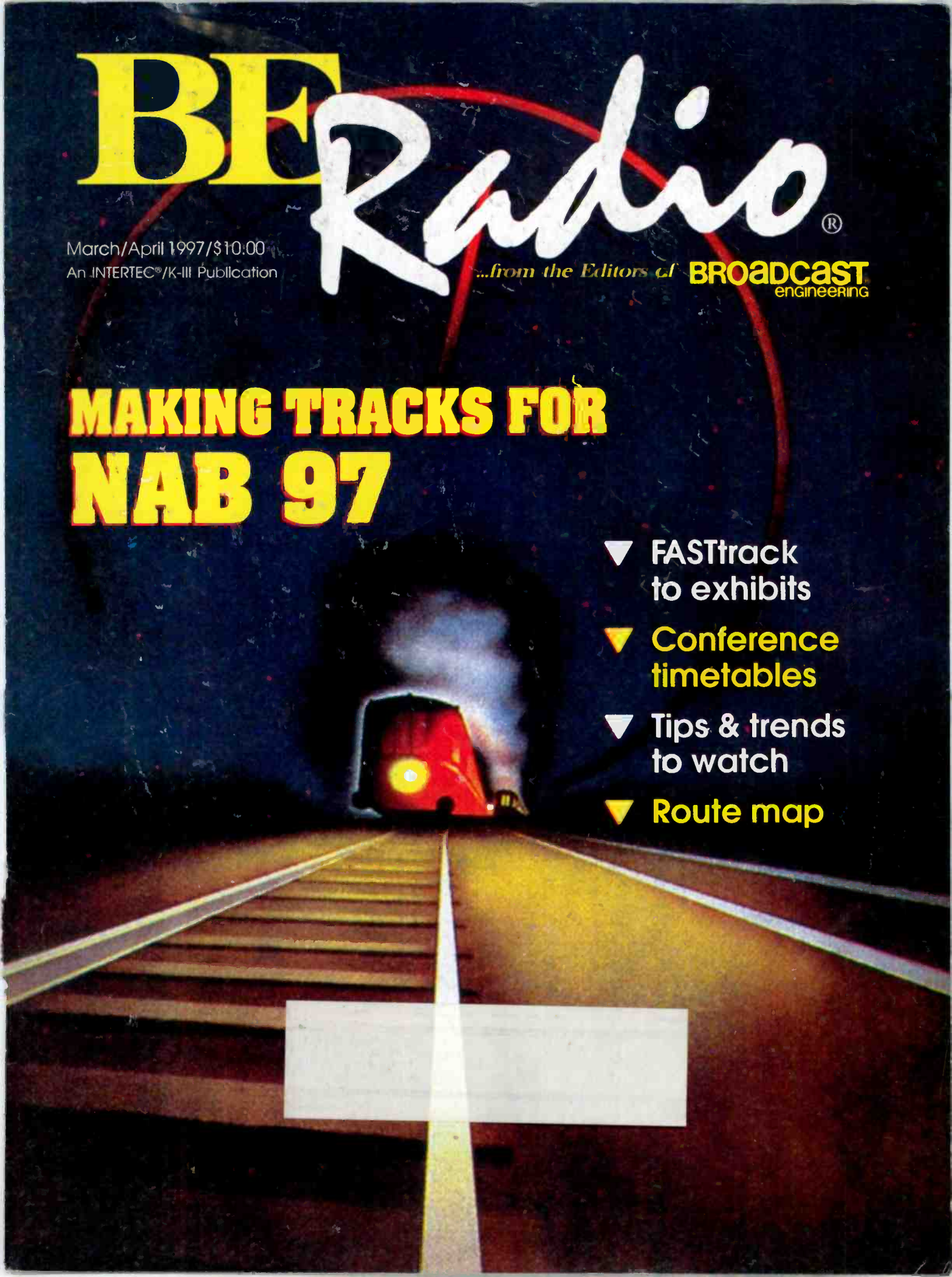
BE Radio®

March/April 1997/$10.00
An INTERTEC®/K-III Publication

...from the Editors of BROADCAST ENGINEERING

MAKING TRACKS FOR NAB 97

- FASTtrack to exhibits
- Conference timetables
- Tips & trends to watch
- Route map



MS1202-VLZ 12-CH • MS1402-VLZ 14-CH • COLLECT 'EM • TRADE 'EM WITH YOUR FRIENDS

VLZ MICROSERIES: SMALL MIXERS WITH WHAT IT TAKES TO HANDLE SERIOUS PROJECTS.

MICRO SERIES 1202 VLZ 4 MONO CHS. 4 STEREO CHS. $429*

MICRO SERIES 1402 VLZ 6 MONO CHS. 4 STEREO CHS. $599*

CALL TOLL FREE, FAX OR E-MAIL FOR YOUR 40-PG "IN YOUR FACE" COMPACT MIXER TABLOID AND APPLI-CATIONS GUIDE

*suggested U.S. retail

BOTH MODELS HAVE:

Studio-grade mic preamps with discrete circuitry for high headroom low noise (–129.5 dBm E.I.N.) and wide frequency response (over 300kHz!).

Low Cut filters (18dB/oct. @75Hz) on mono mic/line channels allow use of low-frequency EQ on vocals without boosting room rumble, mic thumps, P-pops and wind noise.

Trim Controls on mono channels have 60dB total gain range for boosting weak sound sources and a 10dB "virtual pad" for taming hot digital multitrack outputs.

2 Aux Sends per channel (one globally switchable pre/post, one post-fader), each with 15dB of gain above Unity to boost weak effects.

3-band equalization with 12kHz High shelving EQ, broadband musical 2.5kHz peaking Midrange & 80Hz Low shelving EQ.

Constant loudness pan controls.

Stereo in-place Solo.

Mute button routes signal to "bonus" **Alt 3-4 stereo bus** outputs & Control Room matrix. Handy for both recording and live applications.

MS1402-VLZ ONLY: 60mm logarithmic-taper faders based on our exclusive 8•Bus design. Long-wearing wiper material and tight polymer lip seals to protect against dust & other crud.

Built-in power supplies — no outlet-eating wall warts or hum-inducing line lumps.

Phantom power so you can use high quality condenser microphones.

XLR outputs with mic-line level switch (along with 1/4" TRS outputs on top panel).

MS1202-VLZ • 12x2 • 4 MIC PREAMPS

MS1402-VLZ • 14x2 • 6 MIC PREAMPS

All inputs & outputs are balanced[1] to cut hum & allow extra-long cable runs but can also be used with unbalanced electronics.

[1] except RCA tape jacks, headphone jack & inserts.

VLZ (Very Low Impedance) circuitry first developed for our 8•Bus console series dramatically reduces thermal noise & crosstalk in critical areas.

Control Room outputs feed monitor speakers without tying up the headphone jack.

BOTH MODELS HAVE:

Radio Frequency Interference protection via metal jacks & washers plus internal shunting capacitors.

High-output headphone amp can drive virtually any set of phones to levels even a drummer can appreciate.

Aux 1 Master level control & pre/post switch.

Effects Return to Monitor switch folds Aux Return 1 effects into a stage monitor mix via Aux Return 2 level control.

RCA-type tape inputs & outputs.

Peak-reading LED meters with Level Set LED combined with In-Place Solo allows fast, accurate setting of channel operating levels for maximum headroom and lowest noise floor.

Control Room/Phones Matrix adds monitoring, mixdown & metering flexibility. Select any combination of Main Mix, Tape In and Alt 3-4 signals for routing to phones, Control Room outputs and meters. Can be used as extra monitor or headphone mix, tape monitor, or separate submix. Way cool.

Tape Assign To Main Mix assigns unbalanced RCA tape inputs to main mix. Besides its obvious use as a tape monitor, it can also add an extra stereo tape or CD feed into a mix or play music during a break.

MS1402-VLZ only: Global Solo Mode selects PFL or AFL solo modes.

Solid steel chassis & thick fiberglass internal circuit boards resist abuse.

Channel inserts on mono channels.

Not every production project requires dozens of input channels and boatloads of buses.

But doing ANY audio job well requires a mixer with superb specs...and the right combination of useful features.

Our MicroSeries 1202-VLZ and 1402-VLZ might have small footprints, but when it comes to performance, they walk very tall.

Since both are basically chips off our blockbuster 8•Bus Series consoles, they have big-board specs: greater than 90dBu signal to noise ratio, less than 0.005% distortion, more dynamic range than compact discs and frequency response that's only down 1dB at 60,000 Hz.

Why own an imitation when you can own the brand of compact mixer that serious pros prefer. Call for info today.

©1996 MACKIE DESIGNS INC. ALL RIGHTS RESERVED

MACKIE™

Woodinville • WA • USA • 98072 800/898-3211 206/487-4337 • e-mail sales@mackie.com
Outside the USA 206/487-4333 206/485-1152 • Represented in Canada by S.F. Marketing 800/363-8855

Circle (1) on Free Info Card

DIGITAL FM TRANSMITTERS

Platinum Z Solid-state FM Transmitters. Full CD-quality sound that sends listeners to a new dimension without sending your budget down the tubes.

The phenomenal CD-quality sound provided by true digital FM generation is now a surprisingly affordable reality.

Harris introduces the CD Series™ Platinum Z™ transmitters. These fifth-generation FM solid-state transmitters are available in 2 to 20 kW models and feature the world-standard DIGIT CD™, digital FM exciter.

The big news for broadcasters is that Platinum Z provides the reliability of solid-state digital technology at a price comparable to conventional tube type transmitters. Platinum Z transmitters feature Z-axis design, utilizing all three dimensions...X, Y and Z axes. Platinum Z transmitters also use innovative Z-plane combining, which enables seamless transmission during maintenance and enhances redundancy. If you *remove a hot-pluggable RF module from a Platinum Z transmitter at any time, for any reason, the remaining modules will compensate to continue broadcasting at full power.* Incredible RF module MTBF of 250,000 hours further ensures the reliable performance of Platinum Z.

Platinum Z features:

- DIGIT CD exciter (digital or analog input)
- Hot-pluggable RF modules
- Redundant IPA system
- Redundant power supplies
- Broadband design (N+1 capable)
- Life support backup controller
- Dual-output power setting
- Built-in auto exciter switcher
- High overall efficiency

Digital CD-quality performance... solid-state reliability and redundancy...a price comparable to tube type transmitters...and backed by Harris 24 hour worldwide service! Is there any reason to consider a transmitter other than Platinum Z?

To discover for yourself how full CD-quality sound can take your listeners and your ratings to the new "Z" dimension *without* blowing a hole in your budget, contact Harris.

HARRIS CORPORATION
BROADCAST DIVISION

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

Elsewhere
TEL: +1 217 222-8290
FAX: +1 217 224-2764

HARRIS

A new world of broadcast solutions

Radio-FM: DIGIT CD™- Digital FM Exciter • SuperCiter™ Analog FM Exciter • CD LINK™ Digital STL • Quest, Platinum and Platinum Z Solid State FM Transmitters • HT Single-tube FM Transmitters • FM Antennas **Radio-AM:** DX - Digital Solid State AM Transmitters • GATES® Solid State AM Transmitters **Radio-DAB:** DAB 2000 Transmitters **Studio Products:** Digital and Analog Studio Equipment **Systems:** Mobile and Fixed Studios and Satellite Systems

Circle (4) on Free Info Card

©1997 Harris Corporation

Contents

BE Radio
March/April 1997
Volume 3, Number 2

FEATURES

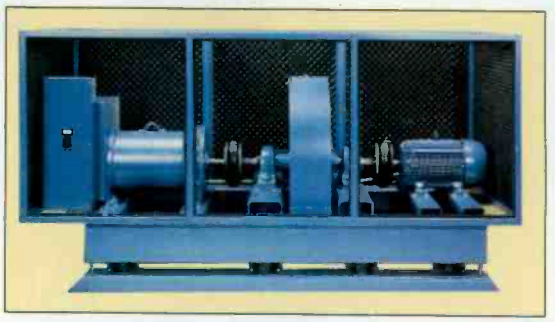
22 All Aboard for NAB 97
By Skip Pizzi
A preview of NAB 97, featuring a sneak peek at products, tips from our reporters, exclusive "FASTtrack" and audio hall map, plus comprehensive exhibitor listings.

80 Public Radio End-to-End
A profile of new non-commercial radio network and station facilities, plus a sidebar on consolidating commercial radio station operations.

92 Field Report: Intraplex TDM-160
By Chriss Scherer

96 Field Report: Gentner GSC3000
By Gary Smith

100 Field Report: Comrex HotLine
By Greg Savoldi



8

21

DEPARTMENTS

6 Editorial
By Skip Pizzi
The power of radio and its place in society are worth remembering.

8 Contract Engineering
By Garrett Wood
Emergency power is a critical component of good station infrastructure.

12 Managing Technology
By Skip Pizzi
ISDN plays a key role in today's radio programming delivery.

16 RF Engineering
By John Battison
New applications of spread-spectrum technology are a boon for radio broadcasters.

21 FCC Update
By Harry C. Martin & J. Todd Metcalf
Spectrum auctions and other regulatory/legislative battles loom on the horizon.

99 Preview

104 Business/People

107 News

108 Reader Feedback

116 Classifieds

117 Ad Index

118 The Last Byte
An update on DAB activities in the United States.

80

ON THE COVER: Make tracks for NAB 97 with *BE Radio's* engineers and crew. (Cover design by Stephanie Masterson, art director.)

CLEARLY THE BEST THING TO HAPPEN TO AM RADIO SINCE DRIVETIME.

INTRODUCING THE FIRST 100% DIGITAL, FULLY PROGRAMMABLE, FM-LIKE SOUND FOR AM. Reaching a larger audience with bright, clear, punchy sound just got noticeably simpler. Because the new OPTIMOD 9200 offers a dramatic improvement in both voice and music quality, while giving you the ability to program AM sound exactly to your audience. Just push a button or program remotely via PC.

Whether it's music, sports or news/talk, Orban's powerful digital technology provides an ideal balance between optimum loudness and high quality sound. So pumping, grittiness and midrange "squash" that muddle AM sound are gone.

Instead, announcer and telephone voices have true presence and impact. Music has real bass, with punch and warmth, not boom. Highs have FM-like clarity. All of which means you'll attract a bigger share of that lucrative drivetime audience, and keep it.

orban®

H A Harman International Company

© 1997 Orban, Inc. Orban and OPTIMOD are registered trademarks. 1525 Alvarado St., San Leandro, CA 94577 USA Phone 1•510•351•3500 Fax 1•510•351•0500 E-mail: custserv@orban.com Website: www.orban.com

Circle (5) on Free Info Card

Editorial

Shine on brightly

The modern philosopher Joseph Campbell observes that the most important element of a society is the one with the tallest buildings. Tracing this trend throughout history and across societies urban and rural, this mantle of maximum height has been worn variously by churches and castles, city halls and factories, grain silos and markets, and others besides, each in their time and place of primacy. In the here and now, the title is held by banks, insurance and all manners of trade and investment, confirming the ascendance of a capitalist society in the late 20th century.

But consider a slight twist on Campbell's thesis: Instead of the tallest buildings, make it the tallest *structures*, and then what element of society moves to the fore? Well, the theory — however corrupted from its erstwhile form — still holds some truth. Broadcasting *is* arguably among the most important elements of contemporary civilization.

Certainly the role of broadcasting — or more broadly, that of electronic media in general — is of paramount importance in a society that is increasingly less communal in real terms. The "virtual town square" that broadcasting provides can counter the "cocooning" of today's Toffleresque, telecommuting tradition.

Indeed, Toffler rightly points out that the First Wave — an agrarian society — required a widely dispersed populace, while the Second Wave brought people physically together in its industrial modality. The currently dawning Third Wave, with its information-based structure, allows either of the first two approaches, so a return to the less-concentrated popular distribution may result. Communication media will then become more important as a method of retaining societal bonds. Regardless of physical location or vogue, humans remain obsessively social. Radio's particular mobility makes it perhaps the optimal channel, allowing near-constant companionship.

In developing nations, radio is universally understood to be the most important medium of mass communication, but for different reasons. Low literacy rates and scarcity of funds for TV receivers make radio the perfect method of reaching the public — a fact not lost on state propagandists, who use it as their primary method of mind control. The command of a broadcast channel in today's conflicts is as pivotal as that of a key roadway or bridge in earlier times, as recent events in Eastern Europe have exemplified.

Ironically, the world's tallest structure collapsed in 1991. It was a radio tower in Poland, centrally located and used for many years by the Polish government to blast an overpowering signal into every corner of the country, and well beyond. Its fall may be a metaphor of a different sort, but we'll save that for another day.

As broadcasters convene again in a town of ever taller structures, they should remind themselves of the importance ascribed to their industry by this society. With such importance is vested a great responsibility that must be observed: To serve as a source of truthful words, a distributor of artistic deeds and a forum for public debate. The better these roles are fulfilled by broadcasters, the taller their structures will stand, and the brighter their beacons will shine.

Skip Pizzi

Skip Pizzi, editor

E-mail: beradio@intertec.com
FAXback: 913/967-1905

***BE Radio* editor Skip Pizzi will appear at several sessions during NAB 97. He welcomes your comments during and after any of the following, so stop in and visit:**

Saturday, 4/5/97, 9:00 a.m. - 5:00 p.m.: "Digital Audio Tutorial" (51st NAB Broadcast Engineering Conference)

Sunday, 4/6/97, 1:30 - 2:30 p.m.: "Sneak Preview of the Radio/Audio Exhibit Hall" (Radio Management Conference)

Monday, 4/7/97, 10:30 a.m. - 12:00 p.m.: "Audio Processing: Competing with Digital Services" (51st NAB Broadcast Engineering Conference)

Wednesday, 4/9/97, 10:45 a.m. - 12:00 p.m.: "Distributing Broadcast-Quality Audio and Video" (NAB Communications and Connectivity '97: Electronic Distribution Conference)

More In A Monitoring Router...

XPRESS Routing Series

The XPRESS offers exceptional specifications like 50Mhz bandwidth video with looping inputs and a unique terminal block adapter to simplify audio connections.

Add the variety of on-board and remote control options, such as the intuitive audio/video breakaway panel, and you have maximum flexibility in all applications.

And furthermore, the XPRESS 12x1 stereo audio/video router is packed into a compact 1RU frame.

But price is not more...it's less.

LEITCH

1-800-231-9673
http://www.leitch.com

Canada	Europe	Japan	Brazil
Tel: +1 (416) 445-9640	Tel: +44 (1256) 880088	Tel: +81 (3) 5423-3631	Tel: +55 (11) 867-0218
Fax: +1 (416) 445-0595	Fax: +44 (1256) 880428	Fax: +81 (3) 5423-3532	Fax: +55 (11) 867-0218

Circle (22) on Free Info Card

Powering your plant

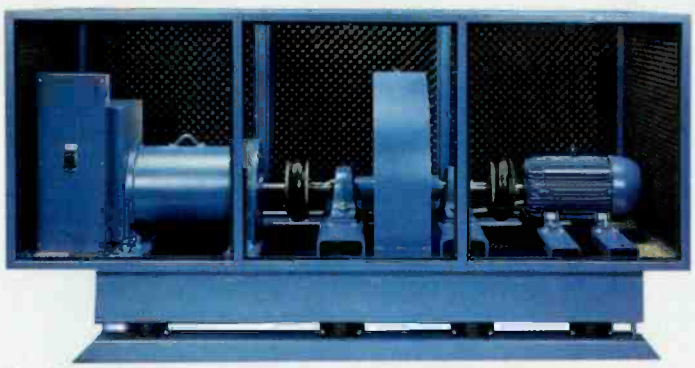
By Garrett Wood

Sooner or later it was going to happen. You agree to cover for another station while its chief engineer is out of town. The telephone starts ringing 30 seconds after a loud clap of thunder. The caller reports that the station's automation computer has stopped executing events and that a smell of burnt electronics is present throughout the studio.

A quick visit confirms your worst fears: All the station's equipment is plugged into wall outlets, and there's not a trace of power protection on the premises. Good luck.

The situation

Power quality has become a critical issue as computer-based systems continue to be key players in most broadcast facilities. From file servers for on-air automation to PC-based traffic networks, computers provide valuable data required for normal operations. It's no wonder that protecting these sensitive electronic devices has taken on a new sense of urgency in the radio industry.



The *Dynamic Energy Storage System* (DESS) from International Computer Power is an example of a "batteryless" short-term UPS. It uses a patented flywheel-coupled motor/generator to provide up to several minutes of "ride-through" power.

Even the finest workstations are sensitive to power-line sags, surges and other electrical disturbances. They prefer power with steady voltages, delivered in a sine-wave shape, and free from electromagnetic and radio-frequency interferences. Unfortunately, this does not describe the typical public utility power that appears at most wall outlets.

The first line of defense: Surge suppressors

Surge suppressors can often help shield equipment from transient overvoltages encountered in AC power service, telephone circuits and data lines. A multistage surge-suppression device located between the equipment and service outlet can make a dramatic difference in power-related equipment failures. Typical multistage designs incorporate an arrangement of metal oxide varistors (MOVs), capacitors, diodes and thermal and fast-acting fuses. These devices can provide reliable protection against power-line noise, voltage surges and spikes. MOVs provide robust voltage-clamping action and can be efficient in soaking up large currents without damage to themselves.

Surge-suppressor performance can be measured by applying a known test surge and observing the greatest voltage that is allowed to pass to the protected device. Products that are rated to allow 330V peak or less will provide a tighter defense from lightning strikes and other surge events. Several manufacturers of suppressors offer protection policies that will repair or replace properly connected equipment up to $25,000 if it's ever damaged by AC surges, including lightning.

Stage two: The uninterruptible power supply

Although surge suppressors help tame transient spikes and noises, they are not capable of keeping vital equipment operating during a sag or total loss of utility power. Battery-powered *uninterruptible power supplies* (UPS) can bridge the gap during these disruptions and provide a higher level of protection to sensitive equipment.

The period of time that a UPS will operate in the emergency backup mode is determined by the amount of battery reserve available. Common UPS systems are designed to have five to 15 minutes of backup time with a full load connected. On some systems, additional battery modules can be added to extend the operating period. This feature is available only on certain systems and should be considered if no other type of standby power is available at the site.

Most UPS batteries are of the sealed lead-acid (SLA) type. Typical replacement schedules range from 24 to 36 months. These batteries are arguably the least reliable and most costly part of maintaining a basic UPS system.

In many installations, UPS backup power is used to maintain critical equipment operation only for a few seconds or minutes until a motor-driven local generator is started, stabilized and transferred to the facility's power service.

Off-line UPS

Off-line or *stand-by* UPS systems filter AC power from the public utility and continually supply the load with a conditioned output. They only switch to the emergency mode upon sensing a power disruption. A power sag or

The Missing Link in your Digital Air Chain

Serial Sound
Broadcast Consoles
by Logitek

- Assignable inputs
- Built-in router
- Up to 32 stereo inputs
- Up to 32 pgm & mix-minus outs
- Mix analog and digital ins & outs
- Rate conversion on digital inputs
- 20-bit analog I/O
- 16 to 24 bit digital I/O
- Machine control interface
- 16 MByte delay & reverb memory

- Rackmount Audio Engine
- 32-bit floating point DSPs
- Run two consoles from one engine
- Easily connect automation systems
- Direct factory support via modem

800-231-5870 - fax 713-782-7597 - email help@logitekaudio.com - http://www.logitekaudio.com

Circle (23) on Free Info Card

failure will cause the off-line UPS to switch to its backup power source, which consists of a DC/AC inverter operating from a battery bank. (See Figure 1.)

In most off-line systems, there is a break in the power supplied to the load during the transfer from the public utility to inverter operation. Typical interruption durations can be as short as 2ms or can extend up to 20ms. Off-line UPS systems are often good enough for small computer operations that can tolerate a brief power interruption, but are generally not recommended for critical applications where loss of *any* data is unacceptable.

On-line UPS

UPS systems that use the inverter to *continuously* supply AC power to the load are referred to as *on-line* systems. Silicon-controlled rectifier (SCR) inverters are common in this application. Again, the inverter takes its input from a DC supply provided by a bank of batteries. These storage cells are maintained by a large battery charger that is connected in parallel with the inverter.

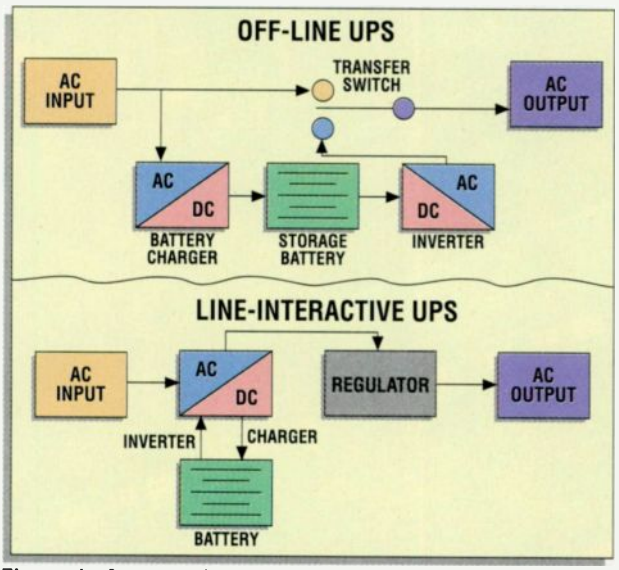


Figure 1. A comparison of off-line and line-interactive UPS topologies shows how the former requires a switchover that may cause a noticeable momentary power loss.

During normal conditions, when utility-supplied AC power is present, the inverter pulls its input supply from the battery charger. When a power disturbance is detected at the utility side of the UPS, the inverter then draws its DC power from the batteries rather than the charger.

On-line UPS systems benefit from the lack of any transfer time associated with switching power sources, but still require diligent monitoring of battery conditions for reliable operation.

Line-interactive UPS

This type of UPS combines some of the reliability and efficiency benefits of a standby UPS with some of the performance advantages of on-line systems.

The line-interactive inverter is always connected to the main UPS output as in the on-line system. The difference is that the AC from the public utility is conditioned and then runs in parallel with the inverter to furnish power to the load. (See Figure 1.) The inverter manages the full load power only when the AC input power fails.

Under normal conditions, the inverter provides output-voltage regulation and furnishes a DC supply to maintain a full charge in the batteries. It is this "interaction" with the line (i.e., utility's) AC source that gives this device its name.

Flywheel-coupled induction motor/generator

This cutting-edge technology provides its power from the rectified output of a flywheel-coupled motor/generator arrangement. It uses the stored rotational energy from a metal flywheel to spin a generator, which produces an AC supply.

The flywheel and generator are normally driven by a motor powered by the public utility. When power to this motor is interrupted, the flywheel continues to turn the generator for a short period. AC supplied by the generator is rectified into a regulated DC voltage, which is connected to the input of a UPS inverter that powers the critical load.

These flywheel-based systems can provide from 15 seconds to several minutes of ride-through energy, which will cover the majority of power disturbances or provide switchover time for generator start-up. The elimination of constant monitoring and maintenance of chemical storage batteries is a major advantage of such a system. It can also be used *with* a battery-powered UPS, to eliminate the charge-cycling problems encountered with frequent, short outages.

Protect your investment

Even the best-equipped facilities can find themselves in trouble without proper power systems. If you can't afford to fully back up your entire equipment complement, consider segregating certain essential elements of the operation to backed-up circuits.

An appropriate UPS and a backup power source should be accompanied by well-documented procedures. These include preventive maintenance and test routines for UPS batteries and motor-driven generators, as well as reboot procedures for the facility's computers after a power loss. Many cases of equipment damage or data loss occur when power is *restored*.

These elements of infrastructure have never been more important. Waiting for a radio station's automation computer to (hopefully) reload program data after power disruptions can be a costly and frustrating situation — to cite just a single example. Often, the money spent on repairs and recovery from electrical disturbances far exceeds the cost of quality protection systems. This is yet another example of "Pay me now, or pay me later." Which will it be for your facility?

Garrett Wood is chief engineer at WUKY-FM, Lexington, KY.

FOR MORE INFORMATION
Circle (200) on Free Info Card.

ON AIR

When the ON AIR light glows, there's no time for amateurs or pretenders. That's the reason top professional broadcasters choose Neumann. Rich, smooth, sound – warm, silky tone. Neumann microphones have that classic presence which makes any announcer sound their absolute best. And in broadcast, sound is everything.

Neumann has a comprehensive range of microphones to suit virtually any application and budget. Contact your Neumann dealer today and discover the secret of the pros.

Neumann... the choice of those who can hear the difference.

NeumannUSA

PO Box 987, Dept. 149B, Old Lyme, CT 06371 Tel: 860.434.5220 Ext. 149B • FAX: 860.434.3148
West Coast: Tel: 818.845.8815 • FAX: 818.845.7140
Canada: Tel: 514-426-3013 • FAX: 514-426-3953 • Mexico: Tel & FAX: 52-5-639-0956
World Wide Web: http://www.neumannusa.com

Circle (6) on Free Info Card

Using ISDN

By Skip Pizzi, editor

The long-awaited age of the *Integrated Services Digital Network* (ISDN) is finally here. In larger cities, availability of this digital dial-up communications system has surged to the point where there are fewer places in which it's *not* available than where it is. It's also becoming possible to find it in smaller and smaller markets as time goes on. Within the next two years, telcos project near-ubiquitous availability, in accordance with the original plan for ISDN as the replacement for analog or "plain old telephone service" (POTS).

What this means for most people is access to inexpensive, relatively high-speed data communications. What it means for radio broadcasters is a return to the cheap remote — among other things. With the right equipment, ISDN is an excellent choice for occasional-use, point-to-point transport of high-quality audio programming.

Equipment needs

Just as every POTS line needs a telephone instrument to be of any use, every ISDN line needs something called a *terminal adapter* (TA), the equivalent of the telephone for the digital age (although they often look and act more like outboard computer modems). TAs include LEDs for line-status indication and ports for connecting other devices to the ISDN network.

While different TAs may offer different features, they must all interface to the incoming telco ISDN line in a standard fashion. This interface is called the *Network Termination* (NT), and throughout the United States it is provided by a device called the *NT-1*. An NT-1 is usually placed between the incoming ISDN service and the customer's TA.

Finally, you'll need a "codec," short for *coder/decoder*. The codec takes analog audio and turns it into a digital signal, compresses it into a data rate that will fit down an ISDN line, and sends it to the TA. (See Figure 1.) Like the TA, you'll need one at each end of the ISDN line (running compatible compression algorithms!), but don't forget that you're establishing a *bidirectional* system, with the potential to carry equivalently high-quality audio in both directions.

What ISDN means for radio broadcasters is a return to the cheap remote.

Ordering ISDN service

Perhaps the most troublesome part of using ISDN is the ordering of service from telcos. Because it's a "switched" (dial-up) service, ordering ISDN is much more like ordering POTS than establishing the dedicated, point-to-point, analog program circuits of the past. Once service is established at a studio or remote site, you can call any other ISDN-equipped location worldwide to establish a high-speed link (of 56kb/s or higher) only when you need it, and "hang up" when you're done.

ISDN monthly costs vary with the telco, but they're generally comparable to POTS rates in most locations. Long-distance fees are also similar to POTS per-minute costs. Again like POTS, local calls are generally not billed on a timed basis, but rather included in the flat monthly service rate.

Unlike POTS, however, a variety of different ISDN service types is available from your local telco. Also, a lot of the "smarts" that are inside the POTS central offices have been moved out to the customers' TAs with ISDN. As a result, the configurations of the TA and the ISDN service must be compatible to each other or problems will result. In the past, this is where much difficulty has ensued in the initial setup of an ISDN broadcast link.

To help solve these problems, telcos and TA manufacturers have recently established a set of *ISDN ordering codes* (IOCs). They allow customers to order a particular flavor of ISDN service that's appropriate to their needs and their terminal hardware by use of simple nomenclature. For example, the most commonly recommended

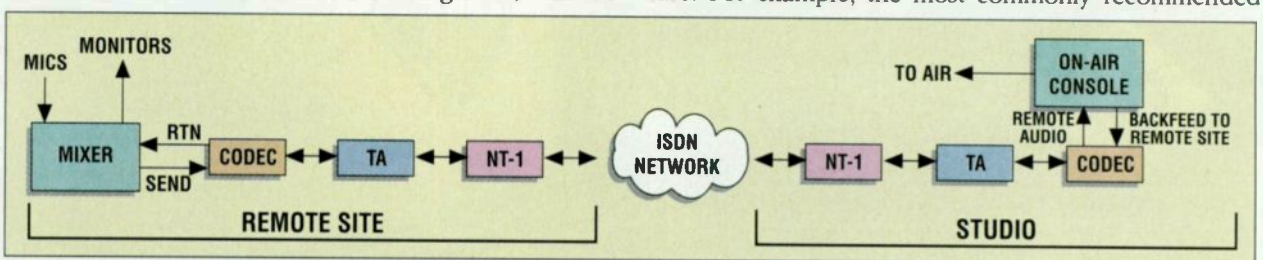
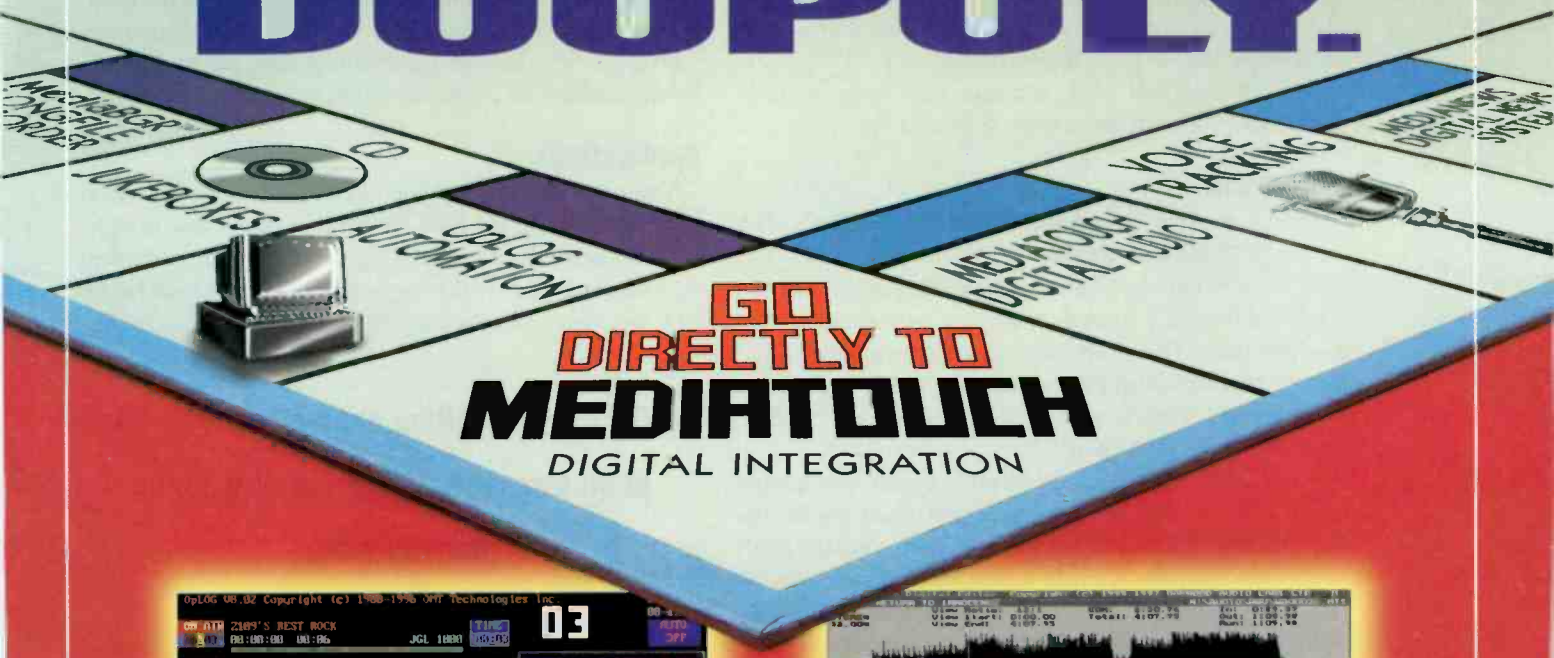


Figure 1. Typical setup for a simple, live radio remote using ISDN. The latest remote equipment combines some or all of the items shown at the remote site into a single unit.

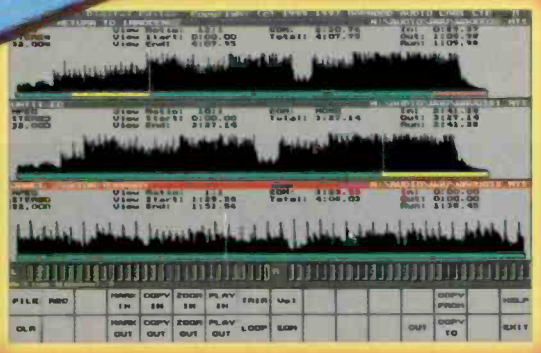
SUPER DUOPOLY.



GO DIRECTLY TO MEDIATOUCH

DIGITAL INTEGRATION

"OpLOG°" Studio Control Panel



"MediaEDIT°" Digital Audio Editor

SOLUTIONS FOR MULTI-STATION INTEGRATION

We worked on our first duopoly project over 5 years ago and our experience leaves nothing to chance. No matter what configuration of stations you have, no matter what format, no matter how many studios... MEDIATOUCH can run it all through one central location, all with the ease of touch screen technology. And MEDIATOUCH works with your existing platforms. No expensive equipment to buy. Flexible. Affordable. Easy to use. Don't roll the cice in the game of Superduopoly. Give your stations the MEDIATOUCH advantage.

MediaTouch
A DIVISION OF OAKWOOD AUDIO LABS LTD.
TOLL FREE 1-800-636-0123

Broadcasters General Store
248C S.E. 52nd Street
Ocala, Florida
34480-7500
Tel: 1-352-622-7700
Fax: 1-352-629-7000

CALL US TODAY FOR MORE INFORMATION

Join us at NAB Booth # 3621 or Booth # 2019

Circle (7) on Free Info Card

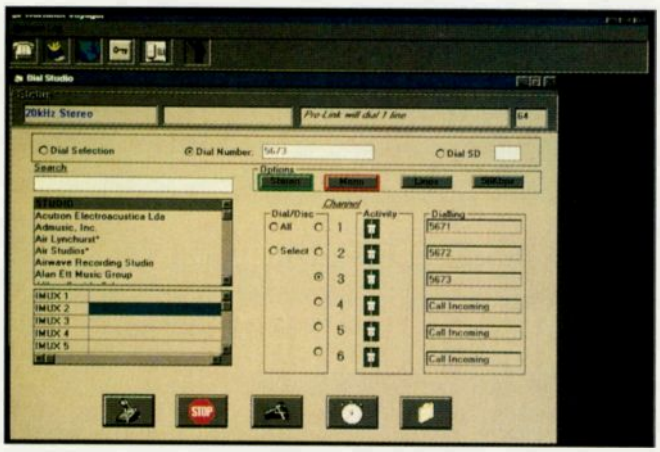
IOC for broadcasters is called *EZ-ISDN1*. Not all telcos support IOCs at present, however, and in these cases, an often painstaking process is still required to get the *service profile* of an ISDN line to match the terminal hardware at both ends of the circuit.

