92009 TEL: 619.438.3911 FAX: 619.438.9277 E-MAIL: sales@pre.com

Circle (105) On Reader Service Card

World Radio History

Firm Funds Investment Group

DALLAS Look for middle-market action from a group called Capstar Broadcasting Partners.

Hicks, Muse, Tate & Furst Inc. has committed up to \$100 million to a new radio industry investment group to be headed by R. Steven Hicks. Hicks plans to resign as president and CEO of SFX Broadcasting by Sept. 1.

Steven Hicks is the brother of Hicks, Muse Chairman and CEO Thomas O. Hicks.

The Hicks brothers purchased WSIX-FM in Nashville in 1987.

The station became part of Capstar Communications in 1989 and in 1993, Capstar merged into SFX, which Steven Hicks co-founded with Robert F.X. Sillerman.

The soon-to-be-formed Hicks, Muse, Tate & Furst Equity Fund III will allow Capstar Broadcasting Partners President Steven Hicks to acquire in leveraged transactions up to \$1 billion of radio station properties.

Said Thomas Hicks, "My partners and

I at Hicks Muse are delighted that we will now be partnering as a firm with Steve and building value for our

In 1993, Hicks Muse helped form Chancellor Broadcasting. The plan is to have Steven Hicks and Capstar focus on markets ranked 25 and below nationwide, while Chancellor continues to focus on the top-25 markets.

"Our principal strategy will be to

The plan is to have Capstar focus on markets ranked 25 and below nationwide.

investors based on his tremendous experience and outstanding track record as the most successful owner and operator of middle-market radio stations in the country."

acquire or merge with several successful middle-market radio groups which will continue to be operated by their existing management who will become our partners," said Steven Hicks.

DAB Tests To Start This Month

▶ continued from page 1

24 citing three issues it was concerned with in the contract. First, according to Bernice Strom of USADR, the NAB and EIA had a "memorandum of understanding" that said the NRSC would evaluate the IBOC proponents while the EIA evaluated the test results of the non-IBOC proponents.

According to Strom, the EIA violated that agreement when it released data from the lab tests early and compared the results of the IBOC systems with the non-IBOC systems.

The two other issues USADR has with the contract are that the test procedures need to be spelled out and the test criteria need to be defined.

Strom said USADR wants every "i" dotted and every "t" crossed before proceeding with the tests. The proponent wants to avoid problems similar to those that surfaced during the lab tests last year. According to Strom, those included improper testing procedures, early release of data and direct comparisons between the IBOC and non-IBOC systems.

None of these issues should surprise the EIA, said Bernice Strom of USADR. She said they were all included in USADR's letter of intent sent in December.

By May 31, however, AT&T/Lucent and the EIA had reached an agreement, and the company added its in-band/adjacent-channel (IBAC) and IBOC systems to the field tests.

Testers are moving the VOA and Eureka equipment out of the NASA Lewis Research Center in Cleveland into the field test truck heading to San Francisco.

Further negotiations will be needed to decide what becomes of AT&T and USADR equipment. Once it is returned to the proponents, Fasold said, the EIA can no longer field test it because the integrity of the systems would be in question.

Fasold anticipated that the tests on the Eureka and VOA systems would begin around the second week of June. They are expected to be finished by June 30. That is when permission to use the L-band for Eureka testing expires.

As for USADR, Strom said "The EIA isn't the only sanctioned testing body." The company may consider using an independent testing entity.

Meanwhile, field test organizer Bert Goldman continued to look for a radio station that would agree to test the IBOC systems. Fasold said that if the two do sign their contracts, the EIA is contemplating building its own station to use in the tests.

MARKETPLACE

Recently Introduced Products for the Radio Broadcast Professional

Digital Workstation Upgrade

A new digital effects upgrade has been added to the DSE 7000 digital audio workstation from Orban. The package includes a replacement DSP board with 24-bit internal processing and new version 6.0 software.



Orban provides digital effects upgrade for DSE7000.

Available effects types include Orban parametric equalization, Optimod compression, digital delay and Lexicon digital reverberation. The upgrade will be standard on all new DSE 7000 units shipped in late spring of this year and may be retrofitted into existing units. The complete upgrade will be provided at no cost to customers who purchased a unit after Jan. 1, 1996.

For more information from Orban, contact Amy Huson in California at (510) 351-3500; fax: (510) 351-0500; or circle **Reader Service 110**.

New Line of Audio Cables

A new line of flexible, non-kink multipair audio cables that exhibit a low level of microphonic or triboelectric noise is available from Belden Wire & Cable. Brilliance AudioFlex Snake Cables can be used for connecting multiple audio channels in low- and high-level componentry.

The cables feature Belden French Braid Double Shield that provides flexibility and improved flex life over standard braid or single- and double-spiral shields. Brilliance cables allow for convenient, direct connections without the use of heat-shrink tubing or other time-consuming preparation steps.

For more information from Belden, contact the company in Indiana at (800) 235-3364; or circle **Reader Service 188**.

Satellite PC Card Receivers

The SR253 DataNet and SR263 FlexData satellite PC card receivers from International Datacasting are com-

plete satellite data broadcast downlinks in a plug-in expansion card. Both install into a standard personal computer ISA card slot.

The DataNet operates at an aggregate data rate of 256 kbps while the FlexData operates at an aggregate data rate of 267 kbps. Both receivers can provide serial data directly on the PC bus using a software driver, or directly output the data on a rear data-output connector.

For more information from International Datacasting, contact the company in Georgia at (770) 446-9684; or circle **Reader Service 136**.

Acoustic Fabric Panels

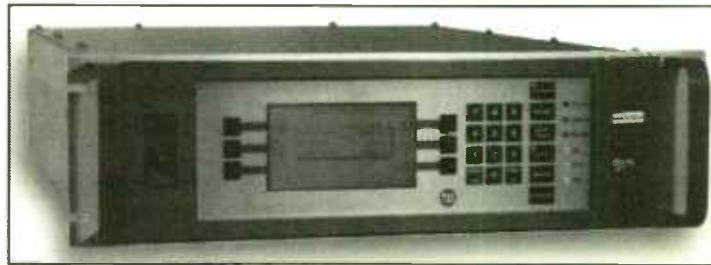
New acoustic fabric panels are now available from NetWell Noise Control. The hardboard compressed fiberglass sound panels are wrapped in more than 30 different colors and are available in either a 1- or 2-inch thickness. The panels can also be cut to meet custom size demands.

The acoustic fabric panels feature NRC values of 1.05 with a low frequency absorption rate of almost 46 percent at 125 Hz. Panels are available in sizes ranging from 1-foot by 4-feet up to 4-feet by 10-feet and can be clip-mounted or glued to a wide variety of wall surfaces.

For more information from NetWell, contact the company in Minnesota at (800) 638-9355; or circle **Reader Service 162**.

Medium Power Amplifier

New from MCL Inc. is the MX3000 TWT medium power amplifier. The MX3000 is a compact, single-drawer amplifier that occupies 3 standard rack units and is suited



MCL Inc. MX-3000

for transportable, satellite uplink applications.

The MX3000 is available in several models including 400 W C-band, 350 W X-band and 350 W Ku-band. Included with all models are a power supply, control logic module and cooling assemblies.

For more information from MCL, Inc., contact Ron Adamson in Illinois at (708) 759-9500; or circle **Reader Service 214**.

U.S. Shortwave Faces Challenges

by James Careless

OTTAWA In theory, U.S.-based international shortwave (SW) stations do what domestic AM and FM stations do: they broadcast radio programming.

However, when it comes to the technical and financial challenges they face, the two businesses couldn't be more different; so different, that having an ability to work in one wouldn't necessarily guarantee you success in the other.

Technical challenges

There are 18 privately owned SW stations in the United States. Most of them — like WHSB Cypress Creek, S.C. (owned by the Christian Science Church), and WYFR Okeechobee, Fla. (owned by Family Stations) — are religious broadcasters, relying on donations and church support to keep them going. A few others — such as WRNO Worldwide in New Orleans and WRMI Miami — are truly commercial outfits, whose main purpose is to make money.

In either instance, all of these stations are faced with the same technical challenge: namely, how to get their signals out to their target audiences, which can be anywhere in the world.

This challenge breaks down into three parts. First, there is power: to be on the shortwave bands, the FCC requires broadcasters to operate with at least 50 kW of transmitter power, and to build the complicated, costly antenna arrays capable of delivering SW signals across thousands of miles.

Second, there is the problem. Unlike FM and daytime AM radio, SW transmission relies on reflecting signals off the ionosphere — a series of electrically charged layers circling the earth — in order to deliver them past the horizon. (In other words, the SW broadcaster transmits skyward to the ionosphere, that then bounces the signal back down to earth.)

The challenge here is that the electrical qualities of the ionosphere vary widely,

first as a factor of exposure to sunlight (meaning that a frequency that works at noon won't necessarily work at midnight), second due to the influence of solar radiation, which varies over an 11-year cycle due to changes in sunspot activity, and third because of the sudden onslaught of solar storms, which can wipe out ionospheric 'bouncing' altogether, occasionally putting stations effectively off-air as far as their listeners are concerned.

Technical hassles can be handled by a competent broadcaster. However, the financial challenges are something else.

Coping with ionospheric changes means that SW broadcasters don't have the comfort of parking themselves on a single frequency 24 hours a day. Instead, they've got to move around the various high and low shortwave bands on a regular basis, in order to get their signals out.

The bottom line? When it comes to putting a shortwave station on-air, "it's a lot of money to get started," says WWCR General Manager George McClintock. "It's a lot of money to operate. It's engineering-driven, and therefore (this) makes it deadly for those owners and station managers who do not understand engineering; they're going to kill themselves."

Financial challenges

Despite the hassles of shortwave signal propagation, it's fair to say that the technical hassles can be more or less handled by a competent broadcaster. However, the financial challenges are something else.

The key problem is that "there's no Arbitron ratings for shortwave," said Jeff White, general manager of WRMI (Radio Miami International). This is because shortwave listeners are, on a city-by-city

basis, a relatively small crowd in the United States, and also due to the fact that American rating services don't cover Canada, Latin America, Europe, Asia and Africa.

The result? When it comes to pitching spot sales, these broadcasters have no audience numbers to persuade advertisers with.

Despite this, some shortwave stations have tried to live on spot sales, as if they were domestic AM/FM broadcasters. The

problem, said Kim Elliott, host of Voice of America's "Communications World" program, is that they all failed.

"Entertainment-oriented radio that would sell spot advertising never made it on shortwave," says Elliott, who stresses that he's speaking for himself, rather than on behalf of the VOA. "The old Radio Newyork Worldwide did not succeed. WRNO did not succeed, even though it tried very hard with that format. KUSW out of Salt Lake City (the station whose signals were used to drive Manuel Noriega out of his refuge in Panama) attempted that format, and folded rather quickly."

Founded in 1981, WRNO is the only one of these stations still in business, but only because Owner and General Manager Joe Costello gave up on spot sales. As he says now, "I anticipated. I thought that we could sell commercials ... but you just can't sell it to the local Ford dealer."

However, what Costello and other stations have discovered — including religious outlets like WWCR — is that "people will pay for coverage." In other words, independent programmers — be they religious groups, governments, political refugees or hardline extremists (usually on the right) — will pay U.S. SW stations to purchase 'block time' slots, so that they can reach whoever it is they want to reach.

WRMI, for instance, sells block time at \$100 an hour. Given its coverage of the Caribbean, it's only natural that many of the WRMI clients are Cuban-American groups opposed to Fidel Castro. They pay the station to carry Spanish-language programs such as "La Voz de la Fundacion," which runs on WRMI daily for three hours at a time.

This show actually used to run six hours, said White, "but the Cuban community here seems to be going through a financial crisis, so a lot of these programs have been cut back. We've been replacing them with more English programs."

Increasingly, many of these English programs — not just on WRMI, but any of the SW stations who lease airtime — are being produced by "organizations in the United States to broadcast to a basically North American audience," he said.

A number of these shows promote extreme right-wing survivalist/militia-type views, the sort of views that some believe motivated the Oklahoma City bombing.

"The percent of people who are interested in these various religious and, political

and other special interest topics tends to be very small," said Elliott, "usually much less than even 1 percent." To reach them, "you need a medium that covers a wide footprint in order to get enough listeners to make it worthwhile. Shortwave is a relatively economical way to do that."

Of course, selling block time doesn't ensure that what gets to air will be of the highest quality, said White. In fact, "I'll be the first to admit that some of the programs we air are not the most interesting in the world."

Still, the overall impact of all sales strategy is that "the private U.S. shortwave business ... (is) engaged to a large extent in domestic broadcasting," said Elliott, "sort of ersatz clear channel broadcasting."

However, there is a problem with this approach, at least from a legal standpoint. Under a 50 year-old FCC rule — one that was aimed at keeping the VOA from turning into the government's domestic propaganda voice — U.S. SW broadcasters aren't allowed to broadcast domestically. This is why the commission requires a minimum transmission power of 50 kW, and demands that antenna sites be capable of delivering signals internationally, to whatever foreign market the station says it wants to cover. (Besides this, however, U.S. SW stations have free rein when it comes to content.)

What this has led to is a legal fiction, where U.S. shortwave stations end up serving an American audience, without legally saying they're doing so. The U.S. listeners just happen to be between the antennas and the target audience — say Canada — so they just happen to be covered. (Human rights groups who want to shut down these so-called 'hate broadcasts' have cited the 'no U.S. broadcast' rule in their legal attacks, but so far to no avail.)

This is a fiction that the broadcasters endure, but don't enjoy. That's why "we are trying to get rid of that rule," said Costello, although a check with the FCC reveals no plans to have it changed.

Money on shortwave?

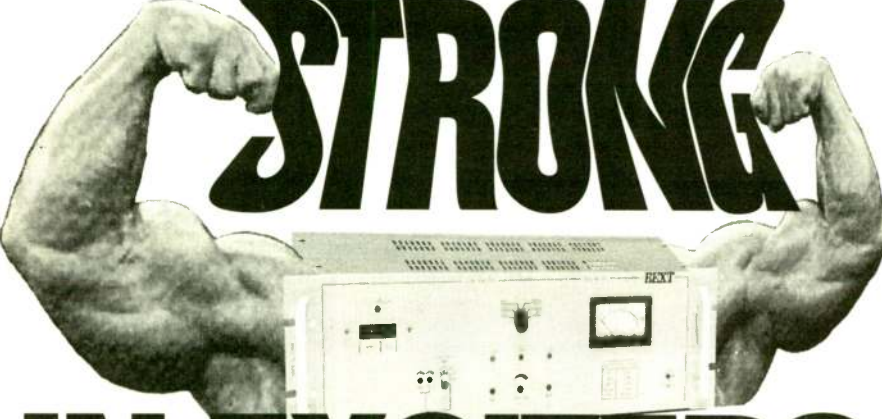
The short answer is "yes," said Larry Magne, Editor in Chief of "Passport to World Band Radio," (the SW annual which sells up to 80,000 copies a year).

Singling out McClintock's WWCR, which is now running via four transmitters, Magne said, "you talk to these guys; they'll wring their hands and say they're barely making money. Well, nonsense: these transmitters are going on almost as fast as he can put them in. So I suspect he's making very good money."

Jeff White agreed, when asked if there's money to be made in this market.

"Yes, there is," he said. "It's a very specialized business. But WRMI has made money since the day we flipped the switch and turned it on the first time. I mean not huge amounts of money — nobody's getting rich off it — but yes, it makes money." (It's worth noting, White added, that his station staff numbers just five, which helps keep overhead low.)

The bottom line? U.S. SW broadcasting may be esoteric, occasionally rowdy and definitely not glamorous, but it does offer some opportunities to the shrewd entrepreneur. And, with only 23 stations in the market, and the potential of digital shortwave looming on the horizon, there could still be some more growth — and profit — in the future.



STRONG IN EXCITERS

compact • programmable • reliable • affordable • well supported • superspecs!

P 2/P 10	1W/10W	\$1695/1895
TEX 20/TEX 30	20W/30W	2495/2695
PTX 30	30W	3595
HPT 40/HPT 60	40W/60W	3890/4190
TEX 100/TEX 150	100W/150W	4495/4995

Options include built-in stereo generator or receiver card, and translator/booster combinations with frequency-programmable inputs and outputs.



The low power leader

619-239-8462 FAX: 619-239-8474
E-mail: support@bext.com

Marti Unveils Smart New Factory

by Mike Vanhooser

CLEBURNE, Texas The grand opening of the new Marti Electronics factory signaled the beginning of a new era for a company that has led the broadcast industry for nearly half a century, and whose name is the generic term for Remote Pickup.

Marti is now set to continue that leadership into the next century. The new facilities are a dramatic improvement over the old plant, which was a maze of offices, shops and warehouse areas, and had been adequate in the beginning but were no longer viable with the increased product line.

The new plant is 20,000 square feet, almost twice the size of the old facility, and is built for expansion. The manufacturing area is designed as a model of efficiency, with an all-parts inventory in the center of the area, assembly lines surrounding the parts area, and final assembly, tune and test, and shipping covering the outer walls.

The layout provides for a smooth and efficient travel of the assembled product, from the first component being installed



In sparkling new facilities, Marti is ready for next century.

until it is packed, shipped and out the door. This efficiency is necessary to handle the ever-increasing demand for Marti products, the newest ones of which were on display.

The new Marti products highlighted were the latest additions to their remote broadcast equipment line. Featured were the Frequency Agile RPUs, synthesized to cover the entire UHF RPU band, nec-

essary to cope with the increasing congestion and required coordination in larger markets. Built when a remote broadcast via RPU is not feasible, the alternative is the SMARTI digital telephone codec, capable of sending and receiving 7.5 kHz audio plus contact closures over any standard telephone line. In addition to showcasing the Marti product line, many of the products of Broadcast

Electronics were also on display, as Marti is now a member of the BE family. BE displayed its AudioVAULT hard disk storage system, solid-state FM transmitters and broadcast consoles.

Accompanying the ever-present George Marti in making the rounds and meeting the crowd of almost 350 — most of whom he greeted by name — were Jim Godfrey, President of Marti Electronics; Jack Nevin, President of BE; and Howard Crowe of Cirrus Technologies. All participated in the ribbon-cutting ceremony with the Cleburne Chamber of Commerce, marking the official opening of the new facility.

The tours, ceremonies and speech-making concluded, it was now time for the serious business of the day. All attendees then drove to the Marti Ranch for a traditional Texas Barbecue, complete with huge amounts of incredible delicious food, Mariachi band, margaritas and beer, for which George Marti has become almost as world-renown as for his outstanding broadcast equipment.

This brought a grand conclusion to a wonderful day, as well as being a glorious beginning of a new generation, with Marti Electronics ready to continue its world leadership in the broadcast delivery field.

Mason Leads New CBS

► continued from page 1

Are you combining operations or are the stations still in competition and operated separately? For example Chicago, where WMAQ and WBBM have been going head to head for a number of years.

Mason: We are going to continue having separate news products. There has been consolidation in the financial areas and the administrative areas, but in the product area, we intend to have two distinct news products in the market.

RW: How are the two cultures meshing?

Mason: The most pleasant surprise to me in this whole period of change has been the cooperation of the former CBS Radio stations, the people within them — they have been tremendous. And we have streamlined a lot of their operating procedures to match Group W's in the area of legal and human resources.

RW: How have the other players in the Chicago market reacted to your new ownership status?

Mason: There's been no reaction. With duopoly and the new Telecommunications Act, all of us are in the same position. In this day and age, when stations change hands between companies, it is not as big a news event as it used to be five or 10 years ago. I remember when a station changed hands years ago, you'd have a television crew cover the news event. Nowadays, you don't even get a call from the newspaper any more because it is common.

RW: The AM dial is dominated by powerful AM stations — many of which are owned by the CBS Radio Station Group. The majority of AM stations, however, will need technical innovation, or something as drastic to do more than survive. What can be done for the nation's pioneer band?

Mason: We have a whole new world ahead of us with digital radio. Time will also take care of that in the future. But a well run AM station can be a daytimer as

well as a 50 kW station. For instance, we have a very successful, daytime AM station in Chicago, with WSCR sportstalk. It is very unique programming and it cash flows more than many FMs in the market. So yes, facility is important, but programming is probably more important. I can show you a lot of 50,000 W radio stations that have no ratings.

RW: Is Westinghouse committed to developing an in-band, on-channel solution for radio?

Mason: The partnership has proven that IBOC works. Does it have technical flaws? Yes. There is a commitment from this radio station group to DAB. We have proven that the technology works and we will continue to develop it further.

RW: Is there the necessary patience in the industry to wait for an IBOC solution?

Mason: I don't know that we have any other options.

RW: KRLD(AM) - Why is this an interesting deal for radio?

Mason: That was a unique situation and our first preference would have been to buy KRLD for cash. But in this day and age, stations are a more valuable form of currency than cash, which is really unusual. Cash is not king in 1996. Now maybe in 1997 or 1998 it might be again, but not today.

RW: You've started to take advantage of some programming synergy between the two companies. You now have some of your stations carrying "60 Minutes" on the radio.

Mason: Doing it on the radio was not a new idea. George Nicholaw, vice president/general manager of KNX wanted to do this for 20 years. But in the old CBS culture, 10 people found a way to not make that happen.

In the new CBS culture, you have a couple of guys like Andrew Heyward, president CBS News, and Dan here, new guys who don't know any better. It sounds good to both of us so let's do it and see what

happens. It has been very successful so far.

RW: How is it that a company that has as long a history in the radio business as Westinghouse/Group W is also one of the groups that is continually on the leading edge? What is it about this company that allows you in the radio division to be so flexible and on the move?

Mason: That is a very easy question to answer. This is a company that is in radio broadcasting for the long haul. And when you are in it for the long haul and you have long range plans, you can do things like that. The commitment to broadcasting, for 50

or 100 years, provides you with a different perspective. You still have to be disciplined, but you don't look at business the same. You can be more strategic. We have come a long way in the last four years ... in financial performance and the company is right there with the top of the industry as far as margin performance.

We have a lot of work to do in our new company with the additional stations but we are running well ahead of all of our targets at this point. And I don't anticipate any problems whatsoever in transforming this company with the financial performance to back it up.

You can measure... with the best monitor and the most accurate test set.

The FMM-2/FMS-2 series monitors provide an even greater degree of precision measurement than ever before... **You can measure S/N below 90 dB, You can measure crosstalk below 85 dB, You can measure separations of better than 70 dB, You can measure frequency response to better than 0.25 dB, You can measure distortions to lower than 0.01%, and much more...** Our uncluttered panels and autoranging voltmeters make these measurements a dream.

BELAR ELECTRONICS LABORATORY, INC.
LANCASTER AVENUE AT DORSET, DEVON, PENNSYLVANIA 19333
Call or write for more information on Belar AM, FM, Stereo, SCA and TV monitors.

(610) 687-5550

Circle (131) On Reader Service Card

Amateurs Seek Sumptuous Signal

by Al Parker

HICKSVILLE, N.Y. Last time, I wrote about the myriad ways resourceful amateurs have reshaped their home rigs to sound very much like their workplace broadcast transmitters.

A few have actually surpassed the fidelity of commercial transmitters. A "broad-as-a-barn-door" receiver like the old Hammarlund HQ-129X tuned across such a sumptuous signal is the sound equivalent of biting into a warm, juicy slab of grandma's homemade apple pie. All of the ingredients are basic and wholesome, but you can't help but feel a little guilty as you revel in the sensation. Sometimes I find myself listening to

people I don't even like, just to hear the wonderful audio.

A likeable mic

Assuming that the prerequisite restoration work has been done on the transmitter, it's time to turn our attention to the microphone and the interface between the microphone and the rig's speech amp.

Most of the microphones designed specifically for communications work lack the frequency range and ergonomics for comfortable broadcast-style hamming. The average desk mic, besides lacking fidelity, is pretty difficult to relax with. They really fit best into the high-tension environment of an old-time police or fire dispatcher. The Turner +3 or more modern Kenwood MC 60A desk mics look impressive, but force you into a hunched position in front of the rig. Worse still, they get in the way of log books, note pads, computer keyboards and other items you want directly in front of you.

The obvious solution is to abandon the desk mic all together in favor of a recording/broadcast mic on a boom. This approach frees up desk space, allows the user to have both hands free and fixes the position of the mic in space.

The means of suspending the mic is limited only by imagination. The most elegant approach is a broadcast Luxo Arm. The height and reach of this wonderful invention allow it to be attached to a convenient point behind all but the bulkiest rigs. The long reach allows the user to sit back in his or her chair. Kicking back, locking down and sipping on a hot cup of java in between precious pearls of radio repartee is my idea of living large.

For the budget conscious

As a somewhat less sexy alternative, the ubiquitous flexible gooseneck with appropriate hardware is available at any Radio Shack store. Budget conscious hams might even consider the possibility of building a poor man's Luxo Arm. The common drawing table lamp — the ones utilizing parallelogram arms counterbalanced with springs — can be converted to hold lighter, electret or dynamic microphones. These lamps can be had for a song, or even plucked from a dumpster for a good deal less than a song. The lamp head is unbolted and replaced with a microphone shoe. For neatness sake, the mic line cord can be fed through the tubular frame structure in place of the defunct AC cord.

The issue of the push-to-talk circuit must also be addressed. Depending on the type and vintage of the rig, the use of a non-communications microphone can complicate mode switching. Using the VOX (Voice Operated X-Mit) mode is one easy solution. Simple transmitters, like the stock Heathkit DX-60, are switched into the transmit mode socket to accommodate a standard microphone plug.

It's probably a good idea to standardize plugs in the shack. A good choice for older tube rigs is the quarter-inch stereo phone plug. Some older transceivers such as the Swan rigs were originally fitted with this common plug. In most cases,

the tip/shield was designated for switching with the collar/shield carrying audio.

Some later rigs were outfitted with more elaborate mic sockets. These multiconductor systems were usually fitted with locking collars for more secure attachment for mobile use, etc. In some recent cases, additional pins were provided as an interface between comprehensive controls in the mic and the transceiver, for remote frequency and volume control, etc. In any event, the manufacturer (or schematic) can provide detailed information about which pins are specifically utilized for audio and T/R switching. Rather than removing the plug from a perfectly good hand mic (still valuable for testing and mobilizing), it might be a good idea to order an extra plug from the manufacturer for your customized installation.

Once the audio and PTT (Push To Talk) connections have been isolated and brought out from the socket, the PTT wires can be terminated in any type of switch you might imagine. A foot switch, console-mounted toggle or even a locking switch built into a hand grip can be crafted. One ham has a command position featuring a seat that's the spitting

RF, naturally a ham's best friend, can be fickle, particularly when integrating solid-state hi-fi audio devices into the station.

image of the Captain Kirk chair. He has actually built the PTT switch into one of the arms of the big swivel chair. The only thing lacking is a bank of Photon Torpedoes to vanquish jammers and other evil doers. He occasionally kicks in the warp engines (a pair of 3-500zs) to keep those nasty Klingons (SSBers?) at bay.

Speaking of "nasties," it is possible that the audio shielding might be compromised by separating out the PTT wiring from the audio leads. In high-powered AM operation and even amplified sideband, this may result in RF getting into the audio circuit. The leads can act like small rods or clamshells can be effective in choking off any RF that might be creeping up and down long audio and PTT leads. It's as simple as wrapping several turns of the insulated wires around the choke of choice. The ferrite should be placed close to the point where the leads enter the rig. RF infiltration effects are more prevalent at higher frequencies. An audio hookup that behaves very well on 160 meters may be plagued with RF feedback on 40 meters.

RF, naturally a ham's best friend, can be fickle, particularly when integrating solid-state hi-fi audio devices into the station. As discussed in the previous installment, microphones intended for recording are generally not directly applicable to ham radio. It's often necessary to insert a matching/equalizing device between the mic and the rig's first audio stage to tone down any excessive midrange emphasis. A broadcast console is best from an ergonomic and shielding point of view.

For those unable to lay hands on such a treasure, it isn't necessary to dig very deep for a reasonable substitute. Even the humble Radio Shack Reverb unit with

variable mic and fixed line inputs works well for some folks. The original, mostly metal version of this useful item is highly resistant to RF. A new streamlined model will have to be tested. At higher frequencies and power, it may be necessary to wind the unit's external power-supply cord around a ferrite choke or simply use the internal battery power source.

Naturally, the lack of EQ means that just the right mic and rig combination will have to be found by trial and error. A very, very, very slight touch of reverb can be helpful in adding dimension. Many say, as with drugs, it is best to "Just Say No" to reverb. If you are one of the rare breed able to control the temptation to overdo, a touch of reverb can add fullness. A side benefit of the Radio Shack Reverb is that it provides a convenient line input for easy patching of tape playbacks, etc.

Up the evolutionary scale

The next step up the evolutionary scale is the compact Instrument EQ. The all-metal DOD FX-40 is a six-band (plus gain control) unit equipped with quarter-inch phone jacks. Its EQ range from 100 Hz to 3200 Hz is ideal for the communications voice range. These units are activated by a foot switch built into the body.

The fact that the FX-40 is built to be kicked around and literally stepped on by rockers means that the construction is tank-like. Maybe this accounts for its wonderful resistance to RF.

providing that the internal 9 V battery source is used. A lithium battery is recommended. Hooking the FX-40 up to an external power source seems to compromise its shielding.

Configuring its sliders in a soft "V" configuration with the 400 Hz scale at 0.0 dB and the extremes (100 and 3200 Hz) at +18 dB has proven effective with several common tube rigs. With a typical condenser mic the highs and lows are truly impressive. The suppressed 400 Hz and tapered 200 and 800 bands practically erase background and fan noise without adversely affecting the vocal reproduction. This unique and economical type of mini-EQ is ideal for stations where space is at a premium.

Even higher up on the list of desirable interface devices is a musician's four-, six- or eight-channel mixing board. Such a unit has all the required inputs and outputs, plus extensive EQ to match about any mic to any rig. These mass-market mixers are usually not as well shielded as boards intended for broadcast environments.

In the final analysis, the best way to keep RF out of your fancy audio input system is to efficiently radiate it away from your shack. Chances are that if stray RF isn't getting into your mixer, it's also keeping respectful distance from local consumer electronics devices, like telephones and televisions.

Carefully tuned rigs, amps, match-boxes, proper grounding, resonant antennas and high-quality feed lines are not only going to make your audio cleaner, they're also going to make you much more popular with your family and neighbors.

□ □ □

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

LMA/DUOPOLY CONTOUR MAPS

The **dataworld** LMA/DUOPOLY Contour Analysis is a precise electronic verification of overlapping and intersecting contours.

AM and FM City Grade contours are shown in full color, including transmitter site indicator. The map is supported with a printout showing all of the stations which appear on the map.

Daily updating of **dataworld's** AM and FM databases ensures the latest information.

OTHER MAPPING OPTIONS

- Shadowing (Terrain Shielding)
- Contour Coverage
- Population Density
- Zip Code Boundaries
- Received Signal Level
- Custom Displays

WHO ARE YOUR LISTENERS ?

Others give you 1990 Census Data. Only **dataworld** gives you CURRENT year data and FIVE year projections!

- Comprehensive Ethnic and Demographic Data
- Ethnic/Demographic Data Available for Each Zip Code Within Coverage Area
- Age Analysis by Ethnic Groups
- Resolution Increased to Block Level
- Percent of County Coverage Shown
- Projections into the next century

ETHNIC/DEMOGRAPHIC INFORMATION DISPLAYED USING MULTI-COLOR SHADING



800-368-5754 FAX: 301-656-5341
e-mail: info@dataworld.com
WWW: http://dataworld.com

Circle (157) On Reader Service Card

Add More Space with New Drive

by Richard Mertz

FAIRFAX, Va. It wasn't so long ago when the state of the art personal computer was an IBM PC. This computer came equipped with two 5-1/4-inch floppy disk drives, 256KB of Random Access Memory, a monochrome monitor and, if you were lucky, a dot matrix or daisy wheel printer.

Ready for operation

You would place the DOS disk in the left hand drive (drive A), turn on the power or press Control, Alternate and Delete and the DOS operating system was copied into RAM ready for operation.

Once the operating system was in place, you would remove the operating system "boot" disk and replace it with the program disk. (In those days, the programs left room on the floppy drives for a copy of the operating system.) Your data was stored on a dedicated disk located in drive B. Each disk, assuming it was double sided, would hold approximately 360KB of information. This is a far cry from the standard 1.44 MB 3-1/2-inch disks we use routinely today.

My first PC was an IBM PC clone manufactured by a company named Eagle. The Eagle sported the same basic configuration as the IBM PC except the maximum memory it could hold was 512KB and had a keyboard with many more keys than the IBM model.

I can recall having to swap the word processor program disk for a Spellcheck disk. Once Spellcheck was completed, its disk had to be removed and the program disk reinstalled in drive A to edit or print the document. Sometimes it seemed that the typewriter was easier.

As programs became more and more elaborate with more features, so did their storage requirements. The best way to execute these larger programs was from a fixed disk (or hard disk drive).

The first benefit of using a hard drive was the access speed, which was an order of magnitude faster than the floppies. My first encounter with a hard disk drive was a massive (humor) 10MB! At the time, 10 MB of storage space seemed tremendous. Sure, plenty of room for all those programs and data!

Disk housekeeping

Unfortunately, like most folks, I'm not good at disk housekeeping. Old, unused files live long, happy lives on my hard drive. Older programs have a home with their upgrade brethren. I learned disk housekeeping quickly, especially when I tried to save an important file and got the "insufficient disk space" message.

The moral to this story is that no matter how much storage space you have available you will surely fill it up.

Back to the present. Every Sunday, the newspaper advertising has announcements about sale after sale of hard disk drives with huge capacities. In previous articles, I described upgrading older computers to 486 or greater by replacing the motherboard and interface boards. Now it's time to add some additional disk space.

When I bought a 345MB hard drive several years ago, I thought I had all the room in the world. I paid about \$290 for the drive (several years ago) in bulk

packaging. Now you can purchase hard drives with over a gigabyte of storage for less than \$300. Not too shabby.

After shopping around, I found a 1.2GB drive manufacturer by Conner for around \$250. Western Digital also makes a drive for about the same price. The Conner drive comes well packaged with instructions, mounting hardware, cables and installation software.

Here are the steps I used to replace an existing IDE interface drive. (Replacing a SCSI, MFM, or RLL drive is another matter and the possible topic for future articles.)

Before replacing the main hard disk drive in a computer, you must first back

up the old drive. Hopefully you have access to a tape backup system.

Once the backup is finished, make a boot disk. Remember, a new hard disk drive doesn't have any data on it and can't load anything until formatted. The boot disk should include the System files. These can be copied to the boot disk by the /s switch for the FORMAT.EXE program.