Another way to simplify the process of establishing ISDN service is to use one of the many service bureaus that can do this for you. These companies book local and long-distance ISDN lines and can also lease terminal equipment for your short-term ISDN needs.

Bandwidth

ISDN comes in two general categories: *Basic Rate Interface* (BRI) and *Primary Rate Interface* (PRI). The bulk of ISDN service today is of the BRI variety, with PRI currently limited to major business customers in certain markets only. The main difference between them (besides their cost) is that BRI provides a maximum available data rate of 128kb/s, while PRI offers up to 1.536Mb/s (equivalent to a switched T-1).

In each case, however, the service is actually divided into individual 64kb/s *Bearer* channels (B-channels), the basic building block of ISDN service. Therefore, the ISDN BRI offers two B-channels while PRI provides 24 B-channels. Although BRI and PRI service are physically delivered to customers on single or dual wire pairs, each B-channel can be accessed independently, so BRI can act like two separate phone lines and PRI can act like 24.



This Windows-based application, called *Voyager* from Audio Processing Technology, manages the inverse multiplexing of multiple ISDN B-channels for wideband audio transport.

Each ISDN circuit also includes a *Delta* or *Data* channel (D-channel) for control and call routing. Unlike POTS where dialing pulses travel down the same path as the audio, ISDN offers *out-of-band signaling*, meaning that call routing data can flow without interrupting the program data flowing on the B-channels. For this reason, BRI service is often referred to as "2B+D."

Alternatively, if the customer so desires (and the terminal equipment permits), multiple B-channels can be combined to provide a single, wider-bandwidth path between two points. This is called *inverse multiplexing* (IMUX), and it allows a BRI line to be used to transfer data at 128kb/s — enough for real-time mono audio of near CD quality. IMUX of *multiple* BRI lines is also possible, allowing four B-channels (i.e., two BRI circuits) to be used for a single 256kb/s signal or six B-channels for 384kb/s and so on. Of course, this implies that each end of the path must have sufficient BRI circuits installed, and if any per-minute service charges are incurred, they are multiplied by the number of active B-channels.

Applications

With one portable and one fixed ISDN codec/TA rig, a radio station can do high-quality remotes without high costs or great difficulty. ISDN is also the medium of choice by most radio networks for news and sports backhauls (the so-called "contribution link"). Similarly, distant talent can be linked to a production center from a remote location or home studio, and stations can send audio to each other across town or across the country. ISDN can also be used to feed finished programs to affiliates or sister stations from a network or station group hub (the so-called "distribution link"). An emerging technology of interest to this application is *Multilink PPP*, which offers the ability to feed a wideband signal in a flexible and cost-effective *point-to-multipoint* fashion.

ISDN is an excellent choice for point-to-point transport of high-quality audio programming.

Besides these applications of *real-time* audio, it is also possible to use ISDN for sending audio via *file-based* transfer, in which an audio file stored on one computer is sent to another computer just as any other data file would be transferred via modem. This allows the interconnection bandwidth to be narrower (i.e., less expensive) than that required to support high-quality, real-time compressed audio transmission. The file will take longer than its actual playing time to transfer, but if this is acceptable, significant cost savings can be achieved at no penalty to the eventual audio fidelity. This technique is generally referred to as *store-and-forward*, and there are several companies providing such service for distribution of commercials (and more recently, for day-of-release music singles) from production centers to radio stations.

ISDN has the potential to serve the radio industry in many ways, for real time and file-based audio transport, in an increasingly simple and cost-effective manner.

For more information
Circle (202) on Free Info Card.

THE FIG LEAF
4000 B.C.
FITS ALL SIZE
NAKEDNESS

THE TUBE SOCK
1946
FITS ALL SIZE
FEET

THE TS612
1996
FITS ALL SIZE
BROADCAST FACILITIES

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.

Circle (24) on Free Info Card

Gentner

1-800-945-7730
OR 1-801-975-7200

Spread-spectrum systems

By John H. Battison, P.E.

As we approach the end of the twentieth century, broadcast engineers can look back on an era that commenced with close regulation and adherence to the Federal Radio Commission's rules and, since 1934, the Federal Communications Commission's rules.

They can also look forward, perhaps, to a period of "Ruleless Operation," based on the increasing number of pirate radio stations whose operations are aided and abetted by ignorant and inadequately prepared judges. Very often it seems, especially in the western region, that totally unqualified judges presume to interpret the First Article of the Bill of Rights dealing with freedom of speech to authorize unlimited "pirate" radio transmission — despite the FCC's authorizing act of 1934. (You may wonder where this is heading.)

Yet, there is one new area where such lack of regulation does no harm, and allows "legally unlicensed" radio operation. Most of you are probably familiar with Parts 73 and 74, and perhaps Part 96 (now Part 101), covering various types of private radio and microwave operation. But how many normally refer to Part 15: *Radio Frequency Devices*, which are basically unlicensed systems?

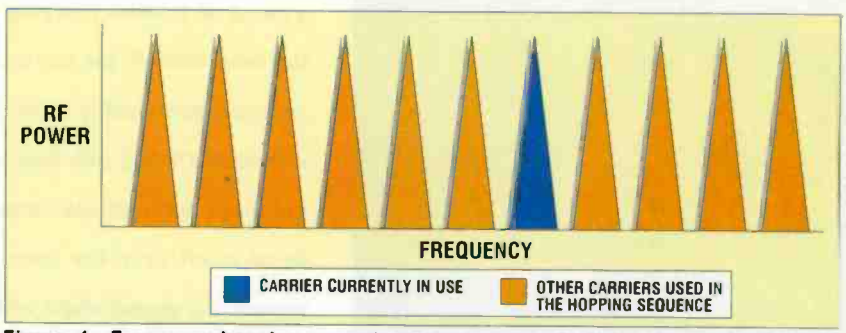


Figure 1. Frequency-hopping spread-spectrum transmission operates in "serial" fashion, placing PSK-modulated data on a narrowband carrier that changes frequency in pseudo-random fashion.

This column's subject is the delightfully unlicensed operation permitted by Part 15 in general, and *spread-spectrum* operation in particular. Some users may have first come into contact with spread spectrum when it was a highly classified operation, and the name was not well-known outside qualified circles. Today, it has brought some auspicious relief to the rather cluttered STL and RPU frequency spectrum.

Spread-spectrum basics

Spread-spectrum operation was first developed in the early 1930s. The old IRE published several articles on the theory that as interference increased, information could still get through if the bandwidth was narrowed. This led to thoughts of frequency hopping, following a prearranged plan. As the system was developed, it became a military vehicle and security clamped down on discussion of it. Originally, the amount of equipment spread spectrum required put its use outside broadcast purposes, but when the transistor and microprocessor were developed, the doors opened up for wider usage of the technology.

The current devotion to digital operations has further spurred the development of spread-spectrum transmission systems. Without digital systems, it would be impossible to obtain the results seen today.

Two major versions of spread-spectrum transmission are commonly used by broadcast-industry equipment. The easier scheme to understand is *frequency-hopping spread spectrum* (FHSS). In this system, the transmitter continually changes its carrier frequency at preset intervals. Program data is typically modulated on to the carrier using phase-shift keying (PSK), while the carrier jumps about in a pattern that is known to the authorized receiver only. (See Figure 1.) An unauthorized user who does not know the frequency-hopping pattern will hear at most only an occasional, brief burst of signal.

The hopping pattern of FHSS comes from a pseudo-random number sequence generator, which creates the unique pattern used in a particular transmission. This allows even identical models of spread-spectrum transmitters and receivers to operate simultaneously without interference in the same frequency band, because each is using different hopping sequences.

The other approach is called *direct-sequence spread spectrum* (DSSS), which is a somewhat more complex process. Here again the program data is PSK-modulated on the RF carrier, but in this case, a double-balanced modulator is used, which results in a transmission without a discrete carrier ("suppressed carrier"). This fixed-frequency signal is then phase-modulated a second time, using a modulating signal of pseudo-random noise (PN) bits called a *spreading sequence*. To ensure adequate "spreading," the PN bits are generated at a much higher rate than the program data. This extends

Others are proud of their many buttons...

... on the On-Air 2000 you can get by with three keys and one fader per channel unit.

Studer On-Air 2000: This is the name of the digital audio mixer for broadcast applications that features a completely new, simple, and intuitive user interface based on the "Touch 'n Action" concept (pat. pend.):

The modular mixing console features 6, 12, 18 or 24 input channels (each assignable to 2 sources)

On-Air 2000 offers the convenience of central operation as well as a synoptic status overview of all channels.

■ The most important settings of each input channel can be seen at a glance on the screen. Only three keys (On, Off and PFL) and one fader are needed.

■ Simply touch the corresponding area of the screen with your finger - and you can process all settings on the central control monitor and save them either as global snapshots or individual Mic settings (integrated PCMCIA slot!).

Touch 'n Action also means: Quick access to all functions without navigation through complex menu trees.

Incremental encoders with software-controlled stops and detent points optimize the operating convenience.

■ The four incremental encoders for setting the parameters have a tactile feedback: the stops and detent points are set individually, depending on the function area. The ergonomic convenience of an analog mixing console is now surpassed by the digital technology!

On-Air 2000: The mixing console for state-of-the-art broadcast automation with DJ mode. Sounds interesting? Please do not hesitate to contact us! ■

STUDER
PROFESSIONAL AUDIO EQUIPMENT

H A Harman International Company

Studer Professional Audio AG, Althardstrasse 30, CH-8105 Regensdorf - Zurich Switzerland, Tel. +41 1 870 75 11, Fax: +41 1 840 47 37
Direct-Subsidiaries: Austria: +43 1 866 54-0, France: +33 1 45 14 47 86, Germany: +49 30 72 39 34-0, U.K.: +44 181 207 50 50
Canada: +1 416 510 13 47, Japan: +81 3 34 65 22 11, Singapore: +65 225 51 15, USA: +1 615 399 21 99
http://www.studer.ch/studer

Circle (25) on Free Info Card

the RF signal to many times its original bandwidth and lowers the power density of the components of the signal. (See Figure 2.)

The ratio of the PN bit rate to the program data rate is called the *processing gain* (PG) of the system. A system with high PG will better withstand low signal levels and interference.

The Global Positioning System (GPS) uses DSSS technology, allowing location data to be delivered via low-power satellite transmission. *Code-division multiple access* (CDMA) communications, such as that used in some digital cellular phone systems, is another example of DSSS. It allows multiple users with different PN codes to communicate on the same channel at the same time.

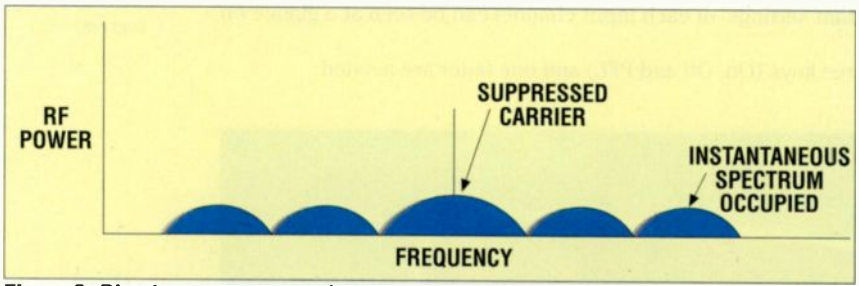


Figure 2. Direct-sequence spread-spectrum transmission is a more "parallel" process, with its PSK-modulated data spread across a wide bandwidth at low power, as determined by a "spreading sequence."

In actual operation, it's unusual to detect a DSSS signal with anything besides a receiver locked to the same PN code. To other receivers, the RF level is so low that it generally appears as noise and is ignored.

Broadcast applications

Section 15.247 lays out the technical rules for unlicensed spread-spectrum operation. Operation can be in the bands 902-928MHz, 2,400-2,483.5MHz (often referred to as the *S-band*) and 5,725-5,850MHz. The power levels allowed are low, with a maximum transmitter power output for frequency-hopping systems of 1W, and a maximum ERP of 6dBi from a directional antenna. For direct-sequence systems, the power density is averaged over one-second intervals.

Several well-known equipment manufacturers have developed remote-control and STL equipment using bidirectional spread-spectrum transmission. One of these is the Burk Technology *BDT-115 Data Link*, a frequency-hopping remote-site control link in the 902-928MHz band. In addition to the highly economical use of available frequencies in this band, it provides a bidirectional, 115kb/s control path that can operate over distances of 20 miles or more. Systems are sold with transmitter/receiver code combinations that are not duplicated in the same area.

Of course, it's still important to have a clear transmission path for use with spread-spectrum systems. Because of the low power used, it's easy to experience random transmission breaks if the carrier is blocked, even by small obstacles like a person's head moving in front of the transmitting antenna. Once lock is acquired, however, and signal-level is maintained, interference will have little effect. A three-inch whip antenna is normally supplied with the BDT-115 for up to 20-mile operation. A directional antenna can be used if greater range is needed.

The beauty of an FHSS system is that even bad interference on some channels will not destroy the total information because each frequency hop is of such short duration. The BDT-115 uses a proprietary operating protocol with 32-bit CRC error correction. Burk claims that up to 100 individual links can be used full-time in a given area. The system provides wireless, full-time control (as opposed to "dial-up" remote-control operation) and offers inherently high security.

On the other hand, QEI's *Quick-Link II* system uses DSSS in the 2,400MHz band to provide a bidirectional, uncompressed 15kHz stereo digital audio path, intended for high-quality RPU usage. Narrower audio bandwidths are also selectable. QEI provides each unit with a set of five different RF frequencies, and can meet requests for a particular custom frequency. Normally, a directional antenna is used, and it's essential to use the same antenna polarization on each end of the transmission path.

The newest entrants to the field are Audio Processing Technology's SBL 128 and SBL 256 systems, which are bidirectional audio links that provide 15kHz mono and stereo paths, respectively. Like the QEI system, they use DSSS techniques in the S-band, but unlike QEI, the APT units employ the company's well-known apt-X100 data-reduction algorithm to reduce RF bandwidth requirements.

A similar system is also offered by Moseley Associates, which adds a choice of either apt-X100 or ISO/MPEG Layer II coding. The *Starlink 9001* Digital RPL (model SL9001SS) includes AES3 I/O and sample-rate conversion.

Certainly the combination of Part 15 with advances in digital technology has made life a lot easier for radio broadcasters in these spectrum-starved days. It is also almost impossible for industry veterans to imagine life without reams of Forms 313 and 402, and long delays while they are bounced back for correction and eventually processed. This technology's integration of wideband, bidirectional communications with high spectrum accessibility and unlicensed operation makes it a welcome addition to the growing menu of connectivity options for today's radio broadcasters.

Battison, BE Radio's consultant on antennas and radiation, owns John H. Battison and Associates, a consulting engineering company in Loudonville, OH.

FOR MORE INFORMATION
Circle (201) on Free Info Card.

Hundt's hard road agenda

By Harry C. Martin and J. Todd Metcalf

On Dec. 26, 1996, FCC chairman Reed Hundt released a document entitled, "The Hard Road Ahead — An Agenda for the FCC in 1997." In it, Hundt set goals for addressing and resolving a series of issues, including methods for awarding new analog broadcast licenses. Hundt concluded that the commission must reform the comparative hearing process and/or develop an alternative to it.

Since the 1993 Bechtel decision by the DC Circuit, the comparative criteria previously used by the commission has been suspended, causing a massive backlog as the commission struggles to determine a reasonable way to fairly allocate new broadcast licenses. In the interim, in an effort to alleviate the backlog, Hundt only sees three ways to solve the crisis.

FCC Commissioner Reed Hundt

First, Hundt suggested that Congress grant the commission authority to put the available channels on the auction block. Hundt endorsed this method over his other two suggestions by describing the auction process as the fastest and fairest way of getting licenses into the hands of those who will put them to the best use. Should Congress not approve auctions, Hundt would consider either employing the non-integration comparative criteria, which were not invalidated in Bechtel, or giving new analog broadcast licenses to applicants whose programming will contribute most positively to their communities.

Hundt described successful applicants under this proposal as those who can present specific, quantifiable evidence that they are willing to provide free air time for political candidates, children's programming, material geared toward minorities and other underserved segments of the community. Finally, the commission could concede defeat and simply give analog licenses away randomly by lottery.

Senator McCain's retort

Chairman Hundt's suggestions raised the hackles of Senator John McCain (R-AZ), chairman of the Senate Commerce Committee, the Senate Committee with responsibility for telecommunications policy. In a Jan. 9 letter to Hundt, McCain intimated that he too favors putting new analog broadcast licenses on the auction block.

In the letter, the senator called on the commission not to set any new comparative standards for assigning the radio licenses inasmuch as he plans to introduce legislation that will free the FCC to auction the analog broadcast spectrum. McCain derided Hundt's suggestion that the commission give away the licenses based on programming commitments as unconscionable and called the chairman's lottery proposal indefensible.

Representative Tauzin weighs in

At odds with the idea of auctioning the broadcast spectrum is Representative Billy Tauzin (R-LA), chairman of the House Telecommunications Subcommittee. In a January speech to the Association of Local Television Stations (ALTS), Tauzin made clear his unequivocal opposition to spectrum auctions. He argued that such auctions threaten the status of free over-the-air radio as no other public policy proposal does.

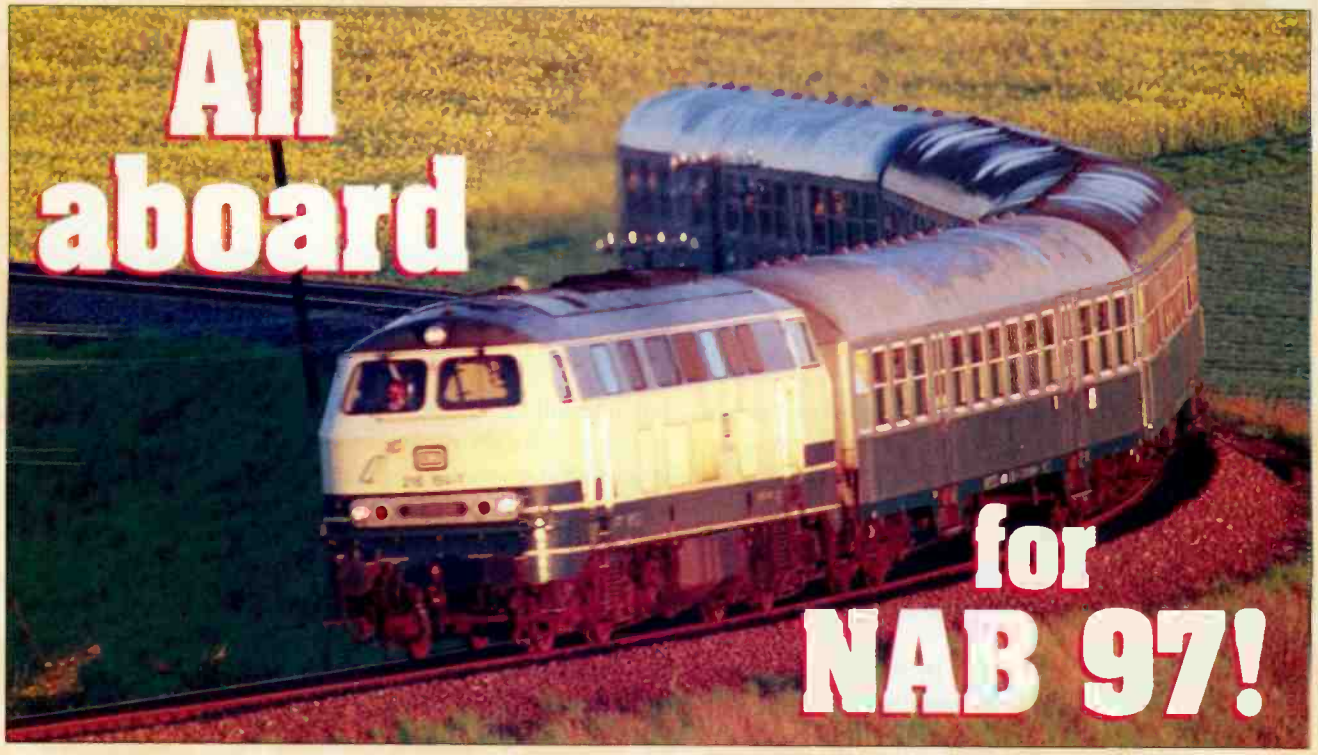
Moreover, Tauzin stated that Hundt's agenda was quite disturbing to him. Tauzin worries that the commission is creating policies rather than implementing the will of Congress. He found Hundt's agenda to read like a public policy document even though the FCC is subject directly to Congress. The congressman made it clear that the commission does not have the right to write its own laws or otherwise set the national telecommunications agenda.

What emerges from arguably three of the most influential voices in telecommunications policy is a muddled prescription. The only certain thing is that there finally are efforts under way to alleviate the backlog of radio license applications. It is impossible to predict whether legislation will emerge to resolve the current dilemma or whether the FCC will again be left to its own devices.

Harry Martin and J. Todd Metcalf are attorneys with Fletcher, Heald & Hildreth, P.L.C., Rosslyn, VA.

dateline

On June 2, radio stations in Arizona, Idaho, Nevada, New Mexico, Utah and Wyoming must file their renewal applications. New licenses will be granted to Oct. 1, 2005. Also on June 2, commercial stations in the following states or territories must file their annual ownership reports: Arizona, Washington, DC, Idaho, Maryland, Michigan, Nevada, New Mexico, Ohio, Utah, Virginia, West Virginia and Wyoming. On May 31, all stations must file their 1997 Annual Employment Reports (FCC Form 395-B).



By Skip Pizzi, editor

You're reading *BE Radio*'s biggest issue ever, and with it comes the radio industry's most comprehensive pre-show coverage of the National Association of Broadcasters (NAB) 1997 Convention in Las Vegas (April 7-10), and its associated conferences. (See Table of Contents below.)

This year's show is larger than ever with more than 700,000 square feet of exhibition space at the Las Vegas Convention Center (LVCC) and the Sands Expo Center. That's no surprise — the show grows every year — but what seems different for NAB 97 is the exceptional number of new products to be premiered. To help you tame this onslaught, check out *BE Radio Extra*, a colorful preview of new radio products expected at the show. You'll also find some "NAB hot-off-the-presses tips" from *BE Radio*'s team of reporters covering the show, with their expectations on what's hot and what's not, plus their suggestions for maximizing your effectiveness and having some fun while in Las Vegas.

There are also more conferences than ever at this year's NAB — 12 in all. For a fighting chance at getting to the sessions you're interested in, see our *Conference Timetable* with the schedules at a glance for the conference tracks of interest to radio broadcasters.

If you're looking for a particular item at the show, take our *FASTtrack*, where you'll find NAB 97 exhibitors and their booth numbers grouped by product type. You'll find this is a good way to learn about some of the many new companies exhibiting at NAB 97. Full-blown exhibitor listings follow, with comprehensive data on all Audio Hall (LVCC North Hall) exhibitors and selected LVCC Main Hall and Sands Expo Center exhibitors whose products pertain to radio.

Our exclusive Audio Hall map completes the package. It's easy to remove for carrying with you at the show. The map includes helpful coordinates on the map's legend plus a handy list of radio/audio exhibitors in the other halls.

Some helpful hints on finding exhibitors: Booth numbers from 900 to 4500 are located in the Audio Hall; all other four- and five-digit numbers without letter prefixes are in the Main Hall of the LVCC; all exhibitors at the Sands Expo Center include a letter prefix — "S" for the general Sands exhibits, "I" for the special (and greatly expanded) Internet area, and "M" for the Multimedia zone. "LA" and "LB" prefixes denote two outside exhibits in the LVCC parking areas (Lot A and Lot B). Two-digit booths are used for exhibitors in the "NAB 97 Technology Showcase," devoted to emerging developments and located in the LVCC's Grand Concourse.

If you won't be attending NAB 97, don't worry. You'll get a great briefing on what will be there in this issue of *BE Radio*, then you can follow up by visiting our on-line Show Daily at **http://www.broadcastengineering.com** where you'll find up-to-the-minute news direct from the show floor. (It will begin operation on April 6.)

Whether you attend in a real or a virtual manner, there will be plenty to see and hear — probably far more than you'll have time for. Plan your time wisely by taking advantage of the radio-specific data compiled by the *BE Radio* staff — and enjoy the smoothest ride through NAB 97.

BE Radio's NAB 97 Preview includes:

BE Radio *Extra* 23
Conference Timetable 42
BE Radio FASTtrack 44
Audio/Radio Exhibitor Listings 52
Audio Hall Map 59

BE Radio EXTRA

New from **Harris** is the CD LINK, a 950MHz aural STL that overcomes the final hurdle in the totally uncompressed digital audio air chain. This STL transports uncompressed AES3 studio-standard digital audio over a standard 300kHz RF channel. With the CD LINK, you can eliminate any components that use lossy compression in the digital audio air chain. A spectrum-efficient RF design allows it to transport one AES stereo signal and two data channels simultaneously.

800-622-0022; fax 217-222-0581; hbd@harris.com
Circle (150) on Free Info Card

Audio Processing Technology will be demonstrating several transceivers in an "as live" environment. The SBL128 and SBL256 digital audio wireless transceivers incorporate apt-X100 compression and also include the latest in RF spread spectrum technology. Aimed at point-to-point operations, these full-duplex S-band units can, depending on antennas being used, operate over radio paths in building-to-building applications or suitable longer haul circuits up to 30 miles.

The company will also introduce its BCF256 transceiver that meets the growing demand for digital STL and other networking applications. This full-duplex unit can be supplied with apt-X100 or any other algorithm. In addition, it can include a primary circuit integrity option supported by an ISDN backup facility accessed via an internal or external TA.

+44(0)1232 371110;
fax +44 (0)1232 371137
Circle (151) on Free Info Card

NAB TIPS

Garrett Wood
Chief Engineer,
WUKY-FM,
Lexington, KY

WHAT'S GOING TO BE HOT AT NAB 97?
Internet/Intranet Theater, NAB Communications and Connectivity 97: Electronic Distribution Conference, on-line streaming audio algorithms and computer-based digital audio automation and editors.

WHAT'S NOT GOING TO BE HOT AT NAB 97 THAT HAS BEEN IN THE PAST?
Digital Audio Broadcasting.

WHAT I'LL BE LOOKING FOR AT NAB 97:
Companies that are focusing their attention toward high-quality on-demand delivery of radio services via the Internet.

WHAT I'LL BE CHECKING OUT FOR AN IMMINENT PURCHASE:
High-power FM transmitter and antenna systems, digital FM audio processors.

THE CONFERENCE SESSIONS I WANT TO ATTEND:
Emergency Planning: Staying on the Air; Audio Processing: Competing With Digital Services; Broadband Delivery Options; and Distributing Broadcast Quality Audio & Video.

WHERE I RECOMMEND HANGING OUT AFTER HOURS:
Grand Canyon and Hoover Dam tours, Battista's Hole in the Wall and Capozzoli's (Italian restaurants) and the Bistro at the Mirage Hotel.

CHANGES I'D LIKE TO SEE MADE AT NAB 97:
More shuttle buses and better coordination of their schedules; additional food service areas for lunch.

MY TIPS FOR FIRST-TIME ATTENDEES:
Obtain convention details in advance and carefully plan your daily activities. It's like visiting Disney World for the first time: you can't see it all. Be sure to wear comfortable shoes. Your mileage may vary, but remember that Las Vegas distances are deceiving.

MY VIEW OF THE INDUSTRY:
I look forward to learning more about the emerging new radio services, such as on-line radio and high-speed datacasting. I'm concerned about the problems facing DAB in the U.S.

TC Electronic is now distributing DK Audio's MSD200, a compact and versatile tool that offers phase metering, audio vector oscilloscope and level metering in a rugged metal box. With a new electroluminescent display that provides an astonishing 160° viewing angle with exceptional high-contrast ratio and brightness, the unit can be used even in broad daylight. In addition, the MSD200 allows the operator to select analog or digital mode.

805-373-1828;
fax 805-379-2648
Circle (152) on Free Info Card

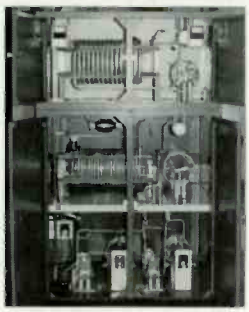
Harris can show you its third-generation CD Cart Machine model CD2001 that is equipped to provide AES3 digital output. To make things easier for you, a server adjustment is now automatic and a 16-bit microprocessor is onboard. In addition, surface mount technology is used and the certified CE-ready unit is manufactured in an ISO 9001-registered factory.

800-622-0022; fax 217-222-0581;
hbd@harris.com
Circle (153) on Free Info Card

YOUR SOURCE FOR QUALITY AM ANTENNA SYSTEMS FROM COAST TO COAST

KINTRONIC LABS, INC.

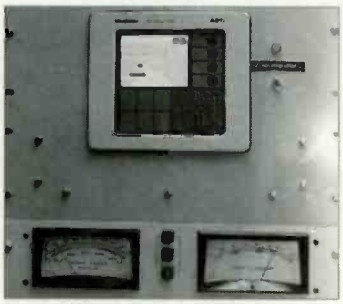
AM DIPLEXED DA ANTENNA PHASING SYSTEMS



KPHP/KFXX RADIO
PORTLAND, OR

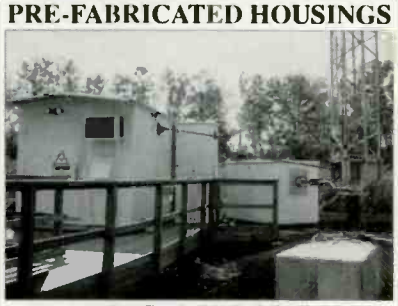
NEW PRODUCTS

SOFTWARE PROGRMMABLE CONTROLLER



WXBQ RADIO BRISTOL, VA

PRE-FABRICATED HOUSINGS



1010 WINS NEW YORK, NY

KINTRONIC LABORATORIES INC.
P.O. BOX 845
BRISTOL, TN 37621-0845
PH./FAX: 423-878-3141/4224
WEB SITE:
http://www.kintronic.com
EMAIL: ktl@kintronic.com

Circle (40) on Free Info Card

NAB TIPS

Chriss Scherer
Chief Engineer,
WMMS-FM, Cleveland

WHAT'S GOING TO BE HOT AT NAB 97?
Internet-related topics, products and ideas.

WHAT I'LL BE LOOKING FOR AT NAB 97:
Advances in digital audio storage and delivery systems.

THE CONFERENCE SESSIONS I WANT TO ATTEND:
Anything dealing with digital storage and delivery or computer networking.

WHERE I RECOMMEND HANGING OUT AFTER HOURS:
Don't miss the vertical wind tunnel/skydiving simulator at Flyaway (just west of the convention center) and the roller coaster at Stratosphere Tower.

MY TIPS FOR FIRST-TIME ATTENDEES:
Wear comfortable shoes and plan your days to cover your high-priority items first.

Mackie Designs has made another audio revolution with its 48x8x2 Digital 8•Bus console designed to work like the analog consoles you are familiar with. This true 48-channel console comes complete with meter bridge, built-in hard-disk storage for effects libraries and automation sequences, 8MB of RAM, 24 channels of analog tape I/O and UltraMix II automation. Virtually every control on the console can be automated, and in the touch mode, you can update every control on the fly.

800-898-3211; fax 206-487-4337; sales@mackie.com
Circle (154) on Free Info Card

Wheatstone Corporation is introducing its D-500 digital audio console designed for on-air radio use. This full digital audio console is capable of handling analog, digital or mixed format digital signal sources. Because the D-500 accepts and outputs digital and analog signals, your station's present equipment is no longer in danger of obsolescence. The console has the intelligence to work with your present equipment and can act as a liaison between it for scheduling and management.

315-452-5000; fax 315-452-0160; wheatstone@aol.com
Circle (155) on Free Info Card

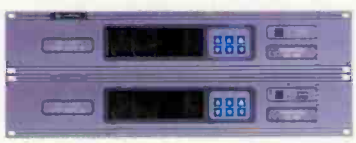
Pristine Systems has created a powerful, fun-to-use digital studio system, Rapidfire, that makes it fun to be a disk jockey. The system puts everything you need on your computer screen allowing you to be spontaneous and creative with Rapidfire's graphical user interface. All you have to do is point and shoot to load any of the four players, choose from the scheduled play list or select from one of Rapidfire's instant Quick Picks.

310-670-7500; fax 310-670-0133; www.pristinesys.com
Circle (156) on Free Info Card

UNCOMPRESSED DIGITAL STL

CD LINK™ STL
Full CD-quality sound that blows minds and blows away competition.

If you thought an *uncompressed* Studio-to-Transmitter Link was impossible in a 300 kHz bandwidth, think again. *Harris makes it economical and easy* for you to have an uncompressed bit-for-bit AES3 path that delivers rich, full, digital sound like your audience has never heard before from an FM broadcast station. Sound that can boost ratings, attract more advertisers, make your station more profitable, draw hotter talent, and start an upward success spiral that leaves your competitors singing the compressed digital blues.



We've made history by introducing CD LINK, the world's first UNCOMPRESSED 950 MHz digital STL.

Now the radio broadcast chain can be 100% digital, with CD-quality sound uncompromised by dueling algorithms and lossy compression schemes. Whether your present STL is analog or digital, a Harris CD LINK STL can provide AES3, left/right analog, composite stereo, one 12 kHz or two 6 kHz AUX audio channels, plus data and remote control channels.

CD LINK is another in a long line of firsts from Harris, designed to make you first in your markets. Contact Harris now for the information you need to make sound decisions.

CLEARLY DIGITAL

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

HARRIS

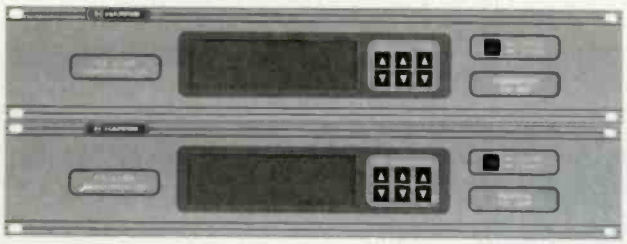
A new world of broadcast solutions

Radio-FM: DIGIT CD™- Digital FM Exciter • SuperCiter™ Analog FM Exciter • CD LINK™ Digital STL • Quest, Platinum and Platinum Z Solid State FM Transmitters • HT Single-tube FM Transmitters • FM Antennas **Radio-AM:** DX - Digital Solid State AM Transmitters • GATES® Solid State AM Transmitters **Radio-DAB:** DAB 2000 Transmitters **Studio Products:** Digital and Analog Studio Equipment **Systems:** Mobile and Fixed Studios and Satellite Systems

Circle (50) on Free Info Card

©1997 Harris Corporation

ADVERTISEMENT



Harris To Introduce CD LINK™, First Uncompressed 950 MHz Digital Aural STL, At NAB '97

Harris' CD LINK™, a 950 MHz digital aural STL that overcomes the final technical hurdle in the totally uncompressed digital audio air-chain, will premiere at NAB 1997 in Booth 5909 at the Las Vegas Convention Center. This revolutionary STL transports *uncompressed* AES3 studio-standard digital audio over a standard 300 kHz RF channel.

Until now, it has been common to have at least one component that uses lossy compression in the digital audio chain. Lossy compression is a bit reduction technique used to fit a digital signal into a specified bandwidth. This technique uses psychoacoustic digital compression algorithms that commonly eliminate 75% of a signal's digital audio content. Content that is eliminated becomes irretrievable.

When two or more components in an air-chain use lossy compression, cascading algorithms can occur, causing very noticeable distortions in audio quality. Until now, all 950 MHz STLs have used lossy compression. CD LINK gives you all the sound your studio is capable of producing.

The CD LINK provides superior performance with a typical signal-to-noise ratio of 93 dB and frequency response of +/-0.1 dB. Beyond a robust signal with improved fade margins, CD LINK offers many other user benefits. A spectrum-efficient RF design allows CD LINK to transport one AES stereo signal and two data channels simultaneously. An analog stereo composite output as well as two 6 kHz or one 12 kHz auxiliary audio channels are available as options.

The CD LINK is designed to fit in the place of an existing analog STL. The transmitter and receiver are each housed in a single, 3-1/2" rack-mountable chassis which contains all digital and RF circuits. The unit is designed for ease of installation with an AES3 XLR or optical input connector, Type N RF output connector and a universal AC power supply.

For more information about the CD LINK and complete specifications, please send your written request to Harris via fax (217-222-0581) or e-mail (hbd@harris.com).

Why You Would Want An *Uncompressed* Digital Audio Air Chain And How You Can Implement One

Since the first digital radio product made its appearance nearly 17 years ago and the CD replaced the LP and tape as the quality standard, radio broadcasting has been edging toward an uncompressed digital audio air-chain. At NAB '97 with introduction of CD LINK™, a revolutionary 950 MHz STL that transports uncompressed audio in a standard, 300 kHz bandwidth, Harris will provide the last link in this chain. In this roundtable discussion, Harris participants discuss the significance of CD LINK and the uncompressed air-chain, its evolution, and how broadcasters can begin implementation.

Roundtable participants include Geoff Mendenhall, VP - Radio Product Line Manager; Jim Woods, Studio Product Line Director; Daryl Buechting, FM Product Manager; Don Taylor, U.S. Radio Field Sales Manager; Dick Fry, FM Applications Engineer; and Rick Funk, Digital Studio Products Specialist.

Q. Why would a broadcaster want an uncompressed digital audio air chain?

Geoff Mendenhall: Better audio.

Rick Funk: Compressed audio, by its nature, is destructive. It's not really the compression so much as it is the bit reduction. Bits that are thrown out in a compression algorithm cannot be retrieved. We have accepted compression because the loss is done in such a way that it's not significantly perceived by the human ear. But broadcasting, through history, has been a more perfect science than that. We've always wanted to strive for the best audio quality, so it's natural to strive for uncompressed audio.

Geoff Mendenhall: Broadcasters want to deliver 100% of the audio content to their audience — not the 25% that remains after compression. Better audio means freedom from artifacts while delivering 100% of the information. It also means eliminating problems associated with cascading compression. The signal only gets worse as one compression scheme takes out some of the information then another compression scheme takes more information from what was left. There's a lot of concern about that.

Rick Funk: Technology to this point has not offered the possibility of transferring digital audio from Point A to Point B over a standard STL without compression. The person who has wanted uncompressed audio has had to go to T-1 links.

Don Taylor: One value of uncompressed digital audio is that it allows you to put the audio processor anywhere you want in the air chain.

Rick Funk: People have wanted to put their processors at the studio, where it is very accessible for adjusting the processing parameters.

Don Taylor: There's an added value to having the processor more accessible. If there's a failure, the engineer can get another signal on the air much more easily.

Q. What is the real significance of the CD LINK, broadcasting's first uncompressed digital audio STL?

Jim Woods: The CD LINK is the last link in the completely uncompressed chain. Now broadcasters can "engineer" their facilities to the level they feel they need to be at from a competitive standpoint. There are no longer any technical hurdles. There still are some economic issues in the studio — for example, do you want to store uncompressed digital audio, and how do you manage that? But that's an economic issue and, consequently, a business decision. The uncompressed digital STL was a technical hurdle.

Daryl Buechting: As an uncompressed digital STL, CD LINK allows you to avoid compression distortions.

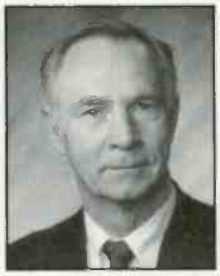
Geoff Mendenhall: It's now possible to provide a transparent, distortionless path all the way to the digital exciter, which can then convert that data directly into an essentially perfect analog RF signal. Before DIGIT (Harris' digital FM exciter was introduced in 1993 and is on air at approximately 900 sites worldwide), there wasn't a strong need or desire

Circle (51) on Free Info Card

ADVERTISEMENT

Geoff Mendenhall

Rick Funk


Don Taylor

James Woods

Daryl Buechting

Richard Fry

to extend the digital source all the way out to the transmitter. Now that we have a digital exciter that can accept AES3 data directly, it makes it much more attractive to provide uncompressed AES3 data all the way out to the transmitter.

Q. What are the advantages of a digital STL?

Geoff Mendenhall: By shipping the audio out as data via STL, you have better fade margins. The product you deliver to your listeners with an analog STL cannot be any better than the signal-to-noise ratio of the STL link, and that can vary with fade and interference. With a digital STL, you either get perfect data or you get nothing, and you probably can operate at 20 to 30 dB lower signal levels (or worse signal-to-noise ratio) and still get perfect audio through.

Also, you don't have to worry about hum pick-up. In the case of composite STLs or other methods of transferring analog audio, you don't have to worry about affects on stereo separation because of phase shift in the transport medium. In the case of split STLs with L and R, you don't have to worry about channel matching levels, or matching pre-emphasis, or matching phase between L and R channels. All of those things are perfect.

Dick Fry: A lot of these benefits were provided by manufacturers of digital modems for analog STL equipment. There were data reduction losses, but there were still benefits of improved fade margin and better signal-to-noise ratios, so there was a market — even with an analog exciter.

Geoff Mendenhall: That's right. As a first step, people were willing to accept data reduction and know that 75% of their audio data would never make it on the air because they could enjoy the benefits of better fade margins and elimination of hum and level match. Now they can have all those advantages, plus they can have 100% of their audio.

Daryl Buechting: CD LINK drops in place of an existing 950 MHz analog STL, so it's very easy to install. And it fits in the 300 kHz bandwidth, the same as a composite stereo STL.

Q. Have we heard from broadcasters who have been waiting for an uncompressed STL before aggressively implementing their digital air chains?

Geoff Mendenhall: That's what we've been hearing. Let me give you a little of Harris' philosophy: Why are we doing this? It certainly wasn't that we wanted to attack anyone: It was purely that we needed this product to complete the uncompressed digital air chain and accelerate acceptance of DIGIT and our other digital product offerings. Acceptance of these things has been held back because there was a missing piece — the uncompressed link. None of our vendors or suppliers have been able to provide us this product, even though we've asked for it a number of times over the years. Finally, we decided to do it ourselves, because it is important to the overall 100% uncompressed path.

Jim Woods: This product completes a chain that allows people to make value decisions about their audio chain. If cascading compression algorithms or pure audio are not of concern, this product may not be of interest. But if cascading algorithms and the other resulting issues are of concern, then this product provides another alternative.

Q. There are many advantages to going digital, aren't there?

Jim Woods: Yes. I think it allows for some very simple interconnects: it solves a lot of interface issues among various pieces of equipment and allows broadcasters to deliver the highest quality, most reliable audio.

Don Taylor: To piggyback, it is far easier to wire AES3 in a studio than it is to wire L and R analog pairs. You only have half the amount of wire. Plus, you don't have to worry about phase reversals, and you don't have to worry about one wire being longer than the other so that the left channel arrives at a different time than the right channel does. All of these issues just go away...

Dick Fry: Equalization... frequency response and degradation over long lengths of wire are eliminated by going to digital.

Jim Woods: In my mind, the benefit is better audio and simpler equipment interconnects. The digital chain provides high-quality audio with no signal degradation from the studio to the output of the transmitter.

Don Taylor: There's less risk as far as reliability and ease of installation are concerned. You take a less technical person, and that person will be far more successful with a digital installation [than an analog installation].

Geoff Mendenhall: That's because you don't have all the tweaks. With analog, you've got to adjust levels, you've got to avoid clipping, and you've got to get levels matched. There are consistency issues, too. A digital system gives you better audio and more consistency. The only thing you have to set is maybe two levels — on the audio processor output and on the DIGIT input — and those levels are for both channels simultaneously. It's more of a plug and play/works or doesn't work scenario.

Don Taylor: It's easier to troubleshoot...

Daryl Buechting: ...and AES3 test equipment *is* available...

Don Taylor: ...and there no longer is the need to figure out where the Left channel left us and where the Right channel left us because it's going to be a continuous stream until the point of failure.

Q. How should a broadcaster go about implementing the uncompressed digital air chain?

Geoff Mendenhall: I would start where the biggest benefits would be: I'd start at the transmitter and work backwards. There may already be digital audio sources at the studio, but still there's an analog console. However, if you replace your exciter with a digital exciter, you'll get an immediate improvement in audio. From there, go with a digital link back to the studio. At that point, you can drive that digital link with an audio processor that accepts analog audio from the studio and converts it to data. In case of the CD LINK, you have a choice of feeding analog audio or AES3 data into it. If you have analog audio from your audio processor at the studio, CD LINK will convert it to AES3 data and transport it all the way out to DIGIT in the AES3 mode. By buying just two pieces — DIGIT and CD LINK — you can make a major improvement to your broadcast air chain. Then when you get ready, you can upgrade the audio processing to fully digital and continue to work backward through the studio until you get to the source.

Daryl Buechting: Harris can package everything together.

Jim Woods: We represent digital sources from CD players to DAT. We are delivering digital consoles and expect NAB '97 to be a watershed. We represent hard disk audio systems to fit different needs — a variety of solutions from Arrakis DIGILINK products to Enco DAD to Orban DDS. We have the unique ability to bundle the digital products together to meet the customers' specific requirements. We represent high-value solutions and can deliver a competitive package to meet our customers' requirements.

Geoff Mendenhall: Back to the question, "Have we heard many customers say they're waiting for an uncompressed broadcast solution?" The answer is yes. I hear it all the time. I hear it at trade shows. I hear it in phone calls — that there are many broadcasters who have NOT converted to compressed STLs because they have been waiting for this solution. I believe there is going to be a huge demand. By the time we're six months out from NAB, I believe the CD LINK should be the world standard.

HARRIS

Circle (52) on Free Info Card

ADVERTISEMENT

The New Harris Uncompressed Digital STL

By Andy Laird
Vice President, Engineering/Radio Group
Heritage Media Corporation

BACKGROUND

The improvements in CD players, audio console design, audio processors and digital FM exciters have, in my opinion, made the 950 MHz STL system the weak audio link in the broadcast audio chain. True lossless or non bit rate reduced digital systems are available for T-1 and at the 23 GHz bands. And these sound great! But my experiences at 23 GHz have been very disappointing from a reliability standpoint. T-1, on the other hand, is reasonably reliable but you have to pay for the circuit every month. Presently we use lossless T-1 equipment at seven of our stations where single hop 950 MHz systems are not possible and/or where a backhaul from the transmitter site is needed. These STLs truly sound better than any of our 950 MHz composite systems. They also sound better than the two 950 MHz systems we have operating with compressed digital encoders/decoders. Why is this?

The digital systems currently available for the 950 MHz band use bit rate reduction, most commonly four to one. This is presumably necessary to reduce the transmission bandwidth to fit into a 950 MHz STL channel. This is called perceptual coding. Perceptual coding works because of the inability of our hearing to notice certain details (they are masked) while other distracting audio events are taking place. The perceptual coder throws away the data that it thinks will be masked by our hearing. It's my opinion that typical broadcast audio processing unmasks the perceptual coding, making the bit rate reduction audible. Additionally, the stacking of different types of bit rate reduction used in distribution systems (such as satellite, ISDN and dial-up), with those used in floppy and hard disk storage systems, and then shoving all that through an additional round of bit rate reduced STL, creates even worse sound than can be imagined just by listening to each element on its own.

CONTACT

So, when Geoff Mendenhall of Harris Corporation called and asked if I would be interested in evaluating a new 950 MHz band STL, I was very interested. After signing a non-disclosure agreement, I found out that the system was uncompressed 16 bit linear digital using no bit rate reduction, the same as the T-1 systems we like so much. And on top of that, the transmission will fit within an existing 300 kHz 950 MHz channel and have two RS-232 ports in addition to auxiliary audio channels.

Circle (53) on Free Info Card

Seemed like magic to me. I wanted to see it and hear it in operation. Subjective judgments of audio quality would be made, compared to our favorite T-1 system.

PLANNING

The Heritage FM station WAMG was convenient for this comparison. The main STL is a T-1 circuit using an Intraplex lossless digital system. The station plays "soft favorites" which includes some newly recorded music. The main T-1 STL consists of an Intraplex encoder/decoder system. The Intraplex system provides L and R audio out into an Orban 8200 processor. The AES/EBU output of the 8200 is fed to the main transmitter's DIGIT™ exciter.

THE TEST SET-UP

For the evaluation, we compared the audio quality of the uncompressed digital 950 MHz system operating closed loop into a dummy load with the "on air" T-1 system.

Occupied bandwidth: Terminating the output of the transmitter through a 20 watt 50 ohm attenuator, then through a precise step attenuator, the output was connected to a spectrum analyzer. The RF spectrum does not look like the "hay stack" that you would normally see from 950 MHz equipment. The energy distribution is very flat across the top and falls off almost vertically at the edges of the channel (300 kHz). It looks more like stacked hay bales as opposed to a hay stack. The cut off on either side of the 300 kHz is very sharp. The total occupied bandwidth of the digital STL fits into a standard 300 kHz, 950 MHz channel.

Fade margin: The attenuated output of the transmitter was removed from the spectrum analyzer and coupled into the receiver. We adjusted the step attenuator feeding the digital STL receiver to provide about the same 200 microvolt signal level being delivered to the backup analog STL. The output was then reduced with a precision step attenuator until just where the error correction circuitry began to operate. This was around 10 microvolts. As the signal level was reduced to 5 microvolts, the receiver muted. We measured about a 30 dB fade margin before receiver mute. The error correction circuit worked very smoothly with no clicks or pops down to the mute point of the receiver.

Operation and diagnostics: The front panel LCD display provides a full array of operating parameters and membrane control buttons. In addition, several diagnostic tools are included to troubleshoot problems. The receiver also stores a history of error corrections.

CONCLUSIONS

We heard no difference between the T-1 system and the uncompressed digital STL system. Comparing music or voice revealed no sonic differences between the two systems. This did not surprise us since both the T-1 system and the new Harris digital STL transport data that is "bit for bit" identical at both ends of the link. Frankly, I was knocked out by the total performance of the system. There is no doubt that the system passes audio quality that Heritage stations have only been able to achieve through the use of non bit rate reduced T-1 systems. In addition to the audio, the system has the promise of greatly improving STL band congestion problems. The first adjacent channel rejection of the system will allow you to use two adjacent channels from the same transmit site to the same receive site with no interference. I think the future is looking very bright for Harris' new uncompressed 950 MHz STL.

NAB '97 - Radio Moves To The South Hall -
Booth 5909 - Las Vegas Convention Center

For demanding, traffic-intensive radio broadcast applications, look for **Orban's** on-air digital delivery system, AirTime. Designed specifically for real-time multitasking network applications, AirTime offers you a choice of four hardware interfaces for adapting operation to the work habits of different personnel. The Sound Cube cart machine emulator mimics the functions of familiar analog cart machines and fits in the same rack space.

510-351-3500; fax 510-351-0500; custserv@orban.com
Circle (157) on Free Info Card

TC Electronic will show the DBMAX digital broadcast maximizer. This product serves three distinct yet interrelated applications equally well. Inserted as the final link in broadcasting, it is the optimal transmission processor, securing a louder, more consistent signal and expanding the actual coverage area. In outside broadcasting, it can solve on-air problem frequencies with selective dynamic equalization. In addition, the unit is a mastering tool for broadcast productions.

805-373-1828; fax 805-379-2648; tc@tcelectronic.com; www.tcelectronic.com
Circle (158 on Free Info Card

NAB TIPS

Kevin McNamara
President,
EXEgesis Technologies,
New Market, MD

WHAT'S GOING TO BE HOT AT NAB 97?
DVD, Internet audio servers, RBDS, digital storage/automation (especially the networked variety) and WAN between facilities.

WHAT'S NOT GOING TO BE HOT AT NAB 97 THAT HAS BEEN IN THE PAST?
Remote ISDN and POTS codecs and CD players (being surpassed by hard-disk and DVD).

WHAT I'LL BE LOOKING FOR AT NAB 97:
Everything I have time to see.

THE CONFERENCE SESSIONS I WANT TO ATTEND:
Presentations on computer networking, marketing skills and any truly new technologies.

WHERE I RECOMMEND HANGING OUT AFTER HOURS:
The Steakhouse in Circus Circus, Ruth's Chris Steakhouse (there are two in town), Tony Roma's, Marie Callender's (for breakfast), Hoover Dam and Lake Mead.

MY TIPS FOR FIRST-TIME ATTENDEES:
When scantily clad models hand you brochures, don't ask for their phone numbers.

MY VIEW OF THE INDUSTRY:
Interestingly, the effects of consolidation in the radio industry are creating more opportunities for people *outside* the station (i.e., contractors, consultants, etc.) than ever existed before *inside* the station.

One Sweet Microphone

At Brüel & Kjaer, The Danish Pro Audio team had a lot of big technical breakthroughs,

But none as big as this.

Introducing one sweet mini, the DPA 4060. This omni expands every performance parameter you can imagine, and some you may not have even thought about.

SMALLER
- 5.4mm capsule and miniaturized clips

BIGGER
- 20Hz-25kHz plus/minus 2dB
- 134 dB dynamic range

LONGER
- non corroding gold diaphragm offers 6 times the life expectancy of current standards.
- high humidity and sweat rejection
- higher sensitivity for lower noise and longer battery pack life

EASIER
- complete with two different equalization grids for alternate body placement
- 48 volt option
- 3 colour options
- lav clips and other accessories available

The Sound. The Price, too hard to believe without a demo.

(ACTUAL SIZE)

Brüel & Kjaer

FOR A DEMONSTRATION PLEASE CONTACT:

Exclusive U.S. Distributor:
Brüel & Kjaer/TGI North America • 300 Gage Avenue, Unit 1 • Kitchener, Ontario, Canada N2M 2C8 • 519 745 1158 • Fax: 519 745 2364

Circle (41) on Free Info Card

See Us At NAB Booth #4006

Problem:

I have a duopoly. I need back-up transmitters for my stations:

Solution:

Don't buy two transmitters — buy ONE!

Our Legend Series, Solid State, FM transmitters are Frequency Agile and Broadband. Your engineer can instantly tune one to any frequency!

We've designed the Legend Series to ensure long transistors life with "wind tunnel" cooling & brute force power supplies.

Legend Transmitters make perfect main transmitters too!

Available from 1KW - 11KW

Two or more stations;
One back-up transmitter.
GREAT IDEA!

Great Products
Great Solutions!

"The Transmitter People"

Energy-Onix
BROADCAST EQUIPMENT CO., INC.

PO BOX 801 ◆ 1306 RIVER ST.
Valatie, NY 12184
Phone 518-758-1690
Fax 518-758-1476
energy-onix @ energy-onix.com

Circle (42) on Free Info Card

NAB TIPS

John H. Battison, P.E.
Consulting Engineer,
John H. Battison &
Associates,
Loudonville, OH

WHAT'S GOING TO BE HOT AT NAB 97?
Digital audio, A/D and D/A converters, digital transmission, satellite DAB and low-power FM.

WHAT'S NOT GOING TO BE HOT AT NAB 97 THAT HAS BEEN IN THE PAST?
Analog technology, the "Mom & Pop" radio station market, proofs of service area, "standard" AM and FM radio, RBDS and EBS.

WHAT I'LL BE LOOKING FOR AT NAB 97:
New transmitters and transmission techniques and improved AM antennas with better radiation control.

THE CONFERENCE SESSIONS I WANT TO ATTEND:
Anything on RF transmission, antennas and modulation devices.

WHERE I RECOMMEND HANGING OUT AFTER HOURS:
Caesar's Palace.

CHANGES I'D LIKE TO SEE MADE AT NAB 97:
Separate radio completely from other disciplines, in its own exhibit area, to minimize walking for radio attendees. Run more hotel and convention-center shuttles and continue them later.

MY TIPS FOR FIRST-TIME ATTENDEES:
Wear loose clothing, *very* comfortable shoes and cut your toenails! Drink plenty of water during the day. Carry aspirin with you, and bring a tape recorder for notes.

MY VIEW OF THE INDUSTRY:
Broadcasting is facing an entirely new future in which it is no longer the "big frog in the small pond." Broadcasters must fight not to be overwhelmed by new media entrants.

At its brand-new stand, **AEV** is exhibiting its software package, VIRTUAL RADIO. The software provides powerful broadcast automation to help you prepare for the digital era. The true 32-bit software development is based on Windows 95 and Windows NT and features multi-user and multitasking for real simultaneous access to audio and data files, Musicam audio coding process, digital recording and editing and unlimited storage capacity.

+39 51 950350; fax +39 51 950201; aevsales@aewv.dsnet.it; www.afair.cou/aev
Circle (159) on Free Info Card

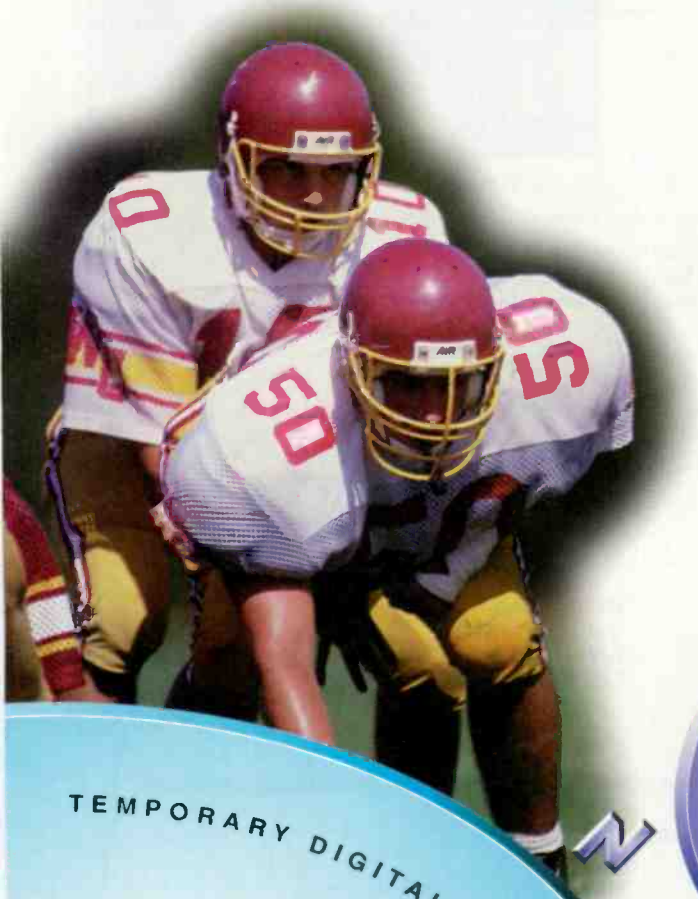
Known for its new technologies, **Broadcast Electronics Inc.** will be showing enhancements that include the AM-10A, 10kW AM transmitter. It offers updated RF amps and power supplies and a compact cabinet at a reduced price, which is something we all like to hear. The Predator, BE's new digital FM transmitter/exciter boasts modular construction and multiple power levels. Also, the new T-series high-power FM transmitters offer updated circuitry with MOSFET drivers.

BE's Digital Studio Systems group is previewing several new AudioVAULT applications, expanding the digital system's software suite. New offerings include a visual cut-and-paste editor, a voice tracking tool, and the StudioBoss studio information manager designed to create paperless studios to integrate various information sources used for show prep.

217-224-9600; fax 217-224-9607; bdcast@bdcast.com; www.bdcast.com
Circle (160) on Free Info Card

Digital audio links

for broadcasters



SWITCHED DIGITAL AUDIO LINKS

BCF256

Over fixed or ISDN links such as those used for studio networking, STLs and temporary outside broadcasts, this full duplex Broadcast Communications Frame facilitates FM quality stereo digital audio up to 20kHz. The new BCF256 provides a host of features including auxiliary data and integral fail-safe ISDN back-up. An optional digital I/O is available.

THE BEST BITS IN DIGITAL AUDIO COME FROM APT

Whatever your broadcast application, only APT provides the most comprehensive, proven and compatible solution to high quality digital audio links. Characterised by the lowest available coding delay - APT codecs provide the most robust and economic audio distribution available, in applications throughout your broadcast operation.

TEMPORARY DIGITAL AUDIO LINKS

DRT128

Designed for the reporter on the move, the DRT128 Digital Reporter Terminal enables speedy direct dial connection to the ISDN through an integral terminal adapter for the simultaneous transmission and reception of broadcast quality audio. Robust and lightweight, the DRT128 provides a variety of transmission options - including stereo.

FIXED DIGITAL AUDIO LINKS

NXL256

The cost effective solution to networking over dedicated links. The NXL256 Broadcast Network Transceiver is an apt-X based codec with provision for back up feed, providing the assurance of programme continuity. A robust and compact codec, the NXL256 is designed for bandwidths from 6.5kHz mono to 15kHz stereo.

APT
AUDIO PROCESSING TECHNOLOGY

Headquarters Tel: +44 0 1232 371110
Japan Tel: +81 3 3520 1020
United States Tel: +1 213 463 2963

URL: http://www.aptx.com

Circle (37) on Free Info Card

An update is now available for the Trak*Star digital multitrack editor from **Arrakis Systems** that backs up any on-air system. Trak*Star is the only multitrack editor that backs up your on-air workstation with live assist, satellite and automation, regardless of the brand of your on-air system. The system features seamless audio scrubbing and audio play with variable speed and direction, digital fader/level control, effects send and receive, auto session backup and edit sessions up to six hours in length.

303-224-2248; fax 303-493-1076
Circle (161) on Free Info Card

To give you AM stations a boost, **Orban** has introduced the OPTIMOD 9200. This fully digital processor was designed specifically for the critical demands of AM radio. It provides maximum signal reach and the best possible audio quality on both voice and music program material. You can operate the OPTIMOD 9200 from remote locations using a standard control or via modem using the Windows-based PC software provided with each unit.

510-351-3500; fax 510-351-0500; custserv@orban.com
Circle (162) on Free Info Card

NAB TIPS

Brian Sanders
Senior Producer,
KNPR-FM,
Las Vegas, NV

WHAT'S GOING TO BE HOT AT NAB 97?
The digital radio station, Internet audio servers/systems, computer-based cart-replacement/program storage systems.

WHAT'S NOT GOING TO BE HOT AT NAB 97 THAT HAS BEEN IN THE PAST?
EAS.

WHAT I'LL BE LOOKING FOR AT NAB 97:
Microphones and mixing consoles.

WHAT I'LL BE CHECKING OUT FOR AN IMMINENT PURCHASE:
Satellite downlink hardware, digital audio workstations, hard-disk recorders and audio production consoles.

THE CONFERENCE SESSIONS I WANT TO ATTEND:
Anything about radio programming and research.

WHERE I RECOMMEND HANGING OUT AFTER HOURS:
Check out the new hotels that have opened since NAB 96: New York, New York, and Monte Carlo (complete with brew pub). The Fremont Street Experience is a four-block long multimedia awning over the old downtown area, which seems to impress engineers. While downtown, try Hugo's Cellar in the Four Queens Hotel for its generous martinis, well-stocked wine cellar and excellent Caesar's salad. Also, downtown is the newly reopened Main Street Station. The Triple Seven Pub offers perhaps the best local microbrew experience. When convention crowds chafe, escape to the brand new Las Vegas Art Museum at the Sahara West Library. Nearby is the Red Rock Recreation area, where you may be tempted to continue west into the spectacular hills and canyons, replete with burro and wild horses. (*Don't* feed them.) For live music, classical fans will enjoy the Emerson String Quartet at UNLV on Saturday (4/5), while jazz buffs can see the Don Menza Quartet at the Riviera on Monday night (4/7). Also at the Riv, Lon Bronson fronts a fantastic R&B showband/review, featuring the best players in town and often a wacky guest artist.

CHANGES I'D LIKE TO SEE MADE AT NAB 97:
More time to see exhibits and more space for the exhibits to reduce crowding at the most popular booths. The Sands expansion is welcome in this respect. (Maybe this year I'll actually get over there.)

MY TIPS FOR FIRST-TIME ATTENDEES:
Pack a sack lunch or bring lots of $$$. Stay away from the gaming tables. Don't depend on cabs — there aren't enough of them for NAB's crowds. Plan on walking a lot. If possible, book your hotel close to one of the convention centers.

RECOMMENDED PREPARATION:
Listen to the new CD-audio adaptation of Hunter S. Thompson's "Fear and Loathing in Las Vegas," starring Harry Dean Stanton.

MY VIEW OF THE INDUSTRY:
In my particular world of non-commercial radio, funding issues are uppermost. I'd like to see more specifics from the FCC on just what is allowed in the areas of listener fund-raising, underwriting and other entrepreneurial ventures.

OMB

OMB America
3100 NW 72 Ave #112
Miami, Florida 33122
Phone: 305-477 0974
Fax: 305-4770611
Toll free: 888-OMB4USA
E-Mail:info@omb.es

BAYS

Stainless steel construction, input connector type N, Maximun input power per Bay 600W, circular and vertical polarization

POWER DIVIDER

Brass made, chrome plated, EIA 7/8 input connector, Broadband 88-108 Mhz, maximun input power 2 Kw, Stainless steel mounting brackets included,double step.

JUMPER CABLES

1/2 inch coaxial cable, included male N connectors

MP 2-4

RADIATING SYSTEMS UP TO 20.000W

PRICE $1,650.00

Offer valid until May 1997

OMB also Manufactures:

- FM transmitters
- TV transmitters
- FM and TV Links
- TV antennas
- Medium power FM antennas
- Connectors

For other radiating systems please contact us

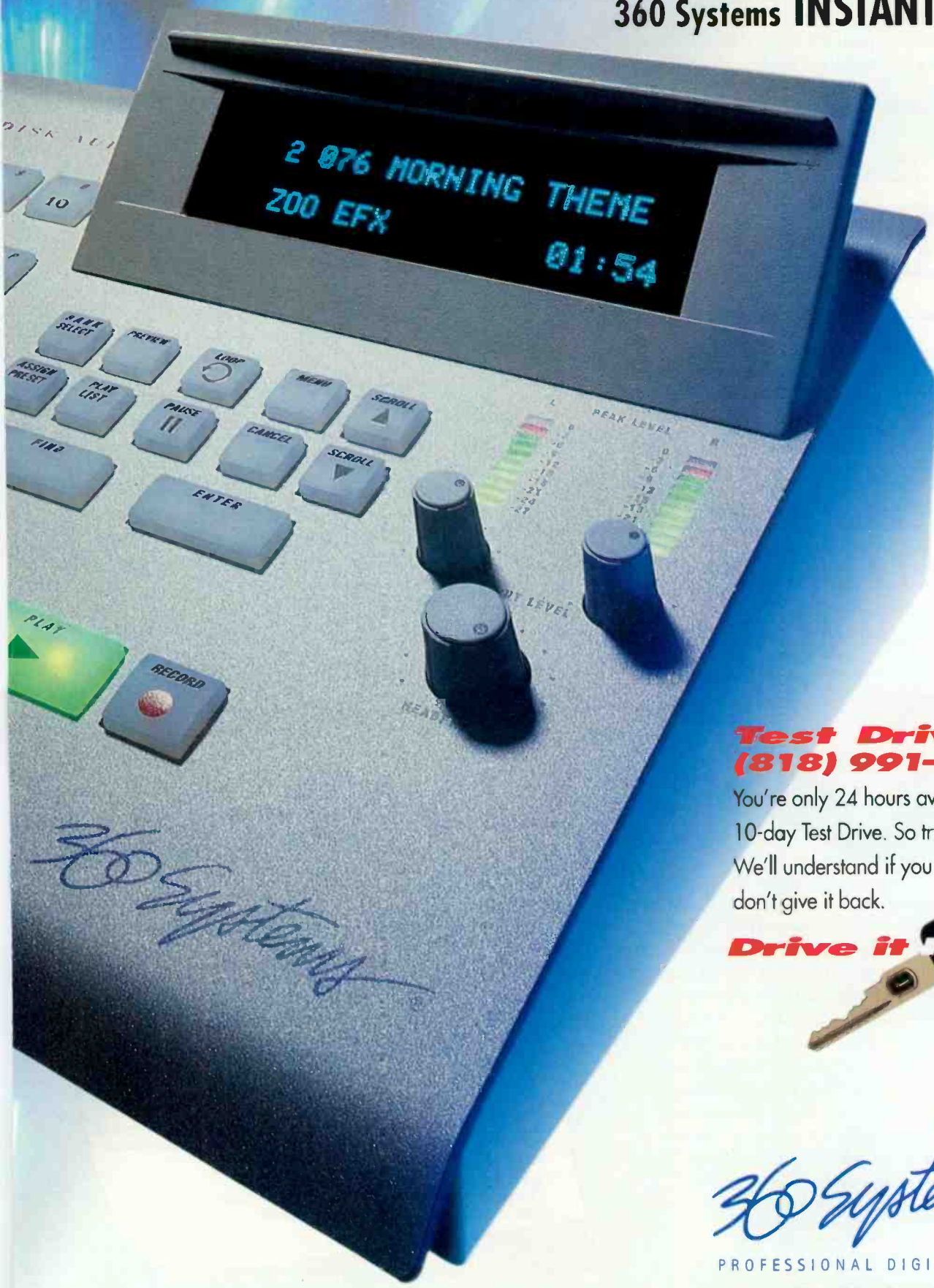
1-888-OMB4USA

Circle (54) on Free Info Card

1000 CARTS IN ONE

HOT LITTLE BOX

360 Systems INSTANT REPLAY®



Test Drive It
(818) 991-0360

You're only 24 hours away from a free 10-day Test Drive. So try it out. We'll understand if you don't give it back.

Drive it Hard.

360 Systems®

PROFESSIONAL DIGITAL AUDIO

Circle (55) on Free Info Card

5321 Sterling Center Drive, Westlake Village CA 91361 USA Voice (818) 991.0360 Fax (818) 991.1360 web: 360systems.com, e-mail: sales@360systems.com

Spectral Inc., known for simple-to-use digital audio workstations, is offering a software application that transfers digital audio directly from a Spectral workstation to Broadcast Electronic's AudioVault digital on-air delivery system through a standard network connection. The AudioVault Transfer Agent software manages the transfer of audio from Spectral AudioEngine or Prisma workstations. The application works concurrently with Spectral's Express broadcast production interface (or Spectral's Producer and StudioTracks XP interfaces) running on Microsoft Windows 3.x or Windows 95.

206-487-2931; fax 206-487-3431; sales@spectralinc.com;
www.spectralinc.com
Circle (163) on Free Info Card

Watch for AirWave, the new on-air broadcast console being unveiled by **Pacific Research & Engineering.** This console was specifically engineered to meet the needs of engineers that are at medium and smaller radio stations. Some standard features include a unique pre-amplifier module that contains five high-performance microphone amplifiers with phantom power, balanced patch points, a stereo program-1, program-2, and monaural output module, a dual remote line selector module, a time-of-day clock and event timer and an easy-to-use telephone module.

619-438-3911; fax 619-438-9277;
info@pre.com; www.pre.com
Circle (164) on Free Info Card

Music Technologies International will be providing music service on the GE Spacenet GStar IV satellite. The company will be offering its unique Bizradio and will also provide a separate ad channel on GStar IV, which will let you receive messages and announcements.

810-827-7788;
fax 810-356-0961
Circle (165) on Free Info Card

NAB TIPS

Yasmin Hashmi
Consultant, SYPHA,
London, England

WHAT'S GOING TO BE HOT AT NAB 97?
Server technology and networking.

WHAT I'LL BE LOOKING FOR AT NAB 97:
Non-linear audio editing and delivery systems.

THE CONFERENCE SESSIONS I WANT TO ATTEND:
Anything about non-linear audio operations.

WHERE I RECOMMEND HANGING OUT AFTER HOURS:
Dive! (a restaurant in the Fashion Show mall).

CHANGES I'D LIKE TO SEE MADE AT NAB 97:
Add another day.

MY TIPS FOR FIRST-TIME ATTENDEES:
Work out who you want to see in advance and pace yourself.

MY VIEW OF THE INDUSTRY:
It's going through a period of metamorphosis from the last throes of analog to the fully digital.

Pacific Research & Engineering will be unveiling its new digital on-air broadcast console, Integrity. The stylish, state-of-the-art console provides a pure digital signal path, while adding new features and functionality. A computer at the heart of the system allows you to easily reconfigure and even automate console settings and functions. Also, Integrity contains an analog subsystem running in parallel with the digital signal path providing a fail-safe backup mechanism to keep the console on the air if the digital path requires service.

619-438-3911; fax 619-438-9277;
info@pre.com; www.pre.com
Circle (166) on Free Info Card

NAB TIPS

Stella Plumbridge
Digital Media
Consultant, SYPHA,
London, England

WHAT'S GOING TO BE HOT AT NAB 97?
The Internet, DVD, digital acquisition.

WHAT I'LL BE LOOKING FOR AT NAB 97:
Non-linear audio editing systems, technologies and tools for broadcasting on the Internet.

THE CONFERENCE SESSIONS I WANT TO ATTEND:
Those at Multimedia World and any Internet sessions.

WHERE I RECOMMEND HANGING OUT AFTER HOURS:
Roulette tables with low minimum stakes.

CHANGES I'D LIKE TO SEE MADE AT NAB 97:
Bring the exhibits back into one hall. Add more seating areas and catering. Provide free roller blades to get around. NAB 97 will be like its predecessors: not enough time and too much to see.

MY TIPS FOR FIRST-TIME ATTENDEES:
Besides wearing comfortable shoes, don't spend too much time in those huge booths so that you miss out on the smaller companies that exhibit *only* at the NAB spring show.

MY VIEW OF THE INDUSTRY:
The whole industry is in a state of flux. It's make-or-break time for many manufacturers and products.

Equi=Tech Corporation is pleased to present its award-winning AC power line products for audio/video applications. These systems are the first in the world that are guaranteed to eliminate electrical noise from electronic signal circuits. Models are available in both rack mount and wall cabinet versions for fast and easy installation. All systems are ETL listed and have been tested to meet ANSI/UL Standard #1012 for power distribution equipment and are wired to meet the provisions of Article 530 Part "G" of the National Electrical Code. Come see us at the NAB Convention in Las Vegas, April 7-10, booth #S-1065 at the Sands and see for yourself what we mean when we say:

"Welcome to AC Power for the 21st Century"

Equi=Tech Corporation • P.O. Box 249 • Selma OR 97538 • Tel: 541/597-4448
FAX: 541/597-4099 • http://www.equitech.com

Circle (67) on Free Info Card

For those of you who like to be in control, check out the AXS Pro Cart digital cart machine from **Electric Works Corporation**. This product was designed for speed and ease of use and includes a fully relational database that tracks all the audio, no matter where it resides on the local area network. Because the database is accessible to all Pro Cart workstations on the LAN, confusion is minimized and everybody has instant access to all available audio cuts. Management, production, traffic and sales people can all review audio cut information across the network.

800-334-7823 or 817-625-9761; fax 817-625-4975; info@electric-works.com; www.electric-works.com/ewc
Circle (167) on Free Info Card

In addition to its other high-level professional microphone products, **Neumann** has added a new AK 20 capsule designed for use with the KM 100 miniature microphone system. Unlike other switchable studio microphones, the AK 20 achieves directional characteristic figure-8 with a single diaphragm. All sound field components reach the 16mm diaphragm directly without the internal path lengths of double diaphragm designs. With the wide range of Neumann KM 100 accessories, the AK 20 capsule can be used as a single microphone suspended from the ceiling, on diverse goosenecks mounted on a floor stand or as a tabletop microphone.