For example, "FORMAT A: /s" will format the floppy disk in drive A and automatically copy the system files. Once this is done, copy, from the DOS directory, FORMAT.EXE, FDISK.EXE, XCOPY.EXE, QBASIC.COM and its associated files, EDIT.COM and its asso-

ciated files, and finally, copy the existing AUTOEXEC.BAT and CONFIG.SYS files from the root directory.

The easy part

Now prepare a second diskette with the software needed to operate the tape backup. OK, it is time. Turn off the power and unplug the old drive power and data cables. Mount the new drive and reattach the cables. That's the easy part. Turn on your computer. The computer BIOS will detect a change in the hard disk drive configuration and give you an error message to that effect. Press F1. You should now be in the BIOS setup.

Follow your computer directions for setting up the hard disk drive. The settings usually required are the number of heads, number of disk cylinders and the number

continued on page 42 ►

When We Say Continental Can Deliver The Whole World Of Broadcast Equipment, We Mean It

BROADCAST SUPPLY DIVISION

Introducing the Broadcast Supply Division of Continental Electronics Corporation, where a wide range of quality broadcast equipment is as close as the telephone. Continental Broadcast Supply can deliver:

- Complete RF installations, from telemetry links to transmitters, antennas to towers, and everything in between. The most complete line of low, medium, and high power standard and custom configuration transmission products available worldwide. Plus, sophisticated DAB transmission products from Continental TELEFUNKEN Senderteknik.

- A complete array of studio equipment, including processors, microphones, modulators, digital and analog recording and reproduction systems, cabinetry and furniture, consoles, test equipment, and much more.

- The most experienced and capable sales and service staff in the industry. Our people know how the products they sell work and can help you get the most out of your equipment and systems.

1946-1996. For 50 years, Continental Electronics has provided excellence in broadcast transmission products worldwide. Refuse to compromise... call Continental first!

3.96.113



Continental Electronics Corporation

P.O. BOX 270879 • DALLAS, TEXAS 75227-0879 • 214-381-7161 • FAX 214-381-4949

Why is the 12,000 the most *Popular* console for Radio ?



- **An 18 channel modular console with 12 modules for only \$6,595.**
- **Ultra high performance for digital sources such as CD's & workstations.**
- **From 3 to 6 output buses for the most demanding studio applications.**
- **Digital data bus built in for control of Arrakis digital workstations.**
- **Ideal for On Air, Production, & News studios in any market size !!!**

As the #1 manufacturer of audio consoles, digital workstations, and studio furniture systems for radio--- Arrakis products provide you with unparalleled features, performance, and reliability. And with nearly 4,000 Arrakis consoles sold in the last 10 years alone, you can be assured that Arrakis is the #1 choice of broadcasters across the country--- and of such prestigious broadcasters as Sony Worldwide Networks in Manhattan and the United States Air Force around the world. The choice of Arrakis is the choice of the leader

Features

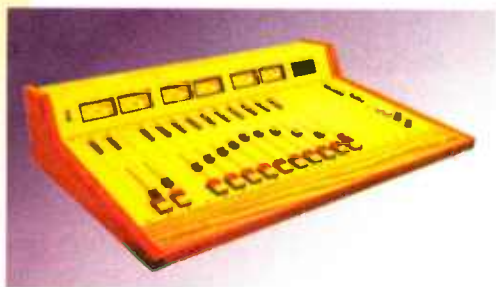
While the 12000 series console is available in 8, 18, & 28 input module mainframe sizes, the 18 channel mainframe with 12 input modules is by far the most popular configuration. The mainframe supports input modules, a variety of option modules such as input selectors and DA's, and even the 99 button Gemini control surface for Arrakis digital workstations. Input modules can be chosen as mic or stereo line input with three models of each to choose from. Also, the input modules may feature either 3 stereo output buses -or- 3 stereo output buses plus 3 mono output buses for a total of 6 assignable outputs. The six output version is perfect for talk studios with multiple telephone mix minus feeds. Input modules feature comprehensive logic control for sources and talk booth turrets. The monitor system supports a control room and two studios with complete talkback facilities. The mainframe even includes a 60 minute up timer standard. All of the features and capabilities are included in the 12000 to make it ideal for any size market.

Performance

Designed for the radio station of the digital '90's, the 12000 series high performance console has a dynamic range of over 100dB which makes it ideal for use with digital audio sources such as CD players and digital audio workstations. Use of Analog Devices monolithic mic preamps assures you of the lowest noise and distortion that current technology can provide. Active balanced in and out, the 12000 is the high performance, professional solution to your studio's needs.

Rugged Reliability

The 12000 series console is a rugged and reliable broadcast product. The modular mainframe simplifies service and provides for future expansion. The use of VCA's and DC channel On-Off switching increases fader life, reduces channel dropouts and noisy switches. The modules feature polycarbonate plastic overlays for scratch resistance. Penny and Giles faders, 5 million operation channel on-off switches, and ITT Schadow switches assure a long life. Use of heavy hardened aluminum panels, polycarbonate module overlays, and solid oak trim will provide a durable and attractive appearance through the years.



12,000-12 Console in tabletop version
with Tan color- \$6,595 List Price

On the air in New York, Moscow, and Tokyo- the 12000 series console line is truly a major market console for the professional broadcast studio of the '90's. ---Choose Arrakis and choose the leader.---

for more information call... (303) 224-2248

in some areas, call (970) 224-2248

from **\$6,595**



arrakis
SYSTEMS INC.

2619 Midpoint Drive, Fort Collins, CO. 80525
Voice- 303-224-2248, Fax- 303-493-1076

Circle (209) On Reader Service Card

World Radio History

Studio Sessions

Equipment and Applications for Radio Production and Recording

Line Out:
Eliminate Ground
Loop Hum
See page 22.

PRODUCT EVALUATION

TensorTech Keeps the Tempo Going

by Read G. Burgan

AKE LINDEN, Mich. TensorTech's "Tempo Works: The Compander" software for Windows is based on a simple premise: Be more creative and produce spots with more impact if you do not have to spend your time worrying about their length.

This article reviews one recent version I tried out and includes notes on the very latest version issued by TensorTech.

Tempo Works will take your finished spot and make it any length you specify. Almost.

Making it work

Tempo Works is easy to use. Save your spot as a SND or WAV file using your favorite digital software. When you are finished, open Tempo Works.

Select your file. You will be given a series of four menus. One will ask you to name the finished file. The second and third will ask if you want to trim the beginning or end of the file.

The last menu asks the biggie: How much you want to expand or compress the file.

Press Start, and Tempo Works does the rest, expanding or companding the file according to your specification.

Does it work? Sure, but there are several pressing questions. How well does it work? Do I need it? Is it worth the cost? You do not have to work with companding software long before you learn there are finite limits.

At the squeeze on

To test Tempo Works, I took two 1974 American Cancer Society PSAs and digitally rerecorded them at 44.1 kHz in stereo. One ran 30 seconds, the other 54. Both had an announcer, a singer and guitar accompaniment. If the software would adversely affect the sound, it would show up in the music first.

Compressing the longer spot to 48 seconds took my 100 MHz Pentium slightly more than a minute to process the file. The same operation on a 486/100 took 22.

When done, the file timed out right and sounded very good with no noticeable annoying artifacts. Compression worked out to about 11 percent.

Next I expanded the 30 second spot to 40 seconds. This worked out to about an 8 percent increase in length and again, everything sounded fine.

So how far can you go? I reprocessed the 30 second spot down to a 25 second length. That was 17 percent compression, and still no noticeable artifacts. Everything was moving at a pretty good clip and the spot was still airable.

I then took the 54 second spot down to 40 seconds. This was about a 35 percent reduction in time. Now I could hear artifacts. The singer's voice was no longer

natural, but had an artificial tremolo.

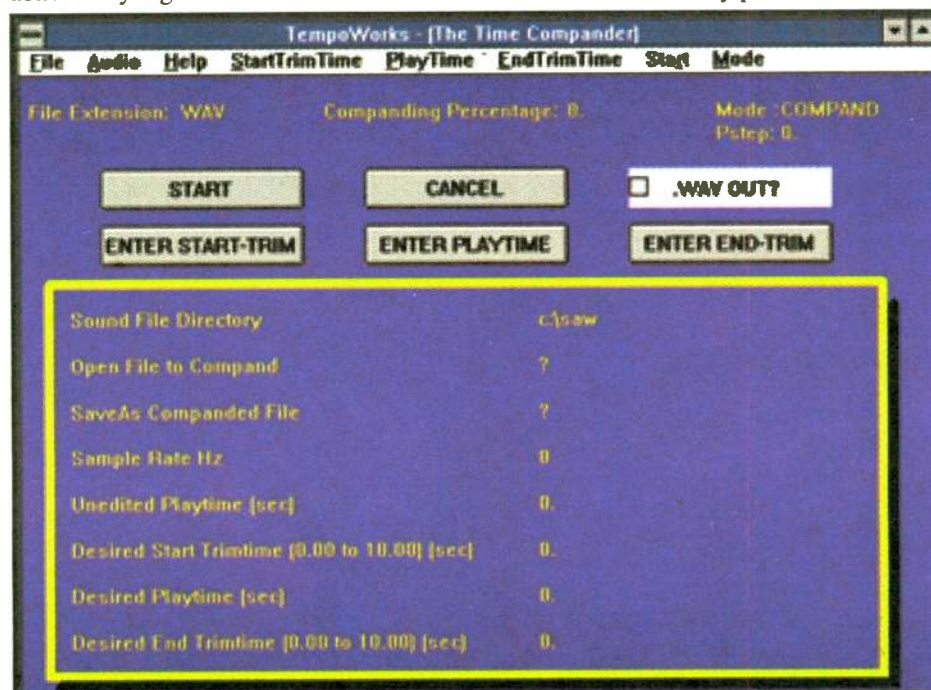
The 30 second spot was reprocessed two more times. First to 35 seconds, increasing its length by approximately 17 percent. Although pushing the envelope, the spot sounded fairly good.

I then took it to 40 seconds, an increase of 33 percent. As expected, it sounded like a tape recorder or phonograph with abnormally high flutter.

the original software, the new file had a grittier sound than the original. The latest version of Tempo Works seems to have solved this problem.

Conversion

The program also allows conversion of 48 or 44.1 kHz files to 16 or 32 kHz. Converting a 44.1 kHz, 54-second sound file to 32 kHz took my pentium 3:47.



Screenshot of Tempo Works from TensorTech

Like other companding software, Tempo Works does an excellent job if you limit your change to approximately 11 percent of the original length of the sound file. Depending on material, you may push that upwards of 17 percent. Beyond that, you are on thin ice.

The newest version of Tempo Works limits the percentage you can change the length of a file to 30 percent. This should not adversely affect its application, as attempting to compress or expand a file further than this will almost certainly result in undesirable artifacts.

In my testing I could discern no appreciable difference between the original and processed files sampled at a 44.1 KHz or 48 KHz sampling rate in stereo.

Here's the pitch

Tempo Works contains a feature that allows you to lower the pitch of a sound file down to three musical notes.

When I applied the process to a 22 kHz mono sound file, the program crashed before reaching completion. Reapplying the process to a 44.1 KHz stereo file, the sound file was truncated, cutting short the end of the spot.

The software manual suggested leaving blank space at the end of the file and reprocessing it. This time it worked fine. The resultant file sounded natural, except for being lower-pitched.

When processing a pitch change with

The resulting sound file was not as good as the original. It had some graininess and sibilance to it.

While the program works well in its basic function, it is not without problems. For a while I was tempted to dub this "Not ready for prime time software."

The most serious was system-wide

instability. Several times my computers became unstable and had to be rebooted after processing files on Tempo Works.

Attempts to start programs resulted in a notice of "insufficient memory, close out one or more programs." This despite the fact that each computer has 16MB RAM and I was running no program other than Windows itself.

The problem seemed to be random because it did not always occur and I could never predict when it would. When I reported this problem, software developer Dr. Monti Wilson was skeptical. The program was already in use at a number of sites and not one user had reported a similar problem.

His conclusion that the problem had to lie with my computers was troubling, because I was running the software on two machines and each had the same problem.

Logical snag

The only thing common to both computers was the recently-installed network linking them together.

Taking one computer off the network and retesting the software still left the computer unstable with the "insufficient memory" warning.

I noted all the network drivers and operating software were still resident in memory. So very reluctantly, I made notes on the network drivers and related settings so I could hopefully restore everything later, then uninstalled the network on one machine.

After rebooting the machine, the software still crashed. This time I was determined to pursue the beast back to its lair.

Running the compander function repeatedly on a single sound file until a crash occurred eventually revealed a repeating pattern.

If the compander was set to a high level like 30 percent, the computer would become unstable after processing the

continued on page 26 ►

DSG-2001
DIGITAL STEREO GENERATOR

CLEAN
RELIABLE
CLEAR
SOOTHING
AFFORDABLE

CALL TODAY FOR DETAILS AND DEALER INFORMATION

audio processing naturally

hnat hindes, inc
42 Elaine St.
Thompson, CT 06277

(860) 935-9066, 935-9242, fax (860) 935-9919

CE

Circle (5) On Reader Service Card

PRODUCT GUIDE

Companies with new product announcements for Studio Sessions Product Guide should send them to: Radio World, c/o Studio Sessions Editor, 5827 Columbia Pike, 3rd floor, Falls Church, Va. 22041

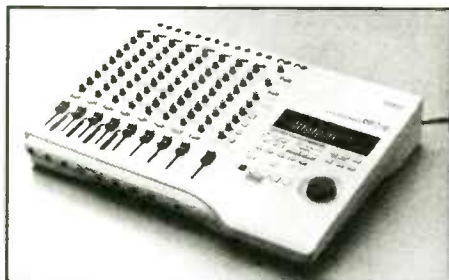
Fostex Upgrades DMT-8

Fostex announced a new lower price and software upgrade for the DMT-8 digital multitrack recorder/mixer.

Suggested retail price of the DMT-8 is now \$1,995. The upgrade includes multiple Copy/Move pasting, pasting to different tracks, MIDI time code slaving via optical ports and digital I/O. Customers with earlier versions of DMT-8 software can upgrade with an EPROM change.

Fostex will soon offer factory retrofits of hard drives with larger capacities.

Users have the option of moving from 540MB to 850MB or 1.3GB.



Fostex DMT-8

The DMT-8 can be cascaded with the new Fostex D-80 rackmount eight-track hard disk recorder for 16 or 24 tracks of digital audio.

For more information, contact Fostex at (310) 921-1112 or circle Reader Service 58.

New Rarefaction CD-ROM

A new company, Rarefaction, is introducing "Diffusion of Useful Noise" by Keith Hillebrandt.

This is a CD-ROM of license-free

sampler source material recorded in 16-bit 44.1 kHz AIFF format. Sounds are looped end-to-end for use in digital workstations and in live audio applications.

Rarefaction is a new company started by two former OSC employees after Macromedia acquired OSC (makers of Deck II software). The company also handles the OSC sound library "A Poke in the Ear With a Sharp Stick."

The Rarefaction Web site is www.rarefaction.com

For more information, contact Rarefaction at (415) 346-1840 or circle Reader Service 32.

Audio-Technica Wireless Mic

Audio-Technica debuted the new 1100 Series of VHF wireless microphones.

The series consists of three models. The ATW-1127 UniPak transmitter can



Audio-Technica 1100 Series VHF Wireless Mics

accommodate high-impedance inputs such as a guitar pickup. The ATW-1128 is a handheld dynamic mic and transmitter while the ATW-1129 combines a transmitter with a condenser mic element.

All three feature true diversity reception with two independent RF sections and a selection of 20 VHF frequencies. Minimum range is 200 feet and frequency is stable to 0.005 percent.

A ground-lift switch on the receiver eliminates hum problems encountered through ground loops.

For more information, contact Audio Technica at (216) 686-2600 or circle Reader Service 6.

Plug-in for Sound Forge

QSound Labs has developed a new plug-in for Sound Forge, the Windows based audio editor from Sonic Foundry.

QTools/SF combines three tools that add the QSound patented virtual audio technology. QSYS/SF performs spatial placement of a mono sound source at user-selected location in a 180-degree arc in front of the listener.

QXpander/SF processes a stereo image that widens the stereo field. QSRC/SF is a high-definition sample-rate converter.

For information, contact Sonic Foundry at (608) 256-3133 or circle Reader Service 213.

High-quality audio transmission •



But low ISDN transmission

costs • Interface to all existing equipment • And networks • IRT approved

• Supports all six sampling frequencies



• G.722 capability •

No need to reconfigure the decoder • Ever • Wherever •



Save time • And money • Easy-to-read displays • Ideal for

reporters in the field



• No need for trained technicians •

No audio delay when monitoring over headphones

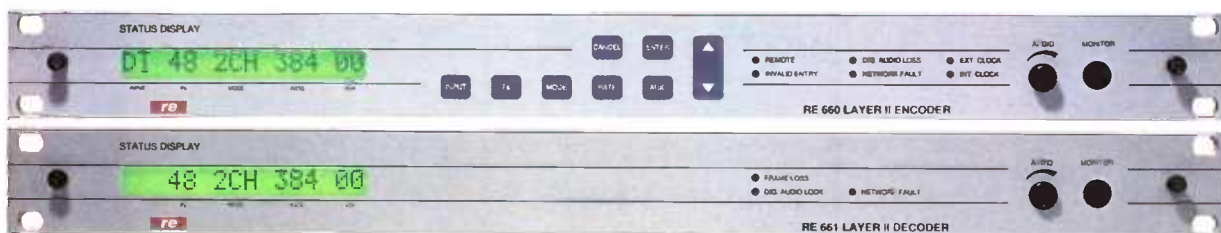


• It's the

RE 660/61 Layer II digital audio codec • Call!



(216) 871-7617



RE AMERICA, INC. • Telephone: (+1) (216) 871-7617 • Telefax: (+1) (216) 871-4303 • RE UK LTD. • Telephone: (+44) (01734) 731119 • Telefax: (+44) (01734) 731190 • RE JAPAN CO., LTD. • Telephone: (+81) 03-3320-0460 • Telefax: (+81) 03-3320-0497 • RE DEUTSCHLAND GMBH • Telephone: (+49) 02461-6803-0 • Telefax: (+49) 02461-56831 • RE INTERNATIONAL AS • Telephone: (+45) 39 17 00 00 • Telefax: (+45) 39 17 00 10 • Plus 30 authorized distributors worldwide.

Circle (2) On Reader Service Card

World Radio History

MOVING?...

Don't leave us behind!

Mail or fax your current label and new address (with effective date) to:

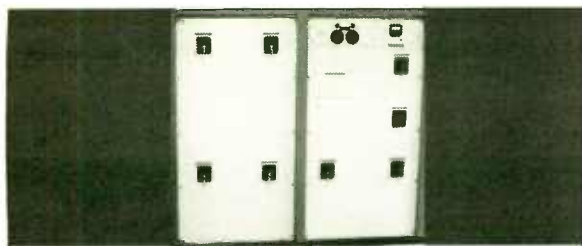
Circulation, RW,
PO Box 1214,
Falls Church, VA 22041 or
FAX 703-998-2966

Address changes will be processed within four weeks of receipt.

Thanks!

Products & Services Showcase

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



- CUSTOM ANTENNA PHASING SYSTEMS
- ANTENNA CONTROL SYSTEMS
- AM/MF ANTENNA TUNING UNITS
- DIPLEXERS & MULTIPLEXERS
- TRANSMITTER COMBINERS
- DUMMYLOADS (WITH MATCHING NETWORK)
- ASSOCIATED RF COMPONENTS
- CALL OR FAX FOR MORE INFORMATION

PHASETEK INC.

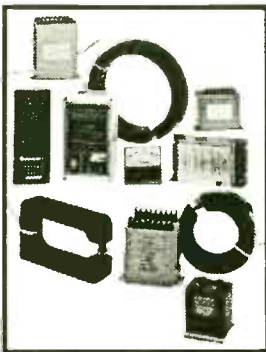
550 CALIFORNIA RD. UNIT 11
QUAKERTOWN, PA 18951

PHONE: 215-536-6648

FAX: 215-536-7180

READER SERVICE NO. 8

TRANSFORMERS & TRANSDUCERS



FLEX-CORE
features a
complete line of
current &
potential
transformers,
transducers, and
instrumentation.

- ◆ Transformers
- ◆ Transducers
- ◆ Recording Systems
- ◆ Energy Management
- ◆ Harmonic Analyzers
- ◆ Demand recording and Control Systems

FLEX-CORE
div. Morlan & Associates, Inc.
(614) 889-6152 FAX: (614) 876-8538
TECH. ASSISTANCE: (614) 876-8308

READER SERVICE NO. 147

The Headphone Amp that Can ...



- Please your talent with plenty of power
- Mount easily at talent station
- Drive high or low impedance phones

The low distortion **HSA-100** Headphone Amplifier mounts easily with four mounting holes in its heavy-duty steel front panel. It runs on a ± 15 to 18 volt power supply.* Its discrete transistor output can drive impedances as low as 16 ohms! Input level is jumper selectable from -10 to +8 dBm. Ideal for custom applications — call or fax for details.

* Power pack included (not pictured)

bdi Broadcast Devices, Inc.
5 Crestview Avenue
Peekskill, NY 10566

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

READER SERVICE NO. 62

A Broadcast Industry

BEST BUY

Cartridge Reproducer

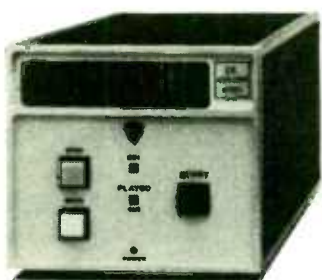
Mono Play

Stereo Play

\$1050 \$1150

(F.O.B. Factory - U.S. \$)

**RELIABLE / RUGGED
PROFESSIONAL DESIGN**



DL Series

AUDI-CORD CORPORATION

1845 West Hovey Avenue
Normal, Illinois 61761 USA
Phone 309-452-9461
Fax 309-452-0893

Available Through Your Regular Distributor

READER SERVICE NO. 89

Coverage!

Great format, great studio sound...but unless your **antenna** sends that sound where your target audience is, your bottom line will suffer.

Shively Labs has thirty years experience in providing pattern **solutions** for predictable and profitable **coverage**.

...it pays to be heard.

Shively Labs

A Division of Howell Laboratories, Inc.
An Employee-Owned Company

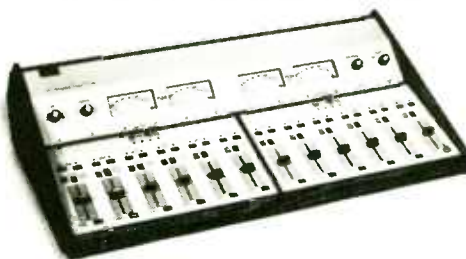
19 Harrison Road, Bridgton, ME 04009
207-647-3327 FAX 207-647-8273

e-mail: sales@shively.com

READER SERVICE NO. 12

Vanguard Series™
Stereo Broadcast Consoles

**OVER 1000
IN USE WORLDWIDE**



Performance, Value, and Reliability
through Innovative Technology.

5 Models Available

BC6DSL* BC6DSR**
BC8DSL* BC8DSR**

BC12DSL*

* Linear Faders ** Rotary Faders

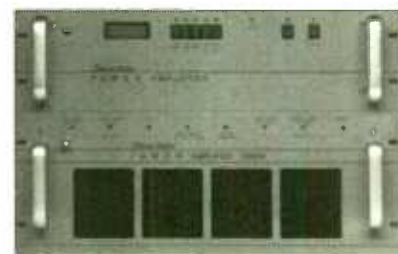
CALL OR WRITE FOR A FREE DETAILED BROCHURE.

AUDIO TECHNOLOGIES INCORPORATED
328 W. Maple Ave., Horsham, PA 19044, USA
(215) 443-0330 (800) 959-0307
FAX: (215) 443-0394 <http://www.ATGuys.com>



READER SERVICE NO. 66

B-1000 POWER AMPLIFIER



READY TO GO

Reliable, all solid state, output power to 1250 watts. Never needs tuning. Steady output power tolerates wide a.c. voltage swings. Self starts after outage.

Efficient. Economic. Transportable.



**Silicon Valley
POWER**
AMPLIFIERS

1 800-986-9700

READER SERVICE NO. 39



The Next Generation in Broadcast Software

- Feature Rich **Live Assist** and **Walk Away**
- **On-Line** Redundancy...No Black Box
- The **Best** Integrated **Play List Scheduling, Production, & On-Air Playback** Available
- **Dolby & MPEG** Overlapping Hard Disk Audio
- **Music on Hard Disk** and/or **CD Jukeboxes**
- Provide Computers/Players & **Save \$\$\$** or Buy/Lease From Us

*Call Us Before You Buy a
Digital Audio System!*

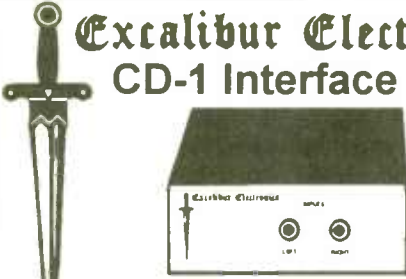
West/Int'l
310-670-7500
Fax 310-670-0133

East
864-292-0300
Fax 864-292-9030

READER SERVICE NO. 93

Products & Services Showcase

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



Excalibur Electronics
CD-1 Interface Amp

The industry's favorite unidirectional interface amplifier is designed to match IHF output standards (10kΩ unbalanced, -10dBV) to broadcast input standards (+4dBm, balanced). DC coupling, <0.006% THD & IMD, and >90dB S/N make the CD-1 appropriate for use with the highest quality CD players, as well as with monitor tuners, cassette and tape playback, DAT playback, and ENG equipment. Table-top mounting or, using the included angle brackets, may be attached to a rack panel, your cabinetry, or anywhere convenient. A dual version, the CD-2, is also available.

EXCALIBUR ELECTRONICS, INC., CHANTILLY, VIRGINIA
Please circle our bingo number for a data sheet and a dealer list.
READER SERVICE NO 35

Call MYAT For Rigid Line & Components

Facing a "right now" emergency? Planning a new installation? Upgrading your facility? Whatever the need, MYAT is the solution. MYAT products are quality-built for maximum performance and long life. And we take delivery commitments seriously.

Call your favorite RF distributor or MYAT direct at 201-767-5380, or fax 201-767-4147 for our complete catalog and reference guide.



380 Chestnut St
P.O. Box 425
Norwood, NJ
0 7 6 4 8

READER SERVICE NO. 116



Digital Audio Codecs

Low cost, well-designed codecs for high quality audio feeds on ISDN and other digital links. Choose the one that's right for you!

- ✓ ISO/MPEG Layer 2
- ✓ G.722
- ✓ apt-X®

COMREX

Comrex Corp, USA Tel: 508-263-1800 Fax: 508-635-0401
Fax-on-Demand: 508-264-9973 (Doc. #101 #102 #103)
READER SERVICE NO 201

E.A.S. ENCODER-DECODER

Write, phone or fax to get on the mailing list for literature on our emergency alert equipment. Ask about our encoder-decoder with 4, 5, or 6 audio inputs on standard model. Easy interface with automation equipment. Quick, simple construction of alert message.

Available late spring.

GORMAN-REDLICH MFG. CO.
257 W. Union St. Athens, Ohio 45701
Phone 614-593-3150 • FAX 614-592-3898

This device has not been approved by the Federal Communications Commission. This device is not, and may not be, offered for sale or lease, or sold until the approval of the FCC has been obtained.

The CircuitWerkes DTMF-16 TouchTone Decoder



Inexpensive & Convenient Control

- Decodes all 16 DTFM tones.
- Bridging input & high current opto-isolated outputs.
- Jumper selectable beep-tone acknowledges commands.
- Momentary or Interlocked Latching output modes.
- New, two-tone decoder & anti-falsing filter improve reliability & versatility.
- Combine with an AC-2 auto-coupler for an economical dial-up remote control.

The DTMF-16 is perfect for interfacing networks to your automation, controlling remote satellite receivers, repeaters, etc. With a list price of only \$199, the compact, light & rugged DTMF-16 can be put almost anywhere to provide the remote controls that you need. For more info, contact your favorite broadcast supplier or call us.

CircuitWerkes
6212 SW 8th Place
Gainesville, Florida 32607
(352) 335-6555 / fax 331-6999
READER SERVICE NO. 45

Suddenly... Everything's Changed!



AD2004 - Quad 20 bit ADC

Introducing the **AD2004B**, a quad, 20-bit A-to-D converter with AES3-id outputs, designed for applications that require *no-compromise* performance.

The typical THD+N is -102.5 dB (0.0008%) broadband, measured at -1 dBFS, *much* better than other 20-bit converters. A reference port allows multiple converters to be synchronized in perfect phase. An ultra low jitter (11 ps) VCXO produces a clean 64X sample clock that may be free-run or phase-locked to an incoming AES3-id reference. Jitter reduction is superb, -50 dB, with sidebands and idle tones below a phenomenal -135 dB even when *phase-locked* to external sync.

The converter runs at a fixed sample rate of either 48 or 44.1 kHz. A dual sample rate option is available. The two 75 Ω BNC outputs conform to AES3-id.

Metering has both coarse and fine scales for monitoring near FSD. A selectable hold function can retain the highest peak until manually reset. FSD detection is exact.

The **AD2004R** has the same performance as the AD2004B but has an 110 Ω AES3 reference input, two 110 Ω AES3 outputs, and a word clock output.

With *absolutely* the highest performance, its per channel price is *only* 30% of some converters. At \$1800 it's about to start a revolution! Call Rory Rall today!

BENCHMARK MEDIA SYSTEMS, INC.
Phone 800-262-4675, FAX 315-437-8119
READER SERVICE NO. 143

Attention Advertisers:

RadioWorld

Combine Direct Mail With Advertising in a Total Marketing Package!

.....

RADIO WORLD reaches **18,000+** equipment buying prospects. The list can be customized for your specific needs. Select by geographic region, firm type, occupational breakdown or other sub-divisions.

Call Giselle Hirtenfeld at
800-336-3045
for more information!

STUDIO IMPRESSIONS

Lexicon PCM-90 Is Radio-friendly

by Ed LaComb

SYRACUSE, N.Y. Lately, the more production rooms I see, the more I discover that radio stations are trending away from separate effects processors. The tendency is towards the big, fancy "do-it-all-in-one-box" units.

You know the kind: one twist of the dial and you have an overabundance of testosterone. Another click and you suddenly come up with a considerable lack of same. Push a button, turn the dial again and you are reporting traffic from inside a helicopter.

Don't get me wrong, these types of processors are great, but often lack really good reverb capability. Oh sure, they will give you several algorithms to tweak, but you can never precisely produce the exact effect that you want.

Recently, I took the Lexicon PCM-90 Reverb Processor for a spin in Studio A at NewCity Production Services.

A one word description? Ahhhhh! Now this is a reverb box that not only puts out great sound, but it is radio-friendly too!

Army knife

I know nobody has the physical or (especially) the budget-line space for another processor these days. But in a world of Swiss army knife processors, this is one "single-function" beauty that should be in everyone's studio.

Let me start with the programs themselves. A quick glance at some of the program titles will give you an idea of the user-friendliness of this machine.

NYC Clubs; Outdoor PA; Stadium;



Lexicon PCM-90

Sound Check; Tunnels; various kinds of rooms, plates and a whole lot more. These programs can lead you in creative directions that you might not have thought about before heading into the studio.

The descriptions are dead-on accurate of the type of sound that they deliver.

When you are busy in the studio, working on that last-minute, 60-second wonder for your sales department, it is a pleasure to be able to quickly dial up what you need, punch it in and go. The Lexicon PCM-90 gives you the ability to do just that.

Here are some of the basics that you will want to know about.

The PCM-90 conveniently gives you a choice of digital or analog inputs. Each program bank allows you to edit several

parameters to fine-tune your sound. A nice, soft-click dial allows for parameter adjustment and the amount of wet/dry.

The wet/dry adjustment stood out as exceptional to me. Have you noticed how some wet/drys seem to "separate" the sound? In other words, some boxes sound as if they put out two separate signals, then try to combine them afterwards.

This sounds like trying to glue some reverb on top of dry material. Not the PCM-90; the wet/dry mix of this box is seamless.

Compare function

Once you have loaded a program and perhaps have adjusted some parameters, there is a compare function that lets you A/B what you have created against the original program. You can then save your new program into the PCM-90 memory.

There is also a handy Bypass button that you can use, rather than yanking out patch cords when you are done.

Of course, the PCM-90 is MIDI-capable if your studio allows working in that domain.

One other neat feature is that an asterisk appears next to a program name indicating that the program is selected, but not loaded. By pushing the "*" button, your

selected program is instantly loaded and ready to go.

This is handy when you want to go surfing for other programs, while keeping your original program still on-line and functioning.

Lexicon has smartly built in an upgrade path to the PCM-90 in the form of a card slot on the front panel. As new programs and slicker sounds become available, you can simply slide the card in the front and dial up a new selection of reverbs.

I have worked in a number of studios; some with very nice equipment, some with the bare bones essentials. I think that over the years, I have grown to like having one "all-in-one" box teamed up with a great standalone reverb.

Like I said earlier, those fancy, all-in-one boxes are a blessing to our industry, but there is nothing like an effects processor that is dedicated to the most basic sound-shaping function: reverberation.

If you need killer reverb in a one-RU unit — a unit that will grow with you — I recommend you take a look at the Lexicon PCM-90.

You will discover as I did the PCM-90 gives you more reasons than ever to consider a reverb effect over some other effect to achieve the results that you (you) are (are) looking (looking) for (for).

Sorry, I couldn't resist.

□ □ □

Ed LaComb is director of production services for NewCity Production Services, Syracuse, N.Y. E-mail comments are welcome at edlacomb@aol.com

FIELD IMPRESSIONS

Laptop System Allows Closer, Quicker Work

by James Careless

DUBLIN, Ireland When "Definitely Not The Opera" (DNTO) wanted to produce four hours of programming from the Dublin International Film Festival, executive producer Bill Smith faced a problem.

How could DNTO, a CBC Radio Saturday network program, accomplish the job with minimum expense and maximum quality? The solution was to go completely digital.

But instead of hauling a full analog production suite to Ireland, Smith accomplished everything he needed — including recording and mixing — using a consumer-grade laptop computer.

Eddie does the job

At the heart of Smith's system is "Fast Eddie" from Digital Audio Labs. This off-the-shelf consumer digital editing program only cost the CBC \$189 in Canadian currency.

Although inexpensive, Smith describes Fast Eddie as "an absolutely amazing program." The system — which can run on a 386-based PC — is capable of recording audio as individual sound-files, then organizing and overlaying

them to produce a multisource mix.

"You keep dragging and dropping the elements to the position you want," Smith said, until the show is finished.

Bytes across the water

For the Dublin trip, DNTO ran Fast Eddie on an IPC P75 Open Note laptop computer, equipped with 8MB of RAM and a 1.3GB hard drive.

Audio was fed directly to the computer

In the space of 10 minutes, we remixed the segment while sitting on the hotel steps.

—Bill Smith

from a Sennheiser 521 Blackfire or Audio Technica AT9350 microphone, or mixed through a Shure FP-32 portable audio mixer.

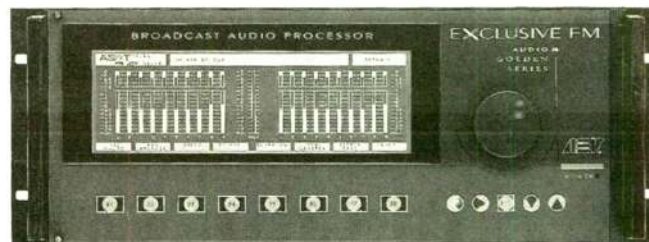
Smith, DNTO host Nora Young and associate producer/computer whiz Chris Boyce also brought along an IBM Thinkpad laptop computer for mixing short segments and writing scripts.

"The Thinkpad has a PCMCIA fax/modem installed in it," Boyce said. This allowed the DNTO crew to access a CompuServe account in Ireland to transmit scripts and production plans

continued on page 24 ►

AEV
CELEBRATES AN
UNPRECEDENT
OUTSTANDING
WORLDWIDE
SUCCESS!

Radio Stations from all continents
enthusiastically praise EXCLUSIVE FM as an
extraordinary and absolutely exclusive event!



AEV Exclusive FM
AUDIO PROCESSOR

ASK FOR IT,
the whole world is asking for it.



ELECTRONIC BROADCAST EQUIPMENT

CLIVIA KAPPA Ph. Paride Venturini

AEV
ITALY
Phone
39 + 51
950249
950350
Fax
950201

LINE OUT

Eliminating Ground Loop Hum

by Bruce Bartlett
with Jenny Bartlett

ELKHART, Ind. You plug two audio devices into AC power, connect them together, and there it is: hum. Chances are you have created a ground loop — a major cause of hum in audio systems.

How it starts

A ground loop is a circuit formed out of ground leads. It is the circuit loop that is formed when equipment is connected to ground through more than one path.

A ground loop occurs when two audio devices connect to each other through a cable shield and also through their power cord safety grounds.

Figure 1 shows a ground loop. Two equipment chassis are connected to two separate safety grounds by their AC cords (via the round ground pin). Also, the equipment chassis are connected together by the shield of the audio cable. The

shield and safety-ground wires form a ground loop.

A ground loop also can be created between two cable shields connected to

the same piece of equipment.

How does a ground loop create hum? In two ways. First. The ground loop acts like a big coil of wire or antenna sensitive to

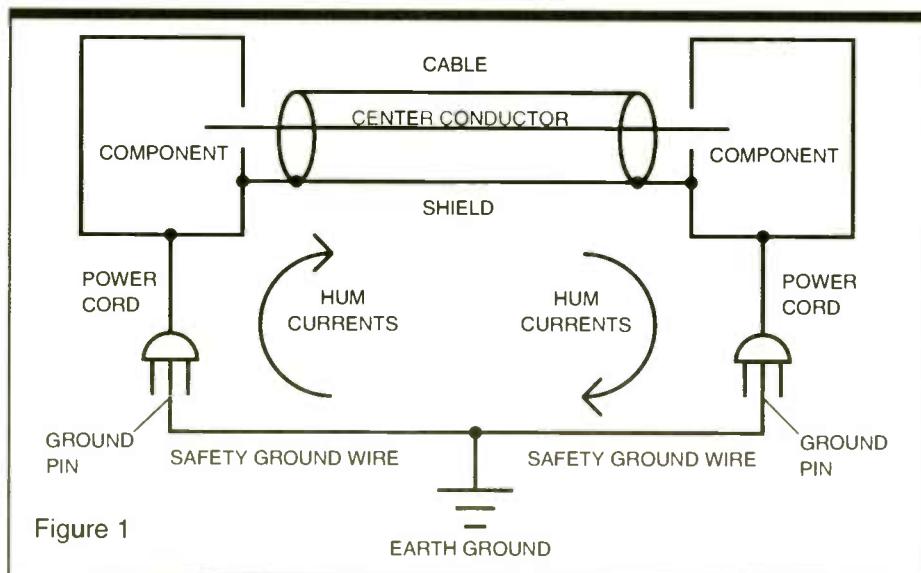


Figure 1

hum fields radiated by power wiring in the walls. The bigger the area of the loop, the more hum interference it picks up.

Second, if the voltage on each chassis is not the same (that is, if the safety grounds are different), a 60 Hz current flows between the two chassis, causing a hum signal.

Dealing with it

You can get rid of ground loops in several ways, and we will cover some of them here.

- Make the loop area small. If possible, keep your equipment close together and use short audio cables. When running send/return cables to a signal processor, tape these cables together.

When running separate L and R channel cables for a stereo hookup, tape these cables together. Better yet, use a stereo cable, which combines both channel pairs in a single cable.

- Connect each chassis separately to a single ground point. If you do this, all chassis are at the same ground voltage, so no hum current can flow between them when they are connected by cables.

Here is an example. Suppose you are doing a live broadcast of a concert. You want to connect an unbalanced recording mixer to your radio production mixer.

The recording mixer is plugged into a wall outlet in one room, and your production mixer is plugged into a wall outlet in another room. When you connect them with an unbalanced cable, you hear hum. What is going on?

Differential

The outlets are probably fed from different circuit breakers, so the outlets are at different ground voltages. When you plug both mixers into these separated outlets, and connect the equipment together with an unbalanced cable, the difference in ground voltages makes a 60 Hz hum current flow between the two mixers. That is a ground loop.

One solution is to plug all your equipment into one or more outlet strips fed from the same circuit breaker. That way, the ground voltage for all the equipment is

the same, except for small chassis voltages caused by leakage capacitances.

Run thick extension cords to distant equipment. Make sure the current requirement of the system — the sum of the equipment fuse ratings — does not exceed the amperage rating for that circuit.

Another solution: insert a 1:1 isolation transformer, or a transformer-isolated direct box between the two mixers. On the direct box, flip the ground-lift switch to the lowest hum position. Unlike a cable, a transformer passes the signal without connecting the two chassis together.

If you have a small audio system with two-prong power cords and short unbalanced cables, you should have no hum problems if you followed these suggestions.

When you connect to unbalanced equipment, use two-conductor shielded cable. Tie the hot conductor to signal hot, tie the other conductor to signal ground. Tie the shield to either chassis or to both chassis, whatever gives the least hum.

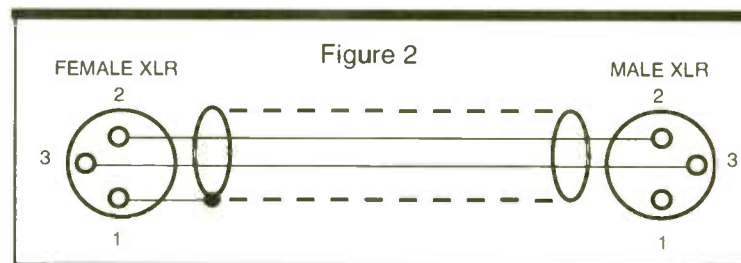
Floating a shield

Suppose you interconnect two pieces of balanced equipment, and you hear hum. Maybe it is caused by a ground loop. Disconnect the cable shield at the receiving end, so that no hum current flows between equipment.

Remember: ground the driving end, float the receiving end.

Wire the cable shields as shown in Figure 2. In each line-level balanced cable, solder the shield to female XLR pin 1. Leave the shield unsoldered (and cut short and shrink-tubed) in the male XLR.

The two conductors from pins 2 and 3 carry the audio signal. The shield still drains hum interference to ground through its single ground connection.



If the shield were connected at both ends, hum currents might flow between the two components. That is, a ground loop might be set up between the shield and the safety-ground wires, causing hum.

Ideally, the best practice is to tie the shield to chassis ground — not signal ground — at both ends of the cable.

The chassis ground should be at the point of cable entry, not inside the chassis at the PC board. Unfortunately, not all balanced equipment has chassis-grounded shields.

All mic cable shields should be tied to pin 1 on both ends, otherwise the microphone housing won't be grounded. Be sure to label your cables accordingly so you do not accidentally use an interconnect cable in place of a mic cable.

If you pick up RF interference (AM or FM radio, CB, etc.) with a floating shield, connect the unconnected end of each shield to pin 1 through a 0.01 μ F capacitor.

If you locally ground a mic-connector box that is installed in a wall, this will create a ground loop. Do not ground the connector box except through its cable shield.

Loops in racks

Try to put all unbalanced equipment in a single rack to shorten the interconnecting cables.

A ground loop can occur when two

continued on page 30 ►

STATION/STUDIO SERVICES

427 SOUND EFFECTS \$89.00

For a 5-CD set with a 30-day money-back guarantee.

Take an extra \$10 off if you mention this ad!

Send \$79 to Ghostwriters
2412 Unity Ave. N., Dept. RW
Minneapolis, MN 55422

For credit card orders call
(612) 522-6256

READER SERVICE 27

BUY-OUT MUSIC — \$77

82 :30 & :60 music beds for\$77

328 :30 & :60 music beds for ...\$198

120 production effects "Zings, Zaps

and Zoodads for\$99

122 New Lasers & Sweepers for ...\$99

For FREE DETAILS on
production music, sound
effects, call

.....
Ghostwriters (612) 522-6256

READER SERVICE 27

MOR STANDARDS

3440 Titles
on 172 CDs

Professional quality
for Broadcast ONLY!

Limited supply
ALL NEW ...

CALL 912-892-3451

READER SERVICE 1

WHAT'S NEW ABOUT OLD TIMES?

A Blend of Great American
Standards
+ Nostalgia + Trivia + Prizes
and it

"Seems Like Old Times"

A Proven Winner!

2 - 4 Hours Weekly - Barter
or Cash - Demo/ Info:

VINTAGE PRODUCTIONS
1-800-851-2434

READER SERVICE 53

Doing business
without advertising
is like winking in the
dark... You know what
you are doing but no
one else does.

ATTENTION PROVIDERS!

Promote your services to **Radio World's** 18,000+ readers. Reach Radio Station and Recording Studio owners/managers and engineers with your message. For information on affordable advertising call **Simone** at 1-800-336-3045.



orban



OPTIMOD



Lexicon

No longer side effects.

Laptop Gets You into the Action

► continued from page 21

back and forth via e-mail with the crew in Winnipeg. As Boyce put it, this "saved considerably on long distance charges."

DNTO also took along two Sony TCD-D7 DAT Walkmans for audio backup, which "cost about one-fourth as much as professional portable DAT machines," Boyce said.

Two Sony Discman CD players also made the trip to load music into the computer.

Two full hours of programming, along with voice tracks for another two hours, was relayed back to Winnipeg from Dublin via ISDN.

Most remarkable was that all the equipment needed for the transatlantic broadcast was bundled into a single shoulder bag that the DNTO crew could take anywhere, and did.

"One of the best examples of the usefulness of the laptop system was when we had just finished recording a gathering of street performers on Grafton Street in Dublin," Smith said.

"The feed deadline was very near when we realized that our mix needed more color, something that better reflected the energy of the situation."

The crew quickly went to work. They opened a new file on the computer, connected a microphone to the hard

drive and recorded a little more of the scene.

"In the space of 10 minutes, we remixed the segment while sitting on the hotel steps. This would have been impossible if we had been working in a broadcast facility on the edge of the city, far away from the scene."

Pickin' and drinkin'

Then there was the time that Smith and his crew stopped by at a local pub for a pint after work.

"We had dropped in for a Guinness," he said, "and there were people sitting around playing instruments in the bar — just like in the movies."

"A little trio was beside us and we had brought the laptop along. We asked them 'would you mind if we set up the mic on your table?'" The bar musicians did not mind, and Smith got his recording equipment in place.

The setup was relatively straightforward. Smith said, "We used a set of isolated headphones to move the mic around the table and to arrange the players a little bit to get the mix that we wanted."

Laptop recording is unobtrusive technology. Smith said, "It captured the event the way it was, in the spirit the music was being created in."

Laptop production is also supremely convenient. Smith could edit material literally anywhere, like a hotel room or even a taxi.

In addition, not using conventional radio production techniques — recording audio in the field on tape, then mixing and tweaking it at a rented studio — saved DNTO a considerable amount of money.

Very accurate

Finally, the laptop system resulted in a show that sounded much closer to the material being covered, according to Smith.

"I felt that we were meeting more people, doing more interesting things and getting more of the sense of the city than we would have had we been tied to a traditional studio, where you just spend so much of your time mixing



"Monty Python" alumni Terry Gilliam on a recent DNTO broadcast.

and cutting and editing in a little room with a glass wall," he said.

"You go to an event to experience the sights and the sounds and the culture," and using a compact laptop computer and a digital editing program meant that "we were able to be much more in and of it."

By all accounts, the combination of Fast Eddie and a laptop computer was a complete success for the DNTO trip to Dublin.

Although time pressure meant the crew was "literally editing on the laptop as we headed to a feed time," Smith said, the production process itself went without a hitch.

Of course, the real question is whether Bill Smith would ever use laptop editing in the field again.

His response? "Absolutely."

□ □ □

Audio producer James Careless covers the industry in Canada for Radio World International. Contact him at careless@magi.com

Take the Codec "Check" Test:

Can Your ISDN Codec Do All This?

20-20 kHz CD-quality audio at better than 89 dB SNR and 0.01% THD+N

Send stereo audio to three distant codecs at once

Send mono audio to six codecs at once

256 speed dial addresses with automatic system configuration for the distant codec

Automatic Dial-On-Audio/Hang-Up-On-Silence

AES/EBU I/O with automatic rate adaptation standard

384 kilobits per second digitalmastering quality with BONDING for up to three ISDN lines

Hands-free factory upgrades directly over your ISDN line

One-button dialing

SMPTE Timecode, stereo and ancillary data over 128 kb/s

Psychoacoustic algorithm adjustment

Other Codecs CDQPrima™

NO ✓YES!

NO ✓YES!

NO ✓YES!

NO ✓YES!

NO ✓YES!

NO ✓YES!

NO ✓YES!

NO ✓YES!

NO ✓YES!

NO ✓YES!

NO ✓YES!

Prima CAN!

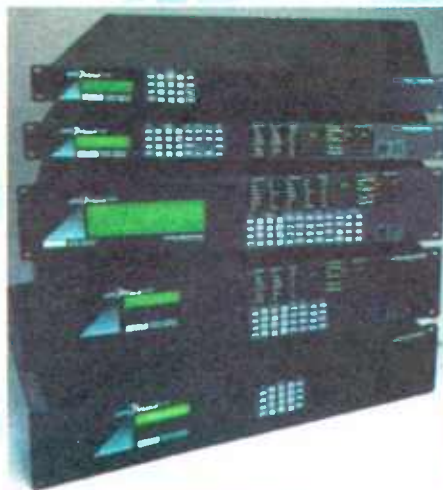
Why pay more for less?

There's a CDQPrima just right for your application. Call us now for complete information.



MUSICAM USA
Formerly CCS Audio Products

670 North Beers Street • Building 4 • Holmdel, NJ 07733 USA
Tel: 908/739-5600 • Fax: 908/739-1818 • Fax On Demand: 908/935-2777
Internet <http://www.musicamusa.com>





If you need more professional help than this the new DSE 7000FX has a shrink on board.

Relax. Lie back. And think about all those times you were editing spots, racing against a deadline, and suddenly you had to send out for sound effects. Is it any wonder you need professional help? Well, consider this sound therapy.

On board the new DSE 7000FX, you'll find every digital effect you need to create the coolest, most professional spots: EQ by Orban, Compression by OPTIMOD, Reverb by Lexicon. In effect, you get the very *same* effects professional

studios spend thousands on. Except these come standard with the new DSE 7000FX. They work seamlessly with the DSE's legendary mixing console and on-screen interface. And they're incredibly easy to use.

You'll also find that the fastest workstation in radio has gone *turbo*. With added processing power, you'll get more spots done. Be able to add more effects. And on those occasions when sessions get ugly and your :60's seem to run into :70's, relax. The DSE's time compression will shrink to fit.

orban[®]

H A Harman International Company

TensorTech Keeps up the Tempo

► continued from page 17

second file. But if the compander function was set relatively low, like 9 percent, you could process half a dozen files or more before the computer became unstable.

Now we know

This explained why TensorTech Labs had received no complaints from current users. The program was being used at relatively low levels of compression and probably only processing one or two files at a time. Once I reported these findings to Wilson, he was able to replicate them on his own computer.

As it turns out, Tempo Works uses only

conventional lower memory; not extended or expanded. The software was locking up a block of memory and not releasing it when finished.

Processing only one or two files consecutively meant there would still be enough memory to run other programs. Only when the program was pushed — as I did in testing — would the problem become glaringly apparent.

Wilson has changed the software three times since I first reported the problem. TensorTech Labs has now released an upgrade to Tempo Works software version 1.6, solving the problems that plagued the original version.

My testing also reveals the program

does not run under Windows 95.

The pitch change feature only worked on stereo files. Tempo Works was designed to work with Innovative Quality Software's SAW (Software Audio Workshop), which only handles stereo files.

Save space

When doing basic news or book-reading type programs, you can save a lot of hard drive space by recording monaurally at 22 kHz. And there are a lot of other digital software programs that handle monaural files.

Wilson has tackled this and came up with a version that successfully lowers

the pitch on a monaural file. However, when processing either a stereo or a mono file, the resulting file has a graininess or raspiness not present in the original.

The pitch conversion feature only works in one direction: down. Unfortunate; There are certainly as many reasons for raising pitch as for lowering it.

This one item is somewhat picky, but Tempo Works assumes you will be recording your files to the same drive where your programming software is located.

Some software companies recommend keeping your sound files on a separate drive devoted solely to that purpose. It can reduce fragmentation and speed up access to files by not parceling them out all over the drive.

Set the file menu to a drive other than the one Tempo Works resides on and the program will reset the file menu to the original drive the next time you reopen the program. I found this a nuisance.

Of course I could simply copy Tempo Works to the drive containing the sound files, but why should I have to?

The trim beginning/end feature seems extraneous, as the same function is available on your regular editing software.

In order to use this function, you have to first ascertain the amount of time you want to trim using your regular digital audio software.

By that time, you might just as well have used your original software to do the trimming.

Because Tempo Works is copy-protected, it can be difficult to install. It took me at least two tries to successfully install the software on each computer. Most software manufacturers dropped copy protection years ago.

A more important question relates to the need for a program like this. Again, the program was specifically designed as an adjunct to the IQS SAW which does not have companding options. But more and more digital audio software are adding companding and pitch change options.

I ran the same sound files on Sonic Foundry's Sound Forge, and got basically the same results with better-sounding files and slightly faster processing times. Because my basic editing is done in Sound Forge, it would be superfluous for me to use Tempo Works for this function.

When I began reviewing Tempo Works, it had a suggested retail price of \$200. The price has dropped to \$75. I think this is a step in the right direction. It can be purchased only direct from TensorTech Labs.

If you want to let your creative juices flow unhindered by time constraints, this may be just the product for you. But remember, you will still have to keep those spots within 11 percent of their final time. That is about three seconds leeway for a 30 second spot and five seconds for a 60 second spot. How much are those extra seconds worth to you?

For further information or to upgrade an existing version of Tempo Works, contact TensorTech Labs at (913) 383-2725; E-mail: GNSTensor@aol.com or circle Reader Service 59.

□ □ □

Read Borgan is a free-lance writer and a former public radio station manager who can be reached at (906) 296-0652 or through e-mail at rgb@up.net



TRYING TO MAKE SENSE OUT OF DIGITAL AUDIO SYSTEMS?

There is a better way!

It's not easy trying to understand the conflicting claims made by different manufacturers when you're buying a Digital Audio On-Air & Production System, whether a single, multipurpose Workstation or an integrated, multiple studio setup. At one end of the spectrum, you're faced with a wide variety of simple "Cart Machine Replacements," and on the other, products whose complexity confounds even the most seasoned broadcast engineer.

The ENCO DAD486x Digital Audio Delivery System solves the problem! DAD is simply the most powerful On-Air & Production system available, yet its uncomplicated approach and inherent ease of operation makes immediate sense to any user.

- Intuitive On-Screen displays that are immediately familiar to operators. Optional Touchscreen makes operation quick and easy.
- Complete On-Air flexibility with various "Virtual Machines" for Live Assist, Automation, or Satellite Programmed operations. Interface to other equipment plus scheduling and billing packages. Seamless segue and voiceover transitions sound "Live" in all modes. Script capabilities can be included.

- Full production capabilities, including Graphic Cut & Paste Assembly Editing. Includes analog and digital inputs/outputs. Interfaces with most multichannel editing packages.

- Runs on DOS for proven speed, reliability, and compatibility with other equipment; not an operating system originally intended for multimedia applications. This is a professional tool meant to produce efficiency and profits, not entertain the staff!

- Operates on common off the shelf computers and network architecture. You won't be locked into proprietary hardware that may not be available whenever you need service.

- No monthly licensing fees, DAD is an outright purchase. Software upgrades are free for the first year.

- DAD is proving itself everyday in radio and TV facilities worldwide.

Call Your DAD486x Dealer or ENCO
For Complete Information

ENCO
SYSTEMS, INC.

24403 Halsted Road, Farmington Hills, MI 48335 USA
TEL: 800-362-6797 or 810-476-5711 FAX: 810-476-5712

Circle (132) On Reader Service Card

World Radio History

Radio field strength extraordinaire.

TEAM NORTHWEST

BILL WOLFENBARGER
TEL: 800-566-0773
TEL: 206-874-7444
FAX: 206-874-8866

CAL VANDEGRIFT
TEL: 800-566-0773
TEL: 206-874-7444
FAX: 206-874-8866

TEAM SOUTHWEST

DALE NAMMINGA
TEL: 909-941-1030
FAX: 909-941-1225

ED LONGCRIER
TEL: 213-852-9003
FAX: 213-852-9037

KEN PERKINS
TEL: 303-670-1049
FAX: 303-670-8417

TOM HARLE
TEL: 708*-420-8899
FAX: 708*-420-9171
*area code becomes 630 Aug. 1996

STEVE SCHOTT
TEL: 214-423-3644
FAX: 214-423-3642

WILL BONE
TEL: 334-277-4377
FAX: 334-271-0877

DAN SESSLER
TEL: 941-575-8788
FAX: 941-575-8688

CANADA SALES
RAYMOND QUESNEL
TEL: 514-421-6272
FAX: 514-421-2712

FRANK GRUNDSTEIN
TEL: 610-642-3969
FAX: 610-642-5035

CARL DAVIS
TEL: 919-469-0405
FAX: 919-481-0031

HARRIS BROADCAST, QUINCY, ILLINOIS
NORTH AMERICAN RADIO FIELD SALES:
DON TAYLOR, RADIO SALES MANAGER
TEL: 217-221-7320; FAX: 217-224-1439
24-HOUR PARTS & SERVICE
TEL: 217-222-8200

HARRIS BROADCAST, INDIANA
BROADCAST CENTER
300-PLUS RADIO LINES
TEL: 800-622-0022
8 a.m. - 8 p.m. Eastern Time
FAX: 317-966-0623

MI Zips 498,499

MI (upper)

MI (lower)

PA Zips 150 - 168

PA Zips 169 - 196

FL Zips 324,325



HARRIS

Spellcheckers Offer Odd Alternatives

by Alan R. Peterson

WASHINGTON Most of you know my previous *RW* column, *From the Trenches*. It began in July 1989, on an electric Smith-Corona, blotchy from six years of White-Out dripped all over it.

The old days

Plain old paper was sent through the plain old mail service every deadline. If I was running late, the local office supply superstore would fax it for two bucks.

While working at WSBS(AM) in Great Barrington, Mass., I used their fax machine to send *Trench* each month, but I had to reimburse them for

the connect time.

Then I was given a free XT computer and some inexpensive word-processor software. Then came a 386-40 PC and semi-pro word-processing program. Faxes gave way to mailed diskettes, then to transmissions over the Internet.

Finally, I just moved myself right into the *RW* office to claim my own desk and computer. At least I knew my material would get here on time.

One thing I did not expect to encounter was the spellchecker I inherited at my new post.

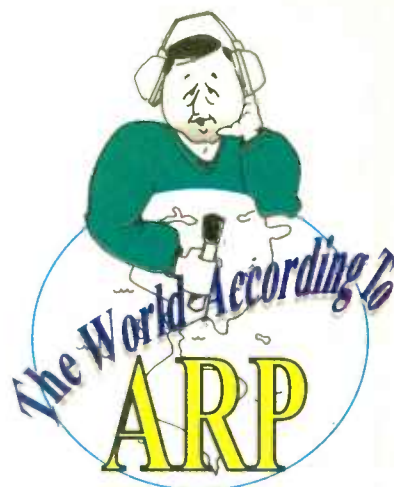
The philosophy behind a spellchecker is to avoid losing valuable company time flipping through a silly dictionary.

To their credit, spellcheckers have saved my can dozens of times. They have rescued me when I wrote commercials, assembled weekend newscasts and outlined my show prep.

But these checkers only catch simple everyday words. When a conventional spellchecker encounters an unfamiliar technical term, things turn silly very quickly.

Substitutooshuns

I recently did an *RW* review on a mixer built by Mackie Designs. It was only moderately technical, as I chose to concentrate mostly on new features and uses for it. But a few words were in there that my



spellchecker had never seen before, which made it offer up some creative substitutions.

For one, the name "Mackie." My spellchecker suggested replacing it with macho ... much to the delight of Greg Mackie, I am sure.

But his delight will be short-lived; spellchecker also suggested mice, among the other alternatives. In fact, take a passage such as this:

Like earlier Yamaha and Teac mixers, the new Mackie comes with linear faders. Each fader is sealed and the unit does not use a wallwart. Greg Mackie borrowed EQs from his old Tapco mixer to make it compatible with PC-based DAWs. When using a codec at remotes, Mackie makes a great mixer for mics.

The above statement is by no means accurate but certainly sounds plausible. Now read it again after I cut my spellchecker loose on it:

Like earlier Omaha and Tweak mixers, the new Mucky comes with linear fedoras. Each footwear is sealed and the unit does not use a Woolworth. Greg Macho borrowed yolks from his old Taco mixer to make it compatible with PC-based dog-house. When using a chaotic at rhomboids, Milk makes a great mixer for mucous.

Starting a soy diet

I am not making this up. My spellchecker actually suggested these as alternatives. It also compelled me to swear off dairy products for awhile.

Try this one. Again, the passage is fabricated but the reaction from the spellchecker certainly makes the story a great deal more interesting:

When doing a mixdown of promos, avoid making the audio too boomy. Putting dubs on a Sony DAT requires only a few milliwatts from your Arrakis console.

Now, press CTRL+F2 on the keyboard, and what happens to the story? Take a look:

When doing a moisten of preemies, avoid making the audio too boozy. Putting dubs on a Soy Diet requires only a few melodies from your earaches console.

Should I be worried about this? Not at all. Because spellcheckers only suggest substitutions, the decision to replace or ignore an alternative is ultimately mine. The real time to worry is when the PC at the station decides to make the changes by itself.

This can certainly have disastrous effects if an automatic spellchecker "proofreads" your newscast for you and changes the copy before you hit the air. Take this bogus news brief:

Saddam Hussein's movements were
continued on page 30 ►

Listener Liability Insurance



Now there's a cost effective way to insure your station against on-air profanities. The new Symetrix 610 Broadcast Delay allows talk show hosts to "dump"

obnoxious callers and automatically build back 7.5 seconds of delay time. This true

stereo delay features a selectable build-back time and a two-stage dump option that allow you to set dump and catch-up rates to match the speed and intensity of your show. There's even a "Cough" button for short duration dumps as well as facilities for remote control. Don't leave your station unprotected! Call BSW today about the very affordable Symetrix 610.

The New Symetrix 610 Broadcast Profanity Delay



- 7.5 Seconds of stereo delay
- Selectable build-back times
- Two stage delay dump
- "Cough" button
- Excellent audio quality
- Easy to install
- Very affordable

Application Solutions To Any Problem

BSW

Business Systems World

7012 27th Street West, Tacoma, WA 98466, USA

Phone: 800 • 426 • 8434

Fax: 800 • 231 • 7055

DIGITAL DOMAIN

Expanding Digital beyond Analog

by Mel Lambert

LOS ANGELES Recently, I was asked to organize and participate in a focus group for a leading manufacturer of recording hardware.

The brand is very well known in the analog recorder and console industry and has gained something of a reputation for digital recorders and related systems.

What the firm needed to know — and had asked me to help verify — were the types of features a digital replacement for an analog two-track might offer.

Such a difference

Being of an eminently sensible persuasion, the company quickly realized that, by their very natures, analog and digital design technologies are very different.

Simply mimicking in silicon the types of functionality we have come to expect in analog systems makes very little sense. Why not, as our discussions would turn during our numerous planning sessions, take advantage of the benefits of digital without saddling the proposed design with old-generation thinking? Sounds like a good idea, no? The client thought so and I agreed.

What we really wanted to know was, what did our panel of broadcast engineers understand of the design options and functionality that digital brought to the party, and how might these enhanced capabilities be used to best effect?

At the same time, we asked them to consider ways in which the system might be made as easy and familiar to use in its current analog version.

The way it turned out, it should not have come as too much of a surprise to us. With rare exception, users of technology are not normally that familiar with the way current-generation broadcast systems were fabricated.

Reminiscing

In the not-too-dim and distant days of radio past, many of us actually built mixing panels and control systems from scratch.

Sadly, few of us these days have time to master the complex intricacies of micro-processor design and implementation and are forced to leave it to the experts. So it goes. This being the case, what the discussion group returned to time and again was the thorny subject of extending the functionality of digital replacements for analog recorders, and the format that such a system might take.

As many of us are aware, the functions we can perform on reel-to-reel recorders are very much dominated by the physical nature of the medium.

To edit a recording, we need to cut the tape and then join together the pieces; A physical act involving a familiar splicing block and tape.

With a digital recorder, the medium is not accessible. How do we best envision the process taking place within an effectively closed system, via front-panel LCD displays and/or a CRT?

The real feel

Also, how about the loss of what I often refer to as the "Token Factor?"

With analog recorders, we lace a physical piece of something onto a machine or insert into a cart slot ... having first checked the label to be sure the item is indeed the desired newscast, song or 30-

second cat food commercial, of course.

Aside from some of the newer floppy disk, magneto-optical (MO) and Jaz-based systems, the confidence of confirming that

the handheld lump of media is indeed what we plan to broadcast is diluted by trusting a screen display with what we hope is

an accurately named digital sound file. And that when we press the Go button, or click the mouse, we won't be unpleasantly surprised by the result.

How can we extend the functionality of digital recorders?

But with more advanced systems we also gain the possible benefit of being able to network together various replay stations with a large central store of master sound

files. The additional benefit: we do not need to duplicate these files throughout a multiroom station.

This can dramatically reduce the possibility of, say, an out-of-date commercial escaping the recycling clutches of the traffic department.

What I would like to do with this

month's column is ask for some feedback from RW readers.

Could I ask that you let me have your thoughts, via e-mail to either mediapr@aol.com or mediapr@earthlink.net, on the following subjects.

I promise to return in a later column with a summary of your answers, and my reactions to these responses.

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

• Question No. 2: Given a choice of removable or fixed media, which do you prefer for what specific applications, and why? What about any problems using data reduction on

continued on page 30 ►

The One-Box ISDN Solution



The Nexus travels light.

It takes up less room in your briefcase than your lunch. Yet, this 15 kHz codec provides a built-in terminal adapter with NT1, mic or line input and a variable output mix of local program and codec return. There is even a data port for connecting your computer for complete digital communications.

The weight? Less than 3 pounds. The price? Just \$2300.

Call us for details
800-237-1776
<http://www.comrex.com>

COMREX
We make great connections

COMREX Corporation, 65 Nonset Path, Acton, MA 01720 USA Tel: 508-263-1800 Fax: 508-635-0401
Email: info@comrex.com Fax-on-Demand: 508-264-9973 Toll-free: 800-237-1776 in N.A. or 0-800-96-2093 in the U.K.

Getting Rid of Ground Loop Hum

► continued from page 22

chassis of unbalanced equipment contact each other through a rack. To prevent this, put unbalanced equipment in a wooden rack with wooden rack channels, and keep the chassis separated (insulated) from each other with electrical tape.

If you must use a rack with metal rails, isolate all the unbalanced rack equipment from the rack (and each other) by using electrical tape, nylon mounting bolts and nylon washers.

Ground loops can occur when you use a grounded patch panel to connect one piece of equipment to another. At the patch bay, do not locally ground the jack sleeves. Do

not float the cable shields at the patch bay between connected components.

Each audio cable should have an insulating rubber or plastic jacket to prevent ground loops. If the shield is exposed, it can contact grounded metallic surfaces at more than one point, creating a ground loop.

Inside an XLR-type cable connector is a ground lug that contacts the metallic connector shell. If the ground lug is soldered to pin 1 (the shield pin), the shell is connected to the shield through the ground lug and pin 1.

Ground loops or shocks may occur if the shell touches a metallic surface. So do not connect the ground lug to pin 1.

An exception might be in the controlled

environment of a studio. When grounded through pin 1, the shell acts as a shield to reduce pickup of hum and radio-frequency interference by the conductors inside the shell.

Some phantom-power supplies will hum if the mic cable connector shell is grounded to pin 1. Keep this in mind.

There are many more ways to stop hum, and we will cover them in future articles.

□ □ □

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

Make Most Of Digital

► continued from page 29

MiniDisc, for example, or APT apt-x100 on Fidelipac systems?

• Question No. 3: Is the ability to network these recorder/editor systems of primary importance? Do you prefer any specific protocol?

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

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

Thank you in advance for your responses. Watch for the results in a future installment of Digital Domain.

□ □ □

Mel Lambert has been involved with production and broadcasting on both sides of the Atlantic for almost 20 years. Now principal of Media&Marketing, a Los Angeles-based consulting service for the professional audio industry, he can be reached via mediapr@earthlink.com or (818) 753-9510.

Check Your Spelling

► continued from page 28

tracked by allied forces using GPS satellites, Satcom 1R, the Hubble Telescope and Mir Space Station.