860-434-5220; fax 860-434-3148; www.neumannusa.com
Circle (168) on Free Info Card

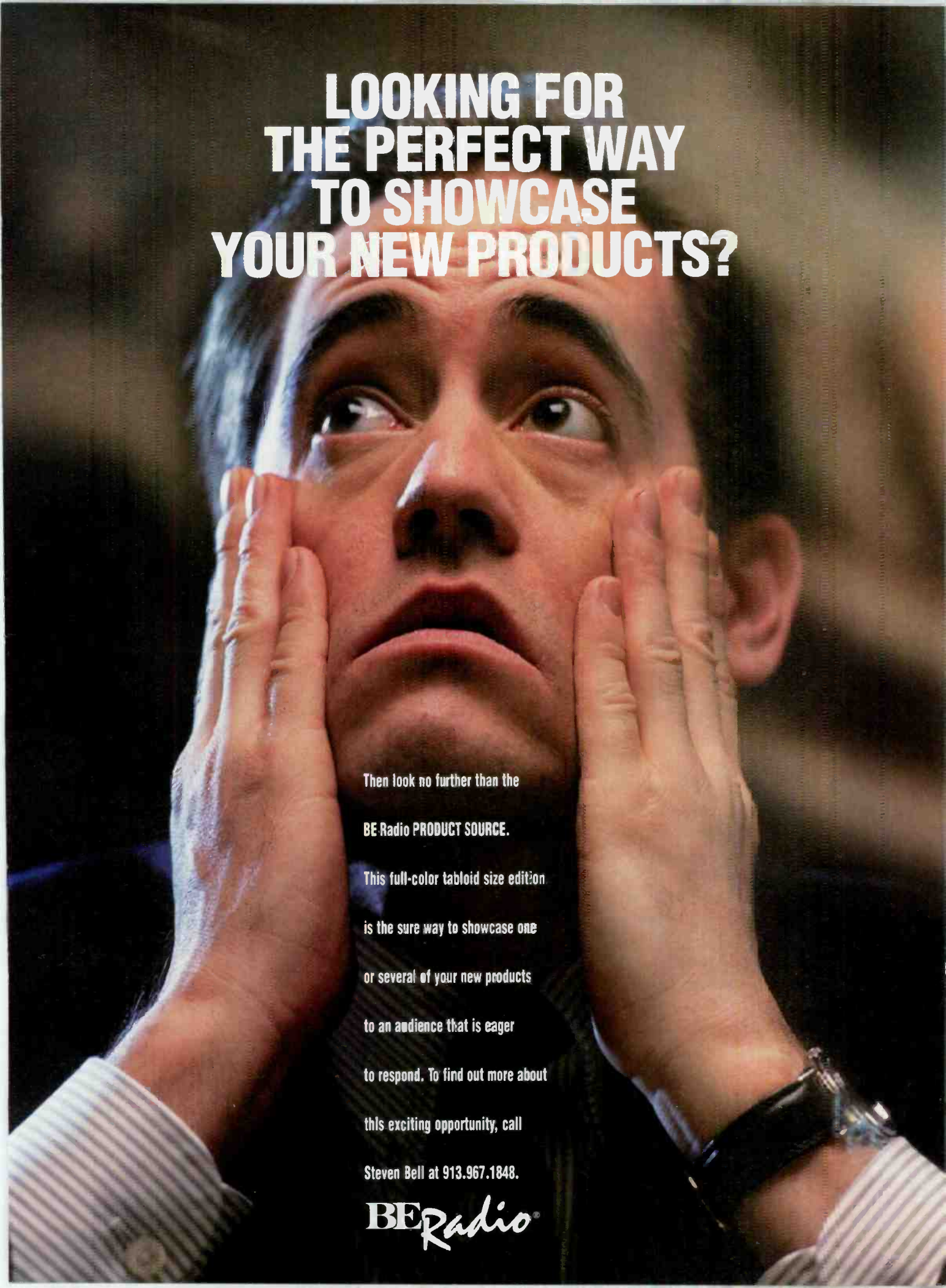
Dalet has a digital audio system that makes for an impressive workflow. TeamRadio is a software package that allows you to effectively manage traffic and billing. Dalet News can provide full integration of text and audio for easy scheduling and airing of news, while the Surfer8 multitrack editor allows you to simultaneously edit and record. If you want to alleviate some of your worries, take a look at NetBack, which offers a powerful backup solution for server failure. And, to keep your station on the cutting edge, you can use the Web Publisher software module to create and maintain a truly active web site.

212-226-2424; fax 212-226-1673; 100437,1536
Circle (169) on Free Info Card

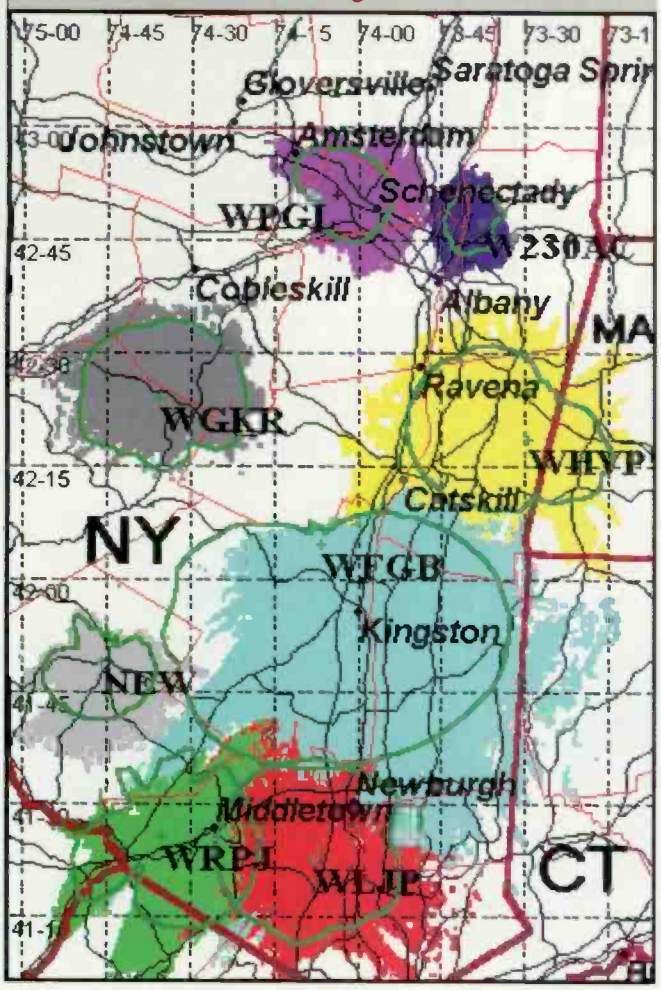
If you are looking for a handtruck that converts to a flatbed cart, **Kart-A-Bag** has the solution — the Kartmaster HD 500S. The streamlined, extruded aluminum and stainless steel unit can carry equipment in the upright mode supported by pneumatic tyres or it can be converted to the four-wheel flatbed mode. In the latter position, the HD 500S can be used with its folding aluminum and steel storage shelves. The bottom shelf slides over the base and locks in place while the top shelf acts as a workstation. A push-button system holds the handles in fully extended and closed positions.

815-723-1940; fax 815-723-2495
Circle (170) on Free Info Card

Circle (68) on Free Info Card


LOOKING FOR
THE PERFECT WAY
TO SHOWCASE
YOUR NEW PRODUCTS?
Then look no further than the
BE Radio PRODUCT SOURCE.
This full-color tabloid size edition
is the sure way to showcase one
or several of your new products
to an audience that is eager
to respond. To find out more about
this exciting opportunity, call
Steven Bell at 913.967.1848.
BE Radio®

ComStudy V 1.50



Here's a Most Likely Server study of eight FM's

RadioSoft proudly releases ***ComStudy*** V 1.50!

Over 4 years in the making, it is the hottest, most advanced software ever created for AM, FM, TV, Paging and all Land Mobile applications. It is designed for Site Owners, Networks, Radio Engineers, Managers, Paging, Cellular and PCS Operators, Coordinators, Brokers, Lawyers and Consultants. Easy to Learn! Instant Coverage Mapping! Totally User Friendly! Many Overlays!

- Uses latest tiling techniques for shadowing
- Has correct propagation models for all services
- Directional Antennae and MultiSite plots
- Choose color, label, font, underlay and overlays
- Too many features to fit in this ad!

PRICED TO SELL! DISCOUNTED PRICES FOR ALL USERS OF RADIO COVERAGE SOFTWARE!

Seeing is Believing!

Call anytime for no cost demo or information:
RadioSoft: Phone 888.RADIO95, Fax: 904.423.0821,
109 West Knapp Avenue, Edgewater, FL 32132
email: pmoncure@america.com

... a ***Customer Friendly*** Company

Circle (70) on Free Info Card

Marti Electronics knows that breaking news doesn't just happen in the studio, and its Smarti and Cellcast products allow remote transmissions from wherever you need it. The Smarti telephone remote pick-up delivers true broadcast-quality audio over standard analog telephone lines. The newly acquired Cellcast-remote broadcast studio incorporates a 3W cellular telephone, four-channel mixer and a frequency extender, so you can be on-air by cellular phone from any location.

817-645-9163; 817-641-3869; marti@bdcast.com;
www.marti.bdcast.com

Circle (171) on Free Info Card

Audioarts Engineering, a division of **Wheatstone Corporation**, is showcasing the R-5 on-air radio console. It delivers better than 16-bit digital audio performance and features simple installation. Among its features, the R-5 has two pairs of Sifam VU meters for stereo program and audition, and you can easily identify the LED-illuminated switches. The R-5 also includes the Simple Phone mix-minus feature that simplifies your multiple call-in operations.

315-452-5000; fax 315-452-0160; wheatstone@aol.com

Circle (172) on Free Info Card

Aphex Systems has announced its newest addition, the model 2020 FM Pro digitally controlled FM audio processor designed for today's professional FM broadcaster. The FM Pro provides sound designers with the tools to design a truly unique and competitive on-air sound tailored to a specific market and format. It is fully programmable, remotely operable and day-part automatable.

818-767-2929; fax 818-767-2641; www.aphexsys.com

Circle (173) on Free Info Card

Experience surround sound using normal stereo headphones with LUCAS, a Dolby Surround sound processor from **Sennheiser**. It provides an authentic five-channel home theater environment with the use of personal stereo headphones. When LUCAS is connected between a stereo television or hi-fi video recorder and headphones, you can hear five virtual loudspeakers — left, center, right and two surrounds. To customize the sound, LUCAS provides 15 pre-programmed sets of "virtual ears" that you can choose from to select your listening preference.

860-434-9190; fax 860-434-1759; www.sennheiserusa.com

Circle (174) on Free Info Card

Increase Your Footprint

Capture the Audience!
It's *your* Listeners. *Your* Viewers.
Make them *Stay With You!*
The *DBMAX*™ Digital Broadcast Maximizer gives you *the impact you need* to reach them!

The *DBMAX* is an innovative no-compromise digital audio processor with excellent sound features, that will interface with all analog and digital broadcast formats.

The *DBMAX* was developed in close cooperation with chief engineers at broadcast facilities world-wide, resulting in a combination of three powerful broadcasting tools in one compact, easy-to-use unit:

Transmission Processor:

- Transparent multiband on-air dynamics processing
- Expansion of the broadcast coverage area, by providing better signal to background noise ratio for all receivers
- Easily adapts to any broadcast standard - all pre-programmed and easy to set up

A Sound Investment!

Inserted as the final audio link in the broadcasting chain, the *DBMAX* maximizes your audio modulation. It provides excellent sound optimization in AM and FM broadcast as well as DAB and digital TV audio transmission. Here the *DBMAX* becomes the optimal Transmission Processor, ensuring a louder and more consistent signal, thereby expanding the actual coverage area. Better coverage means you get better ratings, which in turn makes the *DBMAX* extremely good value!

Outside Broadcast Tool:

- Louder, clearer and punchier signal
- Dynamic compression of spot/trouble frequencies (air conditioning etc.)
- Ensures that dynamic levels are within your station's standard
- Automatic Gain Control for unattended operation

Reliability You Can Back-up!

Years of research and experience in digital compression and limiting techniques for CD mastering have led TC Electronic to the development of the three-band *DBMAX* processor. Reliability and interchangeability is equally important for Outside Broadcasting, so we made sure the information you store on your PC-card will make any *DBMAX* run 100% according to your specific settings. In turn it makes the PC-card an ideal back-up media for your *DBMAX*.

Radio, TV & Film Post Production Optimizer:

- Louder, crisper, warmer, punchier, more subtle, more spectrally-balanced production – the choice is yours...
- Finalizes the material
- Makes it possible to check what the sound will be like after transmission

Put Yourself in the Place of Your Listener

Used as a Post Production Tool the *DBMAX* gives the production engineer the ability to hear exactly what the program material will sound like as received by the listener. The *DBMAX* allows transmission-settings to be copied to the production suites, enabling engineers with a *DBMAX* to listen to the final transmitted signal during the production phase. This way you can make sure your listeners receive the signal you intended them to receive!

t.c. electronic
THE IMAGE SOUND MACHINE

20 years 1976

TC Electronic Inc., 790-H Hampshire Road, Westlake Village, CA 91361, USA • Telephone: (805) 373 1828 • Fax: (805) 379 2648
Email:info@tcelectronic.com • WWW: http://www.tcelectronic.com
TC Electronic A/S, Sindalsvej 34, DK-8240 Risskov, Denmark • Telephone: +45 8621 7599 • Fax: +45 8621 7598

Circle (81) on Free Info Card

CONFERENCE TIMETABLES

BROADCAST ENGINEERING CONFERENCE

	Sat. 4/5	Sun. 4/6	Mon. 4/7	Tues. 4/8	Wed. 4/9
9:00	RADIO TECHNOLOGY TUTORIAL: Part 1	KEYNOTE	ALL-INDUSTRY OPENING AND KEYNOTE ADDRESS	DESIGNING RADIO FACILITIES: Part 1	RADIO TECHNICAL/ REGULATORY ISSUES
10:00		DIGITAL SOUND BROADCASTING: Testing and regulatory issues	AUDIO PROCESSING: Competing with digital services		
11:00					
12:00					TECHNOLOGY LUNCHEON
12:30					
1:00					
1:30					
2:00	RADIO TECHNOLOGY TUTORIAL: Part 2	DIGITAL SOUND BROADCASTING: Implementing new technology	BROADCAST TOWERS: Maximizing your vertical real estate	DESIGNING RADIO FACILITIES: Part 2	RADIO TECHNICAL/ REGULATORY ISSUES
3:00					
4:00					
5:00					6:00 HAM RADIO RECEPTION

RADIO MANAGEMENT/ RAB CONFERENCE

	Sun. 4/6	Mon. 4/7	Tues. 4/8	Wed. 4/9
9:00			THE STATE OF RADIO SALES	RADIO STATION TOURS (9:00 - 12:00)
10:00		INTERNET WORKSHOP	ELECTRONIC MIRACLES THAT ARE REVOLUTIONIZING RADIO SALES	POSITIONING RADIO WITH NEWSPAPER ADVERTISERS (9:00 - 12:30)
11:00		POWERFUL PROMOTIONS	BREAKING REVENUE BARRIERS WITH YIELD MANAGEMENT	
12:00		HOW TO MAKE YOUR PRODUCTION SIZZLE	RADIO LUNCHEON	
12:30		BRIDGING THE GAP BETWEEN PROGRAMMING & SALES		GENERATING REVENUE W/O NUMBERS IN SMALL MARKETS
1:00				RECRUITING & HIRING THE BEST & BRIGHTEST
1:30	RADIO/AUDIO HALL SNEAK PREVIEW	THE COMPETITIVE BENEFITS OF COMMUNITY SERVICE	LUCE'S LEADERSHIP LAWS	
2:00		QUALITATIVE RESEARCH IN SMALL & MEDIUM MARKETS	SMALL MARKET SALES--LARGE MARKET RESULTS	CASH IN THE BANK "THREE P" MAGIC IN SMALL MARKETS
3:00	SMALL/MEDIUM MARKET IDEA SWAP	25 MANAGEMENT TECHNIQUES FOR SUCCESS		
4:00		TOWER & SUBCARRIER LEASES MADE SIMPLE		
5:00	RADIO OPENING RECEPTION			

UPLINK '97: INTERNATIONAL SATELLITE CONFERENCE

	Mon. 4/7	Tues. 4/8
8:00		BREAKFAST RECEPTION (LVCC)
9:00	ALL-INDUSTRY OPENING AND KEYNOTE ADDRESS	MEDIA SATS FOR THE NEW MILLENNIUM (LVCC)
10:00		(break) Meet the panel (LVCC)
11:00		EMERGING SATELLITE TECHNOLOGIES & THEIR IMPACT ON THE TELECOMMUNICATIONS BUSINESS (LVCC)
12:00		NAB COMMUNICATIONS & CONNECTIVITY '97 JOINT LUNCHEON (LVCC)
1:00		
2:00	GLOBAL INDUSTRY SATELLITE LEADERS: Views of the 21st century (Sands)	DIRECT-TO-HOME TV AROUND THE WORLD (LVCC)
3:00	(break) Meet the panel (Sands)	(break) Meet the panel (LVCC)
4:00	SATELLITES FOR PEOPLE ON THE MOVE (Sands)	SATELLITES IN THE TELECOMMUNICATIONS REVOLUTION (LVCC)
5:00	NAB Communications & Connectivity '97 Joint opening reception - SAT pavilion (Sands)	NAB COMMUNICATIONS & CONNECTIVITY '97 JOINT RECEPTION (LVCC)

BROADCASTERS' LAW & REGULATION CONFERENCE

	Mon. 4/7	Tues. 4/8	Wed. 4/9
8:00		7:30 - 8:45 FCC CHAIRMAN'S BREAKFAST	
9:00	ALL-INDUSTRY OPENING AND KEYNOTE ADDRESS	FCC EQUAL EMPLOYMENT OPPORTUNITY OBLIGATIONS IN THE 1996's: Changes ahead?	UPGRADING YOUR RADIO STATION: A manager's guide
10:00	DUOPOLIES, LMAs & OWNERSHIP CHANGES		AVOIDING FCC FINES: A commission rule enforcement primer
11:00	DON'T LET A LIBEL OR PRIVACY SUIT SANDBAG YOUR STATION'S BOTTOM-LINE OR REPUTATION		
12:00			
12:30	CONTESTS, LOTTERY AND CASINO ADS, PLUS STATION PROMOTIONS		THE HITS KEEP COMING: Radio music licensing, your money and managing both to win (1:00 - 2:15)
1:00			
1:30		ANTITRUST PRIMER FOR BROADCASTERS	MARKETING & MANAGING SPECIAL EVENTS AND PROMOTIONS (1:00 - 3:00)
2:00	SMALL & MEDIUM MARKET STATION FINANCING	HIRE'S RADIO ABROAD: Acquiring a business interest in broadcasting	
3:00		REGULATORY DIALOGUE COFFEE BREAK	
4:00		REGULATORY DIALOGUE	
5:00			

ELECTRONIC DISTRIBUTION CONFERENCE

	Mon. 4/7	Tues. 4/8	Wed. 4/9
9:00	ALL-INDUSTRY OPENING AND KEYNOTE ADDRESS	BROADBAND DELIVERY OPTIONS (Sands)	WIRELESS INTERNET ACCESS: Where is it? (Sands)
10:00		WIRELESS SERVICES FOR BUSINESS (Sands	(break) Meet the panel (Sands)
11:00			PORTABLE CONNECTIVITY DISTRIBUTING BROADCAST QUALITY AUDIO & VIDEO (Sands)
12:00		NAB Communications & Connectivity '97 Joint luncheon (LVCC)	
1:00			CELLULAR & PCS DATA APPLICATIONS (Sands) COPPER VS. FIBER (Sands) THE FIBRE CHANNEL SEMINAR (Sands)
2:00	OPENING SESSION: Moving toward a wireless society (Sands)	DIRECT-TO-HOME TV AROUND THE WORLD LVCC)	(break) Meet the panel (Sands)
3:00	(break) Meet the panel	WIRELESS AND BROADCASTING: Where are the synergies? What are the differences? (LVCC)	ELECTRONIC PRODUCT DELIVERY SOLUTIONS (Sands) THE FIBRE CHANNEL SEMINAR (Sands)
4:00	SATELLITES FOR PEOPLE ON THE MOVE (Sands)		
5:00	NAB Communications & Connectivity '97 Joint opening reception (Sands)	NAB Communications & Connectivity '97 Joint opening reception (LVCC)	NAB Communications & Connectivity '97 Joint opening reception

INTERNET BUSINESS CONFERENCE

	Sat. 4/5	Sun. 4/6	Mon. 4/7	Tues. 4/8	Wed. 4/9	Thur. 4/10
9:00			ALL-INDUSTRY OPENING AND KEYNOTE ADDRESS	MULTIMEDIA WORLD KEYNOTE ADDRESS		USING THE WEB TO INCREASE RATINGS
10:00						
11:00				WEBBUSINESS: Investments/ partnerships/ alliances	VRML: 3D moving worlds BRANDING IN CYBERSPACE: Success stories on the Internet	
12:00						
1:00	INTERNET SITE DESIGN: Do it yourself or send it out	HOT PRODUCTS: The add-in showcase ENHANCING YOUR BUSINESS WITH INTRANETS		WEBCASTING: Is it ready for prime time? THE DANGERS OF INTERNET COMMERCE: Pitfalls to avoid	DESIGNING WEB SITES THAT SELL THERE'S MORE TO A WEB SITE THAN MEETS THE EYE	
2:00						
3:00	GREAT EXPECTATIONS A reality check	COOL SITES ON THE WEB LEVERAGE YOUR CORPORATE DATABASE: Integrate it with the Internet	TRENDS IN INTERNET TECHNOLOGY MARKETING ON THE WEB: Direct marketing and customer support	ENTERTAINMENT PROGRAMMING ON THE WEB CONDUCTING MARKET RESEARCH ON THE WEB	THE DESIGNER'S TOOLBOX: Techniques for graphic design CHANNELING TRAFFIC TO YOUR WEBSITE	
4:00						
5:00			6:00 MULTIMEDIA WORLD RECEPTION			

AUDIO ACCESSORIES

Broadcast Electronics	1207
Wheatstone Corporation	1212
Dan Dugan Sound Design	1404
Svetlana Electron Devices	1424
VideoQuip Research Ltd.	1502
Illbruck	1512
KRK Systems/Group One Ltd.	1514
Professional Sound Corporation	1517
Inovonics Inc.	1612
Penta Laboratories	1720
t.c. electronic	1721
Symetrix	1817
LPB Inc.	1900
Circuit Research Labs	2106
Electric Works	2328
Logitek	2521
Continental Electronics	2606
Yamaha Corporation of America	3021
Musicam USA/CCS	3306
Penny & Giles	3424
Radio Design Labs - RDL	3724
Rycote Microphone Windshields	3726
Henry Engineering	4012
Eventide	4101
Horita	5155
Acoustic Systems	5255
ATI Audio Technologies	5527
Whirlwind	5747
Pixel Instruments	6060
R-Columbia Products	6745
Sennheiser Electric	6760
JBL Professional	6940
AKG Acoustics	6948
TASCAM	6952
Wireworks	7206
Dorrough Electronics	7209
Acoustical Solutions	7218
TDC Tally Display Corporation	8679
NVISION	9681
Ward-Beck Systems	11025
Avitel Electronics	11570
ASACA ShibaSoku	11914
Wohler Technologies	LA 501, 9773
JLCooper Electronics	M 7645
Mackie Designs	M 8038
Dolby Labs	S 206, 8940
JK Audio	S 1631
Korg USA Inc.	S 5763

AUDIO DATA COMPRESSION EQUIPMENT

Computer Concepts	2024
Comrex	2121
Electric Works	2328
MediaTouch	3621
Intraplex	3901
Digigram	3912
Nagra Kudelski SA	7005
Thomson Broadcast	7414
Leitch Inc.	8640
ASC Audio Video Corporation	9258
RF Technology	11910
ASACA ShibaSoku	11914
Wegener Communications	11940
Sencore/AAVS	11976
Xing Technology	I 4853
Telos Systems	I 5250, 3006
Dolby Labs	S 206, 8940
IBM Telecommunications	S 2219
Deutsche Telekom	S 2863
Inteisis Sistemas Inteligentes	S 3766
RE America	S 4068

AUDIO MIXERS-ON AIR

Broadcast Electronics	1207
Wheatstone Corporation	1212
AEV Snc di Vaccari GEC	1818
LPB Inc.	1900
Studio Technologies	2104
Dongseo Electronics	2426
Logitek	2521
Continental Electronics	2606
Solid State Logic	2612
Pacific Research & Engineering	2618
Euphonix	3318
Autogram Corporation	3906
Sierra Automated Systems	4027
ATI Audio Technologies	5527
JBL Professional	6940
AMEK Consoles	7343
Lectrosonics	8372
NVISION	9681
Otari	10580
Ward-Beck Systems	11025
AAVS/Sencore	11976
Mackie Designs	M 8038

AUDIO MIXERS-PORTABLE, STUDIO

Broadcast Electronics	1207
Wheatstone Corporation	1212
Cooper Sound Systems	1404
Coffey Sound Service	1428
VideoQuip Research Ltd.	1502
Bradley Broadcast Sales	1506
Professional Sound Corporation	1517
Fidelipac	1902
Comrex	2121
Arrakis Systems	2406
Link Communications SA	2412
AEQ	2412
Audio Developments	2424
Dongseo Electronics	2426
Continental Electronics	2606
Solid State Logic	2612
Location Sound	2627
Auditronics	3018
Yamaha Corporation of America	3021
Harrison by GLW Inc.	3315
Euphonix	3318
Radio Design Labs - RDL	3724
Autogram Corporation	3906
Henry Engineering	4012
Aphex Systems	4103
RAM Broadcast Systems	4109
ATI Audio Technologies	5527
Shure Brothers	5613
Whirlwind	5747
Fostex	6357
JBL Professional	6940
TASCAM	6952
AMEK Consoles	7343
AMS Neve plc	8810
Micron Audio Products	8876
Zaxcom	10270
Otari	10580
Graham-Patten Systems	10976
Ward-Beck Systems	11025
Mackie Designs	M 8038
JK Audio	S 1631
Calrec	S 3976
Korg USA Inc.	S 5763
Soundtracs USA	S 5763

AUDIO PROCESSING, CONVERSION

Dan Dugan Sound Design	1404
Bradley Broadcast Sales	1506
Focusrite Audio/Group One Ltd.	1514
Inovonics Inc.	1612
Apogee Electronics	1718
t.c. electronic	1721
Audio Processing Technology Ltd.	1727
AEV Snc di Vaccari GEC	1818
Gorman-Redlich Mfg Company	1910
Superscope Technologies/Marantz	2102
Circuit Research Labs	2106
Gentner Communications Corp.	2117
Electric Works	2328
Orban	2402
Continental Electronics	2606
Pacific Research & Engineering	2618
Radiomation/Div. of Rosputin	2926
Cutting Edge Technologies	3006
Musicam USA/CCS	3306
Penny & Giles	3424
Roland Corporation US	3612
Alesis	3618
Radio Design Labs - RDL	3724
Intraplex	3901
Harris Corp. / Broadcast Div.	5909, M 6628
Sony Broadcast Products	5929
Pixel Instruments	6060
AMEK Consoles	7343
Leitch Inc.	8640
Benchmark Media Systems	8664
NVISION	9681
Zaxcom	10270
Modulation Sciences	11253
AAVS/Sencore	11976
Wohler Technologies	LA 501, 9773
Dolby Labs	S 206, 8940
Axon Digital Design	S 1049
Audio Intervisual Design/Sanken	S 3638, 8777
Calrec	S 3976

AUDIO RECORDING, STORAGE & PLAYBACK

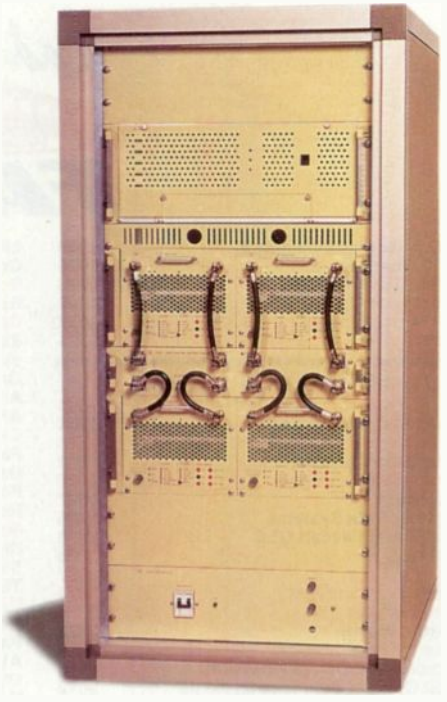
DENON	1021
ENCO Systems	1024
Broadcast Electronics	1207
Radio Computing Services	1216
Coffey Sound Service	1428
Bradley Broadcast Sales	1506
HHB Communications Ltd.	1524
Doremi Labs	1619
360 Systems	1724
Sprague Magnetics	1822
Fidelipac	1902
Crouse-Kimzey Company	1907
Audi-Cord	2006
Scott Studios	2007
Broadcasters General Store	2019, 8865
Computer Concepts	2024
TimeLine	2027
Superscope Technologies/Marantz	2102
dbm Systems	2326
Electric Works	2328
AKAI Digital	2524
Continental Electronics	2606
Solid State Logic	2612
Radiomation/Div. of Rosputin	2926
TM Century	3001
Yamaha Corporation of America	3021
Roland Corporation US	3612
Alesis	3618
MediaTouch	3621
Digigram	3912
Henry Engineering	4012
SMARTS Broadcast Systems	4014
Harris Corp. / Broadcast Div.	5909, M 6628
Computer Expressions	6061
DRS Ahead Technology	6211
Rorke Data	6232
Fostex	6357
McCurdy Radio Industries	6917
Studer	6948
TASCAM	6952
Nagra Kudelski SA	7005
AMS Neve plc	8810
Zaxcom	10270
Otari	10580
AAVS/Sencore	11976
Dolby Labs	S 206, 8940
Pristine Systems	S 1935
Gefen Systems	S 3026, 1621

AUDIO ROUTING AND DISTRIBUTION

Wheatstone Corporation	1212
VideoQuip Research Ltd.	1502
Professional Sound Corporation	1517
360 Systems	1724
Computer Concepts	2024
Studio Technologies	2104
Switchcraft	2924
Auditronics	3018
Burk Technology	3524
MediaTouch	3621
Radio Design Labs - RDL	3724
Autogram Corporation	3906
Henry Engineering	4012
SMARTS Broadcast Systems	4014
Sierra Automated Systems	4027
ATI Audio Technologies	5527
Whirlwind	5747
Audio Accessories	5759
Lectrosonics	8372
Leitch Inc.	8640
Tekniche Ltd.	8817
OpAmp Labs	8884
Link Electronics	9081
Telecast Fiber Systems	9281
NVISION	9681
Ward-Beck Systems	11025
Pro-Bel Ltd.	11501
Avitel Electronics	11570
Sandar Electronics A/S	11864

Colored listings indicate issue advertisers

Itelco 1961-1996 35 years of experience



200 W L band DAB Transmitter

- **Modular design**
- **Reduced dimensions**
- **Perfect signal**
- **Fully reprogrammable***

* under patent

To get an optimized **DAB** transmitter we have simply followed the ingenuity of our design rules

Itelco for Digital Broadcasting

itelco

For further details please contact:

Central and South America Itelco USA Inc. 8280 N.W. 27th street, Suite 501, Miami FL • phone 305 7159410, fax 305 7159414

North America and Canada Itelco USA Inc. 9035 Wadsworth Pkwy, Suite 4450, Westminster CO • phone 303 4311699, fax 303 4312868

International Itelco S.p.A. via dei merciari, s.n.c. - P. O. Box 16 - zona industriale, Sferracavallo - Orvieto (TR) Italy phone +39 763 316231 • Fax +39 763 316236 Telex 661013 Itelco

Circle (71) on Free Info Card

ADC Telecommunications 11958
AAVS/Sencore 11976
Wohler Technologies LA 501, 9773
Rean Products S 1062
AVP Mfg. & Supply S 3020
Bittree S 3775

AUTOMATION SYSTEMS

ENCO Systems 1024
Broadcast Electronics 1207
Radio Computing Services 1216
VideoQuip Research Ltd. 1502
Dalet Media System 1519
Datacount 1527
Register Data Systems 1706
AEV Snc di Vaccari GEC 1818
LPB Inc. 1900
Scott Studios 2007
Computer Concepts 2024
dbm Systems 2326
Electric Works 2328
Orban 2402
Radiomation/Div. of Rosputin 2926
CBSI Custom Business Systems 3012
MediaTouch 3621
Digigram 3912
SMARTS Broadcast Systems 4014
Prophet Systems 4106
McCurdy Radio Industries 6917
CEA Digital Newsroom System 9661
AAVS/Sencore 11976
Pristine Systems S 1935
Pioneer New Media Technologies S 2738
Louth Automation S 3619

COMPUTERS AND PERIPHERALS

Broadcast Electronics 1207
EDX Engineering 1624
Register Data Systems 1706
LPB Inc. 1900
dbm Systems 2326
Electric Works 2328
MediaTouch 3621
Rorke Data 6232
CEA Digital Newsroom System 9661
Quantum Corporation M 6541
JLCooper Electronics M 7645
JMR Electronics M 7938
Pristine Systems S 1935
IBM Telecommunications S 2219
British Information Services S 4858
Pulizzi Engineering S 6129

DEALERS AND DISTRIBUTORS

Audiomation Systems/Sellmark 1301
Coffey Sound Service 1428
Bradley Broadcast Sales 1506
Professional Sound Corporation 1517
HHB Communications Ltd. 1524
QEI 1709
Crouse-Kimzey Company 1907
Broadcasters General Store 2019, 8865
Broadcast Supply Worldwide/BSW 2112
Radio Express 2421
Continental Electronics 2606
Location Sound 2627
Audio Broadcast Group 3840, 4850
TBC Consoles 5441
Harris Corp./ Broadcast Div. 5909, M 6628
Broadcast Store 8666
Jensen Tools Inc. 8860
IRT Electronics Pty Ltd. 8864
Antenna Technology Corp./ATCi 10358, S3063
RF Technology 11910
GEPCO International Inc. 11984
Zack Electronics M 7269
Axon Digital Design S 1049
Herman Electronics S 3121
TAI Audio S 6033

DIGITAL AUDIO WORKSTATIONS

SADiE 1001
ENCO Systems 1024
Broadcast Electronics 1207
VideoQuip Research Ltd. 1502
Dalet Media System 1519
Doremi Labs 1619
Register Data Systems 1706
360 Systems 1724
LPB Inc. 1900
Crouse-Kimzey Company 1907
Scott Studios 2007
Broadcasters General Store 2019, 8865
Computer Concepts 2024
Studio Technologies 2104
dbm Systems 2326
Orban 2402
Arrakis Systems 2406
AKAI Digital 2524
Continental Electronics 2606
Pacific Research & Engineering 2618
Radiomation/Div. of Rosputin 2926
Penny & Giles 3424
Roland Corporation US 3612
MediaTouch 3621
Digigram 3912
SMARTS Broadcast Systems 4014
TBC Consoles 5441
Harris Corp. / Broadcast Div. 5909, M 6628
Nagra Kudelski SA 7005
Fairlight ESP Pty Ltd. 8276
AVID Technology 9940
Otari 10580
Merging Technologies M 6673
Innovative Quality Software M 6860
Soundscape Digital Technology M 7666
Mackie Designs M 8038
Pristine Systems S 1935
Gefen Systems S 3026, 1621
Sonic Solutions S 4132
Korg USA Inc. S 5763

INTERCOM, IFB PRODUCTS, HEADSETS

Coffey Sound Service 1428
Professional Sound Corporation 1517
Studio Technologies 2104
Comrex 2121
Sierra Automated Systems 4027
R-Columbia Products 6745
Telex Communications 8510
Telecast Fiber Systems 9281
Ward-Beck Systems 11025
Anchor Communications 11170
Systems Wireless 11259
Pro-Bel Ltd. 11501
Clear-Com Intercom Systems 11565
JK Audio S 1631

MICROPHONES AND ACCESSORIES

Coffey Sound Service 1428
Professional Sound Corporation 1517
Crown International 2418
Continental Electronics 2606
Location Sound 2627
Alesis 3618
Rycote Microphone Windshields 3726
Audio Ltd. 3727
Schoeps/Posthorn Recordings 4842
beyerdynamic 5505
Shure Brothers 5613
Audio-Technica US 6311
Connectronics 6512
R-Columbia Products 6745
Sennheiser Electric 6760
Neumann USA 6760
Nady Systems 6808
AKG Acoustics 6948
AMEK Consoles 7343
Lectrosonics 8372
Telex Communications 8510
Countryman Associates 8751
Micron Audio Products 8876
Systems Wireless 11259
Azden Corporation S 1260
Audio Intervisual Design/Sanken S 3638, 8777

MICROWAVE, FIBER-OPTIC AND TELCO EQUIPMENT

DB Elettronica 1027
Broadcast Electronics 1207
QEI 1709
AEV Snc di Vaccari GEC 1818
Comrex 2121
Marti Electronics 2202
Utility Tower 2204
Moseley Associates 2602
TFT Inc. 3003
CTE International 3824
Intraplex 3901
TWR Telecom/Lighting 3904
CPI Eimac Division 5604
ITELCO SpA 5742
Leitch Inc. 8640
IRT Electronics Pty Ltd. 8864
Telecast Fiber Systems 9281
Andrew 11054
RF Technology 11910
ADC Telecommunications 11958
Italiana Ponti Radio SRL 11973
GEPCO International Inc. 11984
Telos Systems I 5250, 3006
Frontline Communications LB 204, 11970
SSE Telecom M 7747
Axon Digital Design S 1049
Fiber Options S 3538
Inteisis Sistemas Inteligentes S 3766
Delco Wire & Cable S 3972
RE America S 4068

POWER AND POWER-CONDITIONING PRODUCTS

Coffey Sound Service 1428
Professional Sound Corporation 1517
Superior Electric/Warner Electric 1626
Hipotronics 1917
Northern Technologies 1918
Kay Industries 4116
Lightning Eliminators & Consultants 8756
Control Concepts 9658
CEA Digital Newsroom System 9661
Anton/Bauer 10728
Staco Energy Products 11486
Genelec M 8168
Equi-Tech Corporation S 1065
Best Power Technology S 4367
Pulizzi Engineering S 6129

RADIO TRANSMITTERS, TRANSLATORS AND ANTENNAS

DB Elettronica 1027
Broadcast Electronics 1207
Teracom Components 1324
Svetlana Electron Devices 1424
Armstrong Transmitter 1601
Inovonics Inc. 1612
GEC-Marconi Comm. Systems 1701
QEI 1709
RYMSA (Radiacl=n y Microondas) 1712
Central Tower 1717
Penta Laboratories 1720
LPB Inc. 1900
Link Communications SA 2412
Continental Electronics 2606
CCA Electronics 3009
Omnitronix 3426
RF Plante Ind Com Ltda 3527
Elenos SRL 3601
BEXT 3603
Nautel 3606
Kintronic Laboratories 3609
Electronics Research - ERI 3615
CTE International 3824
TWR Telecom/Lighting 3904
Econco Broadcast Service 3916
Energy-Onix 4006
OMB America 4024
Micro Communications 5607
ITELCO SpA 5742
Harris Corp./Broadcast Div. 5909, M 6628
Jampro Antennas Inc. 6709
R-Columbia Products 6745
Thomcast France 7414
Dielectric Communications 7976
Scala Electronic 9053
LDL Communications Inc. 9953
Electronic Associates 11334
Cablewave Systems 11954
Italiana Ponti Radio SRL 11973
Deutsche Telekom S 2863
ABS spa S 4063

RECORDING MEDIA AND ACCESSORIES

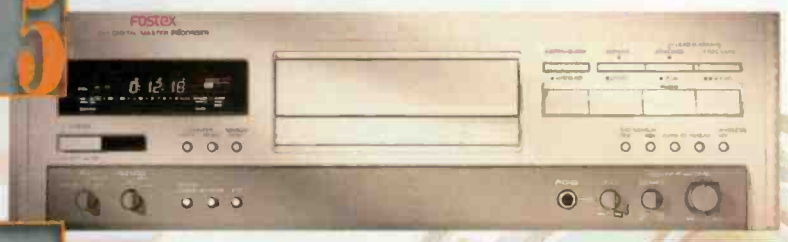
Broadcast Electronics 1207
Coffey Sound Service 1428
Apogee Electronics 1718
Fidelipac 1902
SCA Data Systems 1909

Colored listings indicate issue advertisers

HOW THE FOSTEX DAT RECORDERS STACK UP.