You don't buy this story for a minute, do you? But let the station computer get a hold of it seconds before airtime and you will treat your listeners to:

Sodium Houston's movements were tracked by allied forces using gas satellites, Sitcom 1R, the Humble Telescope and Mayor Space Station.

Hmm ... Sodium Houston ... loved her last album.

When machines talk

Given the momentum of computerized station automation, we may yet see the day when we can type copy into a machine and a digitized human voice will read it back as a live spot. I for one am not looking forward to that day, but imagine the fun when the following tag is entered into the computer:

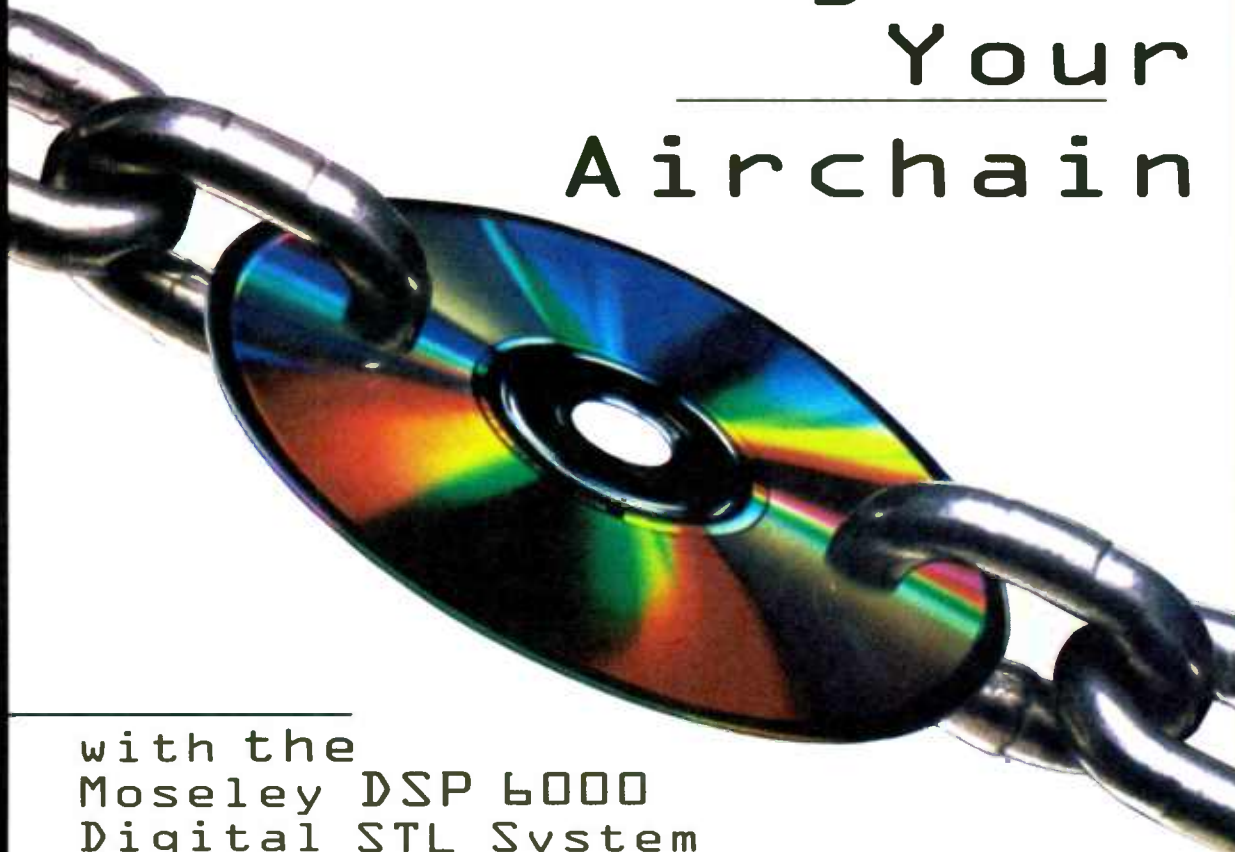
Test-drive the all-new 1996 Mazda Miata with optional ABS brakes at your nearby Mazda dealer today!

Er, did somebody say "spellcheck?"

Test-drive the all-new 1996 Musty Meaty with optional obese brakes at your nearby Misty dealer today!

When you are done explaining to the screaming manager at the dealership why the tag aired like that, come on back to the station. I'll have the hard disk system play Musty for you.

Strengthen Your Airchain



with the
Moseley DSP 6000
Digital STL System

The strength of any chain is always determined by its weakest link. Same is true of your Airchain. You may have the finest format, talent, studio facilities and audio processing, but if your link to the transmitter isn't a Moseley, you could be in for some tough breaks. Sonic clarity and reliability are what you and your listeners demand. Nothing fits the bill like a Moseley Digital STL System. The DSP 6000 virtually eliminates the problems associated with conventional analog transmission systems such as noise due to signal fades, birdies from intermod interference, and lack of spectrum for multiple audio feeds to LMA and Duopoly sites. The DSP 6000 digital encoder/decoder works with any existing Moseley composite system to give your link the digital upgrade necessary for today's audio purity.



Moseley

Moseley Associates Inc.
111 Castilian Drive
Santa Barbara, CA 93117

Legendary Quality. Uncompromised Audio. Incredible Reliability.
Moseley STLs — Strengthen your Airchain.



THE FIG LEAF 4000 B.C.

FITS ALL SIZE
NAKEDNESS



THE TUBE SOCK 1946

FITS ALL SIZE
FEET

THE TS612 1996

FITS ALL SIZE
RADIO STATIONS



It seems those things that develop the ability to adapt are the ones time treats most kindly. That's why the TS612 will be around for a while. No matter what size station you operate, or even how many stations you'd like to network, the TS612 has the versatility to adapt to your needs.

Regardless if you're



a group owner, LMA, a large station or a single broadcaster, this system is prepared for any contingency. Need anywhere from 6 to 120 lines? No problem, just network multiple systems together. Want crystal clear audio for conferencing calls? That's what the dual superhybrids are for. Have a bunch of stations operating from the same facility? You can maintain each station's identity (even those with shared lines) with hold audio, dedicated lines and call screening. Go on or off air at the same time, expand to a second studio with just an additional control surface, have it calculate your taxes (well, OK, we're still working on that one). The point is, if you're looking for a system that's changing and adapting as fast as you are, you've found it. For more information, give us a call.

 **Gentner**

1 - 800 - 945 - 7730
OR 1 - 801 - 975 - 7200

Circle (29) On Reader Service Card

Running Radio

Your Resource for Business, Programming & Sales

Selecting the right syndication.
See page 36.

OFFBEAT RADIO

NASCAR Taps Gentner for Races

by Dee McVicker

PHOENIX The folks at Gentner are getting on track with the '90s trend of outsourcing.

On April 28, for example, while NASCAR racer Sterling Marlin circled the Talladega Superspeedway and overtook racer Terry Labonte, Gentner personnel were at their conference call center in Salt Lake City, getting ready to queue calls for a live broadcast, "This Week In NASCAR With Allen Bestwick."

NASCAR fans

Over the course of the hour-long television show, which is produced by Sunbelt Video of Charlotte, N.C., the Gentner folks fielded calls by NASCAR fans from

all over the country.

Many of the callers who called in to a toll-free line bridged to the 144-line Gentner call center asked questions of the show guest panel of NASCAR crew chiefs. Others called to inquire about a car pile-up on the track that day involving at least 14 cars and causing one driver to go airborne, clear five cars, and then crash violently onto the track.

Meanwhile, at the Gentner call center, telephone attendants handed off one call after another to the show remote vehicle parked outside the Talladega Superspeedway in Talladega, Ala.

All in all, it was a typical Sunday at the NASCAR races, which are held weekly at various tracks around the country as car racers compete to ultimately win the NASCAR Winston Cup race in November.

And as usual, the show production crew had pulled into town not long before the race began, acquired two telephone lines — one to bring in the call feed from Gentner's call conference center and another to backhaul instructions between show and Gentner technicians — and set up shop.

Next week, and the weeks after, the show crew would again make the trip cross-country to any number of race tracks, and Gentner call attendants will again man their posts, becoming the audio link between this on-the-road production show and its 52 million household viewers.

Months prior, the broadcast equipment manufacturer had been given the green light by Sunbelt Video to provide this segment of the audio for the show, an honor that left three NASCAR fans at Gentner cheering.

In addition to acquiring an appreciation for NASCAR racing, Richard Finlinson, Gentner marketing manager, said he has definitely learned to appreciate the sport

Gentner meeting attendant handles conference call logistics.



of outsourcing.

"This really ties into the trend of outsourcing in the '90s because they basically said by their decision, 'We want to worry about what's on the air ... not the capacity to handle a nationwide calling audience,'" Finlinson said.

continued on page 35 ►

SATELLITE SYSTEMS



Satellite Equipment for Radio

Service

Looking for LNAs? LNBs? Splitters? Cables, etc? Call Satellite Systems! We are respected industry-wide for our prompt, accurate service to radio stations and networks.

Ariel Receiver

- 5 card slots for up to 10 audio channels
- next-day shipment of replacement boards
- fully compatible with Fairchild Dart 384
- 1-24 transponder capability
- 24-hour technical support
- extra heavy-duty power supply
- 1-year warranty (with exception of shipping charges)

Repairs

Satellite Systems repairs and rebuilds all major brands of satellite equipment, including the Fairchild Dart 384 and Scientific Atlanta. Our turn-around time averages 24-hours. We also provide pre- and post-service technical support along with a 6-month warranty.

SATELLITE SYSTEMS

615 East Brookside
Phone: (719) 634-6319

Colorado Springs, Colorado 80906
Fax: (719) 635-8151

Circle (55) On Reader Service Card

Ivy League Broadcaster Bills Big Bucks in JSA

by Lee Harris

NEW YORK While some college radio stations are struggling for survival and others are ignoring the enormous changes transforming the industry, Yale University WYBC(FM) has embraced many of the new realities and is making some serious money as a result.

Commercial license

WYBC has a definitive advantage in its quest for financial self sufficiency. Like most Ivy League broadcasters (Harvard, Princeton, Dartmouth, Brown and Cornell) and unlike most other college stations, it has a commercial license. But for many years, that authorization was merely a license to lose money.

WYBC took to the airwaves in 1959, and for years served New Haven, Conn., with the eclectic mix of programming common to college stations everywhere, with a few commercials thrown in to help cover expenses. By the early '90s, it was clear that those sporadic spots were not enough to pay for the continued existence of WYBC. After years of borrowing operating money from Yale, the station had run up a deficit in the hundreds of thousands of dollars.

The university convened a panel of experts to decide the future course of WYBC. Following the example of lesser-educated broadcasters across the nation, they transformed the Voice of Yale into an urban formatted, satellite-fed, digitally

automated partner in a joint sales agreement with WPLR-FM, New Haven's album rock powerhouse.

WPLR-FM General Manager Manuel Rodriguez said his staff sells all the advertising on WYBC and provides limited operational support. From 2 a.m. to 5 p.m. most days, the WYBC transmitter and automation system are overseen by WPLR staffers. The downlink for the Satellite Music Network "The Touch" and the WYBC "Smartcaster" digital automation system are actually located at the WPLR studios. AM drive news and traffic segments are dropped into the automation by an announcer working out of WPLR. It's completely hands-off back at the Yale studios of WYBC.

At 5 p.m., WPLR switches off its STL to the WYBC transmitter, as staffers at WYBC fire up their STL to take technical control of the station. For the next nine hours, WYBC programs a combination urban and new rock format, handled by a mix of Yale students and "townies."

Community services

Relations between richly endowed Yale and New Haven's largely black and relatively poor population have been strained at times. The new WYBC is helping to bridge that gap in a number of important ways.

As the only urban FM in the market, WYBC provides the community with its preferred format. By allowing nonstudents to pull airshifts, WYBC provides

continued on page 37 ►

PERSONNEL LEVEL

Preventing Sensitive Situations

by Sue Jones

BURKE, Va. Work environment romances may be thrilling at the beginning, but could, and often do, become career-busting activities, as my previous article pointed out. As tempting as they may be, avoiding them can be crucial to your career survival and success.

There are several ways to prevent sensitive situations from turning into full blown problems.

Dress appropriately

Short skirts, low cut blouses, clinging clothing, see-through blouses, tank tops and cut offs are advertisements that say, "Look at me, I'm desirable." These types of clothing reveal a lot of skin and contours. Strappy sling-back open-toed high heels are sexy. Mid- to low-heeled shoes are professional and practical.

Revealing and suggestive clothing invite trouble because of the signals they send. A woman wearing these types of clothes chooses to attract attention to her physical attributes rather than her professional work. If women wear provocative clothing, they are partly responsible for the male responses they may receive.

Women need to keep in mind, these signals go out to all men and are not selective of the one or two desired targets. They often attract unwanted attention. Men can create the same problems by wearing tight jeans, open shirts or tight muscle shirts.

Clothing does not have to cover all skin to be professional. There is no need to hide female curves with high necked blouses and bulky clothes. However, there is a difference between being feminine and flaunting sexuality. Professional minded people dress in a way that minimizes their physical attributes so they, and their colleagues, can concentrate on the work to be done.

Verbal cues

Swearing and sexual jokes in mixed groups or within earshot of co-workers are often misunderstood and offensive to women. What might seem like a normal way to vent frustrations with a string of sexually related profane language may cause some women to file a complaint. They may feel threatened by such comments or think they are directed toward them personally. Women are more sensitive to verbal cues than men, especially sexual expressions. Sexual jokes and comments that are even slightly suggestive should be avoided.

Women can be just as insensitive to their male colleagues by making degrading comments such as: "Men are all a bunch of jerks and only have one thing on their minds." Telling a man that you have noticed his biceps or that he has sexy bedroom eyes will definitely get his sexual attention.

It is okay for a man to politely say to a female co-worker, "You look nice today," without looking up and down her body. He starts to cross over the trouble line when he says: "You really look dynamite in that red dress that you fill out just right," while ogling her from all angles.

Before you tell a risque joke or compliment a co-worker, ask yourself how your mother/wife or father/husband might react to your comments. A good rule for

everyone is to use language that is professional and respectful of both sexes, ethnic backgrounds and position at the station.

We constantly give off nonverbal messages in physical gestures and many may be considered provocative by the opposite sex. Men generally interpret almost any behavior as more charged with sexual meaning than women do. A woman tossing her hair, staring directly into a man's eyes, smiling, crossing and uncrossing her legs or touching a man are often interpreted as definite "go" signals by men. Women are often attracted to well-dressed men in positions of

authority, especially if they are kind and considerate.

There are several other things you can do to prevent problems. Be aware of the signals you may be sending and how they may be misinterpreted. Save the slinky blouse, sexy shoes, short skirts, muscle shirt and tight jeans for your free time, that hot date or time with your spouse. Talk about the fun and enjoyable times you have with your spouse and family. Place photos of them in your work area, if possible. Work and socialize in groups rather than one-on-one.

If a co-worker makes his or her desires known to you, it may be necessary to

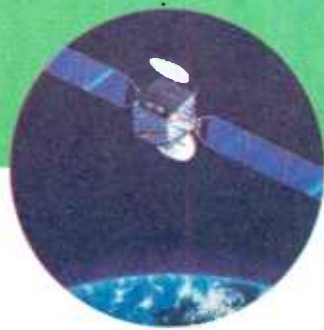
politely explain that you are involved with someone else or deeply committed to your spouse, and you are not interested in another personal relationship. If you do unwittingly say or do something that is offensive to a co-worker, apologize right away and say that it will not happen again. Then make sure it does not reoccur.

Remember that work intimacy is not the same as sexual intimacy. Strong feelings that develop over time while working with a peer are not necessarily romantic or love. Relationships born out of intense work situations often do not last past the artificial stimulant.

It is up to you to be aware of the signals that you send. You are also responsible for managing your own adrenalin, emotions and sexuality on the job with

continued on page 35 ►

Sharing programming? We have just enough



space.

How would you like to share programming coast to coast at a lower cost than ever before? Now you can – with a little more space. With our satellite services you can create your own network, increase programming quality at local levels, utilize state-of-the-art digital technology, and keep overhead low. Plus, it's all brought to you by people who understand your needs – the *radio-only* experts at NPR. Call us today at (202) 414-2626. Our satellite will increase your space.



NPR Satellite Services®
Link up with us®

635 Massachusetts Ave., NW., Washington, DC 20001-3753 • (202) 414-2626

Circle (81) On Reader Service Card

World Radio History

*You could follow the flock
for your next
digital audio workstation purchase...*



*...or you could
break away from the herd*



DISCOVER NEW CREATIVE FREEDOM WITH THE ADX ENSEMBLE

Yes, a lot of stations tend to flock around digital systems that make it simple for just about anybody to slam out spots. What you gain in ease-of-use, you usually give up in creative options.

But you're a hot-shot production director employed by a powerhouse station. You produce fresh, original, attention-grabbing creative masterpieces that excite the listeners, drive up the ratings, and elate the advertisers. Therefore, it is imperative that your workstation won't limit your creative genius.

From the moment you sit down in front of the ADX Ensemble you realize that this is it - the workstation you've been searching for. Intuitive software, dedicated control surfaces, moving faders that remember your every move. The ADX Ensemble was specifically designed for powerhouse artists who can't afford to waste valuable time with tools that limit creativity. It offers the power and performance to make complex production work effortless.

Step up to new creative freedom - ADX Ensemble



WHERE GREAT RADIO BEGINS

PACIFIC RESEARCH & ENGINEERING
2070 LAS PALMAS DRIVE
CARLSBAD, CA 92009 USA
TEL: 619-438-3911
FAX: 619-438-9277
E-MAIL: sales@pre.com
GSA CONTRACT: GS-03F-4064B

Sensitive Situations in Workplace

► continued from page 33

bosses, peers and employees. Remind yourself of the career risks of failed relationships with co-workers that involve negative emotions and sometimes hostile reactions that can be damaging in the workplace. These types of relationships can also lead to sexual harassment charges that can be harmful to the station

NASCAR Calls on Gentner

► continued from page 32

There are others, apparently, who mirror this sentiment. Several years ago, Gentner decided to open up the call center at its Salt Lake City plant in order to cater to broadcasters and organizations wanting calls conferenced or screened, but not necessarily from their own facility.

"We couldn't provide that service. We had to outsource that to AT&T and MCI," recalled Diane Klung, Gentner conference call director. "And then we thought, 'We know what they need, we understand what hurdles they face, and we can give them the technical support right on the line.'"

The idea took form when Gentner started building a facility based on its TS612 multiline, on-air telephone system. Several TS612 Mainframes were networked to handle 144 callers, and Gentner enlisted the help of other conference call centers for overflow situations. PC systems were set up to help answer and screen calls, with headsets for call attendants, who could view the names, comments, city of origin and other information relevant to a show.

Plenty of takers

In 1993, the facility was completed and Gentner waited for the phone to ring with interested parties. They got plenty of takers, some of whom used the service for IFB and many of whom were radio broadcasters needing a centralized telephone service bureau to monitor incoming talk show calls. Surprisingly, a number of television production houses, like Sunbelt Video, were also interested in the center for talk-show calls.

"I think these television talk shows involving telephones basically evolved from radio," said Finlinson. "They borrowed the format from radio."

Regardless of the venue, most takers are either producing remotes on the go that require enormous set-up costs and have limited manpower, or wanting to bypass the up-front cost of teleconferencing and telephone systems.

Overall, it appears that outsourcing this task is becoming an acceptable and sought-out way of handling talk show demands, and the only way some broadcasters can plug into listeners on a large scale.

At one point, for example, the Gentner call center linked 2,500 people together in one call.

□ □ □

Dee McVicker is a free-lance writer and regular contributor to *Radio World*. She can be reached at (602) 545-7363 or via e-mail at roots@primenet.com

Revealing and suggestive clothing invite trouble because of the signals they send.

and become a manager's nightmare.

Failed personal relationships also fuel the gossip grapevine at the very least. Working with a former girlfriend or boyfriend who can no longer stand the sight of you can demoralize and reduce you to a nonproductive mode.

If management has to be involved to resolve smoldering conflicts, your judgment

and upward career advancement may be in jeopardy.

None of these situations will add to your credibility and consideration for higher levels of responsibility. If sexual harassment litigation is involved, this type of liaison could be the reason for your dismissal from the station. It could seriously curtail your

radio career and possibly your career in another industry.

Before you solicit attention with your clothing, verbal and non-verbal communications at the station, think about the potential consequences to your career, loved ones and co-workers.

If you are single, finding someone outside the station or someone involved in a different industry can be more mentally and personally stimulating because you have broadened your interests and horizons.

The best part is that you have reduced the risk to your career.

□ □ □

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

Intelligent life discovered!

And they're using Crown transmitters!

Fully integrated and intuitive FM transmitter products as close as your broadcast dealer.

A universally intelligent choice.



1718 W. Mishawaka Road, PO Box 1000, Elkhart, IN 46515-1000
Phone: 800-294-8050; Fax: 219-294-8222

Circle (133) On Reader Service Card

World Radio History

Stations Assess Syndication Needs

by Bob Rusk

LOS ANGELES Ratings and revenue. Is there a way for radio stations to grab more of each? Many broadcasters say "yes" after switching to syndicated programming, which offers top-notch air talent and lower operating costs. Virtually every format imaginable — including news, talk, music, and sports — is available from syndicators. Stations in large and small markets alike are profiting from the selection.

A case in point is "The Mark & Brian Show," featuring Mark Thompson and Brian Phelps. Their program is broadcast live from 6-10 weekday mornings at Disney-owned KLOS-FM in Los Angeles. It is fed simultaneously via satellite to 17 other markets, including KRQR-FM, San Francisco; WWUC-FM, Union City, Tenn.; and KGON-FM, Portland, Ore.

KGON-FM, which has been airing the show for three years and was Mark and Brian's first affiliate, consistently ranks No. 1 in morning drive (Arbitron, adults 25-54) in the Portland market. This disproves the theory some programmers hold that morning drive must be locally originated.

"We have created an opportunity for stations to localize the program," said Pam Baker, director of affiliate relations, KLOS Syndications Inc., "It's like taking the Jay Leno or David Letterman show. It doesn't matter that they are in Los Angeles or New York. Humor is humor. What we give stations is an opportunity to localize the show with enough news and traffic breaks. And if a station gets a good local personality to interface with The Mark & Brian Show, it begins to sound local.

According to Baker, affiliates have raised ad rates based on their success with Mark and Brian. While stations pay cash for that show, other syndicators, such as ESPN, offer barter programming.

"If you have a hot show, you get good programming and can make money off of it through local advertising, without the cost of hiring local talent," said Bob Stevens, manager, ESPN Radio Network.

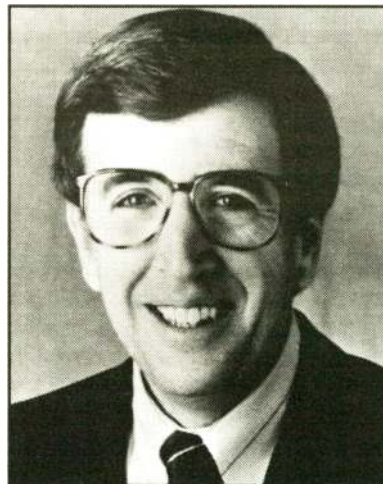
ESPN's offerings include the "Fabulous Sports Babe"; each hour of the show includes two minutes of network spots and 15 minutes of local availability.

KAST-AM in small market Astoria, Ore., relies heavily on ESPN for week-end programming, in addition to a week-day schedule that includes Rush Limbaugh and Dr. Laura Schlessinger. The station, which previously had an adult contemporary music format, switched to news and talk about three years ago. As a result, station manager Jim Servino says the size of his audience has "increased dramatically."

Running syndicated talk "gives us the capability of selling specific programs," said Servino. "We have clients who want to be on Rush's show and other who want to be on Dr. Laura's show, in addition to advertisers who want to be on the station in general. That was something we didn't have as much of in the old days when we played music."

KSTE, Talk 650 in Sacramento, Calif., airs syndicated fare including Westwood One's "Tom Leykis Show." General Manager David Burke said having a talent of Leykis' caliber on his station is money in the bank. Leykis, who is based in Los Angeles, has brought his show to Sacramento. When in town, he appears at listener parties.

KSTE, which signed on in 1991, has been talk since November 1992. "Ratings have been good," Burke said of the syndicated programming. "It's a tough thing to estab-



ESPN Team Member Brent Musburger

lish a brand new talk station. You have to take time and keep at it. This is a style of talk radio that the market had never heard and is gaining in popularity every day."

Burke said that, depending on the day-part and the demographic, his station fluctuates between number five and 12 in the Arbitron rankings. He feels KSTE could score just as well in the rating with locally produced programming — if the station could afford it.

"Leykis and Dr. Laura are top talent. To attract people like that locally would take a lot of money," he pointed out.

All of the syndicated programming that KSTE airs is barter. "That helps a young station like ours," Burke said. "We get terrific programming without having to lay out enormous amounts of cash. That's

the primary financial benefit of syndicated programming."

Country music, radio's most popular format, is also well represented in syndication. One highly rated program, the "Crook and Chase Country Countdown," is offered on a barter basis from Jones Satellite Network. Produced in Nashville, the show is heard on more than 250 stations.

Airing syndicated programming does not automatically guarantee success. The general sales manager of a major market station lamented that "my programmers bury the syndicated programs. Consequently, I don't make a lot of money on it or spend a lot of time developing revenue for those areas."

But when stations use syndicated programming correctly they "will be able to sell a franchise personality," stressed Charlie Colombo, executive vice president, United Stations Radio Networks.

United Station's franchises include "Dick Clark's U.S. Music Survey" (a weekly countdown of adult contemporary songs). To assist local account executives, the company also makes sales kits available to affiliates.

Once the spots are sold, the challenge is to get them into the ears of the audience. "Seems Like Old Times," a nostalgia program featuring pop music standards, does that with contests and prizes.

"That helps to keep listeners alert," says Ed Z. Pell, show host and general manager of Vintage Production. "We slip in a commercial before the contest."

A syndicated format will be for naught, though, if a station loses touch with the community it serves. Consultant Ed Shane of Shane Media Services agreed that local news, weather and features must continue to play a major role in every daypart. "You still have to sound like your town," he said, "and let people know that you're looking out for their interests."

Running Radio Marketplace

A Supermarket of Radio Station Services

For information on the services shown below, circle the Reader Service number on the enclosed card or contact the advertiser directly.



Direct From Music City, USA
The **Nashville Record Review**,
hosted by Katie Haas and Bill Cody,
counts down Country's Top 40
with a four-hour weekly
syndicated radio program
produced on compact disc.

For more information contact:

East: Ken Mullane
(203) 965-6423

West: Lynn Wells
(303) 771-9800

Reader Service No. 234

<http://fm.net>

**Increase traffic to
your web site with a
FREE listing and link
to your web site
from fm.net!**

Register at <http://fm.net/new>
Send email to: radio@fm.net

or

Call 800-800-2786

MUSICTOWN ONLINE SERVICES
Athens, Georgia

Reader Service No. 137

Attention Advertisers!

Reach 18,000+ broadcasting professionals! RADIO WORLD's **Product Showcase** provides a perfect medium for test marketing your products and services. It's an efficient, effective and affordable advertising option! For more information, including rates and deadlines, fax your sales representative at

1-703-998-2966

or call

1-800-336-3045

INTERNATIONAL UPDATE

Austrian Station Beamed from Afar

by Susan Ladika

VIENNA, Austria Radio CD, the only private radio station operating in Vienna, is forced to broadcast from the Slovak Republic.

No private radio licenses were issued in this capital city and plans to grant them stalled last year, so Radio CD continues to carry on, as usual, transmitting from Bratislava, 60 miles to the east of Vienna.

To launch Radio CD, which began in 1990, the entire crew had to transfer to Bratislava, then part of Czechoslovakia, lodging first in a hotel, then in a house that was provided for on-air personalities and editors of the station. Gerhard Weber, who made his on-air debut during the first week of station operation, said that it felt like a ski trip.

Novice staff

Station staff was made up of amateurs. No one had previous radio experience, but all were intrigued by the idea of being involved in a new venture. "We were inexperienced, we did not know how to create a radio station. I think we were kind of charming because we made a lot of mistakes," Weber said.

Initially, the station broadcast from 6 a.m. to 1 p.m. daily. The following year, it expanded to a 24-hour format.

Since the beginning, Radio CD staff, and its parent company, CD International Holdings, struggled with the impulses of the Czechoslovak and Slovak governments.

"When negotiating for permission to use broadcast facilities in Bratislava,



Radio CD officials had to bring 'gifts' for the Communist bureaucrats," Weber said.

"Then in October 1993, the station was shut down for 12 days, with no explanation and, on Jan. 1, 1994, the Slovak government took the station off the air for six months,

I think we were kind of charming because we made a lot of mistakes.

— Gerhard Weber

again without explanation," he added.

Station staff was concerned that, with the six-month pause, the station would not survive. But it endured, and on July 15, 1994, Radio CD was back on the air with a new frequency, 96.6 MHz. Furthermore, by autumn of that same year, it had relocated into a new studio in the midst of a small Vienna shopping mall, where shoppers could look through the glass windows and see the disc jockeys or step inside the studio to watch the broadcast.

Radio CD employees believe the operation is successful because Austrians are tired of the limited selection offered by state-owned radio stations.

Besides Radio CD, only six state-owned stations reach listeners in Vienna. Two operate in other provinces and broadcast Austrian music. The

remaining four, which respectively offer classical music, English-language programming, local music and events, and music for teen-agers and young adults, broadcast from Vienna, and can be heard nationwide.

Georg Peter, Radio CD editor, points out that despite the competition from the state-owned stations, Radio CD manages to hold about 13 percent of market share, or 300,000 listeners.

Radio CD targets 20- to 30-year-olds, and considers close contact with the audience crucial. Every Friday night, for example, the station offers CD Partyline, where listeners can stop by the station and party with the employees.

"It is a way for station staff and listeners to communicate," Peter said.

Thanks to the open-door policy at the station, there is no mystery about the "stars" at the station. At the state-owned stations, however, "everybody is a star, and nobody knows why," said Weber.

The state-owned stations offer more news and information, while Radio CD focuses on music, with segments of news, weather and traffic. Employees

find difficulty in defining the musical focus of the station. "It is not top 40, it is not hot AC, there is a lot of rhythm and blues music. Basically, it is a combination of megasellers spiced with music you do not hear normally," Weber said.

Rigid competition

Today, with 15 employees, and an operating cost of \$3 million, Radio CD receives no state funding. Therefore, advertising sales must pay the bills.

The station produces programming in Vienna and beams it via satellite to Bratislava. The signal is then transmitted back to Vienna, resulting in a 1.5 second delay between the time the DJs speak and their voices are retransmitted to Vienna.

Signal clarity is also a problem, some Viennese cannot tune into the station because it is broadcast from Slovakia. Others lose it when they turn a corner in their car.

"Many listeners would like to hear Radio CD, but cannot stand the interference," Weber said.

In addition, the first Monday morning of every month, the Slovaks take the station off the air for three to four hours to clean the antenna.

CD International was among the companies that applied for a private radio station license in Vienna last year. Although the awards were delayed, a decision is expected in the near future.

But, despite more than six years as a private operation, Radio CD staff is skeptical that CD International will receive a broadcast license due to stiff competition from the owners of some of the largest newspapers in Austria.

"There are many, many big media concerns with a lot of money," Peter said.

That money could also be used to hire editors and disc jockeys away from Radio CD because their private radio experience is unmatched in Vienna.

Anyway, if Radio CD fails to receive an Austrian license, it will continue to operate, as it always has, broadcasting from Bratislava.

□ □ □

Susan Ladika is a free-lance writer based in Vienna, Austria.

Yale Station Makes Money

► continued from page 32

career training in a community where it is badly needed. By targeting the urban audience, WYBC provides a cost-effective advertising vehicle for minority-owned and operated businesses.

While they won't reveal specific figures, both WYBC Operations Manager Wayne Schmidt and WPLR's Rodriguez hint that they expect WYBC to bill somewhere in the neighborhood of \$1 million this year.

Great for WYBC and not bad for Multi-Market Radio, owner of WPLR. Of course, Rodriguez has had to adjust to some unusual arrangements.

"I answer to a general manager who is a student. Going into the JSA you had to understand what the programming was, and that it wasn't going to change. Then it was a question of what kind of sales operation could be developed selling that product."

Rodriguez said the decision-making process also took some getting used to.

"WYBC is a democratic society, things are decided in committee. Different groups get together to discuss how to approach different programming situations or promotions. Decisions tend to be a little bit slower." To date, Rodriguez says WYBC management has not rejected any commercial matter his sales staff has wanted to place on the station.

Rodriguez expects WYBC billings and standing in the community to continue to grow as a result of the JSA.

"It's an education process for both sides, and without compromising what WYBC is, there's still tremendous growth in this

market, because we are the only FM servicing the urban audience. We've been involved in health fairs, we're doing a major get out the vote campaign, and there's a real effort being made to get out into the community and service the community, just like a real radio station.

Rodriguez says the JSA has also made it easier for WYBC-trained broadcasters to get in the door at WPLR. "We hired a number of people from WYBC to handle production and sales, and we even hired someone in promotion. Our doors are open to them if they want to come aboard. We even have a scholarship program for The Connecticut School of Broadcasting for certain WYBC volunteers who want to get more formal training."

Obviously, noncommercial college stations aren't in a position to duplicate this arrangement, but there are many lessons that could be applied at noncoms that attempt to train their broadcasters for the real world.

Yale students who volunteer at WYBC (the student-townie mix is about 70-30) get positive contact with the local population and real world lessons about flexible engineering, satellite programming, automation and sales. This is an education that students working at noncommercial "educational" stations generally don't receive.

□ □ □

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

ATTENTION P.D.s

Schedule the best in "CLASSIC RADIO" with

When Radio Was ...

Hosted by Radio Hall of famer **STAN FREBERG**, the man who drained Lake Michigan and filled it with hot chocolate

THE LONE RANGER
THE BICKERSONS
THE GREAT GLIDERSTEEVE
THE SHADOW
THE CHARLIE MCKEITHLY SHOW
FIBBER MCGEE AND MOLLY
THE LIFE OF RILEY
SUSPENSE
OUR MISS BROOKS
LIGHTS OUT
SHERLOCK HOLMES
BURNS & ALLEN
ESCAPE
X-MINUS ONE
JACK BENNY

Now in its 7th year

Five shows per week—54 minutes each.
BARTER, NO CASH PAYMENTS!