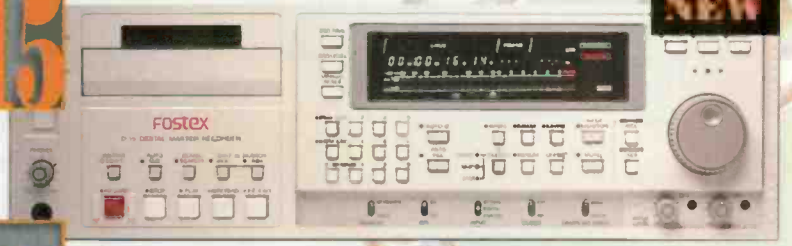
D5

Your smartest buy in a basic DAT recorder. A third sampling frequency (32kHz) offers up to 4 hours of extended play. AES/EBU and S/PDIF optical I/Os offer professional interface.



D15

The most affordable timecode capable DAT recorder, bar none. Fully loaded with all options, nothing comes close to the D-15TCR. Chase functions are built in and instant start is available without pre-loading.

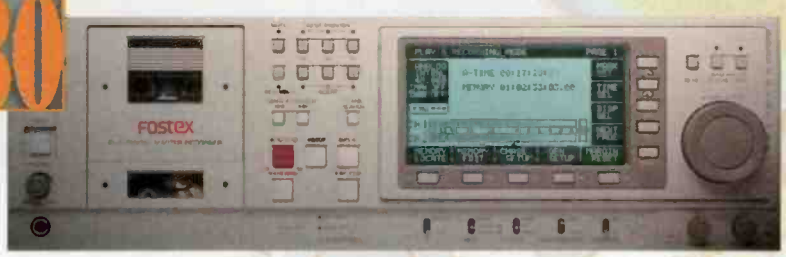


D25

Your best value in a studio timecode DAT recorder. It's the third generation machine from the company that first offered a timecode DAT recorder (the Fostex D-20). A workhorse professional DAT recorder.

D30

The pinnacle of sophistication in a timecode DAT recorder. Dedicated softkeys help you breeze thru menu settings and commands. Ease of routine maintenance has made it one of the most reliable DAT recorders in the industry.



FOSTEX

15131 Blackburn Ave. Norwalk, CA 90650 Voice: (562) 921 1112 Fax (562) 802 1964
Support; 1-800 -9-FOSTEX e-mail; info@fostex.com http://www.fostex.com

Circle (72) on Free Info Card

No Matter How You Play It, You'll Have a Winning Hand.

Play the LMA/duopoly card. Intraplex digital audio multiplexers let you deliver programming to multiple stations from a single consolidated studio.

Or play the STL card. Radio stations and radio networks are saving money, while enjoying higher audio quality by using Intraplex equipment for STL, LMA or networking applications.

Many radio stations have already chosen Intraplex for their LMA, duopoly, or STL transmission solution. When you choose Intraplex, you'll get the benefits of dealing with the industry's digital transmission leader and the flexibility to handle all your communications needs.

Why gamble? Call for our free booklet of radio stations already using Intraplex. In it, radio professionals give their own reasons for choosing Intraplex for a quality transmission solution. Intraplex, Inc. (508) 692-9000. In Europe, +44 1442 870103.

Intraplex

Intraplex, Incorporated
3 Lyberty Way
Westford, MA 01886-3636 U.S.A.
TEL: (508) 692-9000 FAX: 2200
England TEL: +44 1442 870103 FAX: 870148

Web Address: http://www.Intraplex.com

Circle (73) on Free Info Card

BE Radio FASTrack

audiopak	2010
Broadcasters General Store	2019, 8865
Electric Works	2328
Continental Electronics	2606
US Tape & Label	2824
Sony Broadcast Products	5929
Computer Expressions	6061
Rorke Data	6232
Professional Label Inc.	6361
McCurdy Radio Industries	6917
Maxell Corporation of America	8825
Storeel	8837
Prime Image	9285
ASACA ShibaSoku	11914
BASF Jr Pro Sales	S 1556
United Ad Label	S 3029

RF FEEDLINE, COMPONENTS, TOWERS AND SERVICES

Broadcast Electronics	1207
Teracom Components	1324
Svetlana Electron Devices	1424
Flash Technology	1509
GEC-Marconi Communications Systems	1701
Penta Laboratories	1720
Utility Tower	2204
Magnum Towers	2324
Continental Electronics	2606
Shively Labs	3301
Kintronic Laboratories	3609
Electronics Research - ERI	3615
CTE International	3824
CPI Eimac Division	5604
Micro Communications	5607
SWR Inc.	5609
Thomson Tubes Electroniques	5751
Stainless	6811
MYAT	7002
Richardson Electronics	7107
Thomcast France	7414
Dielectric Communications	7976
Scala Electronic	9053
LDL Communications Inc.	9953
Rohn	11037
Kline Towers	11867
RF Technology	11910
Cablewave Systems	11954
California Amplifier	S 2351
Lockheed Martin Micro.-Narda	S 2472, 1501

SATELLITE EQUIPMENT & SERVICES

Antenna Concepts	29, 8672
International Datacasting Corporation	1703
Studio Technologies	2104
Electric Works	2328
Continental Electronics	2606
MediaTouch	3621
NPR Satellite Services	3914
LNR Communications	4112
TBC Consoles	5441
CPI Eimac Division	5604
Scientific-Atlanta	6713
GE American Communications	7429
Leitch Inc.	8640
IRT Electronics Pty Ltd.	8864
Scala Electronic	9053
Toko America	9567
Hughes Communications Inc.	10176
Antenna Tech. Corp./ATCi	10358, S3063
Andrew	11054
RF Technology	11910
COMSAT Corporation	11922
AT&T Skynet Satellite Services	11934
Wegener Communications	11940
EASI Efficient Antenna Systems	LA 503
Frontline Communications	LB 204, 11970
SSE Telecom	M 7747
Deutsche Telekom	S 2863
Channel Master	S 2872
NII Norsat International	S 3068
IDB Systems	S 3165
Prodelin Corporation	S 3171
Microspace Communications	S 3360
Orion Atlantic	S 3469
Intelsis Sistemas Inteligentes	S 3766
RE America	S 4068
Pulizzi Engineering	S 6129

STUDIO & FACILITY SUPPORT PRODUCTS AND ACCESSORIES

Broadcast Electronics	1207
A-Ware	1401
Bradley Broadcast Sales	1506
Professional Sound Corporation	1517

Colored listings indicate issue advertisers

Here's a Happy Guy...

(he's using our on-air phone system!)

Modular Integrated Telephone Systems from IDI

You'll be happy too when you get your hands on our MITS:

Your talk shows will run flawlessly on included screener/host software and hardware.
Your call-in/contest shows will run smooth and smokin' fast.
Your multi-station site will have all its studios networked with the main PBX.
Your independent studio will use the system as its office PBX.
On remote you will have total telephone system remote control.

10 Line MS Work Surface

No other system can match **MITS** innovative features: friendly user-designed keyboards, outstanding single studio capabilities, graphic LCDs, an integrated talkshow system, remote control operation, networks of up to 30 studios and 250 shared lines, existing PBX integration, stand-alone PBX operation, low cost edit/production suite hardware and our state-of-the-art crash-proof software design.

Call us to find out how our ultra-reliable system can make your phones work for you.

Innovative Devices, Inc.

1-800-661-2881

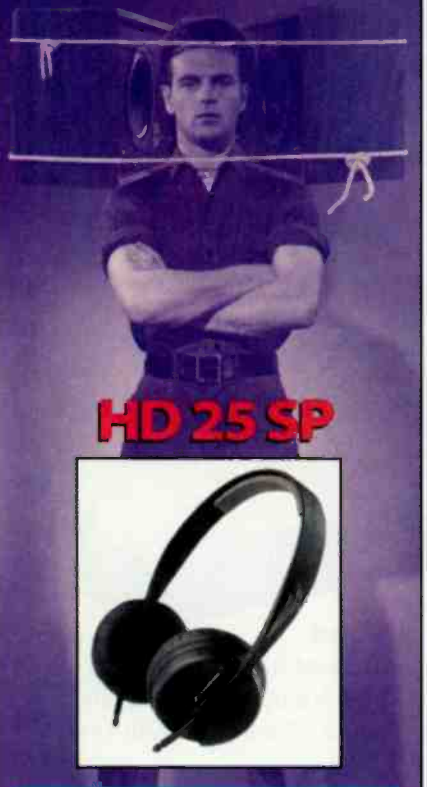
email: info@innovadev.com
website: http:\\www.innovadev.com

Circle (82) on Free Info Card

Think of Them as Reference Monitors You Can Wear

When you need to hear exactly what you've recorded... nothing more, nothing less... then only Sennheiser's HD 25 SP will do. Excellent isolation, with clear, accurate reproduction are the trademarks of these reference-quality headphones. Plus, they're MUCH more comfortable than wearing speakers.

Your project studio is incomplete without the HD 25 SP. Check them out today at your local Sennheiser dealer.



SENNHEISER

6 VISTA DRIVE, P.O. BOX 987, OLD LYME, CT 06371
TEL: 203.434.9190 · FAX: 203.434.1759

IN CALIFORNIA: 4116 WEST MAGNOLIA BLVD. SUITE 100, BURBANK, CA 91505 · TEL: 818.845.7366 · FAX: 818.845.7140

IN CANADA: 221 LABROSSE AVE., PTE-CLAIRE, PQ H9R 1A3
TEL: 514.426.3013 FAX: 514.426.3953

Circle (83) on Free Info Card

BE Radio FASTtrack

EDX Engineering	1624
LPB Inc.	1900
Murphy Studio Furniture	1902
FirstCom/Music House	1906, 8779
WHo Did THaT MUSIC?	1919
Computer Concepts	2024
Circuit Research Labs	2106
Spacewise Broadcast Furniture	2326
Arrakis Systems	2406
Continental Electronics	2606
Pacific Research & Engineering	2618
TM Century	3001
Penny & Giles	3424
Autogram Corporation	3906
Henry Engineering	4012
Killer Tracks Music	5051
Horita	5155
Acoustic Systems	5255
TBC Consoles	5441
Telepak San Diego	5532
Zero Stantron	5625
River City Sound Productions	5858
AMCO Engineering	5913
Computer Expressions	6061
Valentino Production Music	6411
TRF Production Music Libraries	6461
Anvil Cases	6943
TASCAM	6952
Acoustical Solutions	7218
ESE	7227
Leitch Inc.	8640
Radio Soft	8672
TDC Tally Display Corporation	8679
Manhattan Production Music	8755
OMNIMUSIC	8773
Production Garden Library	8862
Aircraft Production Music Libraries	8885
VidCAD Documentation Programs	9664
Audio Action	10360
Industrial Acoustics Co/IAC	10462
Techflex	11160
Hardigg Industries	11178
Marco Inc.	11182
Torpey Controls & Engineering	11238
Avitel Electronics	11570
AAVS/Sencore	11976
GEPCO International Inc.	11984
Specialized Products	I 3654
NBC News Archives	M 6329
Sound Ideas	M 7338, 5859
CBS News Archives	M 7533
Energetic Music	M 7649
Cinebase Software	M 7825
JMR Electronics	M 7938
Wilson Case	M 8325
Sonic Science	M 8332
Weather Central	S 204, 11573
VizuALL	S 1517
Match Production Music	S 1831
Kart-A-Bag/Remin	S 2060
Electrorack Products	S 2928
Ergo-2000	S 3019
Gefen Systems	S 3026, 1621
Non-Stop Music	S 3119
Anthro Technology	S 3232
Promusic	S 3335
Wenger Corporation	S 4958
Solutions Custom Furniture	S 5658
Nigel B Furniture	S 6028
Winsted Corporation	S 6126, 6921
RCI Systems Inc.	S 6136

SYSTEM INTEGRATORS, CONSULTANTS AND REPAIR SERVICES

Communications Data Services	1617
GEC-Marconi Communications Systems	1701
QEI	1709
LPB Inc.	1900
Dataworld	2624
MediaTouch	3621
TWR Telecom/Lighting	3904
Doty Moore Services	4938
Rules Service Company	4956
Micro Communications	5607
Thomcast France	7414
AF Associates	7432
Radio Soft	8672
Tektronix	9914
Rees Associates	10458
NDG Phoenix	10460
Kline Towers	11867
RF Technology	11910
AAVS/Sencore	11976
DSI Communications	I 3748
Wohler Technologies	LA 501, 9773
EASI Efficient Antenna Systems	LA 503
Digital DJ	S 1251
Walters-Storyk Design	S 1503
Automated Weather Source	S 2051
IDB Systems	S 3165
IMMAD Broadcast Services	S 4658
Weathernews	S 5674
The Austin Company	S 6160

TEST & MEASUREMENT EQUIPMENT

Altronics Research	1003
Bird Electronic Corporation	1327
Inovonics Inc.	1612
QEI	1709
Gorman-Redlich Mfg. Company	1910
Selco Products	1922
Potomac Instruments	2017
Circuit Research Labs	2106
Delta Electronics	2109
Crown International	2418
Phasetek Inc.	2826
Audio Precision	3124
Belar Electronics Lab	3312
Burk Technology	3524
Coaxial Dynamics	3909
Horita	5155
Tentel Corporation	5511
Holaday Industries	6645
Dorrough Electronics	7209
ESE	7227
Philips TV Test Equipment	7643
Clark Wire & Cable	7871, 1721
Hewlett-Packard	8071, S 2200
Leitch Inc.	8640
TDC Tally Display Corporation	8679
Leader Instruments	8760
Jensen Tools Inc.	8860
Scala Electronic	9053
Tektronix	9914
Antenna Technology Corp/ATCi	10358, S3063
Modulation Sciences	11253
Electronic Associates	11334
Techni-Tool	11337
Pro-Bel Ltd.	11501
ASACA ShibaSoku	11914
Sencore/AAVS	11976
AAVS/Sencore	11976
Wohler Technologies	LA 501, 9773
Lockheed Martin Micro.-Narda	S 2472, 1501
RCI Systems Inc.	S 6136

WIRE, CABLE & CONNECTORS

Broadcast Electronics	1207
Neutrik USA	1321
Coffey Sound Service	1428
Professional Sound Corporation	1517
Apogee Electronics	1718
Switchcraft	2924
DGS Pro Audio	3728
Whirlwind	5747
Audio Accessories	5759
Connectronics	6512
Pacific Radio Electronics	6761
Clark Wire & Cable	7871, 1721
LEMO USA Inc.	8835
Jensen Tools Inc.	8860
Telecast Fiber Systems	9281
Prime Image	9285
Belden Wire and Cable	9880
Techflex	11160
Yale Electronics	11265
Mohawk/CDT Broadcast Cables	11283
Reel A Pail Inc.	11644
Canare Cable	11944
ADC Telecommunications	11958
AAVS/Sencore	11976
GEPCO International Inc.	11984
JMR Electronics	M 7938
Marshall Electronics	S 1931
AVP Mfg. & Supply	S 3020
Gefen Systems	S 3026, 1621
Bittree	S 3775
Delco Wire & Cable	S 3972
RCI Systems Inc.	S 6136
West Penn Wire/CDT	S 6138

Colored listings indicate issue advertisers

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 (84) on Free Info Card

Exhibitor Highlights

A

AARDVARK S 4369
Circle 251 on Free Info Card

ABC RADIO INTERNATIONAL S 1635
Circle 252 on Free Info Card

A.B.S.S.P.A. S 4063
VHF-UHF transmitters up to 60kW. FM transmitters to 60kW. Directional and hybrid couplers as well as RF adapters and accessories.
Circle 253 on Free Info Card

ACCUWEATHER, INC. 10564
Featuring: UltraGraphix-32; UltraGraphics ULTRA weather systems; FirstWarn 2000, 3000 for crawls, maps, icons to notify viewers of severe weather; AccuNet On-Line weather information, graphics for your web site.
Circle 254 on Free Info Card

ACOUSTICAL SOLUTIONS INC. 7218
Introducing: AlphaTech ceiling tiles; Audioseal sound barriers; Alpha Enviro hanging baffles.
Circle 255 on Free Info Card

ACOUSTIC SYSTEMS 5255
Introducing: Modular control room and studio designs; the Acoustic-Rated Glass Door.
Circle 256 on Free Info Card

ADCOM ELECTRONICS LTD. S 1369
Featuring: Night Suite non-linear production system.
Circle 257 on Free Info Card

ADC TELECOMMUNICATIONS, INC. 11958
Featuring: digital transport system, featuring remote drop or add; time-delayed patching; delay compensation video patching; digital video jacks; analog and serial digital video panels; video/audio modular patchbay; CAPS component analog patching system; FO cable management system for smaller fiber networks.
Circle 258 on Free Info Card

ADVANCED AUDIO VISUAL SYSTEMS 11976
Introducing: @3 applications software, @rchitecture, @pplications for @utomation for management of automated processes in TV centers; @3-on-air automated playout software; @3-remote local, remote surveillance and backup operations for TV sites; video assist multilingual management software; Imaging range Quartet A and accessories; DAs, dual-channel digital audio signal change over; digital linear keyer; analog video DA.
Circle 259 on Free Info Card

A.E.Q. 2412
Featuring: audio codecs; hard-disk automation system; audio mixers; multiconference telephone system; digital hybrids, line extender; telephone terminal equipment.
Circle 260 on Free Info Card

AEV 1818
Introducing: Virtual Radio for Windows 95 and NT; multi-user, multitasking, simultaneous access to audio/data; ISO-MPEG Musicam audio coding; digital recording, editing; unlimited storage capacity; music, commercial scheduling; live assist or fully automated broadcasting.
Circle 261 on Free Info Card

A.F. ASSOCIATES, INC. 7432
Featuring: designs, engineers and fabrication of TV facilities, systems for broadcast, cable, professional and corporate markets; Turnkey systems integration; engineering and system design consulting; project management; server systems, solutions for video archive, program playout and networking.
Circle 262 on Free Info Card

AIRCRAFT PRODUCTION MUSIC LIBRARIES 8885
Featuring: The American Music series; Rock Sweepers and IDs; Ads Up! music for commercials.
Circle 263 on Free Info Card

AKAI DIGITAL 2524
Featuring: digital audio recording equipment, workstations.
Circle 264 on Free Info Card

AKG ACOUSTICS 6948
Introducing: C480B+CK69, C414B TL II, D230, C577, C3000 microphones; K240M headphones.
Circle 265 on Free Info Card

ALESIS CORPORATION 3618
Featuring: digital audio products, multitrack recorders, remote-control equipment.
Circle 266 on Free Info Card

ALLEN OSBORNE ASSOC. INC. S 6079
Featuring: Hillomast telescopic pneumatic-operation masts.
Circle 267 on Free Info Card

ALTRONICS RESEARCH INC. 1003
Featuring: digital calorimeters for water-cooled dummy loads and heat exchangers; air-cooled loads.
Circle 268 on Free Info Card

AMCO ENGINEERING COMPANY 5913
Featuring: equipment enclosure systems.
Circle 269 on Free Info Card

AMEK U.S. OPERATIONS, INC. 7343
Introducing: System 9098 twin mic amplifier; System 9098 dual compressor-limiter; Digital Mixing System; Recall by Langley computer-assisted console.
Circle 270 on Free Info Card

AMS NEVE 8810
Featuring: large multiformat all-digital mixing console, optional Audio-File recorder/editor; Capricorn digital console for operational flexibility, speed, large-scale multitrack recording, mixing, overdubbing; Logic 3 compact digital mixer companion to Audio File recorder/editor; 55 Series analog console.
Circle 271 on Free Info Card

ANCHOR COMMUNICATIONS 11170
Introducing: PBS-100 portable DC battery supply unit for PortaCom wired Intercom systems; operates 8-10 headset stations using six D cell batteries.
Circle 272 on Free Info Card

ANDREW CORPORATION 11054
Dual HMD antenna; Alpac antenna & tower system; HS9HP HELIAX coaxial cable; 2.4m SNG antenna; type-approved earth station antennas; rectangular waveguide; pressurization equipment; terrestrial microwave antennas; rigid transmission line.
Circle 273 on Free Info Card

ANTENNA CONCEPTS INC. 29, 8672
Featuring: UHF, VHF antennas in slot, panel and corner reflector types; high gain CP for LPTV; CP full-band FM panel transmit antennas; transportable omnidirectional VHF antennas.
Circle 274 on Free Info Card

ANTHRO CORPORATION S 3232
Introducing: rack-based workstations, 60-inch and 72-inch.
Circle 275 on Free Info Card

ANTON BAUER 10728
Introducing: InterActive 2000 PowerCharge features camera operation from mains; Logic Series charging, diagnostic add-on modules; ProPac, TrimPac digital battery with fuel gauge interface to camera viewfinder; Gold Mount accessories; Ultralight compact on-camera light.
Circle 276 on Free Info Card

APHEX SYSTEMS 4103
Introducing: Model 2020 FM audio processor.
Circle 277 on Free Info Card

APOGEE ELECTRONICS CORPORATION 1718
Introducing: FC-8 digital audio format converter; APOgee CD-recordable; AD-1000, AD-1000E 20-bit A/D, D/A converters; Apogee Master DAT; Wyde Eye digital cable.
Circle 278 on Free Info Card

APPLE COMPUTER, INC. M 7319
Featuring: personal computers, multimedia equipment.
Circle 279 on Free Info Card

ARMSTRONG TRANSMITTER 1601
Featuring: radio broadcast transmitters.
Circle 280 on Free Info Card

ARRAKIS SYSTEMS INC. 2406
Featuring: digital audio workstations; video switchers with audio follow and control from multiple locations.
Circle 281 on Free Info Card

ASACA/SHIBASOKU CORP. OF AMERICA 11914
Introducing: AM140, AM665, AM1200 digital video disc archiving; CM202H 20-inch, CM323H 32-inch HDTV color monitors; CMC42NP 42-inch Plasma display; TG15B6-HDTV digital test signal generator; RT37A, RT83B TV channel signal generators.
Circle 282 on Free Info Card

ASC AUDIO VIDEO 9258
Introducing: VR300 broadcast video server; VCR300 Fibre Channel RAID storage system; NEWSFlash non-linear editing system.
Circle 283 on Free Info Card

THE ASSOCIATED PRESS S 205
Featuring: AP News Center; AP Graphics Room; SNTV; The Wire; AP Prep Packages; APTV; AP Express; AP Radio.
Circle 284 on Free Info Card

ASTRE SYSTEMS, INC. 4541
Introducing: SoftStart beam power switching device; HDTV-ready MSDC UHF TV transmitter.
Circle 285 on Free Info Card

ATCI/ANTENNA TECHNOLOGY 10358, S3063
Featuring: spectrum analyzer, satellite receiver, monitor; multibeam antennas; PROFLine electronics; voice, data systems; satellite videoconferencing equipment.
Circle 286 on Free Info Card

ATI-AUDIO TECHNOLOGIES, INC. 5527
Introducing: ATI portable and studio stereo mixers, expanders, MXS100, XPS100; featured: Vanguard series consoles; Micro-Amp series modular and self-contained mic, line and DAs; power amps, headphone drivers, interface amps, audio processors, studio metering systems, NanoAmp mixers.
Circle 287 on Free Info Card

AT&T 11934
Featuring: satellite communications services.
Circle 288 on Free Info Card

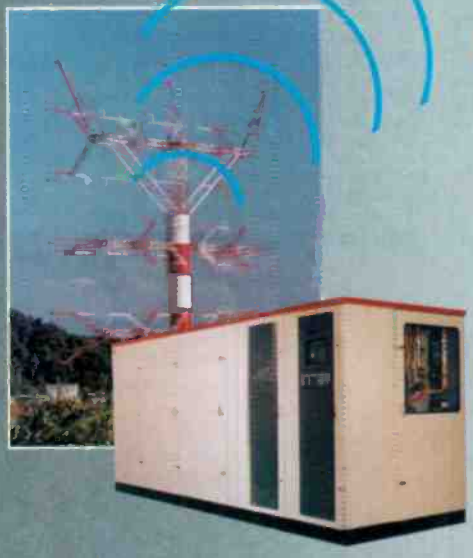
AUDI-CORD CORPORATION 2006
Featuring: audio cart recorders/players.
Circle 289 on Free Info Card

AUDIO ACCESSORIES, INC. 5759
Featuring: audio jack panels, jacks; pre-wired audio patch panels; patch cords, holders; Polysand; video panels; RS-422 patching; Edac connectors, accessories; nickel-plated patch cords.
Circle 290 on Free Info Card

AUDIO ACTION 10360
Featuring: production music library on CDs.
Circle 291 on Free Info Card

Colored listings indicate issue advertisers

Skywave 2000



Short Wave : the Future of International Broadcasting

Presented at major broadcast exhibitions in 1996 **SKYWAVE 2000** might be the biggest leap forward since the birth of Short Wave Radio.

SKYWAVE 2000 will give International Broadcasters the capability of Digital Broadcasting through their existing stations. Improved sound quality, unsurpassed reception stability and all the extras of digital transmission as well as DX-ing analog broadcasts. The future of shortwaves is bright!

THOMCAST

1, rue de l'Hautil, 78700 Conflans-Ste-Honorine, France. Tel : (+33) 01.34.90.31.00 - Fax : (+33) 01.34.90.30.00

Circle (91) on Free Info Card

REPCO

AUDIO DEVELOPMENTS LTD. 2424
Introducing: AD144 studio and OB mixer, 4O/P+2 auxiliaries, extensive monitor features and optional comm module, 12-24 channel frames; AD149 for film and drama use, 2 O/P + 2 aux, continuously variable gain, comprehensive EQ, channel inserts, limiters; AD160, AD261, Mercury, AD146, AD148 mixers.
Circle 292 on Free Info Card

AUDIO INTERVISUAL DESIGN S 3638, 8777
Sanken Audio Systems microphones CSS-5 shotgun stereo, COS-11 lavalier, CU-41 double condenser; JB Technologies dB 3000 digital optimizer, AD122 A/D converter, DA122 D/A converter; Brainstorm Electronics time-code products: SA-1 analyzer, SR-3 repair kit, SR-15+ distripalizer, SR-26 dual distributor-reshaper, SR-1/SR-2 universal refresher, TB-4 remote talkback.
Circle 293 on Free Info Card

AUDIO BROADCAST GROUP 3840, 4850
Circle 294 on Free Info Card

AUDIOMATION/SELLMARK 1301
Distributor of audio products.
Circle 295 on Free Info Card

AUDIOPAK, INC. 2010
Featuring: audio recording media.
Circle 296 on Free Info Card

AUDIO PRECISION 3124
Introducing: SWR-2122 switchers; featuring: System One, System Two Dual Domain test systems; ATS-1 audio test system.
Circle 297 on Free Info Card

AUDIO PROCESSING TECHNOLOGY 1727
Featuring: products for high-quality audio over ISDN and Switch-56 digital circuits; WorldNet-compatible audio codecs studio links, remote feeds.
Circle 298 on Free Info Card

AUDIO-TECHNICA U.S., INC. 6311
Featuring: UniTools remote-powered in-line mic accessories; AT®-7174 UHF synthesized wireless system; ATW-1237 VHF wireless system with hand-held mic/transmitter; 1100 series VHF wireless systems; AT4041 transformerless studio capacitor mic; Quad Mic multi-element boundary mic; AT8446 pop filter.
Circle 299 on Free Info Card

AUDIO USA 3727
Featuring: diversity wireless microphone systems.
Circle 300 on Free Info Card

AUDITRONICS, INC. 3018
Featuring: audio mixers for radio, TV, production; IFB/Mix-Minus system.
Circle 301 on Free Info Card

THE AUSTIN COMPANY S 6160
Featuring: consulting services for broadcast and communications clients with site and facility analysis, strategic master planning, requirements programming, space planning, architectural and engineering designs, technical systems design and integration, project management, construction services.
Circle 302 on Free Info Card

AUTOGRAM CORPORATION 3906
Introducing: Solution-20 rack frame system holding up to 10 cards; RC-1 relay card, DA-3 distribution amp card, SMA-10W amplifier, MPC-1 mike processor card.
Circle 303 on Free Info Card

AUTOMATED WEATHER SOURCE S 2051
Featuring: Real Time local weather for broadcasters and the Internet; School Weather Network; AWS OnLine integrated local weather network with internet; AWS JavaWx first application to provide live real-time neighborhood weather to web; participation of radio/TV stations, schools, museums, science centers, hospitals, chamber of commerce newspapers and business in worldwide network.
Circle 304 on Free Info Card

AVID TECHNOLOGY, INC. 9940
Featuring: Media Spectrum open-platform on-line editing environment; Media Composer video editing system; Film Compower, FilmCutter editing systems; Matador, Advance, Beyond Reality software enhancements; NewsCutter news editor; AirPlay playback server; MediaServer; AvidNet/ATM; NewsView, NetStation automation systems; MediaRecorder, CamCutter, Avid News management system.
Circle 305 on Free Info Card

AVITEL ELECTRONICS CORPORATION 11570
Introducing: DSY3372 digital frame synchronizer; DSA 3345 digital video-to-analog composite; 330 serial digital terminal equipment; under-monitor display and tally systems; digital audio monitors; RMA mounting shelves for VTRs.
Circle 306 on Free Info Card

AVOCET INSTRUMENTS, INC. 1403
Circle 307 on Free Info Card

AVP MFG & SUPPLY INC. S 3020
Featuring: RPT punch panels, wired jackfields; AES audio jackfields; video, serial digital jackfields.
Circle 308 on Free Info Card

A-WARE SOFTWARE, INC. 1401
MusicMaster/LT music scheduling system, CloseLine, Storage Library Editor, real-time studio interface; TrafficMaster.
Circle 309 on Free Info Card

AXON DIGITAL DESIGN BV S 1049
Introducing: digital audio monitors, audio A/D and D/A converters, encoders, decoders, fiber-optic products.
Circle 310 on Free Info Card

AZDEN CORPORATION S 1260
Introducing: Performance Series UHF 63-channel wireless system; PRO series WX/T-Pro XLR plug-in transmitter.
Circle 311 on Free Info Card

BAIRD SATELLITE SUPPORTING SYSTEMS S 3067
Circle 312 on Free Info Card

BARON SERVICES S 3629
Featuring: international weather network with full internet access to remote weather sensors and cameras for real-time weather conditions (www.realtimeweather.com); VHDD250 Very High Definition Doppler Radar with 250kW operating power enables observation of wind shear, areas of circulation on small scale, severe thunderstorm outflows, tornadic formations.
Circle 313 on Free Info Card

BASF MAGNETICS CORPORATION S 1556
Featuring: BASF products for Betacam SP, Digital Betacam, 1-inch type "C" and Pro VHS and S-VHS cassettes.
Circle 314 on Free Info Card

BBC CENTER FOR BROADCAST SKILLS TRAINING S 2067
Circle 315 on Free Info Card

BELAR ELECTRONICS LAB INC. 3312
Featuring: digital TV stereo monitor; SAP, PRO monitors; TV aural monitor for CATV operators; monitoring products for FM group owners; RBDS, subcarrier monitors for Wizard system; AM wizard for controlled carrier.
Circle 316 on Free Info Card

BELDEN WIRE AND CABLE COMPANY 9880
Introducing: AES/EBU digital patch cable; mid-size Star Quad mic cable; IEEE 1394 serial bus cable; plenum S-VHS cable; 24AWG audio cable; Videoflex bundled RG-59 cables; Media Twist premise cable; AudioFlex snake cable.
Circle 317 on Free Info Card

BENCHMARK MEDIA SYSTEMS 8664
Introducing: VCA-02 stand-alone remote-gain control; DAC-2004 quad 20-bit D-A converter.
Circle 318 on Free Info Card

BEST POWER/NORTH STAR TECHNICAL SERVICES S 4367
Featuring Rack-mount Fortress and UNITY/I 3-phase system.
Circle 319 on Free Info Card

BEXT, INC. 3603
Introducing: SS1000 E 1kW solid-state UHF/VHF amplifier, compact design.
Circle 320 on Free Info Card

BEYER DYNAMIC INC. 5505
Introducing: MCD 100 digital microphone; MCE 82 stereo condenser mic for XY stereo configuration; MCE 84 condenser with equalized frequency response; MCE 7 extremely small omnidirectional electret condenser mic.
Circle 321 on Free Info Card

BIA COMPANIES 1617
Circle 322 on Free Info Card

BIRD ELECTRONIC CORPORATION 1327
Featuring: average reading power meter; 5kW, 10kW air-cooled load resistors.
Circle 323 on Free Info Card

BITTREE INC. S 3775
Audio, video, data patching systems, accessories; 3-pin rear interface connector for audio.
Circle 324 on Free Info Card

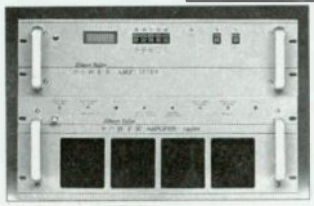
BRADLEY BROADCAST SALES, INC. 1506
Distributors: Panascheme studio furniture, racks; Audioarts mixer; Telos, Gentner phone talk systems; Tascam portable DAT.
Circle 325 on Free Info Card

BRITISH INFORMATION SERVICES S 4858
Featuring: international news feeds available via real audio on the internet, http://britain.nyc.ny.us.
Circle 326 on Free Info Card

BROADCAST ELECTRONICS, INC. 1207
Introducing: Predator digital FM transmitter/exciter with modular construction, multiple power levels; T-series high power FM transmitter using MOSFET drivers; The Lynx digital stereo generator, solid-state FM transmitters, audio consoles; expanded AudioVAULT applications with cut & paste editor, voice tracking tool, StudioBoss studio information manager.
Circle 327 on Free Info Card

BROADCAST ENGINEERING MAGAZINE 5444, S 1760
Circle 328 on Free Info Card

POWER AMPLIFIERS



Call 800-986-9700
Fax 408-986-1438
Ask about our state of the art amplifiers and modules

700W FM MODULES

The B-1000 FM amplifier
1 kW++ of power you can rely on.

All solid state.
Broadband, no tuning.
Modular construction.
Two 700 watt modules.
Multiple fan cooling.
VSWR foldback.
Switch mode supply.
LCD display.
Remote On-Off.
Remote monitor.
Fault warning LEDs.
Thermal cutouts.

Silicon Valley POWER AMPLIFIERS
The RF People

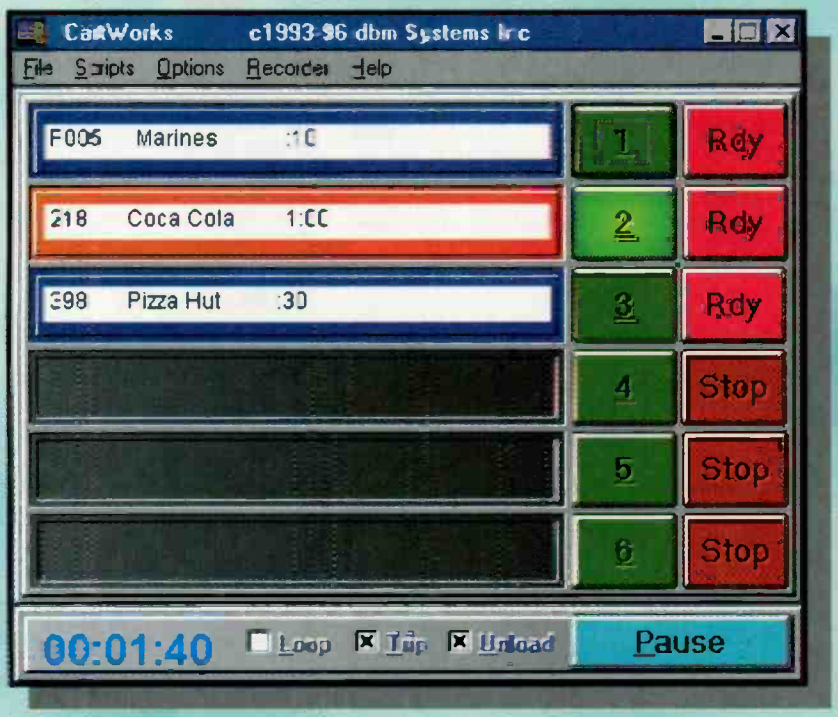
115 PHELAN AVE., UNIT 10
SAN JOSE, CA 95112 USA

Broadband, 87-108 MHz.
Drop in replacement units for many popular transmitters.
Two year warranty.
In stock for immediate delivery.
150W, 300W and 500W also available.

Circle (85) on Free Info Card

Colored listings indicate issue advertisers

Going Digital Just Got Easier !



CartWorks

Digital Audio Systems

From simple cart replacement to full automation, CartWorks is the easy choice!

Familiar Operation

One look and you'll know, CartWorks is undoubtedly the easiest digital audio system to learn and operate. But don't let the simple user interface fool you. There's lots of power hidden below the surface.

Windows95

We've got features you'll never find on any dos based system. With CartWorks and Windows95, you get more than just a digital audio system. Better yet, operators already familiar with Windows become instantly productive.

Affordable

CartWorks is reasonably priced.
Complete Cart Replacement systems start at $4,995.
Complete Satellite Automation systems start at $6,995.

Performance

CartWorks was developed by a team of longtime radio pros for the broadcast environment. It's designed to operate the way you'd expect, like broadcast equipment. And we use only the latest and best industrial grade PCs with world class **apt-X** digital audio.

See us at NAB '97 Booth #2326

Support

24 hour, 7day a week Technical Telephone support by real radio engineers. We speak your language and understand the importance of staying on the air.

Extended Connectivity

CartWorks gives you more choices so you can work more efficiently. LAN Network, Dialup Networking, Remote Control, and Internet Spot Transfer.

NEW ! X-CONVERT

Converts audio storage formats digitally, allowing you to use most any digital editor with CartWorks.

For a free demo disk or to learn more call dbm Systems today:

1-800-795-RADIO

Fax (601) 853-9976
Or visit our site on the world wide web:

http//www.cartworks.com

*Windows & Windows95 are registered trademarks of Microsoft Corp.

Circle (92) on Free Info Card

BE RADIO MAGAZINE 902
Circle 329 on Free Info Card

BROADCASTERS GENERAL STORE 2019, 8865
Distributor for DNF Industries; IQS; Sine Systems; American Recorder Technology.
Circle 330 on Free Info Card

BROADCAST STORE 8666
Broadcast equipment sales, brokerage.
Circle 331 on Free Info Card

BROADCAST SUPPLY WORLDWIDE 2112
Distributors audio, RF/radio products, including Telos, Arrakis, Audion Labs, Roland.
Circle 332 on Free Info Card

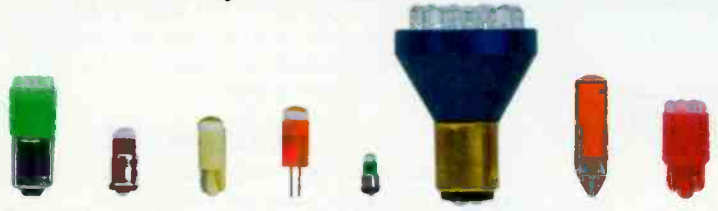
BROADCAST TECHNOLOGY LTD. S 1051
Circle 333 on Free Info Card

BROADCAST TOOLS 2112, 2019
Remote-control systems.
Circle 334 on Free Info Card

BSS AUDIO 6948
Full line of signal processing equipment.
Circle 335 on Free Info Card

BURK TECHNOLOGY 3524
Introducing: EAS encoder/decoder; LX-4 EAS program interrupt; RX-4 EAS monitor receiver system.
Circle 336 on Free Info Card

How to avoid the hidden costs behind every incandescent indicator.



We offer direct replacement LEDs for virtually every incandescent indicator lamp made.

Though inexpensive itself, an incandescent bulb brings with it some very costly baggage.

High maintenance and down-time costs. Incandescents have a short operating life because of the intense heat they generate, the destructive on-off cycling they see and their vulnerability to even minor vibrations.

Poor energy efficiency. Over 90% of the power they consume is actually wasted, producing unwanted heat.

The premature failure of nearby components. Incandescents generate high temperatures which simply fry other components.

Now for the solution–our long-lasting replacement LEDs. They have no filaments, are unaffected by on-off cycling, and tolerate considerable vibration. They also draw 90% less energy and generate almost no heat.

For more information, call (310) 534-1505 or FAX us at (310) 534-1424.

LEDTRONICS
More Choices, More Light.

Circle (93) on Free Info Card

CABLEWAVE SYSTEMS 11954
Featuring: broadcast and microwave antennas; Flexwell low-loss foam coaxial cable, connectors and accessories; elliptical waveguide, connectors, accessories.
Circle 337 on Free Info Card

CALIFORNIA AMPLIFIER, INC. S 2351
Featuring: RF amplifier products.
Circle 338 on Free Info Card

CALREC AUDIO LTD. S 3976
Audio mixing consoles, including digital control for production and dubbing; rack-mounted signal processors.
Circle 339 on Free Info Card

CALZONE/ANVIL CASES 6943
Featuring: Anvil ATA, ArmorLite, Speedster, LifeCases; Calzone Escort series, LDATA series, Titan series equipment cases.
Circle 340 on Free Info Card

CANARE 11944
Introducing: serial digital dual video jacks, video cable; 75-ohm RCA crimp plugs; cable strippers; 110-ohm digital audio cable; 75-ohm F connectors.
Circle 341 on Free Info Card

CARTWORKS/DBM SYSTEMS INC. 2326
CartWorks Plus digital audio systems.
Circle 342 on Free Info Card

CBSI/CUSTOM BUSINESS SYSTEMS 3012
Introducing: new and enhanced traffic and billing systems, Premier, Classic, Elite with DeltaFlex Traffic Engine; InterAcct accounting software with general ledger, accounts payable and report generator.
Circle 343 on Free Info Card

CBS NEWS ARCHIVES M 7533
Featuring: video libraries.
Circle 344 on Free Info Card

CCA ELECTRONICS, INC. 3009
Featuring: FM-series FM exciter; high performance transmitters; AM shortwave and mediumwave transmitters.
Circle 345 on Free Info Card

CEA DIGITAL NEWSROOM SYSTEMS 9661
Featuring: CEA Digital NewsRoom System with miro DC-30 digital audio/video controller, electronic prompting in Arabic and Chinese, on-line script archive and media library, multilanguage editing.
Circle 346 on Free Info Card

CENTRAL TOWER INC. 1717
Featuring: towers, monopoles; structural engineering analysis; complete construction services, antenna, line installation; turnkey projects.
Circle 347 on Free Info Card

CHANNEL MASTER S 2872
VSAT compression-molded reflectors, mounts, and feeds designed for transmit/receive applications including data, audio and video.
Circle 348 on Free Info Card

CINEBASE SOFTWARE M 7825
Introducing: Digital Media Management System DMMS for tracking large volumes of digital imagery including video, audio and graphics to terabytes of data; facilities, studio management support products; management software; engineering facilities management.
Circle 349 on Free Info Card

CIRCUIT RESEARCH LABS 2106
Introducing: software for DP-1000 all digital FM stereo audio processor for improved stereo enhancement, DRX dynamic range extension, processing dayparting, remote control; Featuring FM Amigo, Signature series, Digital SC-100 for FM radio; TVS and BAP series products for television sound; MBL, AM-4m/s and AM Amigo for AM radio.
Circle 350 on Free Info Card

CLARK WIRE & CABLE 7871, 1721
Featuring: coax for serial digital signals; AES/EBU digital audio cable/snakes; Clark Ergonomic Crimp tools; Hannay reels; Service Mult cables, remote composite cables.
Circle 351 on Free Info Card

CLEAR-COM INTERCOM SYSTEMS 11565
Featuring: auto-nulling telephone interface for party-line and Matrix intercoms; Windows 95 software for Matrix Plus II Intercom; 2-way radio intercom interface; production, multichannel party-line, digitally-controlled matrix, wireless intercom, IFB systems, headsets, beltpacks, camera interfaces.
Circle 352 on Free Info Card

You can't check *AES/EBU digital audio* interfaces or cabling with a distortion analyzer

.....even if it's *digital*

The Prism Sound DSA-1 AES/EBU interface test system provides ***unique generator and analyzer*** capabilities enabling the ***most comprehensive*** assessment of AES/EBU interconnections.

For example, the DSA-1 can measure differences between ***source and cable jitter***, or it can ***simulate*** either sort with its ***generator***. These are just some of the capabilities of the DSA-1 which enable thorough testing of AES/EBU outputs, inputs, distribution and cabling.

See us at NAB Booth #S5777

To find out more, call or fax us now for a full information pack, or look up the latest DSA-1 V2.0 specification at our web site.

PrismSound

PRISM MEDIA PRODUCTS, INC.
115 ROUTE 46, B-16
AMERICAN EXPRESS BUILDING
MOUNTAIN LAKES, NJ 07046
TEL: +1 201 299 7790
FAX: +1 201 299 7759

WEB PAGE: http://www.prismsound.com
e-mail: sales@prismsound.com

Circle (94) on Free Info Card

COAXIAL DYNAMICS 3909
Featuring: test and measurement equipment for RF power, custom OEM RF filters and directional power detectors, oil-/air-cooled loads.
Circle 353 on Free Info Card

COFFEY SOUND 1428
Distributor for products for professional audio and broadcast.
Circle 354 on Free Info Card

COMMUNICATIONS DATA SVCS 1617
Featuring: international, North American terrain data.
Circle 355 on Free Info Card

COMMUNICATIONS & POWER IND.(CPI) 5604
Eimac division features ground-based satellite communication klystrons including extended frequency ranges and "Fast-Tune" versions; new range of external cavity UHF TV klystrons, 15kW to 60kW; 28GHz LMDS wireless cable amplifiers. Satcom division features solid-state power amplifiers; compact 300-400W medium power amps; compact single drawer 600-700W power amps; V-Star II 200W hub-mount amps.
Circle 356 on Free Info Card

COMPUTER CONCEPTS CORPORATION 2024
Featuring: DCS Audio Engine integrated audio server/switcher; Visual Traffic traffic, billing system; Composer schedule management system; Maestro on-air control software; NewsRoom computerized newsroom system.
Circle 357 on Free Info Card

COMPUTER EXPRESSIONS 6061
Introducing: Billboard CD holder for 18 CDs, customized with 4-color process art, folds flat for shipping or trade show giveaway, in sizes for rewritable media in quantities as low as 500 units.
Circle 358 on Free Info Card

COMREX CORPORATION 2121
Introducing: HotLine Pots codec; featuring: Nexus ISDN codecs for remote broadcasts; wireless IFB equipment; Buddy remote mixer; frequency extenders; telephone couplers.
Circle 359 on Free Info Card

Get it done fast with Hannay cable reels.

• One or Two Person Transport • Custom XLR & BNC Connector Patterns
• Fast Manual Rewind • Lightweight & Stackable

Hannay Reels®
The reel leader.

553 State Route 143, P.O. Box 159, Westerlo, NY, USA 12193-0159 • Phone 1-518-797-3791 • Fax 1-800-REELING • www.hannay.com

Circle (95) on Free Info Card

COMSAT CORPORATION 11922
Satellite communications products, services.
Circle 360 on Free Info Card

CONNECTRONICS CORPORATUIB 6512
Featuring: parabolic reflectors, accessories, shoulder straps, transport cases, sport handles, wind muff.
Circle 361 on Free Info Card

CONTINENTAL ELECTRONICS CORP. 2606
Featuring: complete line of AM and FM radio transmitters and associated RF products and equipment from International companies Telefunken Sendertechnik and Continental Lensa; CEC Broadcast Supply Division will exhibit products for studios, monitoring, remote control, FM antennas and other related radio station requirements; radio, DAB, TV and broadcast studio equipment.
Circle 362 on Free Info Card

CONTROL CONCEPTS/LEIBERT 9658
Featuring: Isolatron Plus, IsolaGuard power protection systems.
Circle 363 on Free Info Card

COOPER SOUND SYSTEMS 1404
Introducing: CS-106+1, CS-108+1 professional audio mixers; featuring CS-104 ENG/EFP mixers.
Circle 364 on Free Info Card

COUNTRYMAN ASSOC INC 8751
Featuring: microphone products.
Circle 365 on Free Info Card

CROUSE-KIMZEY COMPANY 1907
Audio distributors; Otari digital workstation; Denon CD player.
Circle 366 on Free Info Card

CROWN BROADCAST 2418
Featuring: head-worn and full line of microphones, amplifier products.
Circle 367 on Free Info Card

CTE INTERNATIONAL 3824
Introducing; 250W, 1kW DAB transmitters; 7kW UHF TV solid-state transmitter; 8-element directional antennas; microwave components: coaxial, waveguide BP filters, coaxial, waveguide circulators; E-, H-plane waveguide bends; waveguide to coaxial adapters; flexible waveguide sections.
Circle 368 on Free Info Card

CUTTING EDGE TECHNOLOGIES, INC. 3006
Featuring: broadcast audio processing products.
Circle 369 on Free Info Card

DALET DIGITAL MEDIA SYSTEMS 1519
Introducing: TeamRadio Windows 95 software for traffic, billing departments; Dalet Web Publisher for radio stations to create and maintain a web site; Newsedit, Newscat applications for radio newsroom to assemble, air stories; NetBack database and soundfile backup application; Dalet Ver 5 audio system on client-server platform.
Circle 370 on Free Info Card

DAN DUGAN SOUND DESIGN 1404
Featuring: D-1 live microphone processor.
Circle 371 on Free Info Card

DATACOUNT, INC. 1527
Introducing: Datacount 32, 32-bit traffic and billing software; DARTS traffic and billing software; MusicBox music management and scheduling software.
Circle 372 on Free Info Card

DATAWORLD 2624
Introducing: digital TV coverage and interference analysis packages; CD-ROM database software; GIS-ready coverage data for broadcasters worldwide.
Circle 373 on Free Info Card

DB ELETTRONICA 1027
Introducing: KE20 20W FM exciter; PM300 300W FM transmitter; KF300 300W, KF500 500W FM MOSFET amplifiers; KBU 150/250/500 AB class power amplifier for TV; MVL microwave video link, analog and digital.
Circle 374 on Free Info Card

DELCO WIRE & CABLE S 3972
Featuring: digital, analog video and audio, Clarity microphone cables; electronic multiconductor, multipair cables; custom cables for indoor, outdoor; 50-ohm, 75-ohm Andrew Heliax products.
Circle 375 on Free Info Card

DELTA ELECTRONICS INC. 2109
Featuring: broadcast transmission monitoring products, splatter monitor, operating impedance bridge.
Circle 376 on Free Info Card

Colored listings indicate issue advertisers

BE Radio®

NAB97

CONFERENCES: APRIL 5&6-10, 1997
EXHIBITS: APRIL 7-10, 1997
LAS VEGAS, NEVADA USA

EXHIBITOR MAP

People are talking about the HotLine

"This thing kicks butt!"

"That's just **one** phone line?"

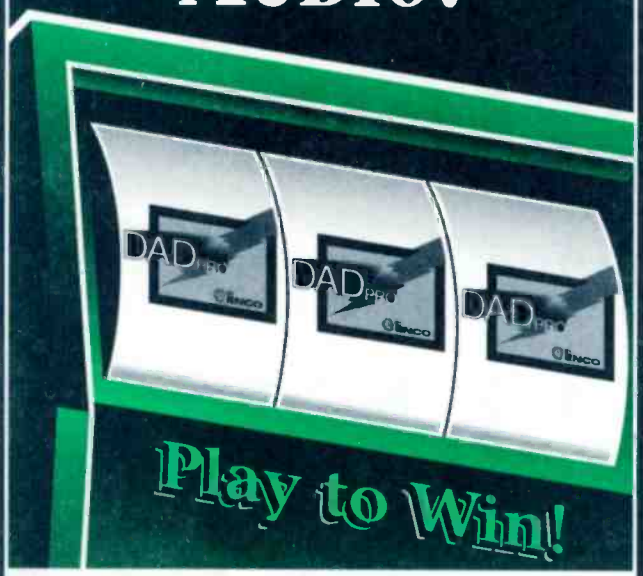
"It's so easy to use!"

"It sounds amazing!"

Come see what all the fuss is about!

COMREX Booth #2121 in the Radio Hall

DON'T GAMBLE ON DIGITAL AUDIO!



Be sure to stop by the ENCO booth and see why the DADPRO Digital Audio Delivery System has become the preferred choice for hundreds of facilities worldwide. DADPRO offers the functionality, power and reliability that others just don't deliver. Plus, DAD fully supports Global Wide Area Networking and Satellite-Based Store Forward operations, which allow groups to manage any number of facilities from a central site. If you're serious about digital audio, hedge your bets with DADPRO and do your gambling in the casinos.

NAB BOOTH #1024

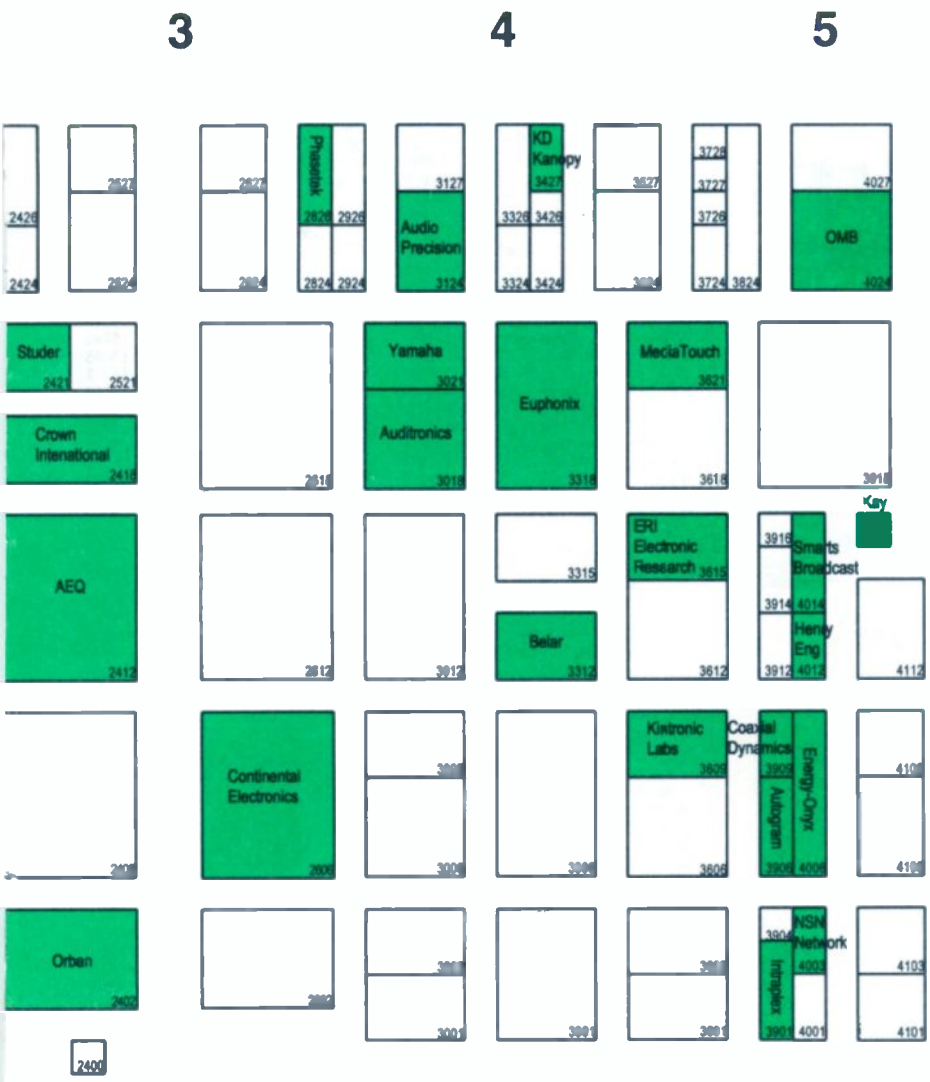
ENCO SYSTEMS, INC.

ENCO America, 24555 Hallwood Court, Farmington Hills, MI 48335 USA
Tel: 800-ENCOSYS (362-6797); 810-476-5711; Fax: 810-476-5712
Visit our website at http://www.enco.com

NAB '97 Radio Hall Exhibitors

(Advertisers in this issue are highlighted in green.)

360 Systems (C-2) 1724
AEQ (B-3) 2412
AEV Snc di Vaccari GEC (B-2) 1818
AKAI Digital (C-3) 2524
Alesis (B-5) 3618
Altronics Research (A-1) 1003
Aphex Systems (A-5) 4103
Apogee Electronics (B-2) 1718
Armstrong Transmitter (A-1) 1601
Arrakis Systems (A-3) 2406
Audi-Cord (A-2) 2006
Audio Developments (C-3) 2424
Audio Ltd (C-5) 3727
Audio Precision (C-4) 3124
Audio Processing Tech Ltd (C-2) 1727
Audioarts - See Wheatstone 1212
Audiomation/Sellmark (A-1) 1301
audiopak (A-2) 2010
Auditronics (B-4) 3018
Autogram Corp (A-5) 3906
Avocet Instruments (A-1) 1403
A-Ware (A-1) 1401
Belar Electronics Lab (B-4) 3312
BEXT (A-5) 3603
Bia Companies (B-1) 1617
Bird Electronic Corp (C-1) 1327
Bradley Broadcast Sales (A-1) 1506
Broadcast Electronics (A-1) 1207
Broadcast Programming (A-1) 1207
Broadcast Supply Worldwide (B-2) 2112
Burk Technology (C-5) 3524
CBSI Custom Business Systems (B-4) 3012
CCA Electronics (A-4) 3009
Central Tower (B-2) 1717
Circuit Research Labs (A-2) 2106
Clark Wire & Cable (B-2) 1721
Coaxial Dynamics (A-5) 3909
Coffey Sound Service (C-1) 1428
Communications Data Svcs (B-1) . 1617
Computer Concepts (C-2) 2024
Comrex (B-2) 2121
Continental Electronics (A-3) 2606
Cooper Sound Systems (A-1) 1404
Crouse-Kimzey Company (A-2) 1907
Crown Broadcast (B-3) 2418
CTE International (C-5) 3824
Cutting Edge Technologies (A-4) .. 3006
D&R North America (B-2) 1721
Dalet Media System (B-1) 1519
Dan Dugan Sound Design (A-1) ... 1404
Datacount (C-1) 1527
Dataworld (C-3) 2624
DB Elettronica (C-1) 1027
Delta Electronics (A-2) 2106
DENON (B-1) 1021
DGS Pro Audio (C-5) 3726
Digigram (B-5) 3912
Digital Courier (C-4) 3326
DNF Industries (B-2) 2019
Doremi Labs (B-1) 1619
Econco Broadcast Service (B-5) ... 3916
EDX Engineering (C-1) 1624
Electric Works (C-2) 2326
Electronics Research/ERI (B-5) .. 3615
Elenos SRL (A-5) 3601
ENCO Systems (C-1) 1024
Energy-Onix (A-5) 4006
Euphonix (B-4) 3316
Eventide (A-5) 4101
E-Z UP International (A-5) 4001
Fidelipac (A-2) 1902
FirstCom/Music House (A-2) 1906



Flash Technology (A-1) 1509
Focusrite Audio/Group One (B-1) .. 1514
GEC-Marconi Communications Systems (A-2) 1701
Gefen Systems (B-1) 1621
Gentner Communications (B-2) . 2117
Gorman-Redlich Mfg Co (A-2) 1910
Harrison by GLW (B-4) 3315
Henry Engineering (B-5) 4012
HHB Communications (C-1) 1524
Hipotronics (B-2) 1917
Hughey & Phillips (C-4) 3324
Illbruck (B-1) 1512
Inovonics Inc (B-1) 1612
International Datacasting (A-2) 1703
Intraplex (A-5) 3901
Kay Industries (B-5) 4116
KD Kanopy Inc (C-4) 3427
Kintronic Labs (A-5) 3609
KRK Systems/Group One (B-1) 1514
Link Comunicaciones (B-3) 2412
LNR Communications (B-5) 4112
Location Sound (C-3) 2627
Lockheed Martin Microwave-Narda (A-1) 1501
Logitek (B-3) 2521
LPB Inc (A-2) 1900
Magnum Towers (C-2) 2324
Marti Electronics (A-2) 2202
MediaTouch (B-5) 3621
Mier Comunicaciones (B-3) 2412
Moseley Associates (A-3) 2602
Musicam USA (A-4) 3306
Nautel (A-5) 3606
Neutrik Instrumentation (B-1) 1321
Neutrik USA (B-1) 1321
Northern Technologies (B-2) 1918
NPR Satellite Services (B-5) 3914
NSN Network Service (A-5) 4003
OMB America (C-5) 4024
Omnitronix (C-4) 3426
Orban (A-3) 2402
Pacific Innovative Electronics (B-2) 1721
Pacific Research & Engineering (B-3) 2618
Penny & Giles (C-4) 3424
Penta Laboratories (B-2) 1720
Phasetek Inc (C-4) 2826
Potomac Instruments (B-2) 2017
Professional Sound Corp (B-1) 1517
Prophet Systems (A-5) 4106
QEI (A-2) 1709
Radio Computing Services (B-1) 1216
Radio Design Labs (C-5) 3724
Radio Express (C-1) 2421
Radiomation/Div of Rosputin (C-4) 2926
RAM Broadcast Systems (A-5) 4109
Register Data Systems (A-2) 1706
RF Plante Ind Com Ltda (C-5) 3527
Roland Corporation (B-5) 3612
RVR Elettronica SRL (B-2) 1818
Rycote Mic Windshields (C-5) 3726
RYMSA (B-2) 1712
SADIE (A-1) 1001
SCA Data Systems (A-1) 1909
Scott Studios (A-2) 2007
Selco Products (B-2) 1922
Shively Labs (A-4) 3301
Sierra Automated Systems (C-5) .. 4027
SMARTS Broadcast Systems (B-5) 4014
Solid State Logic (B-3) 2612
Soundelux/Group One (B-1) 1514
Spectral/Euphonix (B-4) 3318
Sprague Magnetics (B-2) 1822
Studio Technologies (A-2) 2104
Superior Electric/Warner Electric (C-1) 1626
Superscope Tech./Marantz (A-2) .. 2102
Svetlana Electron Devices (C-1) 1424
Switchcraft (C-4) 2924
Symetrix (B-2) 1817
Tamuz Dongseo Electronics (C-3) 2426
t.c. electronic (B-2) 1721
Technosystem SpA (C-4) 3127
Telos Systems (A-4) 3006
Teracom Components (B-5) 1324
TFT Inc (A-4) 3003
Tiesseci SNC (B-5) 3918
TimeLine Vista, Inc (C-2) 2027
TM Century (A-4) 3001
TWR Telecom/Lighting (A-5) 3904
USTape & Label (C-4) 2824
Utility Tower (A-2) 2204
VideoQuip Research (A-1) 1502
Wheatstone Corp (B-1) 1212
Who Did THaT MUSIC? (B-2) 1919
Yamaha Corp of America (B-4) ... 3021

Main Hall and Sands exhibitors of interest to radio broadcasters:

Astre Systems, Inc. 4541
A.B.S S.p.A. S4063
A.F. Associates, Inc. 7432
AARDVARK S4369
ABC Radio International S1635
AccuWeather, Inc. 10564
Acoustic Systems 5255
Acoustical Solutions Inc. 7218
ADC Telecommunications, Inc. 11958
Adcom Electronics Ltd. S1369
Advanced Audio Visual Systems 11976
Aircraft Production Music Libraries 8885
AKG Acoustics 6948
Allen Osborne Assoc. Inc. S6079
Amco Engineering Co. 5913
Amek U.S. Operations, Inc. 7343
AMS NEVE 8810
Anchor Communications 11170
Andrew Corporation 11054
Antenna Concepts Inc. 29, 8672
Anthro Corporation S3232
Anton Bauer 10728
Apple Computer, Inc. M7319
Asaca/ShibaSoku Corp. of America 11914
ASC Audio Video 9258
AT&T 11934
ATCI/Antenna Technology 10358, S3063
ATI-Audio Technologies, Inc. 5527
Audio Accessories, Inc. 5759
Audio Action 10360
Audio Intervisual Design .. S3638, 8777
Audio-Technica U.S., Inc. 6311
Automated Weather Source S2051
Avid Technology, Inc. 9940
Avitel Electronics Corp. 11570
AVP Mfg & Supply Inc. S3020
Axon Digital Design BV S1049
Azden Corporation S1260
Baird Satellite Supporting Systems S3067
Baron Services S3629
BASF Magnetics Corporation S1556
BBC Center for Broadcast Skills Training S2067
Belden Wire and Cable Company 9880
Benchmark Media Systems 8664
Best Power/North Star Technical Services S4367
Beyer Dynamic Inc. 5505
Bittree Inc. S3775
British Information Services S4858
Broadcast Store 8666
Broadcast Technology Ltd. S1051
BSS Audio 6948
Cablewave Systems 11954
California Amplifier, Inc. S2351
Cairec Audio Ltd. S3976
Calzone/Anvil Cases 6943
CANARE 11944
CBS News Archives M7533
CEA Digital Newsroom Systems .. 9661
Channel Master S2872
Cinebase Software M7825
Clark Wire & Cable 7871, 1721
Clear-Com Intercom Systems 11565
Communications & Power Industries (CPI) 5604
Computer Expressions 6061
COMSAT Corporation 11922
Connectronics Corp. 6512
Control Concepts/Leibert 9658
Countryman Assoc Inc 8751
Delco Wire & Cable S3972
Deutsche Telekom S2863
Dielectric Communications 7976
Digidesign S2231
Digital Audio Labs S4065
Digital Audio Research S1835
Digital DJ Inc. S1251
Disc Manufacturing Inc. (DMI) ... M7442
Diversified Marketing S2258
Dolby Laboratories S206, 8940
Dorrough Electronics 7209
Doty Moore Tower Services 4938
DRS Ahead Technology 6211
DSI RF Systems, Inc. ..... I 3748
EASI-Efficient Antenna Systems Inc. ..... LA 503
Electronic Associates 11334
Electrorack Products Co. S2928
Electrosonic Systems, Inc. S1622
Energetic Music M7649
Entertainment Digital Network ... S4058
Equi=Tech Corporation S1065
Ergo S3019
ESE 7227

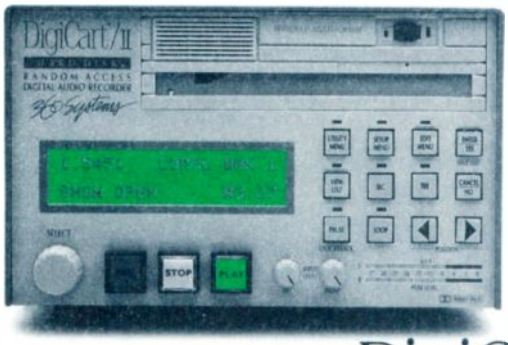
(Continued on back page)

Pick 'em. Prep 'em. Play 'em.

With Digital Audio Recorders, Editors and Players from 360 Systems.

Instant Replay.

Rapid Access Audio Player



DigiCart II Plus

The Industry Standard

Short/cut

PERSONAL AUDIO EDITOR

Our Newest!

360 Systems

5321 Sterling Center Drive
Westlake Village, CA 91361 USA
Tel (818) 991-0360
Fax (818) 991-1360
Email Info@360systems.com
Web http://www.360systems.com

See us in Booth 1724 in the Radio Hall at NAB!

Main Hall and Sands exhibitors of interest to radio broadcasters:

(Continued from inside page)

EVI Audio 10228
Fairlight USA 8276
Fiber Options, Inc. S3538
Fibre Channel Association M7754
FoNet, Inc. S1048
Forecast Consoles, Inc. S4876
Fostex Corporation of America .. 6357
Frontline Comm. LB204, 11970
Garner Industries 7230
GE American Communications 7429
Gefen Systems S3026, 1621
Genelec Oy M8168
General Instrument S2206
Gepco International, Inc. 11984
Graham-Patten Systems 10976
Hafler Professional M8364
Hardigg Cases 11178
Harris Corporation 5909, M6628
Herman Electronics S3121
Hewlett Packard ..... 8071, S 2200
Holaday Industries, Inc. 6645
Hongkong Telecom S3076
Horita 5155
Hughes Communications, Inc. 10178
IBM Corporation S2219
IDB Systems S3165
IEEE Broadcast Technology Society 32
IMMAD Broadcast Services S4658
Industrial Acoustics 10462
Innovative Quality Software M6860
Intelsat S2370
Intelsis Sistemas Inteligentes S3766
Intertec Publishing Corporation 5444, S1760

Broadcast Engineering Magazine
Millimeter Magazine
RF Design Magazine
Satellite Communications Magazine
TCI (Theatre Crafts Int'l) Magazine
Video Systems Magazine
World Broadcast News Magazine

IRT Electronics Pty. Ltd 8864
Italiana Ponti Radio SRL 11973
Itelco 5742
Jampro Antennas, Inc. 6709
JBL - Soundcraft - Spirit 6940
Jensen Tools Inc. 8860
JK Audio S1631
JLCooper Electronics M7645
JMR Electronics Inc. M7938
Kart-A-Bag S2060
Kathrein-Werke KG 9053
Keystone Communications 5617
Killer Tracks 5051
Kline Towers 11867
Korg USA, Inc. S5763
LDL Communications 9953
Leader Instruments Corp. 8760
Lectrosonics, Inc. 8372
Leitch Incorporated 8640
Lemo USA, Inc. 8835
Lightning Eliminator & Consultants 6756
Link Electronics, Inc. 9081
Lockheed Martin Microwave S2472,1501
Louth Automation S3619
Mackie Designs M8038
Macromedia M7333
Manhattan Production Music 6755
Marco, Inc. 11182
Marshall Electronics S1931
Match Production Music S1831
Maxell Corporation 8825
McCurdy Radio Industries Limited 6917
Merging Technologies M6673
MGE UPS Systems S3770
Micro Communications, Inc. 5607
Micron Audio Products Ltd. 8876
Microspace Communications S3360
Modulation Sciences 11253
Mohawk/CDT 11283
Myat, Inc. 7002
NADY Systems 6808
Nagra Kudelski SA 7005
NBC News Archives M6329
NDG Phoenix, Inc. 10460
Network Music, Inc. ..... 6537, M 6228
Neumann USA 6760
Nigel B Furniture S6028
Nil Norsat International, Inc. S3068
Non-Stop Music Library S3119
NVISION, Inc. 9681
OGM Production Music 7208
Omnimusic 8773
OPAMP Labs, Inc. 8884
Orion Atlantic S3469
Otari 10580
Pacific Bell M8133
Pacific Radio 6781
Panasonic BTSC 10701
Philips TV Test Equipment 7643
Pike & Fischer Inc. S2360
Pioneer New Media Technologies S2738
Pixel Instruments 6060
Prime Image, Inc. 9285
Prism Media Products S5777
Pristine Systems S1935
Pro-Bel Inc. 11501
Prodelin Corp S3171
Production Garden Library 8862
Professional Audio Supply S1171
Professional Label 6361
Progressive Networks Inc ..... I 4055
Promusic, Inc. S3335
Pulizzi Engineering, Inc. S6129
Quantum Corporation M6541
Radio Soft 8672
RCI Systems, Inc S6136
R-Columbia Prod. 6745
RE America, Inc. S4068
Rean Products S1062
Reel A Pall 11644
Rees Associates, Inc. 10458
RF Technology, Inc. 11910
Richardson Electronics, Ltd. 7107
River City Sound Productions 5858
Rohn 11037
Rorke Data, Inc. 6232
Rules Service Company 4956
Sandar Electronics 11864
Scala Electronic Corporation 9053
Scala Inc. ..... I 4949
ScheduAll by VizuAll, Inc. S1517
Schoepe/Post Recordings 4842
Scientific-Atlanta Inc. 6713
Sencore/AAVS 11976
Sennheiser Electronic Corp 6760
Shure Brothers 5613
Sira Sistemi Radio 9053
Solutions Custom Furnishings ... S5658
Sonic Foundry S2853
Sonic Science M8332
Sonic Solutions S4132
Sonifex S1933
Sony Electronics Inc. 5929
Sound Ideas M7338, 5859
Soundscape Digital Technology . M7666
Soundtrack USA, Inc. S5763
Speaker Array Logic S4276
Specialized Products Company ... I3654
Spotmagic, Inc. S6166
Sprint M7451
SSE Telecom M7747
Staco Energy Products Company 11486
Stainless Inc. 6811
Storsel Corporation 8837
Studer Professional Audio, Inc. . 6948
Systems Wireless, Ltd. 11259
Systems With Reliability (SWR, Inc.) 5609
TAI AUDIO, Inc. S6033
Talk America Radio Network S2053
Tamrac, Inc. S5766
Tannoy-TGI North America Inc. S1833
TASCAM 6952
TDC (formerly Tally Display Corp.) 8679
Techflex, Inc. 11160
Techni-Tool 11337
Tekniche Limited 8817
Tektronix Inc. 9914
Telecast Fiber Systems, Inc. 9281
Telepak San Diego 5532
Telex Communications, Inc. 8510
Telos Systems ..... I 5250, 3006
Tentel Corp 5511
The Associated Press S205
The Austin Company S6160
THOMCAST 7414
Thomson Broadcast, Inc. 7414
Thomson Components & Tubes ... 5751
Time Base Consoles 5441
Toko America, Inc. 9567
Torpey Controls 11238
TRF Production Music Libraries ... 6461
Troy Sound Wall Systems S1633
United Ad Label S3029
USA Digital Radio 27/28
Valentino Prod. Music Library 6411
VidCAD Documentation Programs 9664
Walters-Storyk Design Group S1503
Ward-Beck Systems Ltd. 11025
Weather Central Inc. S204, 11573
Weathernews S5674
Wegener Communications 11940
Wenger Corporation S4958
WEST PENN WIRE/CDT S6138
Whirlwind 5747
Will-Burt 11800
Wilson Case M8325
Winsted Corporation S6126, 6921
Wireworks Corporation 7206
Wohler Technologies, Inc. LA501, 9773
Xing Technology Corp. ..... I 4853
Yale Electronics, Inc. 11265
Zack Electronics M7269
Zaxcom Inc. 10270
ZERO STANTRON 5625

DENON ELECTRONICS 1021
Introducing: DN-M1050R minidisc recorder, player; DN-C680 professional CD player; DRD-1408 8X speed 200-disc capacity CD-ROM jukebox.
Circle 377 on Free Info Card

DEUTSCHE TELEKOM S 2863
Introducing: ATM in broadcast; DAB digital audio broadcasting.
Circle 378 on Free Info Card

DGS PRO AUDIO 3728
Introducing: Ring Lock DIN connectors; XLR channel identification.
Circle 379 on Free Info Card

DIELECTRIC COMMUNICATIONS 7976
Featuring: digiTLine broadband transmission products for NTSC, HDTV frequencies.
Circle 380 on Free Info Card

DIGIDESIGN S 2231
Digital audio recording systems.
Circle 381 on Free Info Card

DIGIGRAM 3912
Introducing PCX pocket, PCX801.
Circle 382 on Free Info Card

DIGITAL AUDIO LABS S 4065
Circle 383 on Free Info Card

DIGITAL AUDIO RESEARCH S 1835
Circle 384 on Free Info Card

DIGITAL COURIER INTERNATIONAL 3326
Digital audio network service for connecting radio stations, production studios, etc.
Circle 385 on Free Info Card

DIGITAL DJ INC. S 1251
Introducing: high-speed data system delivering information in wireless, mobile environment; includes receiver with LCD screen showing alphanumeric text, graphics to receive real-time traffic, navigation, local and business news, weather, sports, stock reports while listing to FM radio station in stereo.
Circle 386 on Free Info Card

DISC MANUFACTURING INC. (DMI) M 7442
Mastering and replication of all CD formats.
Circle 387 on Free Info Card

DIVERSIFIED MARKETING S 2258
Bidirectional microwave products.
Circle 388 on Free Info Card

DNF INDUSTRIES 2019
Featuring: ST300 slow motion controller; 2-machine cuts only editor; controller for Tektronix Profile for clip-based operation, Shotlist or Playlist available for news, live production, game/award shows, sports.
Circle 389 on Free Info Card

DOLBY LABORATORIES S 206, 8940
Introducing: Dolby Drive 8-channel digital disc recorder; DP562 reference Dolby digital (AC-3) and ProLogic decoder.
Circle 390 on Free Info Card

DOREMI LABS, INC. 1619
Introducing: VId random access disk video recorder with serial digital interface, records full resolution video directly form Digital Betacam or D1.
Circle 391 on Free Info Card

DORROUGH ELECTRONICS 7209
Introducing: Phantom Audio reference generator.
Circle 392 on Free Info Card

DOTY MOORE TOWER SERVICES 4938
Broadcast consultants.
Circle 393 on Free Info Card

D&R NORTH AMERICA 1721
Circle 394 on Free Info Card

DRS AHEAD TECHNOLOGY 6211
ITC cart machines, Digital Program Repeater.
Circle 395 on Free Info Card

DSI RF SYSTEMS, INC. I 3748
Engineering, construction firm; specializing in video, RF system design, construction, maintenance.
Circle 396 on Free Info Card

EASI-EFFICIENT ANTENNA SYSTEMS INC. LA 503
Offering satellite system analysis and integration.
Circle 397 on Free Info Card

ECONCO 3916
Featuring: high quality rebuilt power tubes and klystrons for radio and TV transmitters.
Circle 398 on Free Info Card

EDX ENGINEERING, INC. 1624
Introducing: SignalPro PCS/cellular system design add-on module; SignalPro Microcell 3D ray-tracing add-on module.
Circle 399 on Free Info Card

ELECTRIC WORKS CORPORATION 2328
Introducing: AXS Pro Cart Windows 95 cart replacement product, intuitive log-based operation, virtual faders, stream recorder; DLR/II completely new version of the Digital Longform Recorder for 4-channel record/playback for News, Talk, Sports, NPR formats, operate standalone or with AXS Live and automation systems.
Circle 400 on Free Info Card

ELECTRONIC ASSOCIATES 11334
Introducing: RF-Host multiple site transmitter controller; RF Director 8- and 16-channel transmitter controller; RF

Manager version 6 software upgrade; Windows CE/NEC based remote monitoring software.
Circle 401 on Free Info Card

ELECTRORACK PRODUCTS COMPANY S 2928
Featuring: equipment rack products.
Circle 402 on Free Info Card

New Dynamax MX/D Digital Console

The Sensible Solution, Sensibly Priced

- Conventional 8 channel on air layout eliminates special operator training
- Selectable analog and digital input modules enhance future flexibility and usefulness
- A/D input modules with 18-bit precision converters provide transparent digital audio
- Digital input modules with SRC accept both AES/EBU and SPDIF formats
- XLR input and output connectors simplify installation
- Solid steel construction ensures durability and RF immunity
- Main DSP Board with 24-bit internal processing and 48 kHz sampling rate designed for reliability by industry leader Graham-Patten Systems

Available Now!