For a free CD contact David West.
DICK BRESCIA ASSOCIATES (201) 385-6566

Heard on 300 Radio Stations

Random House Offers Literary Radio

by Frank Beacham

NEW YORK In radio's golden age, the great storytellers — larger-than-life personalities like Orson Welles — drew their best material from the classics of literature.

It was as if the printed words of books had a symbiotic relationship with the spoken words of broadcasting from the very beginning.

Bold experiment

Random House, the New York-based publishing house founded in 1925 by Bennett Cerf, has launched a bold, new experiment to see how modern radio lis-

teners take to hearing writers and artists discuss the literary subjects that are important to their lives.

Maggots in post-World War II Paris.

Since October 1994, Random House has revived the tradition of the witty round-

Random House has revived the tradition of the witty roundtable discussion.

Called "Breakfast at Random House," the new public radio series is reminiscent of another other legendary literary meals, such as the Algonquin Roundtable in 1920s New York or cafés like Aux Deux

table discussions with a series of literary breakfasts at Barney's restaurant in Manhattan. Well-known authors, artists, media types and assorted experts come together to discuss such topics as political satire, war reporting and espionage. They have also tackled the works of authors ranging from Mark Twain and Louisa May Alcott to Raymond Chandler, Oscar Wilde and Dorothy Parker.

Recent guests at the roundtable have included authors Mickey Spillane, Kurt Vonnegut, George Plimpton, Wendy Wasserstein, John Gregory Dunne, Bret Easton Ellis and Tama Janowitz. Other guests have included Lauren Hutton, Helen Gurley Brown, Eartha Kitt, Morley Safer, John Kenneth Galbraith and Sister Souljah.

Power of radio

The fast-paced, often funny repartee, is moderated by Harold Evans, the president and publisher of Random House. Though his career is one of a publishing executive, editor and author, the quick-witted Evans seems at home behind the microphone.

An enthusiastic believer in the power of radio to convey the "richness of books," Evans thinks the absence of the television camera is key to the success of his guests' free-wheeling exchanges.

"Television cameras often make people behave differently," said Evans. "But with radio, the panelists begin to think and really talk. We usually get more than we could possibly expect."

Evans said that before they go before the microphones, many panelists seem to

have memory blockages about the subject being discussed. "Yet when we go on the air without those intrusive cameras, they become truer, more fluent and more relaxed," he said.

Sales of classic works of literature on audio tape continue to rise, said Evans, who sees a bright future for spoken-word programming.

"I think people are fascinated by the sound of voices," said Evans. "On radio listeners are not distracted by the face and by the gestures of the person speaking. It's focused. You can really get it going in your mind."

"Breakfast at Random House" is produced by Lars Hoel, former senior producer of "Morning Edition" on National Public Radio.

"A program like this will be successful because people will feel like they are eavesdropping on a conversation," Hoel said. "That's the best way to get an audience to listen to anything."

Hoel said the audience must be allowed to discover the wit and charm of the panelists for themselves.

"The worst thing you could do is say we are going to have a literary discussion," said Hoel. "Eyes would glaze over and radio switches will snap off all over the country."

One of the reasons the audience is won over, said Hoel, is the quality of the guests. "These are really, really good guests," he said. "Brilliant people, articulate, well-spoken, lettered ... all with something interesting to say."

Curiosity about life

Yet, said Hoel, the series is not targeted to book lovers. "I don't limit myself to the audience I'm going after," he said. "I don't care who they are. They don't even have to read books. They just have to have some basic level of curiosity about life and they will like this show."

Panel discussions are recorded by an audio crew from WNYC-AM-FM, New York, on an eight-channel Tascam DA-88 multitrack digital tape recorder. The voice of each guest is put on a separate channel, said Hoel, which makes riding levels easier. The eight-track master tapes

continued on page 49 ►

Arrakis Studio Furniture systems are #1 with over 1,000 sold !

The Master Control Studio, shown right, is one of seven Arrakis studios in Sony's Manhattan network origination center for SW Networks.



Arrakis furniture is #1 ...

- Off the shelf -or- Custom
- Easy to design & assemble
- Very fast delivery !!!

call today to find out why Arrakis studio furniture is the choice of broadcasters worldwide...
from Moscow, to Tokyo,
to Manhattan...



(303) 224-2248

or (970) 224-2248

1995 Arrakis Systems inc. 2619 Midpoint Drive, Fort Collins, CO. 80525

Circle (185) On Reader Service Card

RBDS

**EASILY
INSTANTLY
INEXPENSIVELY**

... with these two, brand-new products,
INOVONICS has you covered, coming and going!

710 ENCODER: Just \$995 and **no computer required!** The non-volatile memory holds 16 separate frames of program and format identifiers, alternate frequencies, radiotext messages and traffic or emergency flags. A built-in data interface lets you upgrade later to full dynamic operation for revenue-generating paging, GPS, coupons, contests, etc.

510 DECODER: Connects to your existing FM Mod-Monitor. The front-panel LCD display shows RBDS injection level and allows you to scroll through and read all the data groups. An RS-232 port gives unlimited access to raw RBDS data for telemetry and other in-house functions.

Inovonics, Inc.

1305 FAIR AVE., SANTA CRUZ, CA 95060 U.S.A.
TEL: (408) 458-0552 — FAX: (408) 458-0554



Circle (85) On Reader Service Card

GENTNER



TS612 System

It looks like a regular multi-line business phone but it actually provides capabilities that meet the unique requirements of broadcasting, distance-learning, business TV, video and audio-conferencing. Although, this system is highly sophisticated, it is still easy to learn and use.



Microtel

Microtel is a small, battery operated "mini mixer" that connects to the handset jack of your telephone for easy connection to the phone line. It is not a telephone coupler-Microtel does much more than standard couplers. With Microtel you can easily accomplish news reports, business, weather, ski reports, remote broadcasts, and as a tool for your salespeople.



TeleHybrid

The TeleHybrid is the only digital hybrid that can interface with the handset of your analog or digital phone. With the TeleHybrid, there's no need to install a new telephone line in order to connect your phone to your professional audio equipment. Price recently reduced, call for details.

The Source for Talk Radio



G2500 Superhybrid

Originally developed for the demanding feedback control requirements of corporate boardrooms, the G2500 adds Gentner's superior telephone audio quality for the stringent requirements of broadcasters. Housed in a sturdy rack mount chassis, the G2500 provides an advanced digital telephone hybrid with auto-answer/disconnect, auto-null and auto re-null on new line selection, receive mute, and remote control. The G2500 provides automatic mix minus!



G3200 Superhybrid

The G3200 is designed for telephone calls with a live audience or in-studio guests. The G3200 provides both advanced telephone nulling and acoustic echo cancellation. When used in live studio environments, the G3200 prevents transmission of the caller's audio back to the caller.



GSC3000 Remote Control System

The GSC3000 Site Control System takes the concepts introduced by the VRC2000 Remote Control Unit to the next level by providing a system that can cover a single site with minimum needs or multiple stations with extensive requirements. It offers single or multiple PC monitoring sites and friendly Windows® based operation.

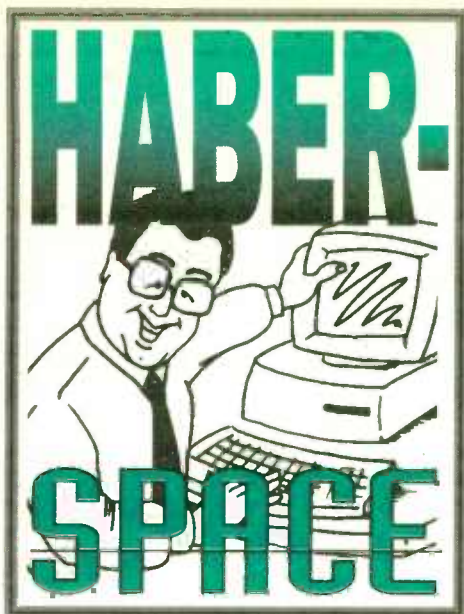
U.S.
TEL: 800-622-0022
FAX: 317-966-0623

CANADA
TEL: 800-269-6871
FAX: 514-421-2712
<http://www.broadcast.harris.com>



HARRIS

© 1996 Harris Corporation



Find International Stations on Web

by Alan Haber

ALEXANDRIA, Va. Hey, it's summer up here in Haberspace! I know, I know — not where you are. Not yet, at least. But up here, where trees bloom bright 11 months out of the year, and the secrets of the TV show "The X-Files" aren't so secret, it's shorts and T-shirts for one and all!

Which, of course, means air-conditioned comfort here in the ever-seasonal, ever-busy Haberspace global headquarters. Yup, we've got AC 24 glorious not-at-all-sweaty hours a day for my dedicated 'Space staff. As you know, each and every one of these groovy guys 'n' gals is

dedicated to surfing the cyber-waves round the clock for the latest and greatest and, perhaps most importantly during these hot summer months, coolest radio-oriented Web sites.

Speaking of cool ...

Icon-da like it!

A great time will be had by all who venture into Radio Korea's gorgeous site at <http://www.radiokorea.com>. You'll first be greeted with a smart-looking jump page, on which you are asked to choose either English or Korean text for your visit.

Next, you're transported to Radio Korea's homepage — a magical creation

featuring wonderfully realized colorful icons presented against a white background. (White is fast becoming the background color of choice on the Web.) From here, you can choose to view a wide variety of different types of information — you can even make a song request on line! You can also listen to the station (if you're RealAudio enabled). And you can view the local time as it scrolls across the nifty LED-type sign!

A quick click on the "About Radio Korea" icon uncovers an overview of the station (the 50 kW KBLA(AM) in Los Angeles), and an informative breakdown of station listeners by gender, age group and other important factors. Advertising rates are also presented here. (I've said it before, and I'll say it again — this is great for prospective advertisers who might be checking out a station site with an eye toward shelling out some bucks for some spots.)

There's some nice work being done here. Take the time to see what the folks at Radio Korea have done.

Neat-O and Net-O sites

Well, they said it couldn't be done, and — ha ha — they were wrong! This month, I'm presenting both of my coveted awards to the same station. Yes, it's the second historic month in a row this unprecedented event has occurred! Yes — Virgin Radio, which broadcasts throughout the United Kingdom, hereby joins WEBX-FM in Haberspace's extremely select group of cyber-radio achievers.

Virgin's eye-popping home page allows you to jump to a number of neat-o areas — all with colorful, groovy graphics — like the Helicopter Pad, where you can find out all about the station traffic copter and check out some of the places it hovers over.

There is plenty here for listeners and potential advertisers. For listeners, there's a most enjoyable station tour, Virgin's on-line newspaper "The Virgin Voice" and the station playlist, in addition to other goodies. For advertisers, there's an extensive area featuring targeted information about Virgin listeners and a selection of advertising success stories. Virgin Radio Sales' telephone number is listed, where, of course, more details can be obtained.

If all this wasn't enough, Virgin Radio pumps its signal onto the Web 24 hours a day and sounds great with the RealAudio 2.0 player!

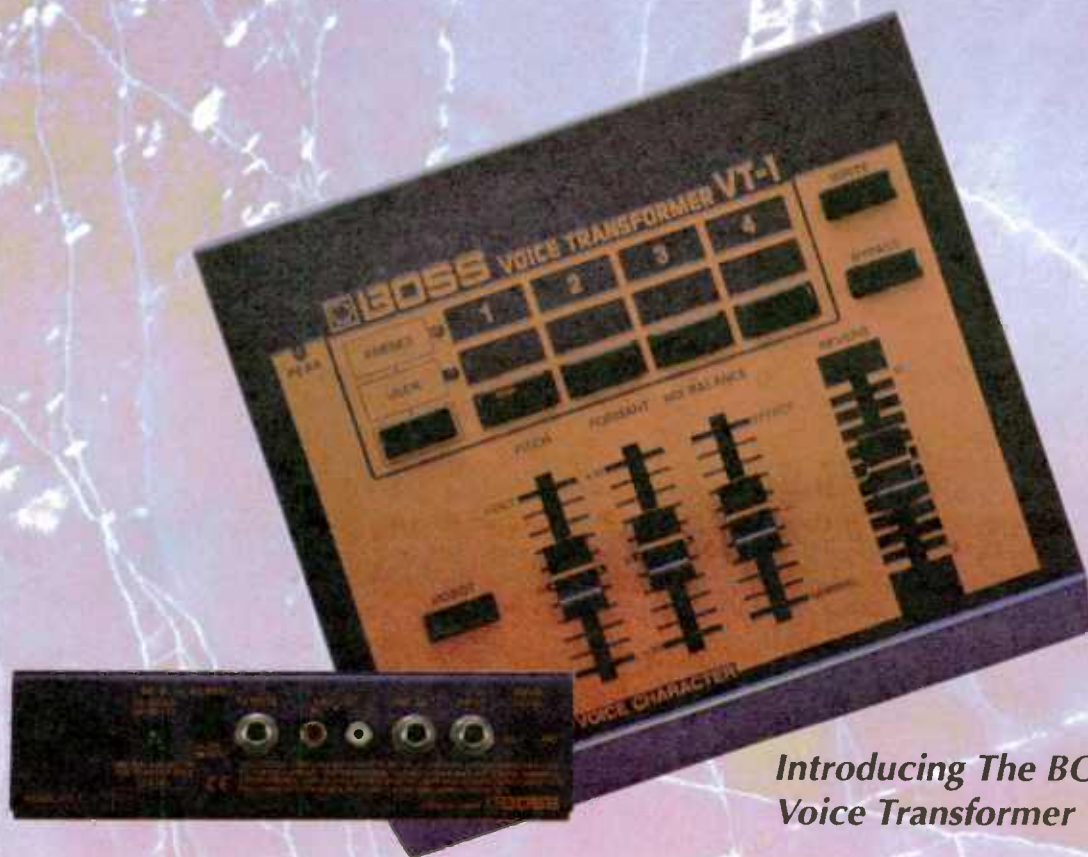
Stations looking to see how to put together a great Web site that caters to listeners and advertisers should URL on over to <http://www.virginradio.co.uk/home.html>

Yes, Virgin Radio is pushing all the right cyber-buttons and is this month's winner of both the Neat-O and Net-O Live Broadcaster Site of the Month awards. From this side of the pond to the other side, here's a jolly good "site well done!"

The cyber-envelope, please ...

This month's mailbag brought an e-mail from Thomas Speicher about WWAS-FM, the Pennsylvania College of Technology (a.k.a., Penn College) radio station. Speicher writes that he designed the site and students in one of the college

ELECTRONIC SEX CHANGE



Introducing The BOSS VT-1
Voice Transformer

NEED A CHANGE OF VOICE?

Transform your voice to sound convincingly like the opposite sex.....easily and electronically with the Boss VT-1 from BSW. In addition to altering the voice pitch, the VT-1 lets you change the character of the voice and add reverb for the perfect blend of special voice effects. Easy adjustments allow you to change your voice to sound like a robot, chipmunk, giant, and everything in-between. Imagine the new cast of characters the morning team or production department can create with this versatile effects unit.

Mfr. List \$399.00 Call for BSW Price

Ask for a Over-the-Phone Demo.

Equipment Solutions To Keep You Number One

BSW

BROADCAST SUPPLY WORLDWIDE
7012 27th Street West Tacoma, WA 98466 USA

Phone: 800-426-8434

Fax: 800-231-7055

Internet Website:
<http://www.bswusa.com>

ROOTS OF RADIO

Breakfast Show Started Day Right

Radio Show Brought Listeners Together with Spontaneity and Delight for Airing Listener Letters

by Read G. Burgan

LAKE LINDEN, Mich. How do you start your day? Do you leap out of bed with unbridled enthusiasm? Or do you pull the covers back over your head to shut out unwelcome reality?

During the 1940s and '50s, millions of Americans began their day with Don McNeill's "Breakfast Club" on the NBC (and later ABC) radio network. McNeill died on May 7 at the age of 88.

audience that was in effect a surrogate for the millions of unseen listeners who held sway over the program through their cards and letters.

From the very first year, McNeill read bits and pieces he gleaned from listeners' letters. He was fond of saying that the people who wrote in could do a better job of writing the show than he could. Once a year McNeill brought the program even closer to his listeners by taking it on the road for a month.

Rural roots

McNeill was born in Galena, Ill., on Dec. 23, 1907, raised in Sheboygan, Wisc., and never forgot his rural roots. He grew up with radio and began his long career in broadcasting as a singer on the West Coast in the late 1920s. New York was where radio careers were made and he and his new bride Kay Bennet set out for the Big Apple in 1931.

When New York proved less than hospitable to his career, McNeill returned to Chicago. In the early '30s, networks considered the early morning slot as commercially worthless as the Sunday morning "ghetto." The NBC Blue network hired McNeill for \$50 a week to host an early morning weekday show called "The Pepper Pot." No one at the network expected much, so McNeill had carte blanche. The first show aired from Chicago on June 23, 1933.

For a while it looked as if the pundits were correct. Six years passed before the network was able to attract consistent commercial sponsors.

But McNeill had a vision of his own. First he changed the name to the Breakfast Club. In the beginning, he



Action on the Set of Don McNeill's "Breakfast Club"

The program was loosely divided into four parts that were each punctuated by his "call to breakfast." One of his regular sponsors was Kellogg's cereals — a natural tie-in.

Eager to appear

The program had an orchestra, guest stars and a regular cast that gradually changed over the years. Once the program hit its stride, young entertainers were eager to appear, knowing that a successful guest spot could launch them into an entertainment career of their own. A young Jim and Marion Jordan honed their dialectal skills on his show in the '30s and went on to their own "Fibber McGee and Molly" program. Bill Thompson, who later joined the Fibber McGee and Molly program as Wallace Wimple and the Old Timer, also devel-

McNeill pushed the envelope to the limit by asking for permission to run the program with no script at all.

wrote the scripts for the program himself. Soon he started reading comments submitted by listeners.

Then McNeill pushed the envelope to the limit by asking for permission to run the program with no script at all. In a time of network censors and exaggerated FCC programming oversight, that was a bold idea. Fortunately, network officials had so little expectations for the program that they scarcely batted an eye as they granted McNeill permission for this change.

It's a bit hard to describe what made Breakfast Club such a success. A lot of it had to do with McNeill himself. The program was very much a family affair with his wife featured regularly and his three sons Tom, Don and Bobby appearing frequently. Both spontaneity and nostalgia characterized the program.

It was performed before a live studio

audience that was in effect a surrogate for the millions of unseen listeners who held sway over the program through their cards and letters.

So did Lawrence Welk's Alice Lon, Johnny Desmond and Homer and Jethro. Fran Allison, who later achieved fame with her "Kukla, Fran and Ollie Show" on television, played the role of the spinster Aunt Fanny who delighted in sharing the secrets of her country neighbors.

War-time comfort

During World War II, McNeill added a "Prayer Time" to the format as a means of comforting those with family members affected by the war. It was so well received that he continued the feature long after the war had ended.

He also had a segment entitled "The Sunshine Shower," during which he solicited listener letters for those confined in hospitals and nursing homes. One can only imagine how many lives were brightened by the letters generated by his program.

During its peak period, the program that originally couldn't attract a commercial sponsor generated \$1 million a year from each of its four sponsors. McNeill, who first earned \$50 a week (\$2,600 a year), received \$200,000 during the program's peak years.

In 1954, the program had the distinction of being one of the first to be simulcast on television.

The format didn't translate well to the TV of that era and the television portion was soon dropped.

But McNeill himself had staying power. While there is some debate over when the Golden Age of radio ended, few will

argue that it was in the final stages of rigor mortis in the late 1950s. McNeill's Breakfast Club continued on until Dec. 27, 1968, long after his contemporary radio artists had fallen by the wayside.

Nearly 30 years later, many of us still drag ourselves from the sack — some later than others — but it's not nearly as much fun as when we knew that Don McNeill was waiting to entertain and delight us.

How nice it would be to hear him say just one more time, "Good morning, Breakfast Clubbers."

Maybe that's why I yawn so much now. Come to think of it, I yawned a lot then, too.

□ □ □

Read Burgan is a free-lance writer and a former public radio station manager who can be reached at (906) 296-0652 or through e-mail at rgb@up.net

Quantum FM

Solid
State

Solid
Reliability

from
QEI

- Proven reliability
- Maintenance-free FET technology
- Self-contained modules with own power supply regulator
- Compact size reduces shipping costs, allows affordable air shipment
- Power levels between 300 Watts and 6 kW
- Modular design offers buy-only-what-you-need affordability and convenience



For the same price you pay for a tube transmitter, you can now have a superior solid state FM transmitter with high-power, advanced technology exciter and cableless combiner. The modular design of QEI's QUANTUM-Series FM transmitters offers the advantage of buying only the amount of power you need...and means that you can upgrade to higher power levels whenever you're ready.

QUANTUM from QEI—the people who have been designing and building solid state transmitters longer than anyone else in the industry.

You need to know more! Call Jeff Detweiler today toll free (800) 334-9154.

QEI Corporation
One Airport Drive • P.O. Box 805
Williamstown, NJ 08094

Tel (800) 334-9154
Fax (609) 629-1751

24-Hour Service Hotline
(609) 728-2020

New Disk Drive Adds Space

► continued from page 15

number of sectors of the disk drive you are installing. If your BIOS is only a few years old, the BIOS will indicate the correct size of the drive.

In my case, the BIOS responded with 1224MB. This is a good thing. If the BIOS indicated the size of the drive to be 512MB this would indicate that I have an older BIOS that requires the interfacing program supplied with the new drive. Because the BIOS responded with the correct disk drive size, on to the next step.

With the boot disk in drive A, complete the BIOS setup and the computer will boot. Run, from the drive A,

FDISK.EXE. This program is needed to set up the partitions on the hard disk drive. I partitioned the new hard disk drive to make the entire drive a DOS drive.

When the formatting is completed, remove the boot disk from Drive A and reboot the computer. The computer should now load DOS directly from the

Now you can purchase hard drives with over a gigabyte of storage for less than \$300. Not too shabby.

Once finished with FDISK, the computer will again reboot. Now run FORMAT using the /s switch. This will format the entire drive and install the DOS operating system.

new hard disk drive. Make a directory on the new drive for the tape backup software and copy the files from the backup disk made earlier. Using the backup tape, restore your old files.

Having a large disk drive is great, however, it is time for some housekeeping, I only have about 300MB left.

Richard Mertz is a principal engineer for the firm of Suffa & Cavell, Inc., in Fairfax, Va. He can be reached at (703) 591-0110; or on the Internet at rmertz@s-and-c.commbiz.com

International Web Sites And the Mail

► continued from page 40

business classes put it together. On line since the beginning of May, the WWAS cyber-home offers an extensive guide to its varied programming mix, which includes sports, all kinds of music and public affairs. Station personality pix are on offer.

On the way is the station's playlist and a screen saver.

Check out this nicely done site at <http://www.pct.edu/wwas>

Also doing the e-mail thing was Chris Carey, operations director at KADV-FM, located on the high school campus of the Modesto Adventist Academy in California's central San Joaquin Valley. KADV's low-key but nicely constructed and well-worth-a-look site (<http://ourworld.compuserve.com/homepages/KADV>) was put together by Michael Hendricks, a 15-year-

Let me know if your station is going to be broadcasting on the Web.

old freshman at the Academy. Hendricks also maintains the site, which features station information and a selection of audio clips for downloading (including promos, PSAs and jingles).

I also heard from Kirk Trummel at The Free Radio Network, which was mentioned in last month's Haberspace. Kirk asked that I point RW and Haberspace readers (that means you!) to the FRN homepage, rather than the Pirate Links page. Glad to do it. Shuttle on over to <http://www.clandjop.com/~jcruzan/frn.html> — from which you can jump to a matey's worth of pirate radio info.

Keep cool

Well, that'll do it for another visit to Haberspace. Next month, I'll dip into the e-mail bag once again and bring you another generous dollop of radio Web sites and Net happenings. Until then, keep sending me your station URLs, and don't forget to let me know if your station is going to be broadcasting on the Web!

I'm still hangin' my cyber-hat at zoogang@earthlink.net. And I'm enjoyin' my AC!

October 10-12, 1996 • Los Angeles Convention Center • Los Angeles, California USA

**RADIO
AUDIO
EXPOSITION**

**SHAPE THE FUTURE
OF BROADCASTING ■ ENTERTAINMENT ■ PRODUCTION**
The Hottest Fall Event in the Hottest Market!

See the Products That Are Shaping Tomorrow—Today

Planning for the future requires an ongoing commitment to pioneering new ideas, new products, and new solutions for your business. And as technology constantly advances, you need to continuously evaluate the products, services and applications critical to your success.

The World Media Expo Radio/Audio Exposition is your best fall opportunity to do just that. Experience hundreds of hands-on demonstrations and compare the full spectrum of the newest and most innovative products and services for radio broadcasting and audio production.

From digital workstations, data broadcasting and the Internet to radio automation, transmitters, DAB and remote broadcasting—you'll find the methods, technologies and solutions you need to stay successful.

Tune-In to Value-Packed Conferences

World Media Expo '96 combines four leading industry conferences from NAB, RTNDA, SBE and SMPTE to form the industry's most comprehensive fall event.



**AT WORLD MEDIA EXPO'S
RADIO/AUDIO EXPOSITION,
YOU'LL FIND THE TECHNOLOGIES
AND SOLUTIONS TO MOVE
YOUR BUSINESS AHEAD.**

Fax this completed form to: (202)429-5343 **RW**

Please send me information on World Media Expo ☐ Attending ☐ Exhibiting

Name _____

Title _____

Company _____ Call Letters ☐ AM ☐ FM

Address _____

City _____ State _____ Zip _____

Country _____

Phone _____

Fax _____

E-Mail Address _____

FOR MORE INFORMATION

For up-to-the-minute registration, exhibitor and program details:

- Visit the NAB Website at <http://www.nab.org/conventions/>
- Call the appropriate organization's Fax-On-Demand services (listed below) from the touch tone handset of your fax machine and follow the voice instructions.
World Media Expo (301) 216-1847, NAB Radio Show (301) 216-1847
RTNDA Conference (503) 721-5867, SBE Conference (301) 216-1853
SMPTE Conference (301) 216-1850

For more information on attending, call (800) 342-2460 or (202) 775-4970
To learn about exhibiting at World Media Expo call (202) 775-4988

WORLD MEDIA EXPO—RADIO/AUDIO EXPOSITION
October 10-12, 1996 • Los Angeles Convention Center • Los Angeles, California USA

Products & Services Showcase

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

EVEN THE BEST CAN BE MADE BETTER

Introducing the new

MINI-MIX 12A

THE COMPACT MIXER WITH A
COMPACT PRICE FROM THE
QUALITY LEADER



\$3499

12 Channels
25 Stereo Inputs

Service & Affordable Quality for Over 23 Years

AUTOCGRAM
CORPORATION

1500 Capital Avenue (214) 424-8585
Plano Texas 75074-8118 1-800-327-6901
FAX (214) 423-6334

READER SERVICE NO. 228

Econco REBUILT POWER TUBES



Approximately One Half
the Cost of New

3,000 Hour Unconditional Guarantee

Call for Our Price List

Econco 1318 Commerce Ave. Woodland, CA 95695
Phone: 916-662-7553 Fax: 916-666-7760 Telex: 176756
Toll Free: 800-532-6626 From Canada: 800-848-8841

READER SERVICE NO. 72

Incredibly Flexible DTMF Control



The NEW DS-8 DTMF sequence decoder.

Bridge the DS-8 across your audio source and get eight individually programmable relay outputs. Each closure is activated by its own code up to four digits in length. Each relay can be set up as momentary, latching or interlocked! Use the DS-8 for remote audio switching, automated program recording, secured remote EBS activations, you name it!

The DS-8 features include:

Each of the eight relays are independently programmable for codes and mode.

Powered RJ-11 jack allows easy programming with any DTMF phone.

High quality metal enclosure can be wall or table mounted. Low cost (optional) rack mount available.

List price is just \$299.

Call your favorite dealer!

CircuitWerkes

6212 SW 8th Place
Gainesville, Florida 32607
(352) 335-6555 / fax 331-6999

NEW
PROBLEM
SOLVER!

READER SERVICE NO. 174

ACCEPT NO SUBSTITUTES

- Eliminate flanging (hollow room) effect
- Eliminate bad room acoustics
- Hold absolute levels
- Correct voice symmetry

AIRcorp 500PH Microphone Processor



- Front panel input level select +4 to -50 dB
- Three section variable boost and cut equalization
- Compander/Expander cross coupled for maximum punch
- Built-in earphone jack
- DE-ESSER designed to protect pre-emphasis curves
- Simultaneous mic level and line level outputs
- Internal 48 Vdc Phantom Supply

AIR corp

Call your dealer

or call 214-304-0455 or fax: 214-304-0550

READER SERVICE NO. 170

WATTCHMAN® TRANSMITTER PROTECTION SYSTEMS



WATTCHMAN protects your transmitter and transmission line system. A permanent 19" rack installation used with any dual socket line section 7/8" through 6 1/8" and elements (additional) to monitor CW, TV, and FM power. Model 81070 features two easily read meters to monitor both forward and reflected power. Abnormal conditions quickly cause transmitter shut down.

TERMINATING LIQUID/AIR LOADS (84000/85000 series) available to cover CW power ranges of up to 10,000 Watts over a frequency range of DC to 2.4 Ghz. All models are available with optional thermal overload switches to interface with the user's interlock or warning circuit.

NEW

COAXIAL DYNAMICS, INC.

15210 Industrial Parkway
Cleveland, Ohio 44135 (216) 267-2233
Toll Free 1-800-COAXIAL (262-9425)
FAX (216) 267-3142

Web Site <http://www.coaxial.com>
Email: coaxial@apk.net

READER SERVICE NO. 99

Attention Advertisers!

Reach over 18,000 readers!
Radio World's

Product Showcase

provides a perfect medium for test marketing your products and services. It's an efficient, effective and affordable advertising option!

For more information on rates and deadlines, fax

Christopher Rucas at

1-703-998-2966

or call

1-800-336-3045

.....

Get rid of your %\$#@& patch bays and try this for a switch

Zercom
CORPORATION



Do your audio routing through a Zercom Patch Switch system. Easy to install and use, a Patch Switch system provides you with front panel access to an unlimited number of input sources (by bussing units), Stereo or Mono selection, Phase reversal, signal summing, and a PCB that's set up for easy installation of audio pads. The enclosed audio switches have been tested to over 1,000,000 cycles for dependable performance. And best of all... it's a Zercom product with a two year warranty.



The Zercom 'PS-2' Patch Switch

\$379.00

P.O. Box 84, Zercom Drive
Merrifield, Minnesota 56465-0084
218/765-3151-Fax 218/765-3900

Available through all major dealers

READER SERVICE NO. 197

Products & Services Showcase

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

Digital Audio, Analog Audio,
Communications and
Computers ... It's Easy as ...



Please visit us
on the
World Wide Web:
www.abg.com

Since 1960, production and broadcast professionals have turned to ABG for solutions. As the world has changed, so have our products, and so have we. From cutting edge digital production gear to the latest designs in custom studio furniture to ISDN telecommunications gear, ABG stays ahead of the game so you can concentrate on what you do best. You create the messages ...you move the world...we'll give you the tools to make it possible.

Please call today! ABG ... your single source solution.

SOUTHEASTERN SALES OFFICE 200 Fareway Drive, Suite 2
Smithfield, North Carolina 27577
Phone: 800-369-7623
Fax: 919-934-8120

MAIN SALES OFFICE 2342 S. Division Avenue
Grand Rapids, Michigan 49507
Phone: 800-999-9281
Fax: 616-452-1652

WESTERN SALES OFFICE P.O. Box 1638
Palmdale, California 93550
Phone: 800-858-9008
Fax: 805-273-3321

YOU MAY ALSO REACH US ANYTIME VIA ELECTRONIC MAIL
cServe: 75371,144
internet: support@abg.com



For 36 years

ABG
Audio Broadcast Group Inc.

READER SERVICE NO. 224



Cellular Telephone Interface

Microphone, tape and tuner inputs

• Headphone Jack

• Send and receive level controls

Works with most Motorola bag phones

CONEX ELECTRO SYSTEMS

1-800-645-1061

360-734-4323 FAX 360-676-4822

READER SERVICE NO. 153



Factory Rebuilds

Have your Eimac tube **REMANUFACTURED**
by the trusted original manufacturer.

- Eimac Quality
- Original Specifications
- Factory Testing
- New-Tube Warranty

Call us: CPI
Eimac Division
San Carlos, CA., USA
(800) 414-8823 or
fax (415) 592-9988



Available through
Richardson Electronics
(708) 208-2200



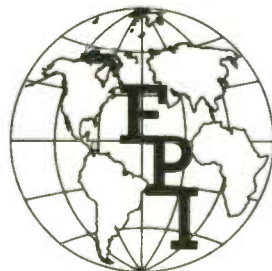
READER SERVICE NO. 126

Freeland Products, Inc.

Power Tube Rebuilders Since 1940

AVERAGE SAVINGS OF 50% OFF NEW TUBE COSTS

RADIO • TV • INDUSTRIAL APPLICATION
UHF • KLYSTRONS



CALL OR WRITE FOR YOUR FREE
PRODUCT INFORMATION PACKET

75412 HIGHWAY 25
COVINGTON, LOUISIANA 70435
(504) 893-1243 • FAX (504) 892-7323
1 (800) 624-7626

READER SERVICE NO. 180

THE COST EFFECTIVE ALTERNATIVE TO MANUFACTURER SERVICE

SERVICE, REPAIR & CALIBRATION

- STL's • RPU's • TSL's
- Exciters • Optimods
- AM/FM Monitors
- Remote Control Systems

SPECIALIZING IN EQUIPMENT BY

- Belar • Marti
- Moseley
- McMartin
- TFT
- And others...

WE ALSO PROVIDE

Free, over-the-phone technical assistance
STL loaner/rentals
PCL 505 Certification



2198 Hubbard Lane Grants Pass OR 97527

(541) 471-2262

READER SERVICE NO. 207

Attention Advertisers

Reach 18,000+ broadcast equipment
buying prospects at AM, FM and AM/FM
radio stations, networks and groups,
recording studios, engineering and
consulting firms every month.

Products & Services Showcase
appears in every issue of Radio World.

For detailed information,
contact Christopher Rucas or
your sales representative.

RADIO WORLD

Tel: 1-800-336-3045

FAX: 703-998-2966

UNIVERSAL SCPC XE-1000



SCPC BROADCAST AUDIO RECEIVER

New, affordable, frequency-agile receiver, direct channel entry by keyboard, selectable companding 1:1, 2:1, 3:1, wide/narrow bandwidth, de-emphasis selectable, 950-1450 MHz, line output 600 ohms, muting, transponder agile, LNB power supply, 50-channel memory, full baseband output, high-quality audio. Every needed feature at a sensible price (lowest in the industry). Write or call for full information on this quality receiver—the answer for your station. Networks call for prices.

UNIVERSAL ELECTRONICS, INC. 4555 Groves Road, Suite 12 Columbus, OH 43232
Communications Specialists Phone: (614) 866-4605 Fax: (614) 866-1201

READER SERVICE NO. 120

Troubleshooting EBS Encoders

by John Bisset

SPRINGFIELD, Va. Went to replace the on/off toggle switch on the front of a Symetrix A-220 amplifier recently, only to find that Symetrix no longer stocks the part. Walt Lowery to the rescue!

appropriate stereo plug installed.

In addition to cutting up your new DAT recorder, the cable assembly can be swapped from machine to machine as needed. Location Sound performs a variety of modifications to broadcast equipment. The Service Department can be

determine the length of the tones sent.

If you study the original schematic, you will see that the length of the tones are determined by the charging of the 47 (F tantalum capacitor to about 6 V, through a voltage divider from the 12 V supply. Due to the original, a simple pull to ground will not work.

The remote start must be a "dry" contact closure.

If the switch is held too long, the tones can be longer than required. If the switch is held for too short a duration, the tones could also be too short.

Robin's solution was not only to change the 47 μF to 22 μF , but also to build a pulse generation circuit that always sends the correct-length closure to the encoder.

An external circuit was used in order to guarantee that the encoder still meets FCC type acceptance. See Figure 1.

The circuit can be installed in and powered by the encoder.

The circuit includes a relay that starts the encoder to insure that it is started by the dry contact closure.

If you are familiar with 555 timers, you will recognize the circuit as a dual timer. The second half of the timer was used also to send the proper duration closure to the Burk remote control for logging.

Because the Burk uses polling of the inputs, the actual status of each input is only checked at the polling rate, or once every few seconds.

The other half of the 556 gives a pull to ground long enough for the Burk to record that the EBS tones were sent at the studio site.

If you mount the board external to the EBS encoder, as Robin has, a wallwart can be used to power the circuit.

★ ★ ★

Joe Stack with ABC in New York sent us a note via e-mail regarding the static cling prevention discussed awhile back. If you don't want the "spring-like" smell associated with Bounce or Downey products, Joe has been using a can of Static-Guard on studio carpeting in the Big Apple.

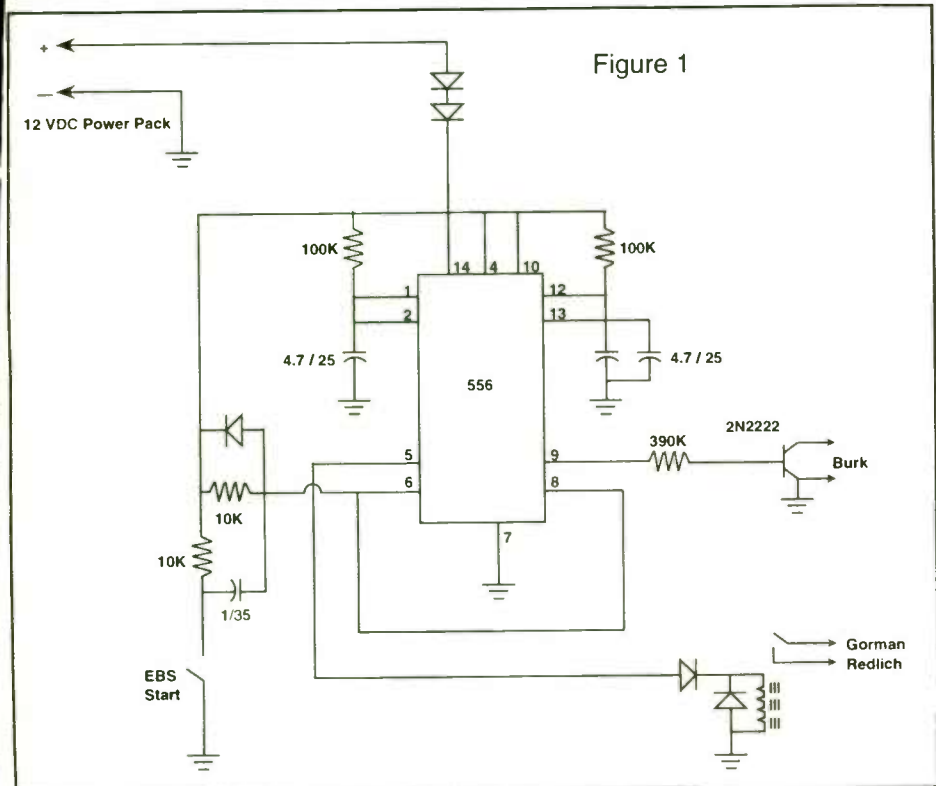
He has also applied it to studio chairs that have vinyl covering, as it seems vinyl + blue jeans = static, for some reason.

If you have a tip or a comment to share, give us a yell at wrwbench@aol.com

Remember that published tips qualify for SBE recertification credit, not to mention the tank of gas that RW will buy you for taking the time to write.

□ □ □

John Bisset is a principal in Multiphase, a national broadcast engineering services company. He can be reached at (703) 323-7180, or on line at wrwbench@aol.com



Walt is the customer service manager at Symetrix, and a frequent contributor to this column.

This time, Walt let me in on a little secret: The Radio Shack part number 275-612 is a great replacement — and it's cheaper, too. Actually, any SPST miniature switch rated at 3 amps will work just fine. Walt Lowery can be reached at (206) 787-3222.

★ ★ ★

Owners of DAT recorders will appreciate this tip from Edwin Somers, the service manager at Location Sound Corp. in North Hollywood, Calif.

Seems their shop has gotten a lot of requests to break out left monaural, right monaural and stereo outputs from the headphone output of DAT machines.

This feature is only found on the more

reached at (800) 228-4429; or in California, call (818) 980-9891.

★ ★ ★

I came across a really neat product the other day that I want to share with you. It's called the GELSEAL Re-enterable. It is a compact splice kit for RG58/RG59 type cable.

The kit consists of two plastic half-moon shaped shells that snap together. Inside the upper and lower halves is a waterproofing compound that forms around the spliced connector.

The GELSEAL protects splices over a temperature range of -40 to 140 degrees Fahrenheit.

Typically used by the cable industry, the GELSEAL comes in three sizes, and may be just what you need to seal that rooftop antenna splice.

The GELSEAL is manufactured by Multilink in Elyria, Ohio.

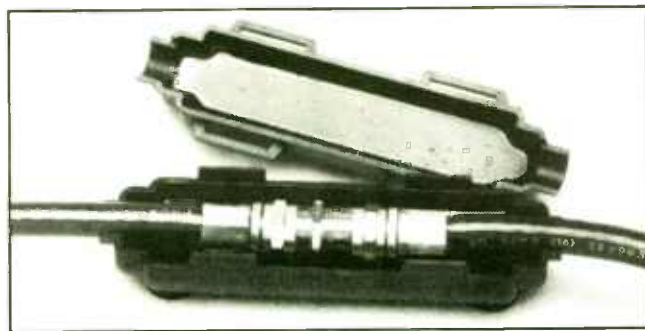
For more information, call (216) 366-6966, or circle Reader Service 84.

★ ★ ★

After modifying the Gorman-Redlich Model CE EBS encoder for the short

duration tones and connecting it to his Burk Technology Remote Control System for logging when the EBS tests were being sent, Robin Cross, chief engineer at WNIU, experienced problems with the duration of the tones.

It turns out that with the shorter duration tones, the length of the switch closure to start the EBS tones can



The GELSEAL

expensive DAT units. When Ed and his crew looked into adding this feature, it became very apparent that there was no room to add even a sub-miniature toggle switch.

The solution was to construct a small box that contains the switch and the phone jacks (1/8-inch and 1/4-inch) along with an 18-inch cable with the

CABLES • PANELS • PATCH BAYS • MIXERS • AMPLIFIERS • ADAPTORS • CONNECTORS

When it's Time to Specify the Wiring,

whirlwind

Specify a Whirlwind Turnkey Custom Design.

WHIRLWIND • 99 LING RD • ROCHESTER • NY • 14612 • 800-733-9473

STATION SKETCHES

Protect Signal from Reradiation

by Tom Vernon

HARRISBURG, Pa. Sometimes the results of monthly directional proofs of an AM pattern can look really strange. While many factors affect the field strength on a given radial, extreme high or low readings in the null region often suggest a reradiation problem.

The erection of power lines, water tanks or even bridges in the main lobe of a station array can wreck havoc with the pattern you have worked so hard to maintain.

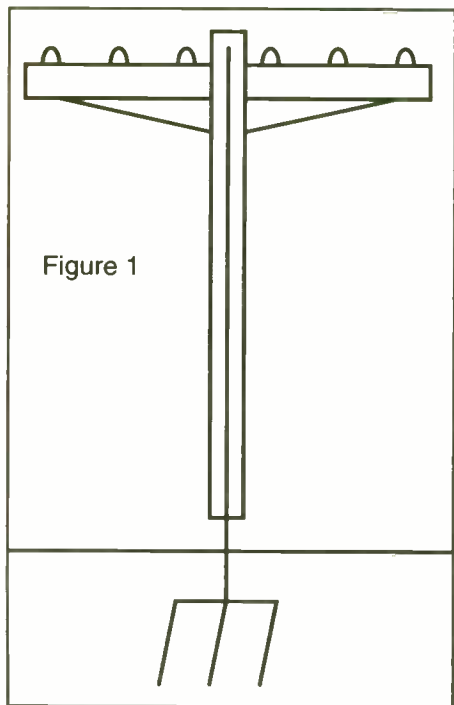


Figure 1

The mechanism of reradiation is fairly simple. A large metallic object, or objects, in the main lobe will reflect RF energy into the null areas. In many cases, the amount of reflected energy is not insignificant. Up to 10 percent of the incident signal may be reradiated in some circumstances. The main lobe is often also deformed by the presence of reradiating structures. The reflected energy can be additive on some radial

points and subtractive on others.

While the causes of reradiation are simple, the solutions usually are not. Exorcising such problems is usually a combination of black magic and engineering practiced by consultants using various methods and devices. This article presents the fundamentals of reradiation and methods for detuning offending structures.

The first step is to determine the source of the trouble. This isn't always easy and usually entails extensive work with a field strength meter. It is important that the source be positively identified, as the installation of detuning hardware is costly, and the cooperation of the owner of the structure(s) in question must be secured. The best indication of reradiation is the presence of a standing wave pattern in measurements taken in a line between the transmitter and structure in question.

The simplest problem is a wooden pole with a ground wire, as shown in Figure 1. One common solution is to attach a wire

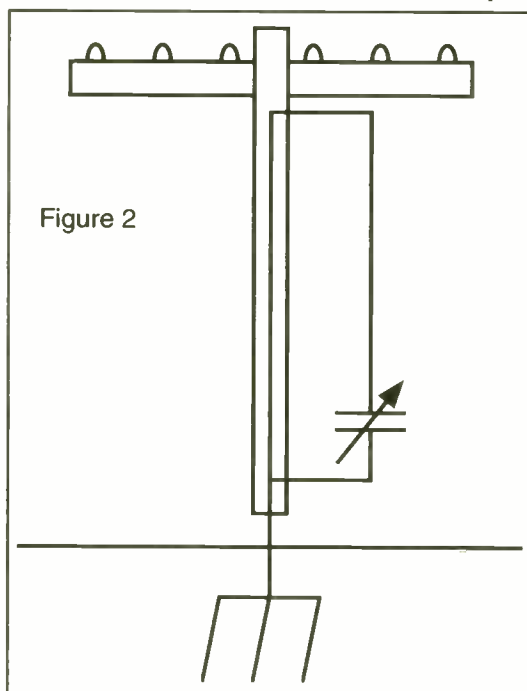


Figure 2

to the ground wire at the top of the pole and run it down the opposite side from the ground wire. It is then connected to a variable capacitor or capacitor decade in series with an RF ammeter to ground. Adjustments are made for minimum RF current in the ground wire. A current reduction of 10 to 1 should be possible.

Once the null has been reached, the variable capacitor may be replaced with a fixed cap of the closest standard value. Usually these are installed in a weather-proof box. A typical installation is shown in Figure 2.

The size of capacitor to be used is determined by the circulating current to ground. Typically "G" series caps are used. In situations where very large currents are involved, G2 caps would be necessary.

There are several circuit variations used to detune poles or other objects. A fixed cap may be paralleled with the variable cap in circumstances where an oddball value is required. Some engineers feel that a variable cap is prone to shorting and opt instead for a variable coil in series with a fixed cap. A variable coil may be used on top of the pole, although this may be difficult to adjust in the field. Inserting an RF ammeter of the right range in series with the ground wire can become cumbersome; most engineers use other methods.

One idea is to build a torroid pickup loop and connect it to the Aux Input of an FIM-21 field strength meter. Some folks have also tried to use the amp clamp accessory that is used to measure current with a DVM. This is a bad choice. The ferrite material in these devices is optimized for good results at power line frequencies, and will not work well with RF.

Some consultants have specially constructed boxes with a tuned pickup loop, diode and RF ammeter. This box is placed next to the pole's ground wire and the detuning mechanism is adjusted for maximum circulating current as indicated on the RF ammeter.

In metro areas, where there may be several strong signals in a given area, it is important to be sure that it's your signal that is being nulled out, and not someone else's. In these circumstances, a field strength meter would be advisable to determine the true identity of signals being reradiated.

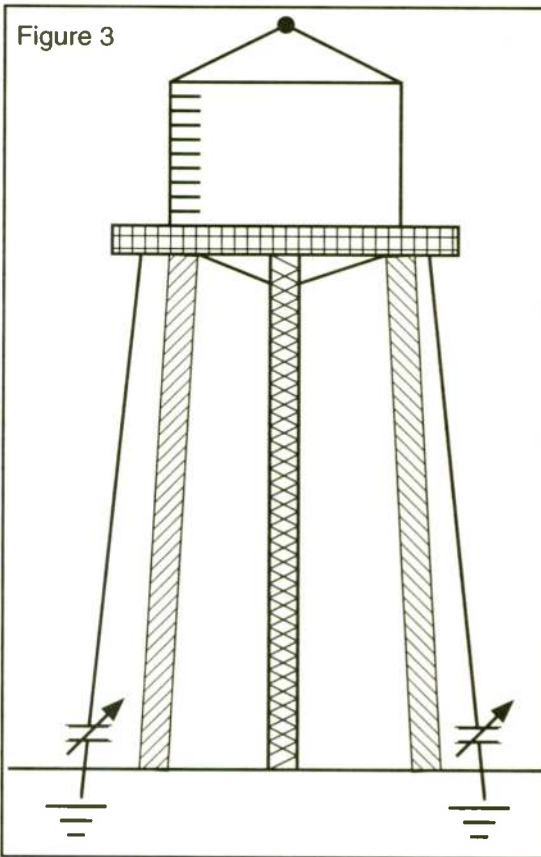
Things become interesting when it is necessary to detune water towers or the four-legged steel towers used by the power company. Typically, detuning wires are placed on all four legs, with each leg being detuned individually. Each leg will interact with the others, so it's necessary to repeat the measurements until satisfactory readings are obtained. Such an

arrangement is illustrated in Figure 3.

Whenever there is a series of power company poles to be detuned, they must be treated as a system. This is because all of the ground wires are connected via the neutral cable. Figure 4 shows the equivalent circuit of power company ground wires.

Once a group of poles or towers has been detuned, it needs periodic maintenance. This takes the form of extra monthly field strength measurements, noting any abnormally high readings. Such problems are

Figure 3



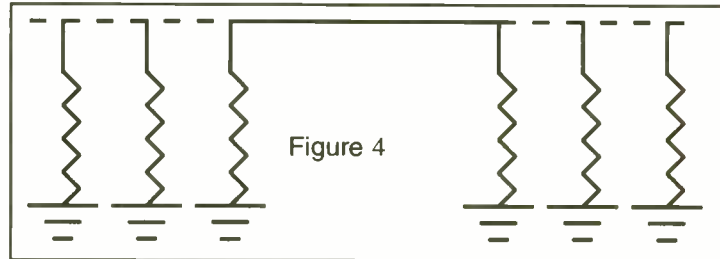
often the result of fixed caps that have been destroyed by lightning.

Another problem is variable inductors, which need occasional cleaning to ensure reliable operation. Of course, the effects of insects in junction boxes and vandals with rifles or wire cutters should not be overlooked.

In all cases, permission of the owners of the structures in question must be obtained before work begins. You will often have to play the role of educator when talking to power company engineers and utility personnel, as these people probably won't be familiar with RF reradiation issues.

Owners of water towers have a somewhat justifiable fear of corrosion through electrolysis if your mounting hardware is of a different metal than their tower. It may be necessary to fabricate mounting brackets from the same type of metal as

Figure 4



the tower before approval can be obtained.

Restoring an antenna pattern by detuning reradiating structures is a costly and complex undertaking, requiring diligent, ongoing maintenance after the project is completed. It's a good idea to work with a consultant on this type of endeavor.

□ □ □

Tom Vernon divides his time between consulting and completion of a Ph.D. He can be e-mailed at TLVernon@AOL.com; or by calling (717) 367-5595.

FM BROADCAST POWER AMPS

... the low-cost way to increase power

HENRY FM Broadcast Power Amplifiers is the low-cost way to upgrade to "Class A" service or new construction or backup service at high power stations. Eimac ceramic triodes are used in grounded grid... a design that is conservative, reliable, stable and very economical. Type accepted for use with any type-accepted 10 watt exciter. Input and output low-pass filters are built in for service as a primary or backup transmitter.

TOLL-FREE (800) 877-7979

HENRY RADIO

2050 South Bundy Drive
Los Angeles, CA 90025

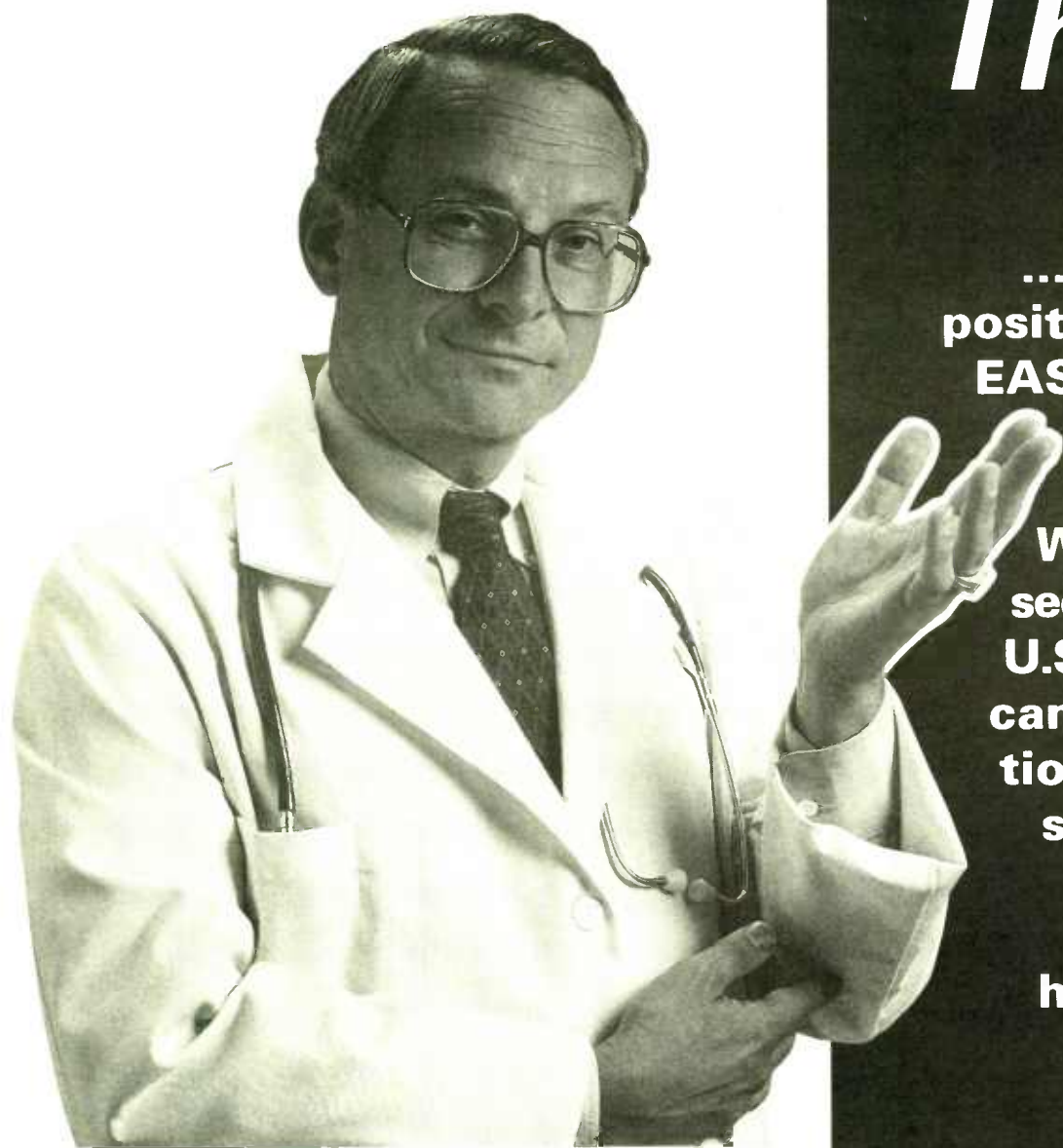
Phone (310) 820-1234
FAX 310-826-7790

Thanks...

...for your overwhelmingly positive response to the Sage EAS solution-ENDEC- at this year's NAB Convention.

We're preparing to open a second production line at our U.S. factory to make sure you can have the best EAS solution up and running in your stations by the deadline.*

**Our people are ready to help you and your people.
Call us.**



"Doc" Jerry LeBow, Creator of ENDEC

TEL: 800-622-0022

FAX: 317-966-0623

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



Sage Alerting
Systems

*Firm orders placed and accepted prior to August 1, 1996 guarantee delivery of your ENDEC prior to Christmas 1996 in time to meet the FCC mandated deadline.

© 1996 Harris Corporation
Circle (108) On Reader Service Card

CIRCUIT THEORY

Analyzing Circuits with Norton

by Harold Hallikainen

SAN LUIS OBISPO, Calif. Last month, we used Thevenin equivalents to analyze a Wheatstone Bridge circuit, which, as you may recall, was first described by Samuel Hunter Christie in 1833.

Let's convert the voltage sources in the Thevenin equivalent to current sources and move the Thevenin resistance from in series with the voltage source to across the current source. This is the Norton Equivalent, a technique described by E. L. Norton of Bell Telephone Laboratories

in 1926. Next month we'll generalize this a little and get Millman's Theorem

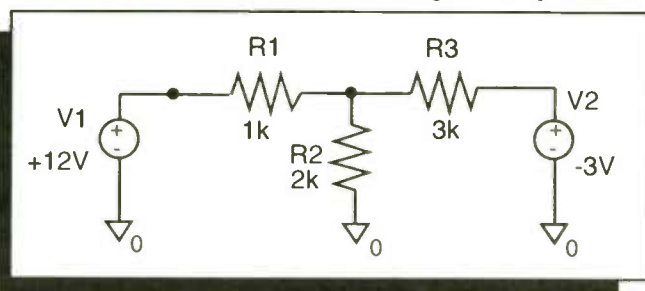
I recently received a fax from George

Pfisterer recalls working in the Data Communications Department of Bell Telephone Laboratories in Murray Hill, N.J. A few doors down the hall in the building known as "Bittsburgh" was the office of Ed Norton, the originator of the theorem we all studied.

Pfisterer recalls walking past the office and "seeing this elderly white-haired gentleman operating a giant 24-inch slide rule." I guess a large slide rule gives a digit or two more resolution? Anyway, Norton first described one of the fundamental theorems of circuit analysis and 40 years later was section head in data communications.

The progress in electronics in one person's lifetime is truly phenomenal. I'm truly impressed by the bit of the history of our field I've lived through. How about you?

Let's go back to the simple three-resistor circuit we've analyzed many times in this series. I hope that in using a variety of techniques to analyze the same circuit,



Pfisterer, Jr., of Huntingdon Valley, Penn.

Juice Up Your Jazz



Nothing is cooler than your on-air sound. Now bring it a cut above the rest of the sound-alikes with that extra edge from MSI's FM ModMinder®.

ModMinder is a revolution in modulation monitoring. It pays no mind to brief overmod peaks which means it delivers every bit of modulation your station can legally use.

Your listeners will swear you've increased your power. The PD will be hip to it. The engineer will like it's easy set-up and operation. And the GM won't lose sleep over the cost.

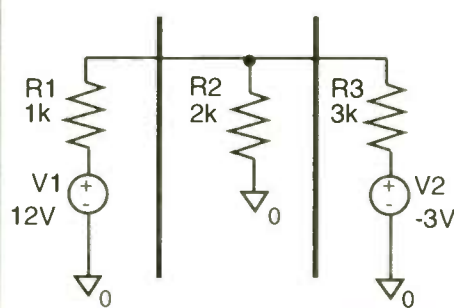
ModMinder will give you back the dynamics your listeners crave from cymbals to sax, from Bird to Kenny G.

Call MSI, the modulation authority at 800-826-2603 and get the joint jumpin'.



12A World's Fair Drive Somerset, New Jersey 08873
Voice (908) 302-3090 • Fax (908) 302-0206

Figure 2



we'll get the same answer each time (it would be nice!), and thus develop a toolbox of analysis techniques.

Figure 1 shows the circuit to be analyzed. In Figure 2, the circuit is broken into three parts. In Figure 3, the left and right portions of the circuit are replaced with their Norton equivalents (while the center resistor remains unchanged).

The equivalent circuit

Recall that in the Thevenin equivalent, a complex circuit is replaced with a single voltage source and a series resistance. Further, the Thevenin voltage was the open circuit voltage of the original circuit. We determined this by placing an "imaginary voltmeter" across the two terminals we were modeling and measuring the voltage.

Finally, we determined the Thevenin resistance by replacing the imaginary voltmeter with an imaginary ohmmeter, replacing all voltage sources with shorts and replacing all current sources with opens. The imaginary ohmmeter then read the Thevenin resistance.

Similarly, in the Norton equivalent, a complex circuit is replaced by a single current source (a source that maintains a specified current, independent of the load resistance) and a parallel Norton resistance. The Norton current is the short circuit current of the original circuit.

Whereas we placed an imaginary voltmeter across the two terminals to find the Thevenin voltage, we place an imaginary ammeter across the two terminals for the Norton current. We determine the Norton resistance the same way we found the Thevenin resistance (which, incidentally, makes them the same!).

If we place an ammeter between the top of R1 and ground in Figure 2 (disconnecting the top of R1 from the remainder of the circuit), we'll get the Norton current for the left side of the circuit. Using Ohm's law, we easily see that this is 12 mA ($12V/1k()$). The right side gives us a Norton current of 1 mA ($3V/3k()$). Further, note that on the left side, conventional current would flow out of R1 (up), while on the right side, current flows into R3 (down) due to the polarities of the voltage sources. This difference of polarity can be represented either as shown in Figure 3 (all current sources positive) or Figure 4 (all current sources pointing the same direction). For now, let's stick with Figure 4.

Current sources in parallel

Current sources in parallel act exactly the same as voltage sources in series. Similarly, just as it is meaningless to put two voltage sources with different voltages in parallel (you'll get an infinite current around the loop as each source insists on setting the voltage), you cannot place different current sources in series (you'll get infinite voltage out of each as it tries to force the other to have the specified current). Just as voltage sources in series add algebraically, current sources in parallel add algebraically. Putting this all together, we get the circuit of Figure 5, where the two current sources (12 mA and -1 mA) have added to yield 11 mA.

In Figure 5, we combine the three parallel resistors to find a single 11 mA current source driving a single 545.5 Ω resistor. The voltage across that resistor is 11 mA $\times$ 545.5 Ω , or 6 V. Further, because the conventional current is going into the top end of the resistor, the top end of the resistor is positive with respect to the bottom (as shown). Finally, we can determine the voltage at VN by starting at ground and "winding our way around the circuit" to VN. In this case, we don't have far to go. Starting at ground, we go up the 545.5 Ω resistor, going up 6 volts (because we came out the positive end of the resistor). The voltage at VN is +6 V. Luckily, this agrees

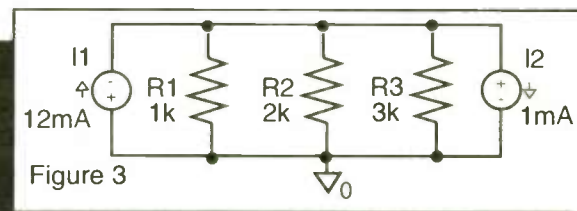


Figure 3

with all our previous solutions to this problem.

The problem of several voltage sources driving a single point through series resistors is a common one. Millman's theorem, which we'll discuss next month, generalizes the approach we just took to cover any number of voltage sources and series resistances.

As we look at such a general solution, what do we do with a resistor that doesn't have a voltage source in series with it (such as R2 in this circuit)? We say it has a zero volt source in series with it! This is a very useful concept! A short (or a piece

continued on page 49 ►

Norton Equivalents

continued from page 48

of wire) can be considered a zero volt voltage source. No matter how much current goes through the short, the

Random House Radio Show

continued from page 38

are then mixed down to DAT and sent to Hoel for editing of the final 30-minute program on his Digidesign Pro Tools III editing system.

"First, I listen along and edit grossly for time," he said. "I break up the conversations into two parts. Mainly because people listen to radio differently these days than they used to. I think they tend to listen in shorter bursts. They may have only 10 to 15 minutes to spend on any given program. I don't want them to feel like they missed something if they come in late."

"Each short segment is pretty much self-contained and is introduced by Harold Evans, who records his narration in a studio later after we've written the script," Hoel said.

"The idea is to easily help listeners get into the flow of the program and let them know they haven't missed a thing."

Though Hoel edits tightly — removing extraneous content — he does not cut laughs or background clatter. "People say I can hear phones ringing in the background. Well fine, it's in a restaurant and you are going to hear phones ringing and people clinking their spoons and cups. That's part of the liveness of it."

Random House has produced 13 original shows so far in the series, which began airing this summer on public radio stations.

"If we get an audience and people like the show, we'll keep it going forever," said Evans.

voltage remains zero (ideally).

This is exactly the same as an ideal 12 V battery. No matter how much current goes through the battery, the voltage remains 12 V. But, a 12 V battery seems useful, while a zero volt one does not. The Spice circuit analysis program (available on our Web pages and our BBS) does not have an ammeter element. If you want to measure current through some particular point in a circuit, you insert a zero volt voltage source. The current through that voltage source is calculated by Spice.

Coming up

Next month we'll finish up DC circuit

analysis with Millman's theorem, then move into AC circuit analysis.

With AC, we'll use the same techniques we've developed so far, but use "funny numbers" to do the math.

Eventually we'll move into active circuits, amplifiers, oscillators, modulation and ideas about information theory. (Is FM the original spread spectrum system?)

I look forward to your ideas on the route we should take on our trip.

□ □ □

Harold Hallikainen designs transmitter control and lighting control equipment for Dove Systems, a manufacturer

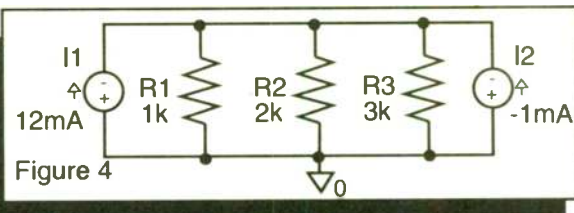


Figure 4

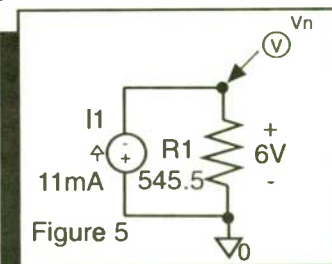


Figure 5

serving the broadcast and entertainment industries. He also teaches electronics at Cuesta College and is an avid contra dancer.

He can be reached at (805) 541-0200 (voice); (805) 541-0201 (fax); hhallika@slonet.org (e-mail); and <http://slonet.org/~hhallika/> (World Wide Web).

Rack Mountable and Rugged
Use it in the studio, in the field or in your rack.

12 Total Inputs
4 stereo, and 4 mono. The world's best utility mixer.

Channel Inserts (CH 1-4)
A TASCAM exclusive in this price range. Just like larger consoles, these handy inputs are great for compressor/limiters or using even more effects.

60mm Master Fader
What's a mixer without a master fader? Greater visual reference of your mix.

Precision 12-Segment Display
Bright LEDs so you know what's going on.

Stereo Buss/AUX SUB Inputs
Signal routing designed for flexibility and expansion.

Dedicated Stereo Tape Input
No need to waste a precious stereo channel for your master recorder. Assignable to L/R buss or monitor.

Balanced Inputs and Outputs
Running lots of cable? Using pro equipment? You'll need these. (Unbalanced, too!)

Double Reinforced Ground
Part of TASCAM's low noise circuitry that promises transparency and hum free operation.

4 Effects Returns
Use your imagination.

Overload/Peak Indicators
No guess work here. You get them on every channel and for PFL.

4 XLR Mic Inputs
Complete with 48V phantom power for using the highest quality condenser microphones.

Mute & PFL
Switches on every channel. PFL overload indicator too!

EQ on Every Input
Hi (12kHz) and Low (60Hz) $\pm 16\text{dB}$ on each.

2 AUX Sends
Take your signals Pre or Post

THE LAPTOP YOU CAN GET FOR UNDER \$350*

No more excuses for not having a compact, full-featured utility mixer. A mixer you can plug in anywhere. Need more inputs? How about a submixer? What about audio for video or multimedia? Get a TASCAM M08. It's the perfect mixer for these applications and more. Part of



the new breed of next-generation mixers from the leader in recording, TASCAM's new M08 will surprise you. You'll scratch your head trying to figure out how we can give you so much

mixer for so little cash. No tricks. Just value.

Look at all those features! It's the mixer that goes anywhere to do almost anything. Use it every day — or when you're in a crunch. So whatever you do, don't scramble for more inputs, or schlep that big mixer, pull out your M08 instead. It's the world's best and hardest working compact utility mixer. And it comes with TASCAM quality and durability at no extra cost. Everybody needs one. Best part is, at \$349 anyone can have one. They're at your dealer. Get yours today.

TASCAM

Take advantage of our experience.

MOVING?...

Don't leave us behind!

Mail or fax
your current label
and new address
(with effective date) to:

Circulation, RW,
PO Box 1214
Falls Church, VA
22041
or FAX 703-998-2966.