Call for more information

DYNAMAX®
BROADCAST PRODUCTS BY FIDELIPAC®
Fidelipac Corporation
2707 Black Lake Place
Philadelphia, PA 19154 • USA
TEL: (215) 464-2000 • FAX: (215) 464-1234

Circle (96) on Free Info Card

See us at NAB Booth #1902

ELECTROSONIC SYSTEMS, INC. S 1622
Introducing: Prolite system, LCD projector using the ImageStar 31K, a videowall processor capable of dynamic displays without flicker on 31kHz monitor or projection cube videowalls; C-Through for Windows, software to compose displays of video sources and special effects.
Circle 403 on Free Info Card

ELENOS S.R.L. 3601
HF-1000 MOSFET amplfiiers; FM tube amplifiers to 20kW; solid-state amplfiiers to 1.2kW; FM exciters.
Circle 404 on Free Info Card

ENCO SYSTEMS, INC. 1024
Introducing: DADpro32 digital audio delivery system.
Circle 405 on Free Info Card

ENERGETIC MUSIC M 7649
Demos of buy-out music library with Tubebuilder, a self-editing computer program; entire 28-disc library of buy-out music and sound effects available for review; new releases of Sports and Action disc, as well as Light Jazz #1.
Circle 406 on Free Info Card

ENERGY-ONIX 4006
Featuring: frequency-agile digital STLs; ECO and MK series grounded-grid triode FM transmitters 1kW to 50kW; SST solid-state FM transmitters Legend FM transmitters 1-10kW.; multiple preset dual-frequency short-wave transmitters.
Circle 407 on Free Info Card

ENTERTAINMENT DIGITAL NETWORK S 4058
Circle 408 on Free Info Card

EQUI=TECH CORPORATION S 1065
Super-isolator series balanced power conditioning equipment for A/V facilities, rack-mountable ac systems for interference-free operation, clean equipment operation and increased dynamic range.
Circle 409 on Free Info Card

ERGO S 3019
New product line: sliding computer keyboard shelf.
Circle 410 on Free Info Card

ERI ELECTRONICS RESEARCH, INC. 3615
Introducing Two-Tower-Tops combined HDTV and multiplexed FM antennas; FM antennas, filters, combiners; towers, structural analysis and tower reinforcing; lightning protection and grounding products.
Circle 411 on Free Info Card

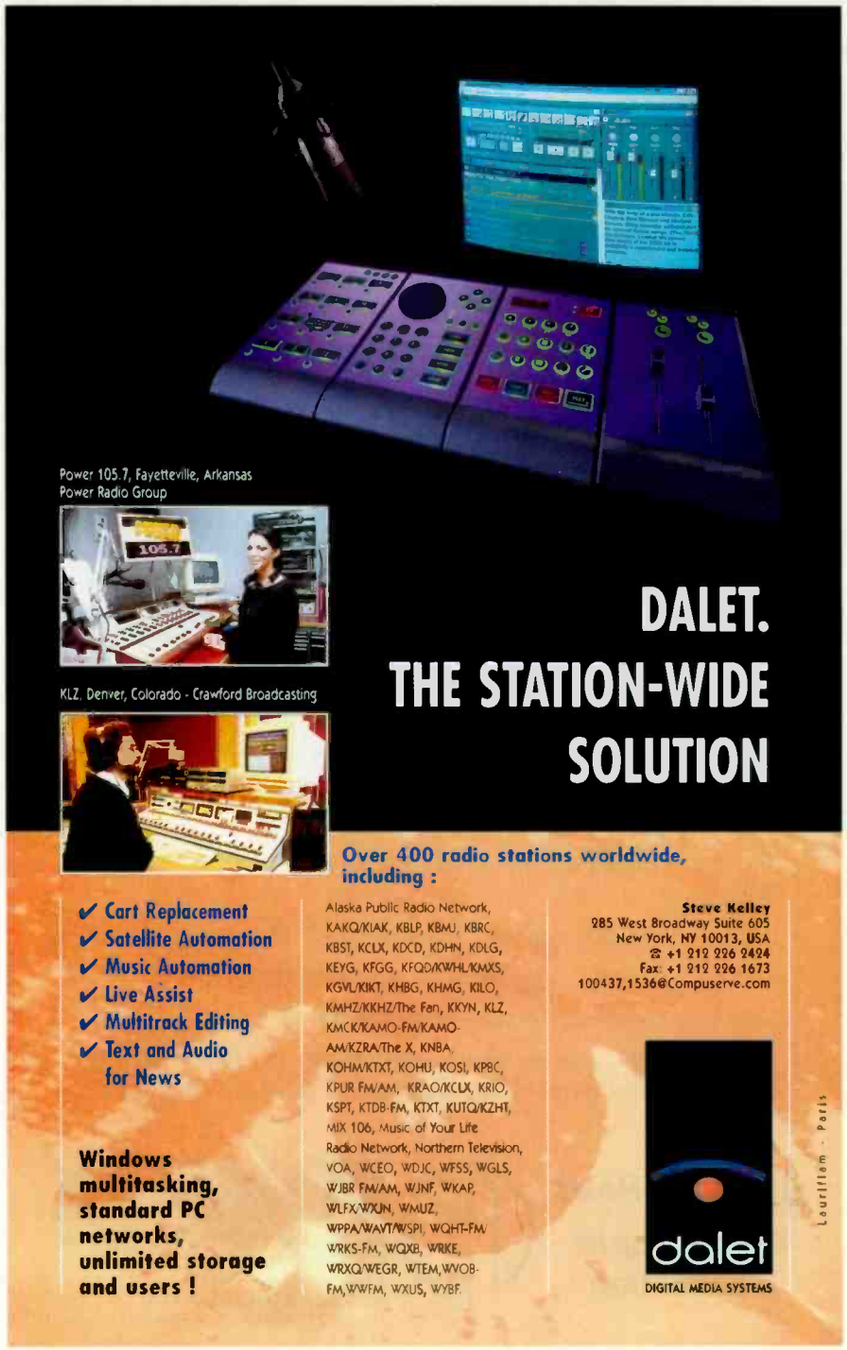
ESE 7227
Introducing: LX-5105 5-inch , LX5116 16-inch self-setting/impulse analog clocks; LX-221 genlockable RS-170A blackburst generator; PC-471 PC interface reads ESE and SMPTE time code; ES-245 quad 1x6 audio DA, 24 independent gain controls; ES-218 1x4 audio DA.
Circle 412 on Free Info Card

EUPHONIX, INC. 3318
Introducing: Euphonix CS3000 digital control mixing system.
Circle 413 on Free Info Card

EVI AUDIO 10228
Electro-Voice, Vega, Klark-Teknik, DDA Featuring: wired and wireless microphones, mixers, loudspeakers equalizers; compressors, gates; digital delays; cross-overs; stereo programmable graphic equalizer.
Circle 414 on Free Info Card

EVENTIDE, INC. 4101
Featuring Harmonizer audio effects processors; video accessories.
Circle 415 on Free Info Card

E-Z UP INTERNATIONAL, INC. 4001
Featuring: Eclipse, Encore E-Z UP Instant shelters for shade at remote locations; setup time less than 60 seconds; accessories, sideways, rail skirts.
Circle 416 on Free Info Card



Circle (97) on Free Info Card

FAIRLIGHT USA 8276
DaD digital audio dubber; F.A.M.E. Fairlight audio mixer editor; MFX3 disk recorder/editor software, including Audio Base, High Speed Networking, OMF file compatibility.
Circle 417 on Free Info Card

FIBER OPTIONS, INC. S 3538
Featuring: fiber optic systems: Y/C component video; video, 18-bit audio single-mode long-haul broadcast grade; long-haul broadcast-grade video signals; mini rack enclosure for fiber optic links; Learning Link 1-way video/audio link for distribution in educational classrooms.
Circle 418 on Free Info Card

FIBRE CHANNEL ASSOCIATION M 7754
Information about the Fibre Channel drive standard and manufacturers and products that support the standard.
Circle 419 on Free Info Card

FIDELIPAC CORPORATION 1902
Featuring: Dynamax digital cartridge machine with magneto optical option; Dynamax MXE consoles.
Circle 420 on Free Info Card

FIRSTCOM MUSIC 1906, 8779
Featuring: Music On-Line network; MusiQuick search.
Circle 421 on Free Info Card

FLASH TECHNOLOGY CORPORATION 1509
Featuring: dual, high and medium intensity obstruction lighting.
Circle 422 on Free Info Card

FOCUSRITE AUDIO ENGINEERING 1514
Introducing: Green Range, Red Range products; Blue ISA 230 dual compressor/limiter; products for recording, postproduction, broadcast applications.
Circle 423 on Free Info Card

FONET, INC. S 1048
Circle 424 on Free Info Card

FORECAST CONSOLES, INC. S 4876
Circle 425 on Free Info Card

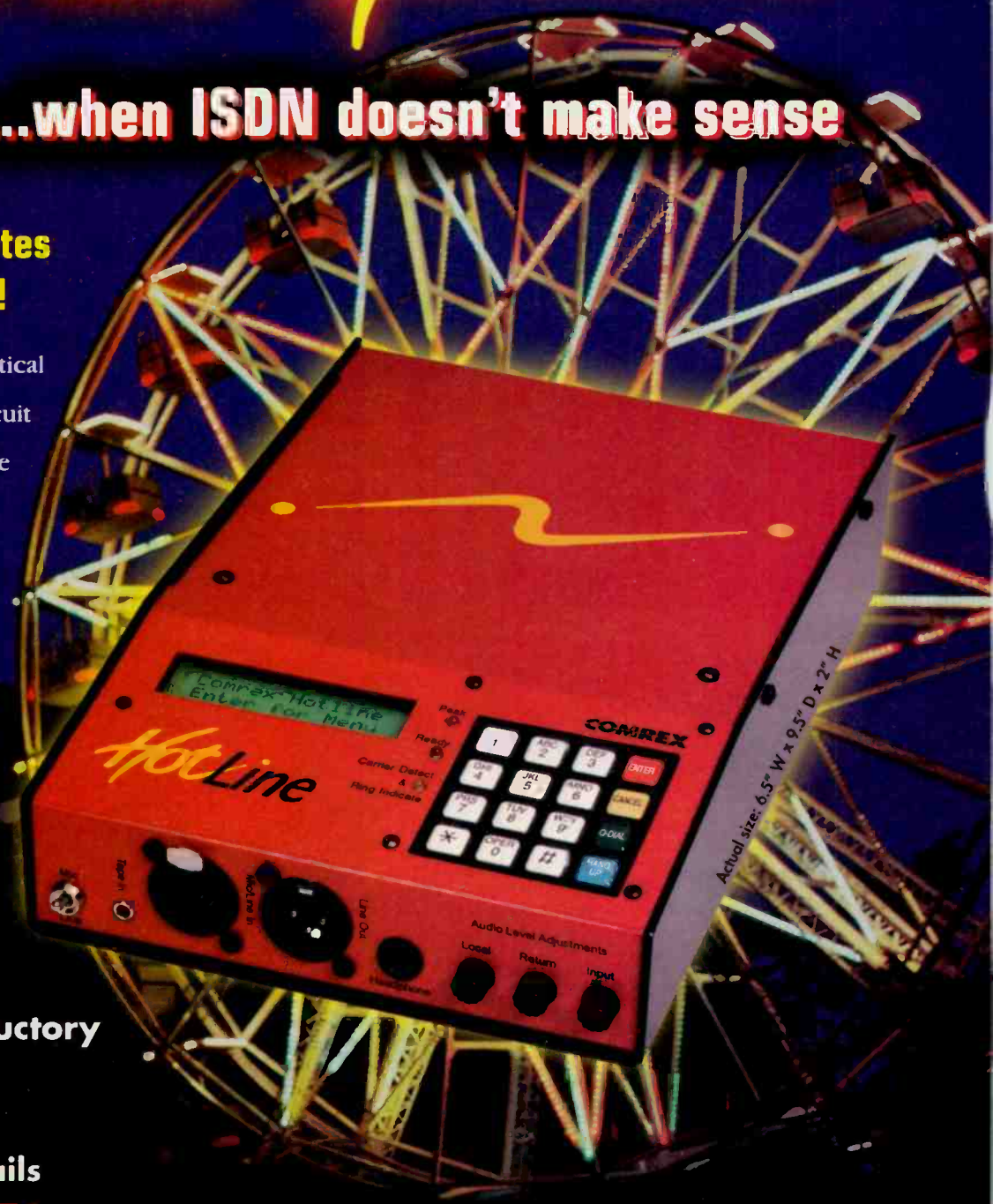
FOSTEX CORPORATION OF AMERICA 6357
Featuring: audio recording, mixing equipment.
Circle 426 on Free Info Card

FRONTLINE COMMUNICATIONS LB 204, 11970
Introducing: digital and analog SNVs; microwave ENG vans; microwave utility vehicles, remote production units; radio vans.
Circle 427 on Free Info Card

Colored listings indicate issue advertisers

Use the HotLine

...when ISDN doesn't make sense



One-time remotes just got easier!

Sometimes it's impractical to install a special circuit like ISDN for a one-time remote. However, a plain telephone line is usually available. Wouldn't it be nice if you could have high quality two-way audio on that plain line? That's just what you get with the *HotLine*.

Special introductory price: $2995

Call us for details

800-237-1776

http://www.comrex.com

Wideband two-way audio on POTS (Plain Old Telephone Service)

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 North America
or 0-800-96-2093 in the U.K.

Circle (98) on Free Info Card

GARNER INDUSTRIES 7230
Introducing: Garner MGD3 degausser; Eliminator 4000, Models 682, 1400L degaussers, erasers.
Circle 428 on Free Info Card

GE AMERICAN COMMUNICATIONS 7429
Featuring: satellite news gathering relay services.
Circle 429 on Free Info Card

GEC MARCONI COMMUNICATIONS 1701
Featuring: Band III DAB transmitters, DAB GAP fillers, DAB COFDM modulator, live DAB demos; FM 1000 1kW FM transmitter; Alan Dick antenna systems.
Circle 430 on Free Info Card

GEFEN SYSTEMS S 3026, 1621
Introducing: TSE150 (MAC), PCX150 (PC) professional monitor and keyboard extenders; VDX600 video distribution amp; Touch-The-Music computerized jukebox for background music; DCJ Pro background music system; SFX library distributor, MoE Pro SFX locator software, MoE Organizer SFX locator software.
Circle 431 on Free Info Card

GENELEC OY M 8168
Model 1039 active main monitoring system with two 320-liter enclosures, two 7U racks to house amplification system, active crossovers, protective circuitry.
Circle 432 on Free Info Card

GENERAL INSTRUMENT S 2206
HDTV Grand Alliance.
Circle 433 on Free Info Card

GENTNER COMMUNICATIONS CORP. 2117
Featuring:network interface to connect multiple multiline talkshow systems together; remote transmitter control; portable transmitter for assistive listening; products for broadcast and teleconferencing applications; site control systems for transmitters.
Circle 434 on Free Info Card

GEPCO INTERNATIONAL, INC. 11984
Introducing: #7537 miniature serial digital coax; 4200 series 22awg, 4400 series 24awg, 4600 series 26awg multipair audio cables; Ultrahome composite cable.
Circle 435 on Free Info Card

GORMAN-REDLICH MFG. COMPANY 1910
Featuring: EAS encoders, decoders; weather radios for NOAA weather alerts; digital antenna monitors for AM directional arrays.
Circle 436 on Free Info Card

GRAHAM-PATTEN SYSTEMS 10976
Featuring: D/ESAM digital edit suite audio mixers.
Circle 437 on Free Info Card

GROUP ONE LTD. 1514
Circle 438 on Free Info Card

Circle (99) on Free Info Card

HAFLER PROFESSIONAL M 8364
Circle 439 on Free Info Card

HARDIGG CASES, A DIV. OF HARDIGG IND 11178
Introducing: Roto-Molded rotationally molded cases, rugged, airtight, watertight; off-the-shelf and custom designs.
Circle 440 on Free Info Card

HARRIS CORPORATION 5909, M 6628
Introducing: CD LINK, uncompressed 950MHz aural STL. Featuring: mobile production and uplink systems; compact SNG vehicle in Suburban or comparable 4-wheel drive van; digital networks, wireless cable systems; DAB 2000 transmitters; SuperCiter analog exciter; CD, Quest FM transmitters; Gates, DX AM transmitter series; 360 Systems Instant Replay hard disk audio player; Sage Alerting EAS system; DVB satellite exciter; DIGIT FM exciter; DRC1000 digital audio console; Audion VoxPro sound editing system; Audio-Metrics studio furniture.
Circle 441 on Free Info Card

HARRISON BY GLW 3315
Featuring: console automation computer; broadcast console for TV with mix-minus and clean-feed IFB options; digital audio hardware and software.
Circle 442 on Free Info Card

HENRY ENGINEERING 4012
Introducing: Audio Online caller-interactive linstener/viewer information system, 16-line, hard drive storage for hours of digital audio; featuring Matchbox II, USDA and ProblemSolver products; audio switching, digital audio storage products.
Circle 443 on Free Info Card

HERMAN ELECTRONICS S 3121
Distributors: Amphenol, Belden, Brady, Kings, Neutrik, Shure, Sony, Telex.
Circle 444 on Free Info Card

HEWLETT PACKARD 8071, S 2200
Featuring: HP workstations; MediaStream interactive products.
Circle 445 on Free Info Card

HHB COMMUNICATIONS LTD. 1524
Featuring: PORTADAT portable DAT recorders; advanced media products; Cedar audio restoration equipment; loudspeakers; microphones.
Circle 446 on Free Info Card

HIPOTRONICS 1917
Featuring: medium, high power automatic voltage regulators.
Circle 447 on Free Info Card

HOLADAY INDUSTRIES, INC. 6645
Introducing: HI-3510 personal RF monitor; Naptex RF protective clothing.
Circle 448 on Free Info Card

HONGKONG TELECOM S 3076
Broadcast and fixed satellite services.
Circle 449 on Free Info Card

HORITA 5155
Introducing: PT2 portable tone generation; PW2100 portable SMPTE window inserter.
Circle 450 on Free Info Card

No manual required

but we'll send you one anyway

If traditional audio production is analogous to walking, a digital audio workstation is the equivalent to flying.

Unfortunately, a lot of audio production software can seem like the equivalent of 747 cockpit controls: serious technoid overkill when you're just trying to get from point A to point B.

That's why we developed the **Express**™ software interface for our **Prisma**™ workstation hardware. So you can enjoy workstation speed and maneuverability instead of logging frustrating hours just trying to get the thing off the ground.

Express is *the* creative tool for radio broadcast production with a clean interface so simple that even your program director could learn it. *Everything you need is on a single screen* — cut/copy/paste buttons, snapping/grid controls, faders & pans, a transport that is very familiar, a pull-down sound library list, and the ever popular 10-level undo/redo. And the best part is, it works the way you work — quickly and intuitively. So you don't have to spend endless hours inside a manual deciphering cryptic icons, memorizing multiple keystroke combinations, and struggling with computerese.

Not that we cut out any feature you might *need*; we just took out all the stuff you *hate* about digital workstation software. Like nested menus, tricky hardware set-up, and way too many screens piled up on top of each other.

But Express isn't just some kind of "dumbed down" product. Lurking underneath this deceptively simple interface lies a tremendous amount of power and capability that allows you to accomplish even the most difficult editing tasks. Powerful tools like time compression/expansion, normalization and one-touch submix.

Prisma systems also work well in groups, with Internet-compatible network audio transfer between systems in different rooms or across the planet. You can even send a spot you've created in Express directly to one of several popular digital on-air delivery systems — all ready to play.

And if you *really* want to get going fast, we'll build you a complete turnkey Prisma system, so all you need to provide is some desk space and a power outlet.

So don't just sit on the runway reading the manual. Grab the controls and fly. Express for Prisma. Get it done while you're still young.

EXPRESS for Prisma

"I've always known my Prisma system was speedy. Then I got my hands on the new Express software. Its simple interface and intuitive tools make virtually every radio project a snap. It's easy, it's fast... and it makes mounds and mounds of carrot salad. We love it!"

Dave Green
Director of Production Services
Paxson Communications, Orlando

Feature Bullets with Tiny Print

- 8 tracks with instant vertical and horizontal zoom
- Over 250 markers and 99 auto-locate points
- Fast bipolar waveform views
- Easy head and tail trim
- Directly draggable fades and crossfades
- Snap sounds to markers, grid, current position, or other sounds
- 10-level undo/redo
- Customize keyboard and MIDI controller hot keys to match your working style
- Several popular tactile work surface options to choose from
- Trade sound files and projects with other Spectral workstations via removable media, local networks, or the Internet
- Direct PCM or MPEG network transfer to popular digital on-air delivery systems
- Complete turnkey Prisma workstation systems available
- Free software updates and upgrades for 1 year

Here's the Really Fine Print

Express is just one of three compatible software interfaces for Prisma — and editors are just a part of our product line. Turn to Spectral for an established company specializing in digital audio workstation and connectivity solutions. Call, fax, or e-mail for complete, detailed information on our practical approach to enhanced productivity and for a new tuna salad recipe.

Circle (100) on Free Info Card

SPECTRAL, Incorporated
18800 142nd Ave NE Woodinville, WA 98072 USA
Toll free sales phone: 800 407 5832 Not-the-sales-phone phone: 206 487 2931 Fax: 206 487 3431
http://www.spectralinc.com
E-Mail: sales@spectralinc.com

SPECTRAL
A Euphonix Company

HUGHES COMMUNICATIONS, INC. 10176
Featuring: range of satellite communications services for premium video, voice, data, mobile, business, educational and direct-to-home consumer entertainment service; division of Hughes Electronics, subsidiary of General Motors.
Circle 451 on Free Info Card

HUGHEY&PHILLIPS, INC. 3324
Featuring: FAA-approved obstruction lighting, controllers and remote monitoring for tall towers.
Circle 452 on Free Info Card

IBM CORPORATION S 2219
MPEG encoder/decoder chipsets.
Circle 453 on Free Info Card

IDB SYSTEMS S 3165
Engineering, design, integration and installation of satellite earth facilities.
Circle 454 on Free Info Card

IEEE BROADCAST TECHNOLOGY SOCIETY 32
Circle 455 on Free Info Card

ILLBRUCK ACOUSTICS 1512
Introducing: SONEX acoustical products, curtains, active headsets; ProSpec sound barriers.
Circle 456 on Free Info Card

IMMAD BROADCAST SERVICES S 4658
Technical services to the broadcast industry including systems design and integration, project management, facilities maintenance and manufacturing.
Circle 457 on Free Info Card

INDUSTRIAL ACOUSTICS 10462
Introducing: Quad Series V, Series VIII studio environments; dual mode acoustical doors, acoustical windows, air conditioning silencers.
Circle 458 on Free Info Card

INNOVATIVE QUALITY SOFTWARE M 6860
SAW Plus is a digital audio workstation software package providing up to 16 mono or stereo tracks of simultaneous, live playback on Windows-compatible sound cards.
Circle 459 on Free Info Card

INOVONICS, INC. 1612
Introducing: Model 540 FM subcarrier monitor; Model 701 "Dirt Cheap" RDS encoder; Model 235 "Comprehensive" AM processor.
Circle 460 on Free Info Card

INTELSAT S 2370
Circle 461 on Free Info Card

INTELSIS SISTEMAS INTELIGENTES S 3766
Featuring: products for CATV, satellite, TV and microwave services; audio/video compression equipment.
Circle 462 on Free Info Card

INTERNATIONAL DATACASTING 1703
Introducing: EchoWeb, EchoNet Internet connectivity software; CR253, CR263 cable receiver PC cards ISA.
Circle 463 on Free Info Card

INTERTEC PUBLISHING CORP. 902, 5444, S 1760
Publishers of Broadcast Engineering, BE Radio, Video Systems, World Broadcast News, Millimeter, TCI (Theatre Crafts International), Lighting Dimensions, Satellite Communications; stop by the booth for copies of magazines and subscription information.
Circle 464 on Free Info Card

INTRAPLEX, INC. 3901
Introducing: TDM multiplexers and versatile high quality program audio, voice and data capabilities for radio, TV; Intercom Data Trunking, T1 over Video, Duopoly/LMA and STL exhibit.
Circle 465 on Free Info Card

IRT ELECTRONICS PTY. LTD. 8864
Introducing: RWA-2310 reverse path amplifier, RWT/RWR-3080 L-band fiber optic (FO) link, VA-503/553 70MHz IF FO link; DDA-3100 34Mbit distribution amp; DVT-3220 270Mbit SDI multimode FO link; DVT-3210 270Mbit SDI single mode FO link; DVC-3111 270Mbit SDI composite PAL/NTSC and RGB encoder.
Circle 466 on Free Info Card

ITALIANA PONTI RADIO SRL 11973
Featuring: VHF/UHF transmitters; microwave links; antenna systems; HF equipment.
Circle 467 on Free Info Card

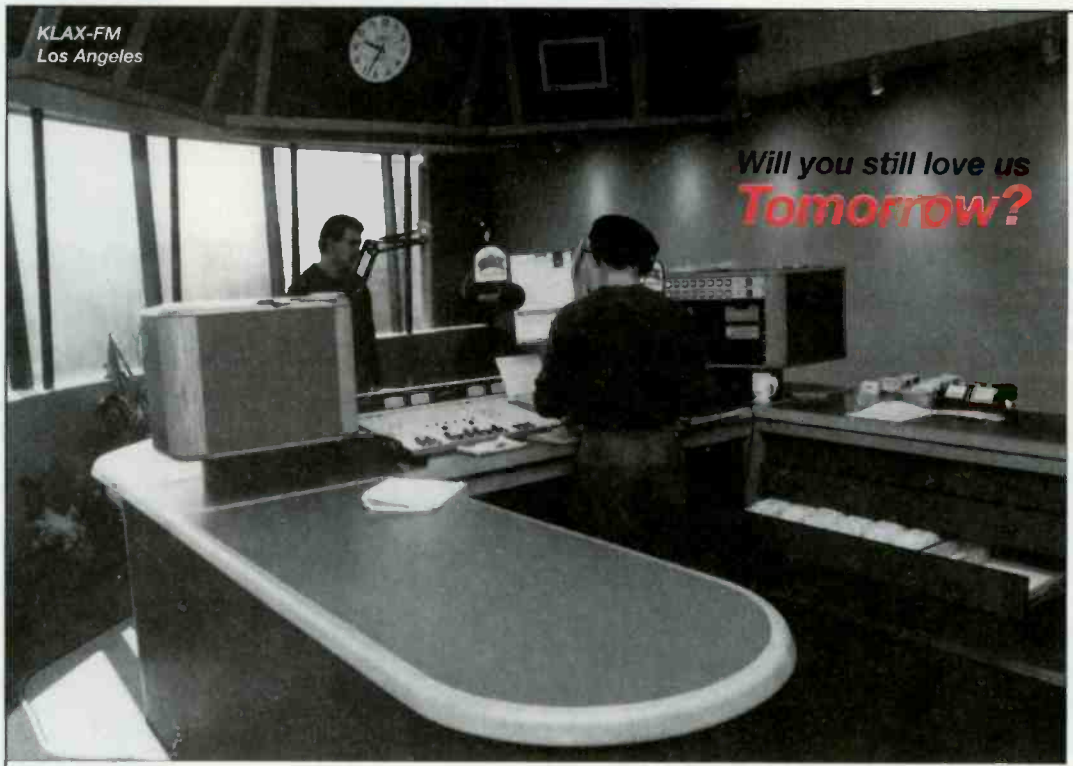
ITELCO 5742
Introducing: UHF/VHF liquid-cooled solid-state transmitting systems.
Circle 468 on Free Info Card

JAMPRO ANTENNAS, INC. 6709
Introducing: JHD-HR2 low power dual dipole flat panel antenna for VHF; Quick Step reducers; DTV system solutions.
Circle 469 on Free Info Card

JBL - SOUNDCRAFT - SPIRIT 6940
Professional audio products including Follo Notepad, Powerpad, Portapad, Folio F1, Folio SX, XL7, Spirit 8 mixers; Absolute 4P powered speakers.
Circle 470 on Free Info Card

JENSEN TOOLS INC. 8860
Introducing: Tektronix TDS-200 series digital oscilloscope; JTK-88 inch/metric field service tool kit; Sescom CT-6 audio/video cable tester; F W Bell 4060 ELF meter; Fluke 7-series low-cost electrical testers; Linear Laboratories LTL100 infrared thermometer; Sper Scientific 840029 sound level meter; C K electronically insulated tool set.
Circle 471 on Free Info Card

JK AUDIO S 1631
Introducing: RemoteMix 3 combined telephone line hybrid mixer and universal handset interface; QuickTap IFB telephone handset IFB tap.
Circle 472 on Free Info Card



Studio furniture is one decision you'll be living with for a long time. If you make it Murphy, you can count on a relationship that will last for years. Durability, deliverability and thoughtful design–all part of the enduring elegance of Murphy Studio Furniture.

MURPHY
STUDIO FURNITURE

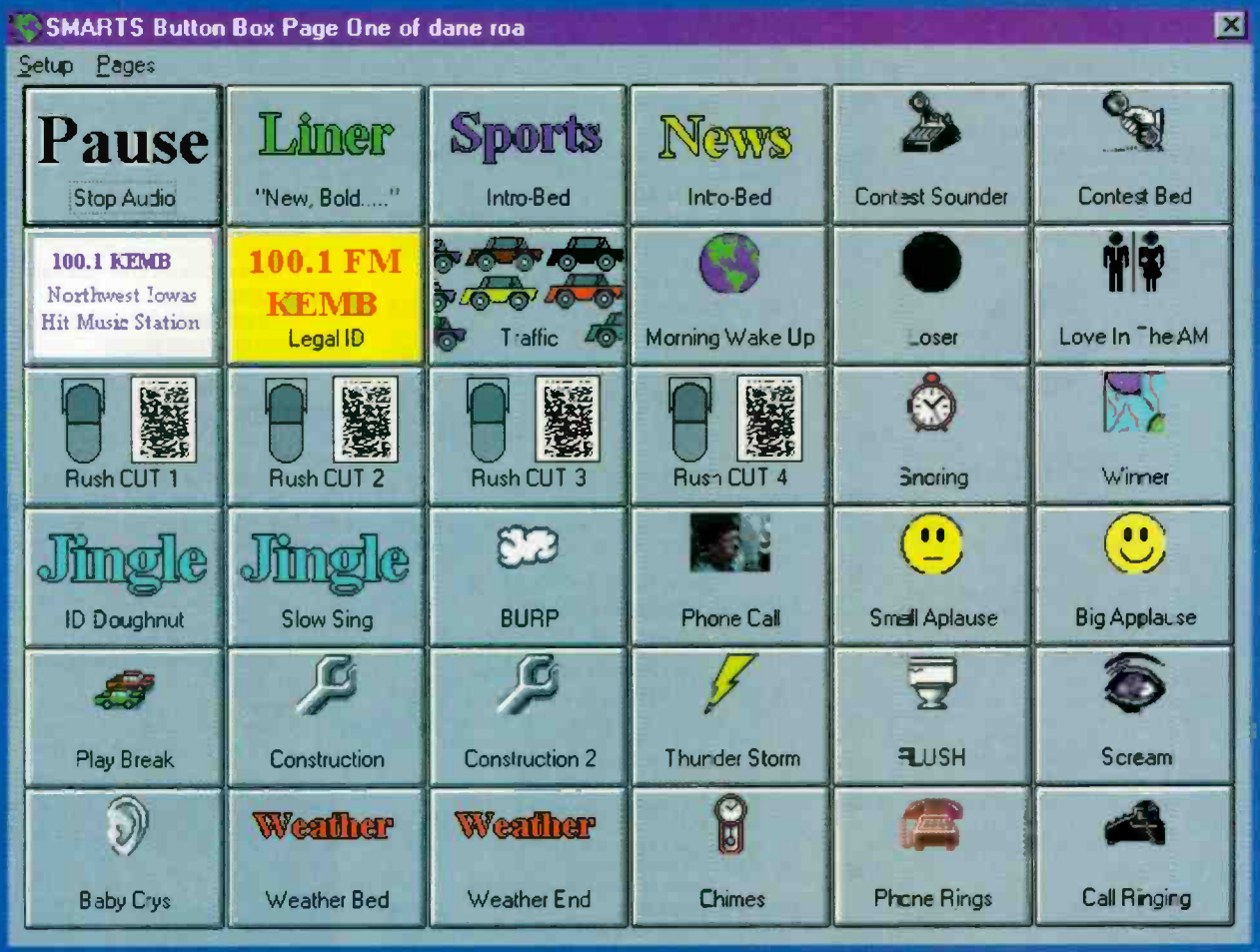
▲ 4153 N. BONITA STREET ▲ SPRING VALLEY, CA 91977 ▲ TEL (619) 698-4658 ▲ FAX (619) 698-1268 ▲
▼ (800) 307-1060 ▼ Email dwmurphy@electriciti.com ▼ URL http://www.electriciti.com/dwmurphy ▼

Our service goes beyond design and fabrication, to total management of your concept's execution.

Circle (101) on Free Info Card

Colored listings indicate issue advertisers

Touch Me In The Morning !



Or any other time of day for that matter!

Smarts Broadcast Systems introduces The Right Touch. Over 900 individual, programmable audio events, available at the touch of the screen! It works with the SMARTCASTER Digital Audio System, but plays to separate inputs on your console, so you have total control of content and levels. It's a touching experience! Contact us today at 800 747-6278. Fax us at 712 852-5031, or Email us at smarts@ncn.net. Visit our Website at http://www.ncn.net/smarts for more information on all our products.