Address changes
will be processed
within four weeks of receipt.

Thanks!

©1996 TEAC America, Inc. 7733 Telegraph Road, Montebello, CA 90640 (213) 726-0303
TEAC Canada LTD, 340 Brunel Road, Mississauga, Ontario L4Z 2C2 Canada (905) 890-8008
*Actual MSRP is \$349.00. Actual prices may vary by dealer.



INFORMATION+SPCS VIA FAX
800 • 827 • 2268
DOCUMENT #6280

UTILITY
M08
MIXER

RadioWorld®

Broadcast Equipment Exchange

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

AMPLIFIERS

Want To Sell

BGW 250E, 150 W/c w/LED power indicators, \$400. L Hoover, Logical Audio Solutions, 410-896-3626.

700W FM MODULES



Broadband, 87-108 MHz. In stock. 300W and 500W also available.

Silicon Valley POWER
1-800-986-9700
FAX 1-408-986-1438

Bogen GA6A (6), new in sealed boxes, \$50/ea or all for \$250 +shpg. E Davison, 217-793-0400.

Yamaha A-700 integrated power amp, 100 W/ch, exc cond, \$125. R Cobb, Solid State Recording, 1044 Lightfoot Rd, Winaina FL 33598. 813-634-1940.

Yamaha 2150 pwr amp, stereo/mono, 150 W per chnl, excel cond, \$350. Al 712-362-7939.

ANTENNAS/TOWERS/CABLES

Want To Sell

NEW & USED: 1-5/8 & 7/8" coax cable, on spools, will cut to length, guaranteed. Goodrich Ent, 11435 Manderson St, Omaha NE 68164. 402-493-1886.

240' TOWER

Allied Model 30 SR/MW unpainted galvanized tower, 2 torque arms, solid rod construction, all hardware, NO RUST. From West Texas. 915-685-3000

EF Johnson 145-102-13 AM antenna changeover switch, \$135. P Willey, WBTN, Historic Rte 7, Bennington VT 05421. 413-663-3419.

3" HELIAX STANDARD COAXIAL CABLE

50-Ohm, unused, cut to length. Priced below market. Shipped instantly.

Call Basic Wire & Cable (NANCY) 800-227-4292
FAX: 312-539-3500

Phelps Dodge 2 bay FM antenna, 107.1 MHz, 1-5/8 EIA input, \$500; 10 kW dummy load, gd for AM & FM, \$800; 3-port coax relays, 1-5/8 EIA flanges on ends, \$250; 7/8 EIA flanged cable approx 4' long, \$50 ea; 7/8 EIA flanged 90's, \$25 ea; Scala HDCA-10 antenna 92 MHz, \$100, all plus freight & pack. D Gilliam, KJZZ, 1435 S Dobson Rd, Mesa AZ 85202. 602-710-0803. GILLIAM@RIO.MARICOPA.EDU

Rohn 65 G tower, 180', gd cond, on ground, some cables, \$5000. R Carlson, 801-268-8181.

AUDIO PRODUCTION

Want To Sell

dbx-180 (5); Timeline Micro Lynx synchronizer; JL Cooper CS10 controller Protocols mixer; Dolby 360 (2); BO. G Morgan, Master Audio Prod, 514 Fairmount Ave, Chatham NJ 07928. 201-635-0140.

Korg A3 performance signal processor, \$500; Deltalab ADM1024 Effectron II digital delay unit, \$250; Digitech IPS-33 MIDI controllable intelligent pitch shifter, \$250. L Hoover, Logical Audio Solutions, 410-896-3626.

Mackie MS1202 micro series 12 input mixer, 4 mic, 4 stereo line inputs, like new, original box, manuals, \$275; Turtle Beach 56K-PC 2-track HD editing system for PC, sound card, interface for MIDI, SMPTE, SPDIF, cables, software, manuals, \$1000 or B/O; Akai DR4D dedicated 4-track HD audio rec/editor, 340 MB drive & SMPTE interface, manual, original box, like new, \$1600. T Kremer, 3378 Ceremony Drive, Las Vegas NV 89117. 800-211-0968.

Panasonic 3500 DAT; RCA BA-11 mic pres; Millennia Media HV-3 mic pres; Altec 352-A mixer/amp, \$150; Gates M-5576 tube program amp; Allison Labs variable filters; Altec passive filters; Tannoy System 8 studio monitors. T Coffman, 619-571-5031.

ARP Quadra synthesizer, works great, \$700. W Whitney, Whitney Creative, 2232 Wengler, Overland MO 63114. 314-428-6430.

Collins 26W limiter, \$200; Audiomax III ALC, \$100; Volumax APC, \$100; UREI 527-A EQ, \$250; Micro-Trak PM5-MX mixer, \$250; LPB S-2 compressor/limiter, \$100; EV 605 Hi Z mic, \$100, u-ship. H Mills, W3HM, Rt 3 Box 712, Harpers Ferry WV 25425. 304-876-6483 alt 6pm EDST.

Dolby 361 Type A NR, 2 chnls, mounted in road case, complete package, \$850. R Streicher, Pacific A/V Enter, 545 Cloverleaf Way, Monrovia CA 91016. 818-359-8012.

Telefunken V72A tube mic preamp, \$575; (3) RCA BA2A tube mic preamps w/pwr supply, \$700; (2) RCA SH1A tube mic preamps w/pwr supply, \$500; Gates Level Devil tube compressor/expander, \$500; Gates SA39B tube compressor, \$600; Ampex MX10 6 chnl/stereo out tube mixer, \$750; MXR blueface 113 digital delay, \$300; MXR pitch shift/doubler, \$300; Gates tube mono mixer, needs work, \$300. 617-293-5671.

ADC patch bays, 1/4" 52 points, \$169; ADC TT bays, \$129 up; Furman 1/4" to 1/4", \$95 ea; Rane ME15 graphic EQ, \$150; Digitech 3.6 sec delay, \$150. W Gunn, 619-320-0728.

Want To Buy

Neve, API, MXR, Lexicon mic, EQs, delays, compressors, Harmonizers, reverbs. T Coffman, 619-571-5031.

Cooper Time Cube, Vanguard mics/docs, Ampex PR10 plug in transformers, weird studio effects, old guitar effects & tweed Fender amps, working or not, dbx VCA200 for 161 compressor. 617-293-5671.

Telos Zephyr or other ISDN codec. 213-466-3595. oncue@earthlink.net.

AUTOMATION EQUIPMENT

Want To Sell

Cetec 7000 w/2 IGM 48-tray carts, 4 ITC reels, many spare parts, working when removed from service, \$3000; TRC-15 remote control, \$350 or trade for record cart machine. Dwight or Mike, Jan-Di Broadcasting, 970-242-5665.

IGM E.C. system & Sentry FS 12B system, (5) Insta-Carts, stereo, (3) Go-Cart 24's, stereo, (4) 42 Go-Carts, stereo, will sell as system or individually. C Mandel, KAMP, 619-352-2277.

Cetec 7000 liquidation of all or parts, Level 2 automation, source cards, racks, spares, call for list. E Moody, KJEM, 216 N Main, Bentonville AR 72712. 501-273-9039.

IGM EC System, (3) 48-tray stereo Insta-Carts, 24 stereo Go-Cart & computer, \$3000 for complete system, might consider selling individually. C Mandel, KAMP, 626 Main St, El Centro CA 92243. 619-352-2277.

Schafer 903E (3) w/Audiofile 1; ITC r-r, \$1000. D Rose, KDUC, POB 250, Barstow CA 92312. 619-256-2068.

Sentry FS12B System, (2) 48-tray stereo Insta-Carts, (2) 24 stereo Go-Carts, (4) 42 Go-Cart machines & computer, \$3750 for complete system, might consider selling individually. C Mandel, KAMP, 626 Main St, El Centro CA 92243. 619-352-2277.

SMC Instacart interface, \$50; ESPI SMC pwr supplies (2), \$50 ea; Audiocord cart recorder, \$200; racks, \$100 ea; Gates 55A3 silence sense, \$50. D Rose, KDUC, POB 250, Barstow CA 92312. 619-256-2068.

SMC 350 Carousels (2), \$50 ea; SMC 450 Carousels, \$400; (2) monochrome monitors, \$50 ea; (4) SMC TS25 tone sensor (dual), \$50 ea. D Rose, KDUC, POB 250, Barstow CA 92312. 619-256-2068.

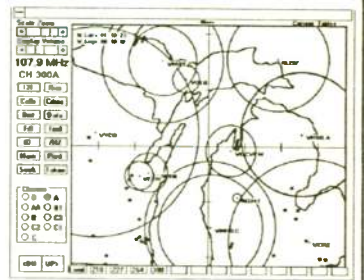
SMC ESP-2 1988, gd cond w/(4) 450 Carousels, (4) ITC, R-R mod 755, (2) ITC 770 R-R, (3) racks, \$2495/BO. J Helmkamp, Monett Comm, 1569 N Central, Monett MO 65708. 417-235-6041.

SMC DP2 control head, \$50; SMC DP2 spare parts kit, \$50; SMC 350 Carousel spare parts, \$50; SMC DS20A switcher, \$50; Gates motor fader, \$50. D Rose, KDUC, POB 250, Barstow CA 92312. 619-256-2068.

Systemation Sattire II system w/CPU, color VGA monitor, Epson printer, software, tape backup & wiring harness, set up for Jones GTO format, \$2000/BO +shpg. B Toole, 19 Makowski Ln, Whitehall MT 59759. 406-287-5286.

BROADCAST ENGINEERING CONSULTING SOFTWARE

Professional software packages for preparing FCC applications and plotting coverage. For Windows and DOS.



- ✓ Prepare concise FCC coverage maps and allocation studies from USGS digital line graph databases
- ✓ Search for AM, FM, and TV channels with professional graphics oriented programs and FCC databases
- ✓ Determine population with US Census databases
- ✓ Plot S.T.L. paths using NGDC terrain databases
- ✓ Tower and airport databases & more!

Soft Communications

DOUG VERNIER
1-800-743-DOUG (3684)

Internet Access - WorldWide Web
http://www.v-soft.com
email: dvernier@v-soft.com

BROKERS

Want To Sell

Appraisals • Brokerage • Consulting
T.A. BRANSON
media broker
1-800-453-3169
"Member NAB"
Confidential
Small/Medium Market Specialist

Telex 36 cart deck w/rack mount, new in factory boxes, BO. E Davison, 217-793-0400.

Want To Buy

ITC, BE, Fidelipac cart machines: single, triple, mono, stereo, play & record/play. Call M O'Drobinak @ 619-758-0888.

COMPUTERS

Want To Sell

Computer Concepts DCS, 1.966 GB HD, color monitor, DCS controlled 8 input/2 output switcher, APTX board, Format Sentry interlace incl source controllers for 24 6-pack Pioneer CD machines, 18 machines incl in package, all cables, cards & instruction manuals. J Hansen, WYRQ, 320-632-2992.

IBM 5170 w/computer aided design (CAD) & word processing software, 5154 color monitor, \$350; IBM 386 w/WordPerfect 5.1, Excel 3.0 & Windows 3.1, VGA monochrome monitor, keyboard, Logitech mouse, \$350; several 386 & 486 clones, various speeds & HD sizes, recently removed from service. R Franklin, Super Sound Studios, 215-639-9230.

Want To Buy

Tandy 6000 HD with at least one floppy drive. Mel Crosby, 408-363-1646.

CONSOLES

Want To Sell

BE 150A 5 channel 10 input, works well, \$575; BE 4M50A good for parts, \$65; Russco 505M, \$75; carts, \$.40 ea. M Butzner, KSUH, CA State Univ, Hayward CA 94542. 510-885-3588.

Ramsa WR-8816 16 chnl, 4 group, 2 output recording/mixing, ea chnl has 3 band EQ, insert point & direct output, mint cond, \$1800/BO. M Lesko, Upstate Sound, 136 Beverly Rd, Syracuse NY 13207. 315-474-8985.

ITC Series 1 PB stereo cart deck, \$1000. J Vega, Urban Community Radio, 2434 Southport Way Ste A, San Diego CA 91950. 619-336-4900.

Radio Systems ESA-10 stereo in gd cond, 10 slider pots, \$1800. G Arroyo, WONQ, 407-260-6100.



706 Rose Hill Drive Charlottesville VA 22901

BRAND NEW!

Sine-System's "Time-Temp Announcer"

DOESN'T YOUR SMALL TOWN HAVE DIAL-IN TIME & TEMPERATURE?

Add EASY Sales \$\$!

Sound like the "Big Guys" for very few bucks!

- Connects to one telco line - optional up to 62 lines
- Three rotating intro and one exit message
- Complete with mic, temp sensor & easy calibration
- Try a Free Demo @ (615) 227-4022
- Info: sales@halls.com AND www.telalink.net/~sinesys

Call us for the Best New & Completely Rebuilt Equipment!

(804) 984-HALL (4255) Fax: (804) 984-FAXX (3299) http://www.halls.com/

List Price: \$1,499
Call / email for Special Introductory Price!

CONSOLES...WTS

Howe Series 7000 console with sliders, new 1984, working when removed from service, \$1000 or Best Offer. Dwight or Mike, Jan-Di Broadcasting, 970-242-6665.

Sony MX-20 8x4 channel mixer/line mixing board, \$175. D Meyer, 805-962-8273.

Tangent Series 4 recording mixer, good condition, with manual, \$500. T Peloubet, WGRY, Grayling MI. 517-631-5583.

LPB 513C 8 channel stereo, \$1200; Harris Stereo 80, \$1000. D Rose, KDUC, POB 250, Barstow CA 92312. 619-256-2068.

Soundcraft Spirit live mixing console with 2 additional stereo inputs & 5 aux buses, custom modifications, excellent condition, \$1650, roadcase extra; Mackie 1202 mixer, 4 mic/line inputs + 4 stereo line inputs, 2 aux & stereo outputs, modified with tape return to monitor, like new, \$250. R Streicher, Pacific A/V Enter, 545 Cloverleaf Way, Monrovia CA 91016. 818-359-8012.

Soundcraft 400B 24x4x2 in flight case, excel cond, \$2900/BO +shpg. P Thompson, Moonlight Snd, 4763 WCR 32, Longmont CO 80504. 970-535-4748.

Studiomixer II 16 chnl 8 submix audio console, \$750. R Blair, Columbia School of Bdctg, 5808 Columbia Pk, Bailey's Crossroads VA 22041. 703-820-2020.

Mackie 1604, \$725; Tascam 512, \$950; Tascam 520, \$1750; Allen & Heath SYNCON 28x24, \$8000; Ramsa 820, \$2200. W Gunn, 619-320-0728.

DISCO-PRO SOUND EQUIPMENT

Want To Sell

Biamp Mixpak 7 Plus, 7-chan mixer w/built in reverb, EQ, 250 W amp, \$400. L Hoover, Logical Audio Solutions, 410-896-3626.

Carver C-4000 2-channel preamp with auto correlation, time delay, excellent condition, \$175. R Cobb, Solid State Recording, 1044 Lightfoot Rd, Winaina FL 33598. 813-634-1940.

Peavey CS-400 (3) 400 W stereo amp; UREI 535 (2) stereo graphic EQ; (4) speakers, large home-made with EV speakers, 15" base reflex, mid horn, tweeter. R Lide, Jim Gibbons Radio, POB 151, Frederick MD 21705. 301-663-4181.

Want To Buy

Tube hi fi units Harmon Kardon, Dynaco, Fisher, McIntosh or Marantz; Altec 604 speakers. R Cobb, Solid State Recording, 1044 Lightfoot Rd, Winaina FL 33598. 813-634-1940.

University T50 hi-frequency horn driver. E Davison, 217-793-0400.

FINANCIAL AND LEASING SERVICES

EQUIPMENT FINANCING

- FA/T APPROVAL
- ALL TYPES OF EQUIPMENT
- EASY TO QUALIFY
- LONG TERM LEASES - FIXED RATES

FIRST UNITED FUNDING
800-964-3525

FINANCING

LOANS BY PHONE (800) 699-FLEX

- We finance all types of Broadcasting Equipment
- Flexible Credit Criteria
- Flexible Payment Plans
- No Down Payment, No Payments For 90-Days Available

To apply or request additional information call Jeff Wetter.

FLEXLEASE, Inc.

LIMITERS

Want To Sell

Orban 418A stereo limiter, gd cond, \$300. T Peloubet, WGRY, Grayling MI. 517-631-5583.

Inovonics 230 8 band peak limiter, AM or FM selectable. R Lide, Jim Gibbons Radio, POB 151, Frederick MD 21705. 301-663-4181.

Aphex Easy Rider 4 channel compressor/limiter, like new w/manual & box, \$240/BO. Ron, GMI Media Group, 206-839-9414.

Moseley TFL 280, \$50; Moseley TGR 340, \$50; Volumax 4000, \$50; FM Volumax 4000, \$50. D Rose, KDUC, POB 250, Barstow CA 92312. 619-256-2068.

Orban 424A, mint condition with (2) CBS Audimax 444 AGC, recapped, spare Nuvisitors, \$500/all. P Russell, Bowdoin College, Sills Hall, Brunswick ME 04011. 207-725-3066.

Texar Audio Prism (2) black case model, \$1000 ea. J Vega, Urban Community Radio, 2434 Southport Way Ste A, San Diego CA 91950. 619-336-4900.

Want To Buy

CRL DX-2 NR, stereo, will trade for other bdct equip, feedline, etc. N Gabeaux, 317-852-9119.

Teletronix LA-2A's, UREI LA-3A's & LA-4's, Fairchild 660's & 670's, any Pultec EQ's & any other old tube compressor/limiters, call after 3PM CST, 214-271-7625.

UREI LA2A, LA3A, LA4A 1176, Gates, RCA, Collins, Altec, dbx 160, 165, all types, working or not. T Coffman, 619-571-5031.

MICROPHONES

Want To Sell

Vega R42/T77/T87 (4) VHF diversity wireless combo w/body pack lavalier & handheld mic, w/light cases, \$2000 ea or B/O. T Kremer, 3378 Ceremony Drive, Las Vegas NV 89117. 800-211-0968.

Bruel & Kjaer condenser mic, pwr supplies only, as is, \$200; Altec condenser mic, pwr supplies only, as is, \$200. V Vogt, Archaic Audio, 330 SW 43rd St, #247, Renton WA 98055. 206-382-5571.

Countryman TVH Tie-Clip mic, miniature hypercardioid condenser, requires phantom power, \$165; AKG D-140 dynamic cardioid mic (3), \$115 ea; Schoeps Colette KC5L cable, with Lemo connector & adaptor, like new condition, \$335. R Streicher, Pacific A/V Enter, 545 Cloverleaf Way, Monrovia CA 91016. 818-359-8012.

EV RE/38 ND mic, like new w/case, \$300/BO. Ron, GMI Media Group, 206-839-9414.

Neumann U87 mics & various other models, shock mounts & accessories, \$2000. T Lawlor, Tom Lawlor Prod, 6 Newbern St, Jamaica Plain MA 02130. 617-524-0844.

Neumann CMV563 tube condenser mic w/M7 capsule & new regulated pwr supply, \$2500. P Santo, Bugtussle Recdg, Box 634, Bryantville MA 02327. 617-293-5671.

Want To Buy

Call-letter plate for RCA 44 mic. Michael Harrington, PO Box 7619, Little Rock AR 72227.

EV RE-20; Sennheiser 421; Sennheiser 4032; Shure SM-81; AKG 460-EB; AKG 451-EB; Neuman U-87 w/shock mount. T Coffman, 619-571-5031.

Neuman, Sennheiser, EV, Altec, RCA 77 & 44, Coles. T Coffman, 619-571-5031.

RCA 77-DX's & 44-BX's, any other RCA ribbon mics, on-air lights, call after 3PM CST, 214-271-7625.

DYNAMIC CARDIOID MICS NEEDED: Shure SM48, SM57, SM58; Electro-Voice RE-10, RE-11, RE-15, RE-16 or other equivalent makes & models. Steve Kirsch, 516-763-1776 (voice), 516-763-1750 (fax).

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

MISCELLANEOUS

Want To Sell

Alesis Datadisk real-time MIDI sequence playback, \$225. L Hoover, Logical Audio Solutions, 410-896-3626.

CCS CDQ-2000E; Adtran DSU11AR (4); Straight Wire Audio PH-2B phone pre-amp; Aphex stereo Compellor, BO. D Irwin, KJAZ, POB 1450, Alameda CA 94501. 415-616-5768.

Viking 76 R-R w/R/P electr w/new hysteresis motor, can wind carts, \$45; Telex/Viking 36 cart deck, table top w/8 W SS PB amp, \$35, spare motor \$10 +UPS; tape PB preamp w/600 ohm bal out SS, EQ & gain, \$20 +UPS or BO for the lot w/spare parts. E Davison, WNMS, 1129 Willowbrook Dr, Springfield IL 62707. 217-793-0400.

Rotron Blowers for Elcom, Harris, CCA, CSI, McMortin, rebuilt & new. Goodrich Enterprises Inc. 11435 Manderson St, Omaha, NE 68164 402 493 1886 FAX 402 493 6821

Records (approx 4500) 45 rpm, 570 albums, ranging from 70's-80's & early 90's, country music library, call for info & pricing. Marshall or Brian, WEKT, 502-265-5636.

UTC transformers, A48 hybrid, (2) A25, Altec/Peerless 4665, 15095, \$15 ea +UPS. E Davison, WNMS, 1129 Willowbrook Dr, Springfield IL 62707. 217-793-0400.

CSI CS-100 DTMF controller, \$200; Gentner EFT 900 phone coupler, \$100; Russco DA 241B dist amp, \$50; Nikke tuner AM/FM, \$50; portable disco mixer, 2 CDs, 2 cassette, speakers, \$1000. D Rose, KDUC, POB 250, Barstow CA 92312. 619-256-2068.

Recordex 330WP & 330-II both master, 3 position slave cassette duplicator, new heads, recently refurbished music quality, \$850 each/BO. C Roberts, Edgewater Co, 232 C St, S San Francisco CA 94080. 415-589-3313.

Tangent 1202A mixing console, 12 channel in, stereo-mono out, EQ on ea input chnl, echo send/return, all inputs mic/line level, solo & foldback outs, \$600. S Lawson, KAK Prod, 928 Hyland Dr, Santa Rosa CA 95404. 707-528-4055.

CONSULTANTS



Consulting Communications Engineers

FCC Applications, Design, Field Engineering & Tower Detuning
Video/Data/Voice • Statewide Networks • Wide-Area Networks

EXPERTS IN:

TV • AM • FM • ITFS • MICROWAVE • PCS • FIBER

210 S. Main St., Thiensville, WI 53092 (414) 242-6000 FAX (414) 242-6045
Internet: http://www.evansassoc.com Member AFCCCE



for successful FM TRANSLATORS..

- Feasibility studies
- Changes - upgrading
- Frequency searches
- Engineering
- FCC application work

Talk with Howard Enstrom (904) 383-FMTA (3682)

FM Technology Associates
30925 Vista View
Mount Dora, FL 32757

W. LEE SIMMONS & ASSOC., INC.

TELECOMMUNICATIONS CONSULTANTS
Allocation Studies • AM, FM, TV, LPTV • Applications • Appraisals • Inspections • Local & Wide Area Computer Network Microwave Design • Specialized Computer System Designs
44 Bow Circle #B, Hilton Head Is., SC 29928
803-785-4445 fax 803-842-3371 e-mail: wlsimm@IBM.net

GRAHAM BROCK, INC.

BROADCAST TECHNICAL CONSULTANTS
Full Service From Allocation to Operation
AM/FM/TV/AUX Services; Field Work; Antenna and Facilities Design
Over 35 years engineering and consulting experience
912-638-8028
202-393-5133

R. MORGAN BURROW, P.E. & ASSOCIATES, P.C.

ALLOCATION STUDIES
FIELD WORK A SPECIALTY
• AM Directional antenna adjustment, measurement & proof
• RADHAZ measurements
• RADHAZ evaluation
• CATV Leakage Testing
• FM & TV field intensity & other measurements
• Facility inspections for purchase/insurance purposes
ELECTROACOUSTICS
OSHA measurements
301-948-3844 Fax 301-330-5565

E. HAROLD MUNN, JR. & ASSOCIATES, INC.

Broadcast Engineering Consultants
AM - FM - TV
WAYNE S. REESE
PRESIDENT
Box 220, 100 Airport Rd.
Coldwater, MI 49036
517-278-7339

MLJ

Moffet, Larson & Johnson, Inc.
Consulting Telecommunications Engineers
1110 North Glebe Rd, #800
Arlington, VA 22201
(703) 741-3500
FAX: (703) 741-0312
Member AFCCCE

Consulting Communications Engineers

- Station improvement and modernization
- FCC Applications and Field Engineering
- Frequency Searches and Coordination
- AM-FM-CATV-ITFS-LPTV

OWL ENGINEERING, INC.

E-mail: Owleng19@skypoint.com 1-800-797-1338
1306 W. County Road. F, St. Paul, MN 55112 (612)631-1338 *Member AFCCCE

MULLANEY ENGINEERING, INC.

Consulting Engineers
•Design & Optimization of AM Directional Arrays
•Analysis for New Allocation, Site Relocation, And Upgrades
AM-FM TV LPTV
Wireless Cable (MDS/MMDS/ITFS/OFS)
•Environmental Radiation Analysis
•Field Work
•Expert Testimony
9049 Shady Grove Court
Gaithersburg, MD 20877
Phone: (301) 921-0115
Fax: (301) 590-9757
email: mullengr@aol.com



Where In The World Are You?

Reach radio professionals worldwide by advertising in Radio World's international edition.
Call Simone for more information.
1-800-336-3045

T. Z. Sawyer Technical Consultants

AM-FM-TV-LPTV
• FCC Applications & Exhibits
• Experimental Authorizations
• AM Directional Antennas
• High Power Antenna Arrays
• Frequency Studies
• Class Upgrades
• STL Applications
• Station Inspections
1-800-255-2632
FAX: (301) 913-5799 • 6204 Highland Dr. • Chevy Chase, MD 20815

PC - SOFTWARE

AM FM TV Search Programs
Signal Mapping—STL Paths
RFHAZ—US Census PopCount
FAA Tower—Draw Tower

Doug Vernier
Engineering Consultant
1600 Picturesque Drive
Cedar Falls IA 50613
800-743-DOUG

DISTRIBUTOR DIRECTORY

The following distributors serving the broadcast industry would be glad to help you with any of your requirements.

...Some people get hooked on broadcast equipment big time...they think about it...dream about it...talk about it all the time...for example...us...

RADIO! The beat goes on!

CROUSE-KIMZEY OF ANNAPOLIS

tops in broadcast equipment
1-800-955-6800
ask for Kathleen

CORNELL-DUBILIER MICA CAPACITORS

FROM STOCK

JENNINGS VACUUM CAPACITORS

FROM STOCK

JENNINGS VACUUM RELAYS

SURCOM ASSOCIATES

2215 Faraday Ave., Suite A
Carlsbad, California 92008
(619) 438-4420 Fax: (619) 438-4759

MISCELLANEOUS...WTS

Wegener 1601 main frame; Wegener 1605-12 pwr supply; Wegener 1606-51 block rcvr; Wegener 1622A demod; Wegener 1645 audio decoder; Wegener 1646 audio decoder, all in excel cond, w/manuals, sold as set, \$900. T Peloubet, WGRY, Grayling MI. 517-631-5583.

Conex Electro Systems AS101 audio selector switch, 10 in 1 out, \$400; Lighting Control LC-700A beacon light controller/flasher, \$400; Westinghouse ATSBM40100XRR auxiliary power transfer switch with 100 amp contacts, \$2200. J Vega, Urban Community Radio, 2434 Southport Way Ste A, San Diego CA 91950. 619-336-4900.

UPS Excide Electr Powerware 6 kva w/battery side car, deluxe front panel, comm package, still under warranty, many extras. P Appleton Studios, 954-587-7900.

Lyrec tape timers (3), \$300 ea; (7) Seike/Spotmaster tape timers, \$175 ea; (5) Spotmaster TP1B cart winders w/timer, \$225 ea; (5) Spotmaster TP1B cart winders, no timer, \$50 ea. Mel Crosby, 408-363-1646.

Want To Buy

Jazz record collections, 10" LP/12" LP be-bop, swing, dixie, highest prices paid. B Rose, Program Recdgs, 228 East 10th, Nyny 10003. 212-674-3060.

MONITORS

Want To Sell

Belar/RCA FMM-1/BW-75A FM composite mod mon; Belar/RCA FMS-1/BW-85A FM stereo mon; Belar/RCA SCM-1/BW-95A SCA mon, 67 kHz; Belar/RCA RFA-1/BW-100B FM RF amp; Belar RFA-1 FM RF amp; McMartin TMB-3000A FM digital freq mon. R Lide, Jim Gibbons Radio, POB 151, Frederick MD 21705. 301-663-4181.

McMartin TBM 3700 monitor, fair condition, with manual, \$200; McMartin TBM 2200A stereo monitor, fair condition, with manual, \$200; McMartin TBM 2000B SCA monitor, good condition, with manual, \$200; McMartin 2500C RF amp, good condition, with manual, \$300, or all for \$750. T Peloubet, WGRY, Grayling MI. 517-631-5583.

RECEIVERS & TRANSCEIVERS

Want To Sell

Sears 1964 vintage AM/FM stereo table radio, needs work, w/schematic, \$20. P Beckman, WTVK, 3451 Bonita Bay Blvd #101, Bonita Springs FL 33923. 941-498-4600.

SCA RECEIVERS—ALL TYPES

Will work to meet your receiver needs
Professional / Table / Portable
Field Strength Meters
Reading Service / Ethnic / Data

DAYTON INDUSTRIAL CORP.

2237 Industrial Boulevard
Sarasota, FL 34234-3119
Tel: 941-351-4454 FAX: 351-6081
E-Mail: SCARadio@aol.com

RECORDERS

Want To Sell

Scully '100' recorders, record/play amplifiers, 8, 16, 24 track heads. Sequoia Electronics, 4646 Hounds-haven Way, San Jose CA 95111. 408-363-1646.

Ampex Micro70 port stereo cassette rec, \$150; Sony TC-520CS port stereo cassette rec w/shoulder strap, \$150; JVC TD-W30J dual cassette rec w/high speed dubbing, \$100; Teac R-435X auto-rev cassette rec w/Dolby B & C, dbx, mic inputs, record mute, \$150. L Hoover, Logical Audio Solutions, 410-896-3626.

Ampex 354 stereo 1/2 trk w/wooden stand & (2) Inovonics 370 electr. BO. R Rubio, 2631 N Washtenaw, Chicago IL 60647.

ITC ESL IV splice finders (2); ITC Omega mono play (3); ITC Omega mono R/P; BE 2100PS stereo play (3); BE 2100RPS stereo R/P; BE 2100RP mono R/P (3); ATC mono, R/P (1) & (2) play; IGM mono (3) R/P & (3) play; Tapeaster 700P mono play (9); Tapeaster 700RP mono R/P (3); Allied A-Line wood cart rack; Lazy Susan cart racks (2); ITC Scotchcart (1000); Fidelipac (1000). R Lide, Jim Gibbons Radio, POB 151, Frederick MD 21705. 301-663-4181.

HEAD RELAPPING/REPLACEMENT

All tape and film formats
30 years experience



350 N. Eric Drive
Palatine, IL 60067
800-227-4323

Studer A-80 VU layback, excel cond; Otari 5050 4 trk 1/4"; Teac A3340 4 trk 1/4"; 10" metal reels & boxes, BO. G Morgan, Master Audio Prod, 514 Fairmount Ave, Chatham NJ 07928. 201-635-0140.

MCI JH-116 2" 16 trk w/8 trk 1" stack, \$2000; (8) dual chnl dbx-150 units, \$500. R Blair, Columbia School of Bdcg, 5808 Columbia Pk, Bailey's Crossroads VA 22041. 703-820-2020.

Otari MK III-2 & BQII 1/4" machines, both in gd cond, on wheels, 4 trk has very low hrs, \$400 & \$550. Greg, Mars Audio, Astoria NY. 718-274-0771.

DO YOU NEED PARTS FOR SCULLY TAPE RECORDERS ???

SEQUOIA
ELECTRONICS
1-(408) 363-1646
FAX 1-(408) 363-0957

Otari MX 5050 BQII 4 chnl R/P R-R, 9 yrs old, \$995/BO. J Travis, WCIK, POB 506, Bath NY 14810. 607-776-4151.

AKAI vintage r-r, portable, stereo, tube-type, gd cond, BO. Al 712-362-7939.

Panasonic SV-3700 DAT recdr (2), excellent condition with special AES/SPDIF digital mode selector switch installed on front panel, \$950 ea. R Streicher, Pacific A/V Enter, 545 Cloverleaf Way, Monrovia CA 91016. 818-359-8012.

Revox PR-99 2 trk in mint cond, \$900, W Whitney, Whitney Creative, 2232 Wengler, Overland MO 63114. 314-428-6430.

Tascam DA-88 digital recdr w/remote excel cond, less than 600 hrs, recently serviced, \$3400. J Range, Sing Studio, 8241 N Mariposa St, Fresno CA 93720. 209-436-4749.

MRL short test tapes 2", \$229. W Gunn, 619-320-0728.

REVOX PARTS/SERVICE

Cassette-CD-Open reel
NOS PR99 repros.
Capstan resurfacing, ALL BRANDS.
JM TECHNICAL ARTS
30 Music Sq. W. #156
Nashville, TN 37203 (615) 244-6892

Otari MX70, \$5950; MX70 video lay-back system, \$900; gd used 1/2"x2500' 456 tape, \$20; 1"x2500' 996 & 250, \$35; Nagra III sync recorder w/SLO resolver, \$695/both; Nakamichi 550 great port cassette, \$250; W Gunn, 619-320-0728.

Scully 280 4 track 1/2" w/1/4" head stack in rollaround walnut console; Inovonics 375 R/P amp, VU meter is funky, the rest is up to specs, \$100. L Beigel, Oncue Recdg, POB 85042, Hollywood CA 90072. 213-466-3595. oncue@earthlink.net.

Ampex AG602, unmounted, \$250; rackmount for 600 series, \$30; (2) Samsonite cases, 600 series, mono, brown, gr cond, \$50 ea; Samsonite case for 600 series, stereo, grey, gr condition, \$50; 601 tube type in case, \$200; (7) Ampex 7.5 ips alignment tapes, unused, \$20 ea, BO; various used Ampex capstan & reel motors, working, as is, \$50 ea; Microtran table top degausser, like new, \$150; AG 500-2 recorder, as is, \$100; (2) AG440A mono FT, as is, \$150 ea; AG440 mono FT, play only, \$100; Scully 282-4, 4 trk 1/2" tape, \$800. Mel Crosby, 408-363-1646.

OTARI MX-5050 MK-III 8 track + 8 channels; dbx Pro I NR, excellent condition, \$1995 inc. shipping/OBO. 615-360-8826.

Tascam ATR60, \$2950; ATR60, \$1250; Tascam AQ-85 locator for 85-16, \$395; Otari 5050BII, \$800; Custom Locator, \$495; Tascam DX-8 dbx for 80-8, \$295. W Gunn, 619-320-0728.

Want To Buy

25 Hz tone board for ITC 850 r-r, must be in working cond. B Knight, WAQQ, POB 344, Chillicothe OH 45601. 614-775-2600.

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

REMOTE & MICROWAVE EQUIPMENT

Want To Sell

Gentner G2500 super hybrid, built in mix-minus digital hybrid, 1 yr old, \$949. J Travis, WCIK, POB 506, Bath NY 14810. 607-776-4151.

Moseley/RCA PBR-15A/BTR-15 15 chnl analog, for parts only. R Lide, Jim Gibbons Radio, POB 151, Frederick MD 21705. 301-663-4181.

Zephyr® Rental

NEED SOME EXTRA CODECS FOR THE OLYMPICS OR CONVENTIONS?

The Telos Zephyr offers compatibility with the greatest number of Layer II, Layer III, and G.722 codecs, has a built-in terminal adapter with NT-1, and is the easiest to use. Contact these rental agencies for special prices.

INTERCOM SPECIALTIES
SILVER LAKE AUDIO

Phone +1.818.557.2650 • Fax +1.818.557.2659
Phone +1.516.763.1776 • Fax +1.516.763.1750

Moseley 1620 control terminal (2), excel cond w/manuals; Marti SGBB sub-carrier gen, excel cond w/manual, \$2150. T Peloubet, WGRY, Grayling MI. 517-631-5583.

Cellabs LineJack II, \$200. P Beckman, WTVK, 3451 Bonita Bay Blvd #101, Bonita Springs FL 33923. 941-498-4600.

Marti M30 (3) 30 W VHF xmtr, 166.25 MHz, tube type, works, one converted to rack mount; Marti base station remote control (2), DC type, walnut case, VU meter; Microdyne 1100 SPCP downconverter & analog demod w/service manual. R Lide, Jim Gibbons Radio, POB 151, Frederick MD 21705. 301-663-4181.

Wegener 1806-014 sat rcvr; Wegener 1620-01 baseband demod; Wegener 1602 mainframe; Wegener 1677-02 modulators, BO. D Irwin, KJAZ, POB 1450, Alameda CA 94501. 415-616-5768.

Comrex DXR 7.5 Codec (2) upgradable, \$2000/pr; Cray DCP 3080 CSUs (2) w/cables, \$600. G Manfroi, WMAY, POB 460, Springfield IL 62705. 217-629-7077.

RENT IT HERE! Call Steve Kirsch for Details

COMREX
1, 2, & 3-Line Extenders
Digital Codecs

TELOS
Zephyr
Digital Phone Hybrids

MUSICAM
PRIMA CODECS

SHURE
FP-410 Automatic Mixers

SCOOP REPORTER
7kHz single POTS line codec

SILVER LAKE AUDIO • 516-763-1776 • FAX: 516-763-1750

Marti SCD-10 subcarrier demod; (3) Moseley SCG-8 subcarrier generator; Moseley SCD-8 subcarrier de-mod; Moseley SCG-4T subcarrier generator. R Lide, Jim Gibbons Radio, POB 151, Frederick MD 21705. 301-663-4181.

WE RENT

TELOS ZEPHYR
CCS "Prima" Codecs
COMREX
3 line extender

Frank
Grundstein
Audio/Video
Consultants

610-642-0978

CRL APR 300AS mono, can be pair as stereo units, \$350/Best Offer + shipping. B Knight, WAQQ, POB 344, Chillicothe OH 45601. 614-775-2600 after 4PM.

REPAIR SERVICES

EXPERT REPAIR SERVICES for all types of broadcast equipment. Specialized STL, RPU, TRL, video and computer monitor repair. Reasonable rates and eastern U.S. location. ALLEN BOAZ ELECTRONIC SERVICES, 263 Archie Yokeley Rd, Winston-Salem NC 27107. 910-769-9689. 71511.2320@compuserve.com

DENON CD CART PLAYER REPAIR

• Same Day Service
• Reasonable Rates
• We honor Denon Warranty

**AUDIO VIDEO
SERVICE LABS, INC.**
800-765-4434
Quality Denon Service Since 1991
"The Best Kept Secret in Broadcasting"

MIDWEST DIGITAL SERVICES, INC. (Chicagoland area): Premium Dat Service; Sony Pro Specialist since 1985; Quick turn-a-round-time. (708) 448-7539 or FAX: (708) 448-7678.

SATELLITE EQUIPMENT

Want To Sell

UNIVERSAL SCPC XE-1000

SCPC BROADCAST AUDIO RECEIVER

New, affordable, frequency-agile receiver, direct channel entry by keyboard, selectable companding 1:1, 2:1, 3:1, wide/narrow bandwidth, de-emphasis selectable, 950-1450 MHz, line output 600 ohms, muting, transponder agile, LNB power supply, 50-channel memory, full baseband output, high-quality audio. Every needed feature at a sensible price (lowest in the industry). Write or call for full information on this quality receiver—the answer for your station. Networks call for prices.

Phone: (614) 866-4605 Fax: (614) 866-1201

UNIVERSAL ELECTRONICS, INC. 4555 Groves Road, Suite 12 Columbus, OH 43232
Communications Specialists Phone: (614) 866-4605 Fax: (614) 866-1201

SATELLITE SYSTEMS

Satellite Equipment for Radio

- Repairs all major brands of satellite equipment.
- Service is fast.
- Service is accurate.
- Knowledgeable engineers and tech support staff ready to assist any radio station, any time.
- 7 am — 5 pm Mountain Standard Time

SATELLITE SYSTEMS

615 East Brookside Colorado Springs, CO 80906
Phone: (719) 634-6319 Fax: (719) 635-8151

SERVICES

- Terrain Analysis
- FM Studies
- Population Studies
- FCC/FAA Databases
- Contours

Communications
Data Services, Inc.

800-441-0034
fax 703-532-5497
http://www.comm-data.com
6105-E Arlington Blvd.
Falls Church, VA 22044

HARRIS

PARTS AND
TECHNICAL
SUPPORT

Now we can be
reached online via e-mail.
TSUPPORT@HARRIS.COM

For your parts needs
or with any technical
problems you're having.

**REMOTE BROADCASTS IN
THE U.K. AND EUROPE**

Planning remotes from
the U.K. or Europe?
we offer a one-stop service

- we organize venues for your shows
- we provide temporary equipment
- live links via ISDN/Switched 56
- experienced radio engineers
- we help you line-up guests

Contact London (44) 181 442 8900
Wired for Sound Ltd., London U.K.

Tower Sales & Erection

Turnkey Site Development
Installation & Maintenance
AM/FM Broadcast, TV
Microwave Systems,
Antennas & Towers

TOWERCOMM
Communications Specialists

Ben Wall
President

6017 Triangle Dr.
Raleigh, NC 27613
(919) 781-3496
Gen Contractor #25891 Fax: (919) 781-6454

**REMOTE EQUIPMENT
RENTALS**

COMREX and GENTNER
1, 2 & 3-Line Extender Systems
Now With The New TELOS ZEPHYR
MARTI VHF/UHF RPU Systems
ISDN & Switched-56 Systems
Call or FAX Dwight Weller
WELLER AUDIO-VISUAL ENGINEERING
Baltimore, Maryland
Phone: (410) or (800) 252-8351
FAX: (410) 252-4261

SOFTWARE/
DATABASES

Want To Sell

Ron Balonis' Broadcast Engineer's COMPUTER TOOLBOX programs make the computer into a very smart technical assistant. For details, write COMPUTER TOOLBOXES, 118 Rice St., Trucksville, PA 18708.

Affordable TRAFFIC & BILLING

PC SOFTWARE for DIGILINK & other popular digital systems. Excellent for non-automated stations, too. Try it for 60 days. No obligation. For demo, call ABA Software (941) 643-3689

STATIONS

Want To Sell

Glasgow, KY, 25,000 W FM & 5000 W AM, 3,000 sq ft studio on 10 acres in city limits. J Barrick, 502-678-4897 or 502-576-5541.

1000 Watt AM in Southern New England. Includes studio and transmitter equipment. Will accept bids over \$250K, cash. Terms to be negotiated. Call 1-800-845-0338.

Want To Buy

License for small daytime AM or FM for small town in Georgia. ML Gholston, 706-282-4542 (day); 706-779-3490 (eves).

Looking for small AM/FM combo with real estate, dark ok, have cash. A Toriello, 139 Pugsley Avenue, Bronx NY 10473. 718-893-4328.

TAPES/CARTS/
REELS & CD's

Want To Sell

Top Hits USA format AC-CHR-CW from 9/94 to 3/96, 81 CDs, 353 AC cuts, 646 CHR cuts, 489 CW cuts, \$500/BO + shpg. B Knight, WAQQ, POB 344, Chillicothe OH 45601. 614-775-2600 after 4PM.

Telex/Magnecord 2500 Series (4), some work, some for parts; (2) Magnecord 1021 mono; (4) Scully 280. R Lide, Jim Gibbons Radio, POB 151, Frederick MD 21705. 301-663-4181.

MARATHON
PRODUCTS COMPANYAudio Cartridge
Rebuilding
Division

Rebuilding/reloading, like new, all brands, any length up to & including 3.5 minutes, \$2.05 for Standard Tape, \$2.25 ea. for HOLN Tape. FOB out plant, 48 hrs delivery. (New rate effective 3/1/96)

New NAB Marathon cartridges prices on request.

35 Years professional experience!
Lifetime member AES R.D. MYERS Sr.
Manufacturers of Audio Devices,
Continuous Tape Mag.

69 Sandersdale Rd. Charlton, MA 01507
1-508-248-3157 or 1-508-853-0988

Circle (191) On Reader Service Card

Radio commercials, large quantity, PSA's & promos from local market in 3 & 5" reels from 60's & 70's, BO. R Meyers, 4700 SW 75 Ave, Miami FL 33155. 305-995-2115.

Pams Jingles reference tapes from the years of 1951-1976, avail from every radio market in the US, Canada & Europe, call after 3PM CST, 214-271-7625.

Want To Buy

Sound effects libraries on CD. G Morgan, Master Audio Prod, 514 Fairmount Ave. Chatham NJ 07928. 201-635-0140.

TM Programming 10.5" automation reels, stereo rock format & others. Jim, 513-922-7049.

TAX DEDUCTIBLE

Non-profit, non-commercial, educ FM station seeks used FM translator equip, donations only, we pay shpg. KANW, 202 Coal SE, Albuquerque NM, 87106.

WANTED: Donations of working radio studio & recdg studio equip. MCDI Alternative HS for special needs, at-risk inner city youth. Mr. Roy, MCDI, 140 Wilbraham Ave, Springfield MA 01109. 413-781-5640.

TEST EQUIPMENT

Want To Sell

TTC 1020B satellite digital error simulator, \$10,000; HP 435B, \$900; HP 5342A high stability counter, \$3000; B&K & Altec condenser mic power supplies, \$200; B&K 7003 port rec, \$500; Tektronix J16 digital photometer, \$1000; Inline IN3020 analog RGBS DA, \$300; Newton GBS 2600 satellite TV tester, \$500; Chaparral Comm paraclipse polarator, \$250; L&N 8067 bridge, \$1000; lots of tube HAM gear, Fluke 97 scopemeter, \$1500; Tektronix T202 digital scope, \$1000; Createc digital scope, \$750; Bolex H16 movie camera, \$300; Tektronix 604, \$150. V Vogt, 330 SW 43rd St, #247, Renton WA 98055. 206-382-5571.

EICO 955 capacitor checker, \$25; B&K 1240 color bar gen w/manual, \$25; Jetronic 058C/U oscilloscope, \$50. P Beckman, WTVK, 3451 Bonita Bay Blvd #101, Bonita Springs FL 33923. 941-498-4600.

HP 5342A 18 GHz high stability counter, \$3000; HP 435B 18 GHz pwr meter, \$900. V Vogt, Archaic Audio, 330 SW 43rd St, #247, Renton WA 98055. 206-382-5571.

Want To Buy

Western Electric optimization amps, big old speakers, 4-pin radio tubes. V Vogt, 330 SW 43rd St, #247, Renton WA 98055. 206-382-5571.

TRANSMITTERS

Want To Sell

Wilkinson 25 k on air 99.9 MHz, incl filter, good shape, \$20,000 or B/O. Dwight or Mike, Jan-Di Broadcasting, 970-242-5665.

CCA ELECTRONICS

NEW SPECIALS!

3 YEAR WARRANTY!

AM 1000D 1kw AM \$10,500
FM 1000SS 1kw FM \$12,000
Compact Solid State

CCA NAB '96 DEMOS

FULL 3 YEAR WARRANTY!

CCA FM100GS 100w \$4,200
FM Exciter
FM 10000GZ3 10kw \$25,000
FM w/100w exciter

USED TRADES

85' Cont. 816R-3b \$28,000
25kw FM w/802a exciter

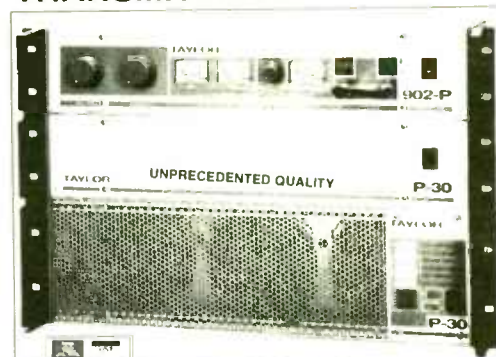
We take most trades on new transmitters! Call today!

Call Darrin, Steve,
Howard or Charles

770-964-3530

BE 1984 FM30 30 kW xmtr, 40,000 hrs w/exciter, BO. G Liebisch, Curtic Media Group, 919-876-0674.

LPB AM60P, like new, used 40 mins as 3rd AM backup, \$1500. R Swan, WROY, POB 400, Carmi IL 62821. 618-382-4161.

INCREDIBLE
TRANSMITTERS

TV TRANSMITTERS

1 Watt	\$1,114
2 Watt	\$1,664
4 Watt	\$2,180
20 Watt	\$3,880
40 Watt	\$5,046
100 Watt	\$6,206
200 Watt	\$9,874
400 Watt	\$13,171
800 Watt	\$18,295
1KWatt	\$22,900

TAYLOR
The Transmitter People

FM RADIO
TRANSMITTERS
Including Stereo Encoder

1 Watt	\$1,138
30Watt	\$1,499
300 Watt	\$3,174
600 Watt	\$5,960
1K Watt	\$8,716
2K Watt	\$11,905
4K Watt	\$20,741

1-800-845-0338
Taylor Electronics Corporation, Ltd.
40000 Highway 100, Unit 100
Guelph, Ontario, Canada N1H 7G9
Fax: 519-836-1716

RCA BTF 10C 10 kW FM on 99.5 MHz, now operational, no PCB's w/2nd harmonic filter & documentation, avail immed w/Harris TE-3 exciter, \$5000/BO. D Payne, WZPL, 9245 N Meridian St #300, Indianapolis IN 46260. 317-816-4000.

Elcor BT-505W 50 kW auto-tune short-wave xmtr 2-18 MHz, new, unused cond, \$185,900. J Gorski, J.L.G. Prod. Box 266, Vinton IA 52349. 319-472-5102.

New McMartin 20 W, BFM-8000 FM exciter. New McMartin IBM1005D FM relay/rebroadcast revrs; also some used McMartin B910 exciter, 15W. Goodrich Enter., 11435 Manderson St., Omaha, NE 68164. 402-493-1886 fax 402-493-6821

CONTACTOR SALE

GCR-201: \$250
GCR-701: \$400

GELECO

PH: (416) 421-5631
FAX: (416) 421-3880

Harris HT 3.5 for parts only, 1 plate transformer, 2 filter chokes, all 3 yrs old, \$1500. B Carr, WIMX, 1201 Fremont Pike, Woodville OH 43469. 419-837-9696.

Gates FM10H3 10 kW w/TE-3 exciter at 92.5 MHz, \$10,000; Electro Impulse OPTC-10KFM FM dummy load, \$1500. J Vega, Urban Community Radio, 2434 Southport Way Ste A, San Diego CA 91950. 619-336-4900.

TRANSCOM CORP.

Serving the Broadcast Industry Since 1978

Fine Used AM & FM Transmitters and Also New Equipment

For the best deals on Celwave products,
Andrew cable and Shively antennas.

1 kW FM 1978 Collins 831C-2	1 kW AM 1982 Harris SX1
2.5 kW FM 1983 Harris FM2.5K	1 kW AM 1978 Harris MW1A
5 kW FM 1981 McMartin BF-5K	1 kW AM 1963 RCA BTA 1R1
5 kW FM 1969 RCA BTF 5D	5 kW AM 1977 RCA BTA 5L
10 kW FM 1968 RCA BTF 10D	10 kW AM 1974 CSI T-10-A
10 kW FM 1971 Collins 830F-1B	25 kW AM 1982 CSI T-25-A
10 kW FM 1976 RCA BTF 10E	50 kW AM 1978 Harris MW50C3
20 kW FM 1974 Collins 831G2/Cont 816R2	(1100 KHZ)
20 kW FM 1968 RCA BTF 20E	

1077 Rydal Road #101, Rydal PA 19046

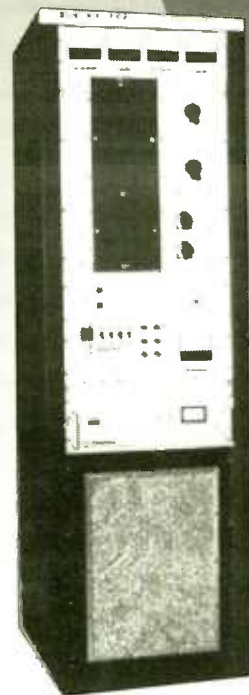
800-441-8454 • 215-884-0888 • FAX No. 215-884-0738

IF YOU WISH TO CONTACT OUR HOME PAGE,
WE ARE AT WWW.VOICENET.COM/~TRANSCOM

IF YOU WISH TO E-MAIL US, WE ARE AT TRANSCOM@VOICENET.COM

Circle (218) On Reader Service Card

If you think a new, top quality
FM transmitter is
expensive...
Think Again!



In Powers to 11 KW

The "ECO Series"...
has ARRIVED!



"The Transmitter People"

Energy-Onix

752 Warren Street, Hudson NY 12534

518-828-1690

FAX: 518-828-8476

Circle (22) On Reader Service Card

TRANSMITTERS...WTS

Tepco J-316-M FM translator with manual, excellent condition, 107.7 MHz receive, 101.7 MHz transmit, \$1250. B Vinikoor, WNTK, 297 Beaver Meadow Rd, Norwich VT 05055. 802-649-3510.

BESCO

World Leader
in AM - FM
Transmitters

91 AM & FM Pre-Owned Units in Stock

- ✓ ALL - Powers
- ✓ ALL - Manufacturers
- ✓ ALL - Instruction Books
- ✓ ALL - Complete
- ✓ ALL - Spares

Call and take advantage of our liberal trade-in plan. Tune and test on your frequency, available on site. Complete inventory on request.

Phone: 214-630-3600
Fax: 214-226-9416

QEI amplifiers, exciters and stereo generators. All are reconditioned and are tuned and tested on your frequency. 6 month warranty is included. If you want quality used equipment, call or fax 609-232-1625 and ask for Bob Brown.

Used equipment for sale: Belar SCM-1, Belar RFA-1, Belar FMS-1, Belar FMM-1, Moseley MRC 1600 system, TFT EBS receiver/generator, Gentner patch panel, and Harris racks. Call Transcom Corporation 800-441-8454 or 215-884-0888.

Harris MW-5A, 5 kW AM in vgc, tuned to 1470 kHz, \$15K. G Arroyo, WONQ, 407-260-6100.

Want To Buy

20 kW dummy load 50 ohm prefer air but will consider liquid, will pickup if in Midwest. D Payne, WZPL, Indianapolis IN. 317-816-4000.

McMartin AM/FM transmitter, any model, exciter or stereo modules. Goodrich Enterprises, 11435 Manderson, Omaha NE 68164. 402-493-1886.

TUBES

Want To Sell

ECONCO

Quality Rebuilt Tubes

Approximately 1/2 the
Cost of New

Call for Our Price List

800-532-6626

916-662-7553

FAX 916-666-7760

Circle (49) On Reader Service Card



Svetlana

ELECTRON DEVICES

Quality* Power Tubes

3CX2500A3	4CX15,000A
3CX2500F3	4CX15,000J
3CX2500H3	4X150A
3CX3000A7	5CX1500A
3CX3000F7	5CX1500B
3CX10,000A3	572B
3CX10,000A7	5U4G
3CX10,000H3	6550B
3CX15,000A3	6550C
3CX15,000A7	6AS7G
3CX15,000H3	6BM8
4CX250B	811A
4CX250B-C	833A
4CX250BM	833C
4CX250R	EL34
4CX350A	SV811-3
4CX350AC	SV811-10
4CX400A	TH5-4
4CX800A	TH5-6
4CPX800A	TH6-3
4CX1500A	TH6-3A
4CX1600B	YC130/9019
4CX1600U	8560AS
4CX3500A	SK300A
4CX5000A	SK1300
4CX10,000D	SK1320

- Watch this list grow.
- Shipment from USA stock.
- Manufactured in Russia's largest power tube factory.
- Generous* warranty based on high quality.
- Honest prices based on quality at low cost.

Broadcasters

Phone: 800-239-6900

205-882-1344

FAX: 205-880-8077

OEMs, Distributors

Phone US: 800-578-3852

Int'l & US: 415-233-0429

FAX: 415-233-0439

Circle (76) On Reader Service Card

FOR THE BEST PRICE

& 24 Hr service on transmitting tubes
call Goodrich Ent Inc at 402-493-1886
day or night, FAX 402-493-6821.

EIMAC, AMPEREX, RCA 4CX250B, 4-400, 4-1000, 4CX300, 4CX350A, 807, 833, 3CX400A7. Westgate 800-213-4563.

Buy Factory Fresh New Tubes

- ✓ EIMAC, BURLE, SIEMENS, AMPEREX, NATIONAL, and more
- ✓ Off-the-shelf delivery
- ✓ 24-hour emergency service

Richardson Electronics, Ltd.

1-800-348-5580

FAX: (708) 208-2550

D and C Electronics Co.

Lowest Price on Tubes including:

4-1000A/3-1000Z/
8B77/4CX250B/833A
4-500/5-500/4-400/
4CX 3500/5CX1500
and much more!

Factory Warranty!

1-800-881-2374
(352) 688-2374

Se habla Español

FAX: (352) 683-9595

TURNTABLES

Want To Sell

Kenwood KD2055 belt drive, very good condition, \$25. P Beckman, WTVK, 3451 Bonita Bay Blvd #101, Bonita Springs FL 33923. 941-498-4600.

Microtrak 740 (2), \$50 ea. D Rose, KDUC, POB 250, Barstow CA 92312. 619-256-2068.

Advertising Space is Available!

703-998-7600

ADVERTISER INDEX

This listing is provided for the convenience of our readers.
Radio World assumes no liability for inaccuracy.

Page No.	Advertiser	Reader Service No.	Page No.	Advertiser	Reader Service No.
21	AEV SNC	28	6	Harris	109
19	ATI	66	27	Harris	158
43	Air Corp.	170	39	Harris	211
16	Arrakis	209	47	Harris	108
38	Arrakis	185	46	Henry Radio	82
19	Audi-Cord Corporation	89	17	Hnat Hinds	5
44	Audio Broadcast Group	224	38	Inovonics	85
55	Auditronics	160	44	J Squared Technical Service	207
43	Autogram	228	22	MOR Standards	1
28	BSW	184	53	Marathon Products	191
40	BSW	4	48	Modulation Sciences	134
13	Belar	131	30	Moseley	3
20	Benchmark Media Systems	143	24	Musicam USA	80
12	Bext	187	36	Musictown	137
19	Broadcast Devices, Inc.	62	20	Myat Inc.	116
4	Burk Technology	83	42	NAB	—
1	CCA Electronics	212	33	NPR Satellite Services	81
44	CPI	126	23,25	Orban	106
20	Circuit Werkes	45	10	PR&E	105
43	Circuit Werkes	174	34	PR&E	107
43	Coaxial Dynamics	99	19	Phasetek	8
29	Comrex	210	19	Pristine Systems	93
20	Comrex	201	41	QEI	30
44	Conex Electric Systems	153	18	RE America	2
15	Continental Electronics	183	37	Radio Spirits	159
35	Crown Broadcast	133	2	Register Data Systems	31
3	Cutting Edge	57	32	Satellite Systems	55
14	Dataworld	157	19	Shively Laboratories	12
54	Econco	49	19	Silicon Valley Power	39
43	Econco	72	8	Sonic Foundry	135
26	Enco Systems	132	54	Svetlana Electron Devices	76
53	Energy-Onix	22	49	Tascam/TEAC	161
20	Excalibur	35	7	Telos Systems	79
19	Flex-core	147	53	Transcom Corp.	218
44	Freeland Products, Inc.	180	44	Universal Electronics	120
31	Gentner	29	22	Vintage Productions	53
22	Ghostwriters	27,10	56	Wheatstone	186
20	Gorman Redlich	18	45	Whirlwind	56
36	Group W Satellite	234	43	Zercom	197
50	Hall Electronics	164			

PublisherStevan B. Dana
Associate PublisherCarmel King
Production DirectorLisa Stafford
Publication ManagerHeather K. Heebner
Classified/Showcase Production CoordinatorVicky Baron
Ad Traffic CoordinatorKathy Jackson

Production AssistantTrina Masters
Production AssistantJames Cornett
Ad Coordination ManagerSimone Mullins
Circulation DirectorEleya Finch
Circulation ManagerSteven Bowman
Accounts ReceivableSteve Berto

Advertising Sales Representatives

U.S. East: Skip Tash703-998-7600 Fax: 703-998-2966
U.S. West: Dale Tucker916-721-3410 Fax: 916-729-0810
U.S. Midwest: Sandra Harvey-Coleman317-966-0669 Fax: 317-966-3289
International: Stevan B. Dana+1-703-998-7600 Fax: +1-703-998-2966
Europe: Dario Calabrese+39-2-7030-0310 Fax: +39-2-7030-0211
Japan: Eiji Yoshikawa+81-3-3327-2688 Fax: +81-3-3327-3010

Free Subscriptions are available upon request to professional broadcasting and audiovisual equipment users. For address changes, send current and new address to RW a month in advance at P.O. Box 1214, Falls Church, VA 22041. Unsolicited manuscripts are welcomed for review - send to the attention of the appropriate editor.

EMPLOYMENT

To place ads in this section, use the ActionGram form. To respond to box numbers write Radio World, PO Box 1214, Falls Church, VA 22041. Attn: _____

POSITIONS WANTED

Alternative female ready to do on-air, news, production & creative copy, would like to start in Oklahoma. Megan, 405-739-0496.

Experienced, hot radio voice, call for samples. Jamie, 405-359-9193.

Hardworking, self-motivated, on-air, sportscasting, sales, AOR/C & W, willing to relocate. Kevin, 405-634-7230.

Knowledgeable R&B DJ seeks to host show. Call for audiotape demo. G Foster, 1-800-770-7878.

MD, production or announcer, graduated in May with 4 years commercial FM experience, all markets & formats considered. Wade, 317-348-5655.

25 year pro seeking operations manager or general manager position, goal is to own my own station, looking for opening in Southeast. Ed 515-432-9466.

Country morning monster!, renegade ratings, women & phones, no demographics! Mike 616-924-5471.

Afternoon air talent for #1 radio station in Gallup NM avail immediately. K Garrett, 505-722-4442.

HELP WANTED

Sales - Technical

Incentivized sales and technical support on new products from established manufacturer for broadcasting and cable TV. Excellent working environment in a fast-growing, high-tech company. Earn up to \$100K annually, depending on skills and experience. Full employment benefits, 401(k) and bonus.

Send resume to:
ATTN: Human Resources
530 Lawrence Expressway
Suite 531
Sunnyvale, CA 94086

HELP WANTED

Multi-year radio veteran seeks position, preferably in the Southeast, positions held include everything from announcer to GM. Jim, 919-523-0592.

General Manager

FM Radio Network based in Tallinn Estonia. Fluent & skilled in Estonian/English language. Broadcast Mgmt & Sales experience necessary. Immediate opportunity. 941-262-1118

ASSISTANT CHIEF ENGINEER

Assist in maintaining transmitters and studios for two AM and one FM stations in Los Angeles area. Assume all engineering responsibilities in absence of Chief Engineer. Five years experience in AM and FM broadcast engineering with emphasis on installation and maintenance. Resumes to: Bill Banks, Liberman Broadcasting, 5724 Hollywood Blvd., Hollywood, CA 90028. EOE

ADVERTISE!

in RADIO WORLD's

BROADCAST EQUIPMENT EXCHANGE

CONTACT

SIMONE MULLINS AT

703-998-7600 x154



FROM THE LARGEST FACILITY
TO
THE SMALLEST STATION
PEOPLE KNOW
THE
 AUDITRONICS 210 SERIES



PEOPLE KNOW:

- ◆ classic style when they see it
- ◆ sturdy reliability when they feel it
- ◆ convenience when they operate it
- ◆ support when they need it
- ◆ affordability when they buy it
- ◆ longevity when they use it year after year
- ◆ thousands are in use right now

AND PEOPLE GET THE BEST AUDIO FROM:

 **AUDITRONICS**

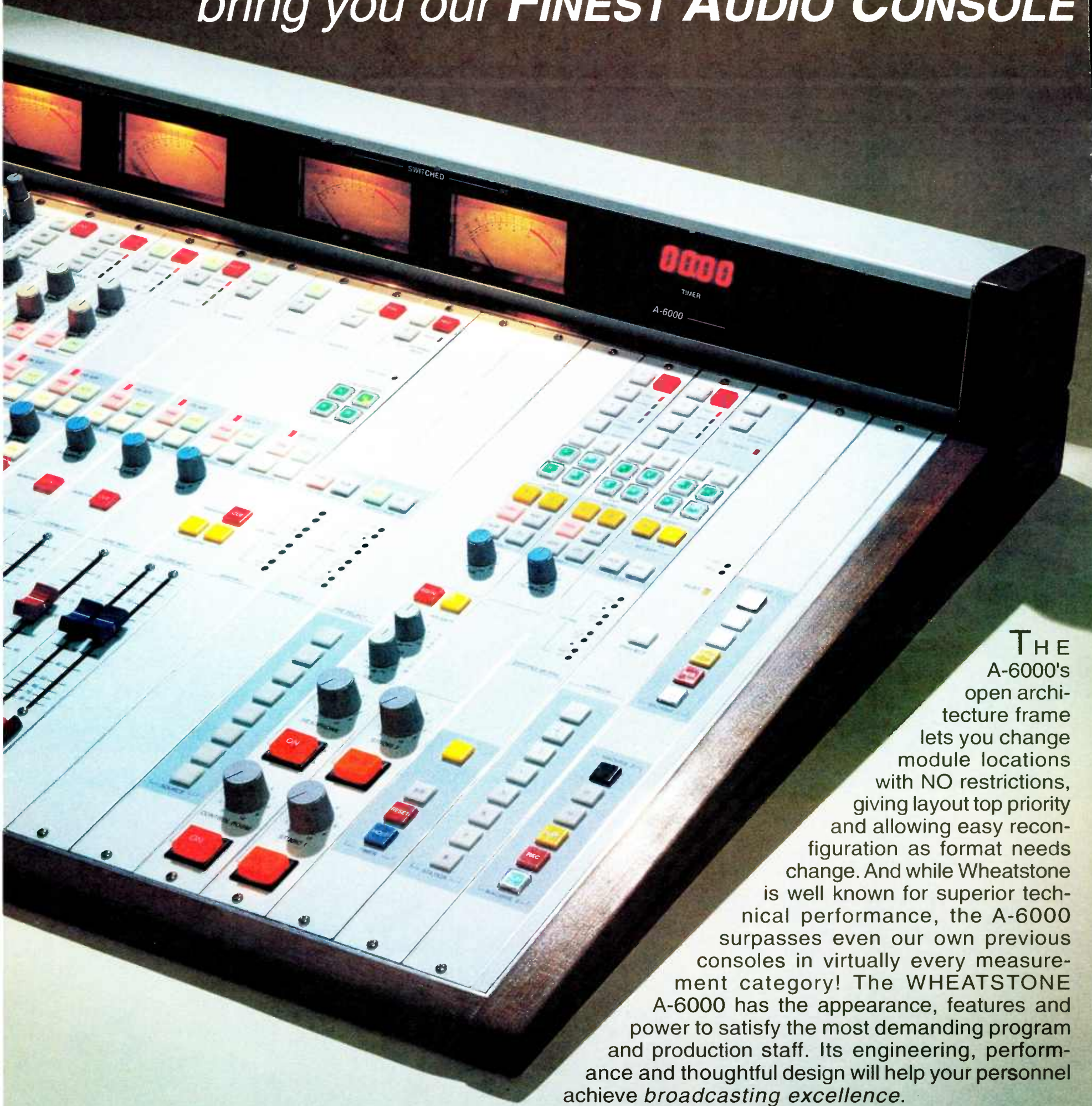
3750 Old Getwell Road, Memphis, TN 38118 (901)362-1350 Fax: (901)362-8629

GSA #GS-03F-4032B

Circle (160) On Reader Service Card

World Radio History

*We've taken **all** we know, **all** you've asked for,
and the very **best** of today's technology to
bring you our **FINEST AUDIO CONSOLE***



THE A-6000's open architecture frame lets you change module locations with NO restrictions, giving layout top priority and allowing easy reconfiguration as format needs change. And while Wheatstone is well known for superior technical performance, the A-6000 surpasses even our own previous consoles in virtually every measurement category! The WHEATSTONE A-6000 has the appearance, features and power to satisfy the most demanding program and production staff. Its engineering, performance and thoughtful design will help your personnel achieve *broadcasting excellence*.

A - 6 0 0 0 B R O A D C A S T C O N S O L E

7305 Performance Drive, Syracuse, NY. 13212
(tel 315-452-5000 / fax 315-452-0160)

 Wheatstone Corporation

Circle (186) On Reader Service Card

World Radio History