SMARTS
Broadcast Systems

Circle (86) on Free Info Card

JLCOOPER ELECTRONICS M 7645
Introducing: MCS-3000, MCS2 for Media 100; MCS2 for 9 pin; CuePoint/Cue9.
Circle 473 on Free Info Card

JMR ELECTRONICS INC. M 7938
Introducing: STAX by JMR stackable desktop enclosures; fiber optic rackmounts, communications racks, 19-inch electronic cabinets.
Circle 474 on Free Info Card

K

KART-A-BAG S 2060
Featuring: equipment transportation products.
Circle 475 on Free Info Card

KATHREIN-WERKE KG 9053
Antennas and accessories for FM & TV broadcasting.
Circle 476 on Free Info Card

KAY INDUSTRIES INC. 4116
Featuring: Phasemaster rotary phase converter, produces true equivalent of utility 3-phase service from existing single-phase power source.
Circle 477 on Free Info Card

KD KANOPY, INC. 3427
Featuring: quick setup, durable, portable canopies, tents; take seconds to assemble; customized graphics; show station call letters at remotes, promotions.
Circle 478 on Free Info Card

KEYSTONE COMMUNICATIONS 5617
Provider of transmission services for radio and television broadcasters.
Circle 479 on Free Info Card

KILLER TRACKS 5051
Featuring: production music libraries.
Circle 480 on Free Info Card

KINTRONIC LABS, INC. 3609
Featuring: single-pole, double-throw RF contactors; AM transmission system products.
Circle 481 on Free Info Card

KLINE TOWERS 11867
Featuring: design, fabrication and erection services of broadcast and special antenna support structures, featuring latest advances in ice protection, component style construction.
Circle 482 on Free Info Card

KORG USA, INC. S 5763
Introducing: SoundLink digital recording systems; 168RC recording console, digital 16x8x2 with 2 ADAT optical inputs, 8 analog inputs with 18-bit A/D converters, effects processors, console animation; Trinigy Music Workstation DRS line.
Circle 483 on Free Info Card

KRK SYSTEMS, INC. 1514
Introducing: Expose series E7, E8 studio reference monitors; Featuring: M6000/S, M7000B/BS, M9000B, K-RoKs monitors.
Circle 484 on Free Info Card

L

LDL COMMUNICATIONS 9953
Introducing: Landmark series DTV digital TV transmitters for ATSC standards featuring new control system technology and ATSC compliant exciter; Digital Radio transmitters for L-band and Band III, both compatible with Eureka 147; LeBlanc demonstrations for tower analysis to determine capabilities of existing towers to hold support additional antennas for digital services; Larcan TTC lower power TV, FM transmitters.
Circle 485 on Free Info Card

LEADER INSTRUMENTS CORPORATION 8760
Introducing: SDI compression artifact analyzer, SDI test generators for variable/calibrated jitter and noise; monitors; composite, component signal sources, monitors; RF level, spectrum meters, RF generators; analog/digital oscilloscopes.
Circle 486 on Free Info Card

LECTROSONICS, INC. 8372
Introducing: synthesized UHF wireless microphone systems.
Circle 487 on Free Info Card

LEITCH INC. 8640
Introducing: ew family of digital conversion products to fit in one-, two-rack 6800 frames for independent conversion needs or using DigiBus digital conversion system.
Circle 488 on Free Info Card

LEMO USA, INC. 8835
Introducing: hybrid fiber optic connectors; circular quick connect/disconnect connectors.
Circle 489 on Free Info Card

LIGHTNING ELIMINATOR & CONSULTANTS 8756
Introducing: SP-series Direct Buss surge protector; Chem-Rod Expansion Disk.
Circle 490 on Free Info Card

LINK COMMUNICACIONES S.A. 2412
Studio interview console; Broadcast audio mixing console; 5kW FM transmitter using solid-state technology.
Circle 491 on Free Info Card

LINK ELECTRONICS, INC. 9081
Modular processing, distribution product family; routers; audio/video products for the digital frame to mix analog and digital.
Circle 492 on Free Info Card

LNR COMMUNICATIONS INC. 4112
Featuring: digital video flyaway satellite sytem with voice communications; low profile Ku-band video exciter.
Circle 493 on Free Info Card

LOCATION SOUND CORPORATION 2627
Distributor: Lectrosonics 200 series wireless mics; PSC M4+ mixer; K-Tek boompoles; Brüel & Kjær lavalier.
Circle 494 on Free Info Card

LOCKHEED MARTIN MICROWAVE 1501, S 2472
Introducing: Narda 8700 series "D" probes; Model 8712 RF survey meter; Model 88440-0.5 RF personal monitor.
Circle 495 on Free Info Card

LOGITEK ELECTRONIC SYSTEMS 2521
Introducing: CS-10 digital console for on-air radio; UltraVU LED audio level meter with alarm outputs showing VU and true peak levels, alternate modes for loudness and phase information display.
Circle 496 on Free Info Card

LOUTH AUTOMATION S 3619
Featuring: PC-based media management and automation products; software-based multichannel automation system, automated recording of master spots, segmenting of program material; automated recording and timing of incoming material.
Circle 497 on Free Info Card

LPB INC. 1900
Introducing: Salsa-NT Windows NT networked multiple station radio automation system; Hayes StealthOne studio monitors.
Circle 498 on Free Info Card

M

MACKIE DESIGNS M 8038
Introducing: Digital 8-Bus 48x8x2 digitally controlled console works like the analog console you're used to using with integral meter bridge hard disk storage, 8MB RAM, 24-channel analog tape I/O, UltraMix II automation; HUI Human User Interface digital audio workstation featuring eight motor faders, dedicated per channel pan and send encoders and controls, tactile illuminated switches, MIDI I/O, expansion port, RS-232/-422 port for computer connection; HR824 high-resolution active studio reference monitor with mass-loaded resistivity-damped 6th order system of two 6-1/2 inch passive radiators.
Circle 499 on Free Info Card

MACROMEDIA M 7333
Develops and markets authoring and digital arts software for creating multimedia applications.
Circle 500 on Free Info Card

MAGNUM TOWERS INC. 2324
Radio, TV and communications towers.
Circle 501 on Free Info Card

MANHATTAN PRODUCTION MUSIC 8755
Introducing: Tunefinder music search system; AppleTrax 30CD library; Manhattan Production Music 50CD library; Chesky Records classical series 60 CD library.
Circle 502 on Free Info Card

MARCO, INC. 11182
Featuring: edit suite furniture; control room consoles; equipment racks, accessories.
Circle 503 on Free Info Card

MARSHALL ELECTRONICS S 1931
Introducing: Tajimi push-pull BNC connectors; Mogami high definition RGB snakes, patchcords featuring push-pull BNC connectors; Mogami high definition 75-ohm RGB cables; Mogami 110-ohm digital audio snake and console cable.
Circle 504 on Free Info Card

MARTI ELECTRONICS 2202
Featuring: Smarti telephone remote pick-up delivers broadcast quality audio on standard analog telephone lines; Cellcast remote broadcast studio; SRPT-40 40W frequency-agile RPU remote pick-up transmitters with SR-10 RPU receiver; STL-30 30W export STL transmitter; remote pick-up transmitters at 2W, 15W, 30W.
Circle 505 on Free Info Card

MARTINSOUND 1301
Circle 506 on Free Info Card

MATCH PRODUCTION MUSIC S 1831
Production music libraries.
Circle 507 on Free Info Card

MAXELL CORPORATION 8825
Introducing: Betacam SP, D-2 digital, Digital Betacam, D-3 digital videocassettes; DVD; CLS cleaning solution.
Circle 508 on Free Info Card

MCCURDY RADIO INDUSTRIES LIMITED 6917
Introducing: D-MAS multi-channel television broadcast automation, interfaced to broadcast equipment, traffic systems; Flexible Cache Control and Fibre Channel interfaces for seamless integration to video servers, library systems, Tektronix Profile; McCart digital audio storage system; DCS3000 digital intercom; ATS-100 extended range VU/PPM meter.
Circle 509 on Free Info Card

MEDIATOUCH 3621
Introducing: Super Duopoly enhancements to MediaTouch radio automation and integration software.
Circle 510 on Free Info Card

Colored listings indicate issue advertisers

MERGING TECHNOLOGIES M 6673
Introducing: Pyramix virtual studio Version 1.2 digital audio workstation; audio interface unit A/D, D/A audio I/O interface.
Circle 511 on Free Info Card

MGE UPS SYSTEMS S 3770
Circle 512 on Free Info Card

MICRO COMMUNICATIONS, INC. 5607
Introducing: DTV/NTSC panel antennas, adjacent channel combiners; 10-50kW UHF constant impedance filter; compact UHF Switchless (Magic-T) combiners.
Circle 513 on Free Info Card

MICRON AUDIO PRODUCTS LTD. 8876
Featuring: complete line of SQN stereo/mono audio mixers for ENG/EFP, film, studio; TRAM electret microphones, accessories.
Circle 514 on Free Info Card

MICROSPACE COMMUNICATIONS CORP. S 3360
Provides video, data and audio transmission services designed for antennas. Operates on domestic and international satellites.
Circle 515 on Free Info Card

MIER COMMUNICACIONES, S.A. 2412
TV transposers, TV transmitters, TV satellite receivers, modulators, antennas, filters, multiplexers.
Circle 516 on Free Info Card

MILLIMETER MAGAZINE 5444, S 1760
Circle 517 on Free Info Card

MODULATION SCIENCES 11253
Introducing: PTR-100 precision video receiver, demodulator for accurate measurement of visual and aural signals.
Circle 518 on Free Info Card

MOHAWK/CDT 11283
Introducing: Spectrum digital audio, video cables, AES/EBU digital audio cable, serial digital video cable, fiber optic/copper composites; Stage boxes, breakout boxes, flexible digital snake cable.
Circle 519 on Free Info Card

MOSELEY ASSOCIATES 2602
Introducing: Starlink 9000 digital STL designed to solve audio problem conveyance using T1 and RF modes; MRC 2, MRC 1620 remote control products; mastercontroller, TaskMaster20 PC remote control products; PCL 6000 STL, PCL 6000 multichannnel option aural STL. DSP 6000 digital audio transmission equipment for A/V STL equipment.
Circle 520 on Free Info Card

MURPHY STUDIO FURNITURE 1902
Circle 521 on Free Info Card

MUSICAM USA, MUSICAM EXPRESS 3306
Introducing: Road Runner portable mono codec/mixer for ISDN remote audio feeds; Olympian stereo codec mixer for ISDN remotes; CDQPrima digital audio codec with MUSICAM encoding; FieldFone, StudioFone high quality audio system using standard telephone lines.
Circle 522 on Free Info Card

MYAT, INC. 7002
Introducing: high-efficiency, fault tolerant UHF/HDTV power combiner with matched load; featuring: complete line of high-quality rigid transmission lines, components, accessories.
Circle 523 on Free Info Card

NADY SYSTEMS 6808
Introducing: Nady 551VR, 661VR, 950GS wireless mic systems.
Circle 524 on Free Info Card

NAGRA KUDELSKI SA 7005
Featuring: NAGRA-D digital audio recorder; ARES-C portable stereo recorder with mono record time of 40 minutes on 20Mbyte PCMCIA card, copy, edit, G722, MUSICAM ISO/MPEG Layer II compression, ISDN option: NAGRAVISION digital, NAGRA PLUS analog pay-TV with subscription management, encoding, decoding, network control, electronic program guide production, prepaid/impulse pay-per-view.
Circle 525 on Free Info Card

NAUTEL MAINE, INC. 3606
Introducing: XL series 12-60kW super efficient solid-state AM transmitters; ND series 105kW rugged, economical solid-state AM transmitters; FM series 4-20kW high efficiency solid-state FM transmitters; NA series 100-300kW+ solid-state MW transmitters; NE50 digital FM exciter.
Circle 526 on Free Info Card

NBC NEWS ARCHIVES M 6329
Featuring: contemporary, archival footage: personalities, politics, wildlife, scenics from around the world.
Circle 527 on Free Info Card

NDG PHOENIX, INC. 10460
Operations management software; library management system.
Circle 528 on Free Info Card

NETWORK MUSIC, INC. 6537, M 6228
Featuring: production music, sound effects, production element libraries; presentation audio CD-ROM.
Circle 529 on Free Info Card

NEUMANN USA 6760
Wired microphones for studio and field use.
Circle 530 on Free Info Card

NEUTRIK USA, INC 1321
Introducing: "z" series XLR cable end with pre-tinned contacts; PowerCon ac mains power connector; A/B series IDC panel mount connectors requiring no solder.
Circle 531 on Free Info Card

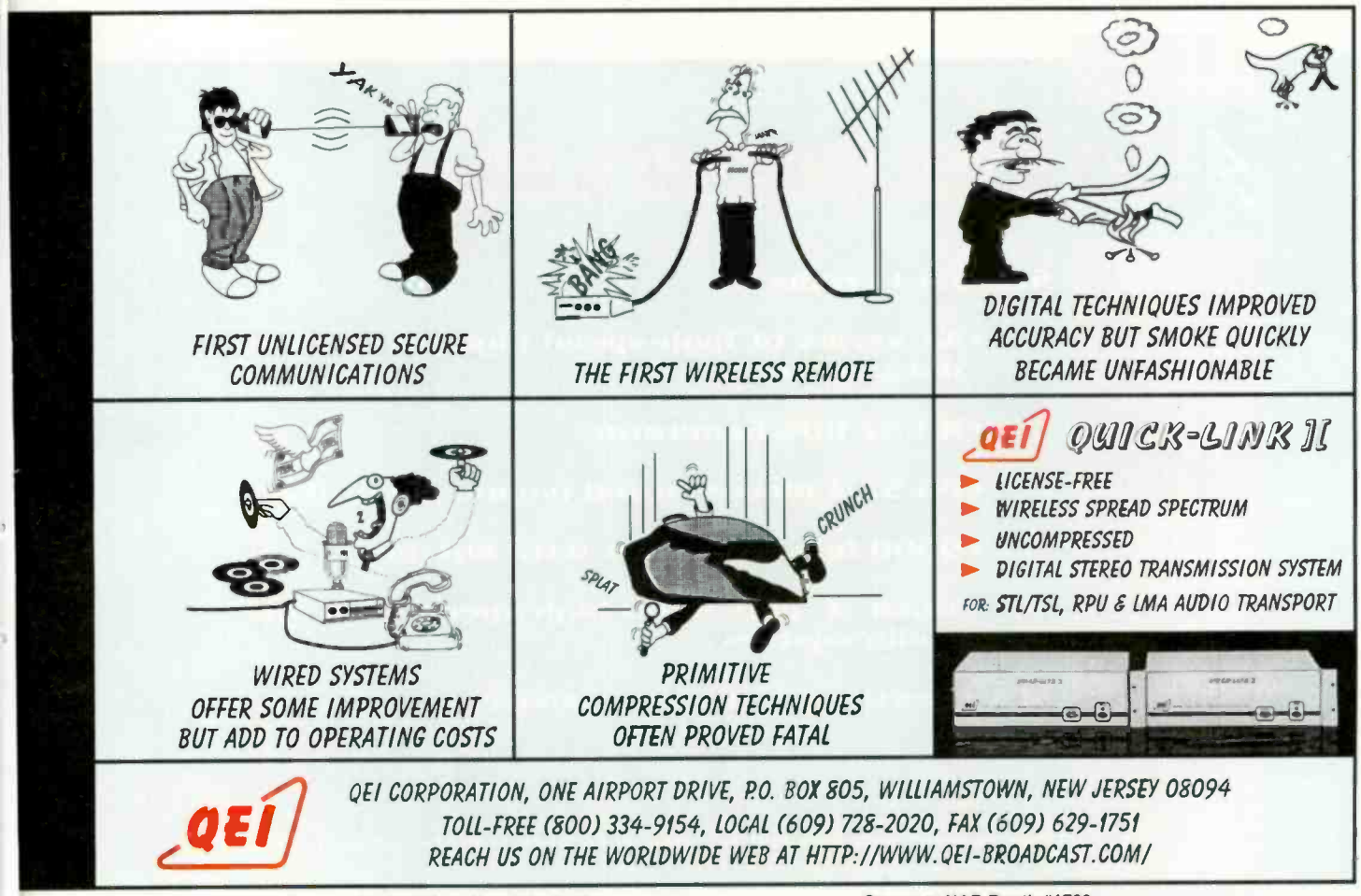
NIGEL B FURNITURE S 6028
Featuring: projector stands; monitor cabinets; mixing tables, stands for Mackie, Yamaha systems; nonlinear editing edit furniture; ceiling mounts for monitors, speakers; speaker mountings.
Circle 532 on Free Info Card

NII NORSAT INTERNATIONAL, INC. S 3068
Featuring: multistandard agile modulator for private cable system headends; Windows-based GUI control software.
Circle 533 on Free Info Card

NON-STOP MUSIC LIBRARY S 3119
Promotion music industry producing music for television, film and advertising.
Circle 534 on Free Info Card

NORTHERN TECHNOLOGIES, INC. 1918
Power conditioning equipment.
Circle 535 on Free Info Card

NPR SATELLITE SERVICES 3914
Satellite transmission services for radio broadcasting.
Circle 536 on Free Info Card



Circle (87) on Free Info Card
See us at NAB Booth #1709

NSN NETWORK SERVICES 4003
SpotBox all digital store-and-forward network localization system; InSat internet partnership program.
Circle 537 on Free Info Card

NVISION, INC. 9681
Introducing: a range of products featuring digital audio routing and interfacing equipment with time code and RS-422 data processing and routing products; 20-bit A/D-D/A converters; synchronous, asynchronous AES, RS-422 dynamic port, digital time code, AES time code routers, modular distribution and synchronization equipment.
Circle 538 on Free Info Card

OGM PRODUCTION MUSIC 7208
Production music libraries.
Circle 539 on Free Info Card

OMB 4024
Introducing: 20W portable FM transmitter, compact system in carrying case with batteries for emergency broadcasting.
Circle 540 on Free Info Card

OMNIMUSIC 8773
Music production libraries.
Circle 541 on Free Info Card

OMNITRONIX INC. 3426
Solid-state AM broadcast transmitters rated 500W, 1kW, 25kW; solid-state tropical band SW transmitter.
Circle 542 on Free Info Card

OPAMP LABS, INC. 8884
Featuring: amplifiers for audio, video, distribution, mic, EQ, line, VCA, power; routing, matrix switchers; press boxes, audio transformers, oscillators, power supplies; custom sub-systems.
Circle 543 on Free Info Card

ORBAN 2402
Introducing: Optimod-AM 9200 digital audio processor.
Circle 544 on Free Info Card

ORION ATLANTIC S 3469
International digital video satellite transmission services through London and New York MCPC gateways; SCPC digital video transmission service using Drop & Shoot small ground stations for rapid service start.
Circle 545 on Free Info Card

OTARI 10580
Introducing: Radar disk recorder; PD-80 disk recorder; TTS postproduction system; DTR-85 DAT recorder; Elite, Status audio consoles.
Circle 546 on Free Info Card

PACIFIC BELL M 8133
Multimedia CD publications.
Circle 547 on Free Info Card

PACIFIC INNOVATIVE ELECTRONICS 1721
Circle 548 on Free Info Card

PACIFIC RADIO 6761
Distributor: Belden Audio-Flex multipair snake cables; MidAtlantic Multi-Desk Pro; Ziptape Shrink-N-Shield.
Circle 549 on Free Info Card

PACIFIC RESEARCH & ENGINEERING 2618
Introducing Integrity digital on-air broadcast console; AirWave on-air console design for middle market radio.
Circle 550 on Free Info Card

PANASONIC BTSC 10701
Introducing: AJ-LT75 DVCPRO laptop editor; DVCPRO 200 series AJ-D230V desktop VTR and AJ-D20 1/3-inch 3-CCD camcorder; advanced digital cameras, high definition products; Postbox 3.0 nonlinear editing system; Quick Cutter DVCPRO nonlinear editing system with 4x transfer VTR.
Circle 551 on Free Info Card

PENNY & GILES 3424
Introducing: Pythagoras mastering software for Penny & Giles PP-10 audio multiprocessor; 20-bit A/D, D/A converters; frequency selective compression.
Circle 552 on Free Info Card

PENTA LABORATORIES 1720
Featuring: power tube devices for broadcast.
Circle 553 on Free Info Card

PHASETEK INC. 2826
Manufacturers of AM antenna phasing equipment, antenna tuning units, RF components and RF inductors.
Circle 554 on Free Info Card

PHILIPS TV TEST EQUIPMENT 7643
Featuring: digital sync test generator; color analyzers; modulators, demodulators; waveform monitors, vectorscopes; sync generators.
Circle 555 on Free Info Card

PIKE & FISCHER INC. S 2360
Circle 556 on Free Info Card

PIONEER NEW MEDIA TECHNOLOGIES S 2738
MPEG2 encoder, digital LD hybrid video library system; Video Browse server; CD audio disk changer; commercial insertion system; fast file stills & clips presentation; DVD technology demo; multiscan video cube wall system.
Circle 557 on Free Info Card

STOP BY
BE Radio
booth 902
in the
LVCC Radio Hall

SCA Data Systems, Inc.
The Leading Manufacturer of SCA Products

Standard Products

- NT series of high-speed high-performance data systems
- RD-57 RDS Generator
- PG 57-3 phase-locked paging generator
- 9600 bps subcarrier data system
- Music 4® plus 9600 high speed data and audio system

SCA questions... We have answers

2912 Colorado Avenue, Suite 200, Santa Monica, CA 90404 • 310/315•9930 • FAX 310/315•9530

Circle (88) on Free Info Card

See us at NAB Booth #1909

TELLING IT LIKE IT IS ...

...about DADPRO, the Digital Audio Delivery system that's ideal for both Production and On-Air, whether Live Assist or Automated, small market or large

"In our pre-purchase research, we found that the most common compliment paid to competitive units was that their technical support staffs were always there when the system crashed. When we talked with DAD users, they hardly knew anyone at ENCO since their systems had never gone down. That's the kind of compliment I was looking for! DAD's segue editor feature revolutionizes automation. We pre-program the entire station, then the talent previews and customizes their breaks to give us a totally live feel. Plus, we simulcast both stations and DAD lets us easily set up separate spot schedules. It's major market ready, and built like it."

Philip Urso, GM
WDGE/WDGF,
Providence, RI

"We've had five DAD workstations in action for over a year, and I really don't know how we could get along without the system. It allows all three of our stations to present a consistent on-air sound and frees the talent to concentrate more on communicating with the audience. We're still finding new and innovative ways of using the system a year later. In my opinion, if you're planning on automation, you can't do it RIGHT without ENCO!"

Chris Andree, Asst. PD
WWKL/WYMJ/WCMB,
Harrisburg, PA

"We're a news programming provider and deal with a large number of actualities every day, so speed in production and getting it down the line are paramount. DAD allows us to bring information in, and seconds later it's ready to go. The greatest feature is the ease of editing and file transfer between our four workstations. On-air is a breeze."

Dane Wilt
Radio News Company,
Las Vegas, NV

"Way cool. The greatest thing about DAD is that it acts and thinks like a cart machine and doesn't intimidate the talent. We use touchscreens, and the learning curve is about 2-1/2 hours before they're up and running. From an engineer's standpoint, it's great because DAD uses off-the-shelf hardware, so maintenance is a snap."

J.R. Rogers, Asst. CE
KSON/KIFM,
San Diego, CA

"The DAD system was on the cutting edge of systems we looked at, and there was some initial reluctance to enter the digital arena. After having the system in-house for a month, the entire production and on-air staff felt like they could never do without it again. Now our news staff has a system of their own, and we're getting a third system for our sister TV station."

Chuck Whitaker, PD
WSBT, South Bend, IN

Call your DAD dealer or ENCO for complete information.

ENCO SYSTEMS, INC.

ENCO America, 24555 Hallwood Court,
Farmington Hills, MI 48335 USA
Tel: 800-ENCOSYS (362-6797); 810-476-5711; Fax: 810-476-5712
Web Site: http://www.enco.com

Circle (74) on Free Info Card

PIXEL INSTRUMENTS 6060
New products to be announced; featuring: serial digital synchronizer, proc amp; audio time compressor, expander, pitch shifter; digital audio transcoder; audio delay products.
Circle 558 on Free Info Card

POTOMAC INSTRUMENTS 2017
Featuring: 1900 series directional array antenna monitor; AA-51A audio analyzer; AG-51 audio generator; SD-31/RS-31 frequency synthesizer, coherent detector; FIM-41 MW, FIM-71 VHF, FIM-72 UHF field strength meters; SMR-11 synthesized AM monitor receiver; QA-100 program audio analyzer; 1750-TLM tower light monitor; 1500-PC programmable transmitter controller with DOS compatible software.
Circle 559 on Free Info Card

PRIME IMAGE, INC. 9285
Introducing: A/V Twister, passes video, stereo audio on single twisted pair to 1 mile; Stereo Twister, passes audio on single twisted pair to 1 mile; Pick-2 combines two Prime Image boards, including audio delay, standards converter, synchronizer/TBC and logo inserter; Time Machine, allows an additional 30 seconds of commercial time during 30-minute program.
Circle 560 on Free Info Card

PRISM MEDIA PRODUCTS S 5777
Circle 561 on Free Info Card

PRISTINE SYSTEMS S 1935
Introducing: RapidFire digital studio system for radio; integrated package that encompasses scheduling, producing and on-air playback with GUI interface.
Circle 562 on Free Info Card

PRO-BEL INC. 11501
Introducing: TM64 compact analog and digital router; XD series digital audio/video routers, MADI multiformat audio router; Accent series logo generator, inserter, mixer, conversion products; TX-220 digital master control switcher; Compass, Sextant, Procion automation products; MAPP video server control; Trilogy Mentor SPG, Commander intercoms with Pathfinder, Rapide line control systems.
Circle 563 on Free Info Card

PRODELIN CORPORATION S 3171
Introducing: quick deployable satellite antenna.
Circle 564 on Free Info Card

PRODUCTION GARDEN LIBRARY 8862
Production music libraries; Tune Ranch library; "In Your Face" tracks; new collection of rock and urban CDs; Manchester music library.
Circle 565 on Free Info Card

PROFESSIONAL AUDIO SUPPLY S 1171
Circle 566 on Free Info Card

PROFESSIONAL LABEL 6361
Featuring: Label Producer Version 3.16 for Windows; labels for videotape, including custom printing; CD labels, packaging.
Circle 567 on Free Info Card

PROFESSIONAL SOUND CORPORATION 1517
Introducing: new line of VDB carbon fiber light weight, high strength boom poles; M8 8-input, 4-output battery operated portable audio mixer.
Circle 568 on Free Info Card

PROGRESSIVE NETWORKS INC I 4055
Circle 569 on Free Info Card

PROMUSIC, INC. S 3335
Introducing: ABACo music library on Tune Builder; Primrose music library.
Circle 570 on Free Info Card

PROPHET SYSTEMS 4106
Radio automation systems.
Circle 571 on Free Info Card

PULIZZI ENGINEERING, INC. S 6129
Introducing: IPC 3300 series Intelligent Power Controller provides power control, distribution through push buttons or RS-232/422 computer control; LA 1653 satellite antenna lightning arrester; TPC 12S-A/MTD power controller with ac ports, Form C dry contact closure ports; TPC 115-10/MTD power controller; RCP 2242 remote control panel for power controller; TPC 400 low profile 3-phase 30a/phase ac power controller.
Circle 572 on Free Info Card

QEI CORPORATION 1709
Introducing: Quantum 1000E 1kW FM transmitter.
Circle 573 on Free Info Card

QUANTUM CORPORATION M 6541
Hard drives and data recording products.
Circle 574 on Free Info Card

RADIACION Y MICROONDAS, S.A. (RYMSA) 1712
Introducing: DAB antennas and filters.
Circle 575 on Free Info Card

RADIO COMPUTING SERVICES 1216
Introducing: Master Control NT new technology for digital on-air studio operation; TalkBack complete talk show management and screening database; NewsLink newsroom text and audio integration; Tracker instant continuous recording and indexed playback of 8 stations at once.
Circle 576 on Free Info Card

RADIO EXPRESS, INC. 2421
Circle 577 on Free Info Card

RADIOMATION 2926
Introducing: enhanced news system with integral ISDN transfer of text and audio.
Circle 578 on Free Info Card

RADIO SOFT 8672
ComStudy V1.50 coverage mapping software.
Circle 579 on Free Info Card

RAM BROADCAST SYSTEMS 4109
Audio consoles.
Circle 580 on Free Info Card

RCI SYSTEMS, INC S 6136
Introducing: custom wiring systems snakes, fans and stage boxes; Broadcast Media mult boxes. VMAV A/V multi box; RL2 rack light; CT-2 cable tester; 440 pro adapter and floor boxes; custom A/V control wall plates, map panels, rack panels, truck panels, accessories; custom engraving, silk screening.
Circle 581 on Free Info Card

R-COLUMBIA PROD. 6745
Introducing: PalmTalker hands-free, VOX-less wireless intercom headphones; Expand-A-Com wired intercom system, expands from 4 to 400 stations.
Circle 582 on Free Info Card

RDL (RADIO DESIGN LABS) 3724
Introduction: additions to Stick-On products, ST-LMX3 mic/line mixer; ST-PD5 power supply distribution module; STR-19A, -19B racking systems; EMC products, TS-1D transient suppressor with GB6 mounting, grounding bar.
Circle 583 on Free Info Card

RE AMERICA, INC. S 4068
RE660 series MPEG layer II audio codecs, linear PCM RE8930 audio, data, video codec.
Circle 584 on Free Info Card

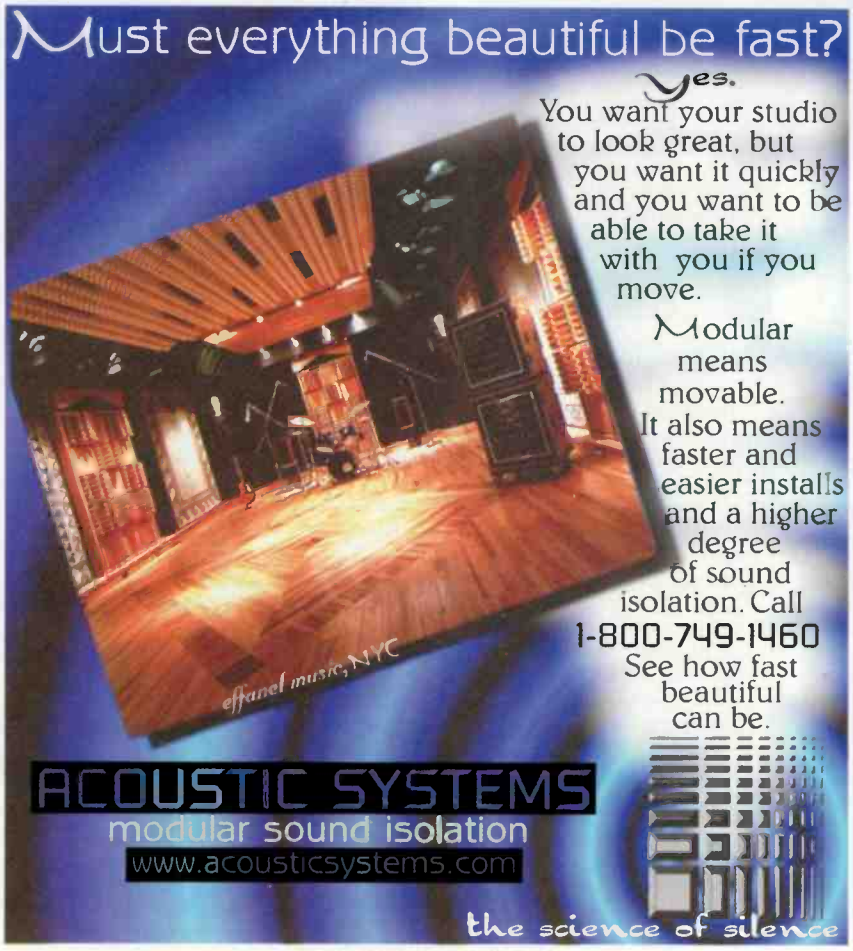
REAN PRODUCTS S 1062
Featuring: audio patch bays.
Circle 585 on Free Info Card

REEL A PAIL 11644
Circle 586 on Free Info Card

REES ASSOCIATES, INC. 10458
Facility design and planning for broadcasting and production facilities.
Circle 587 on Free Info Card

REGISTER DATA SYSTEMS 1706
Featuring: The Phantom digital audio system; Traffic 32 traffic and billing system; Replicator digital program delay.
Circle 588 on Free Info Card

RF PLANTE IND. COM. LTD. 3527
AM, FM transmitter systems.
Circle 589 on Free Info Card



Circle (75) on Free Info Card

Colored listings indicate issue advertisers

MAESTRO™

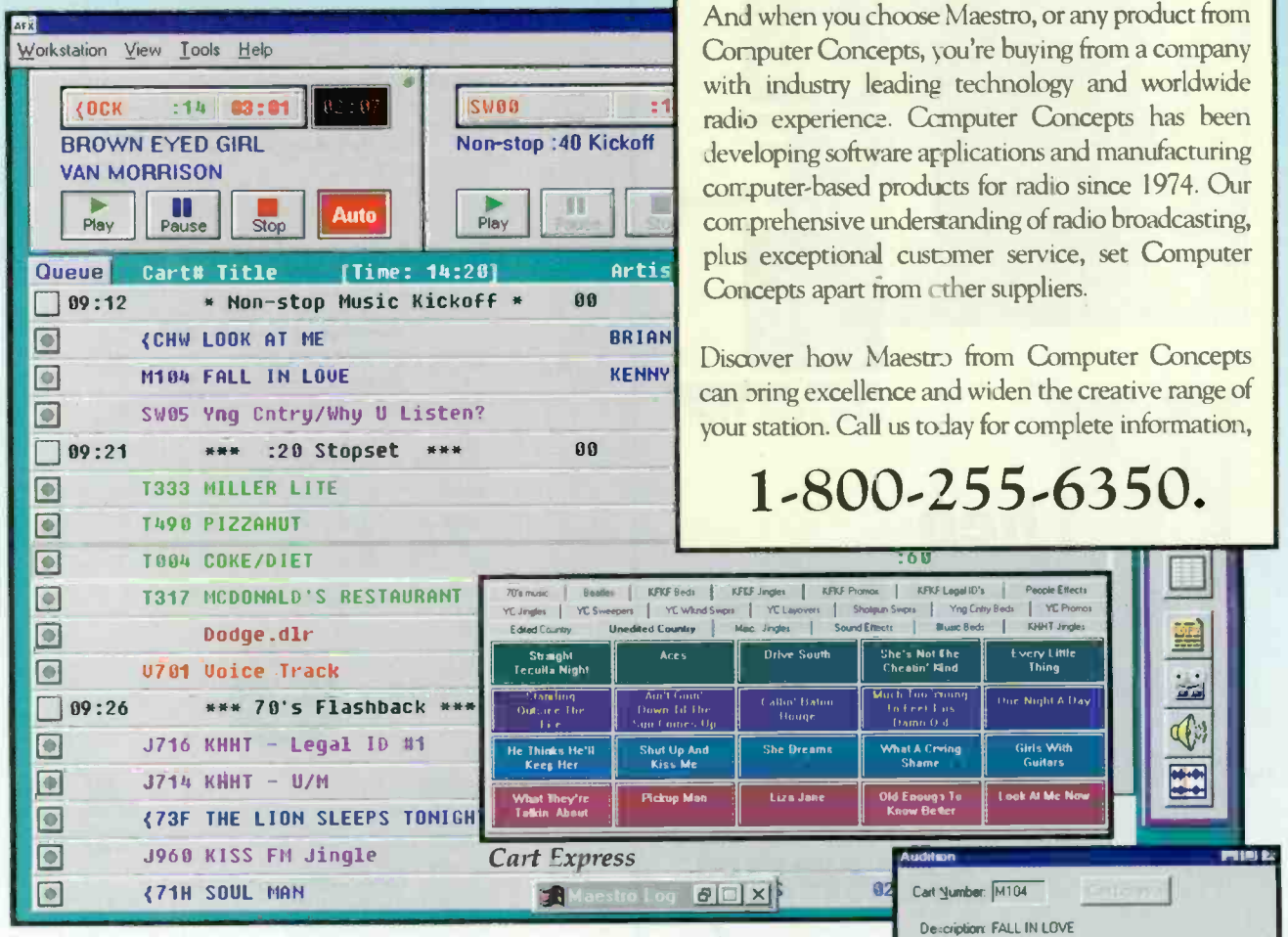
GREAT SOUND
TOTAL CREATIVE CONTROL

Maestro is the heart and the brain of the digitally integrated radio station. All operations, from commercials...to music...to announcer text...to up-to-the-minute scheduling information, are at your fingertips. Maestro brings all your digital operations together into one, easy-to-use command center and is your key to accessing CD quality audio directly from hard disk.

And when you choose Maestro, or any product from Computer Concepts, you're buying from a company with industry leading technology and worldwide radio experience. Computer Concepts has been developing software applications and manufacturing computer-based products for radio since 1974. Our comprehensive understanding of radio broadcasting, plus exceptional customer service, set Computer Concepts apart from other suppliers.

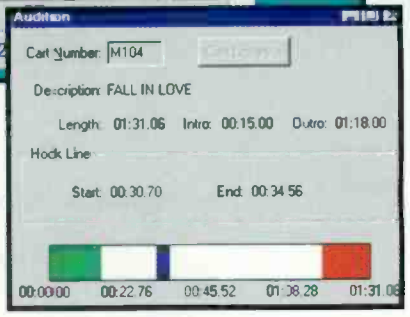
Discover how Maestro from Computer Concepts can bring excellence and widen the creative range of your station. Call us today for complete information,

1-800-255-6350.



Main Screen

Cart Express



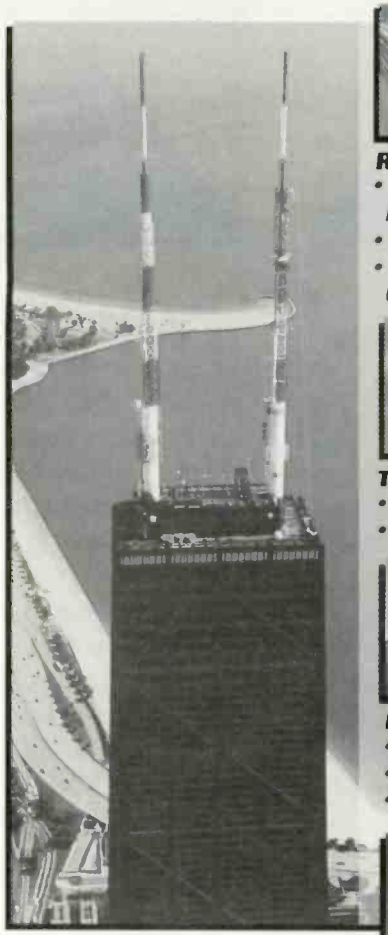
Audition Window

Computer Concepts Corporation

8375 Melrose Drive, Lenexa, Kansas 66214 • Phone 800-255-6350 • Fax 913-541-0169

See us at NAB Booth #2024

Circle (76) on Free Info Card



RF COMPONENTS
- *Transmission Line Rigid/* **HELIAX®**
- *Waveguide*
- *Filters/Combiners UHF/VHF*

TV ANTENNAS
- *UHF • LPTV*
- *VHF • Dual mode*

FM ANTENNAS
- *Sidemounts*
- *Panels*
- *Combined Systems*

PANEL ANTENNAS
- *FM • UHF • VHF*

When You Want More Than Just An Antenna

JAMPRO

Made In USA since 1954

JAMPRO ANTENNAS/RF SYSTEMS, INC.
P.O. Box 292880
Sacramento, CA 95829 USA
Phone (916) 383-1177 • Fax (916) 383-1182

www.jampro.com • E-Mail: jampro@ns.net

HELIAX® *is a registered trademark of Andrew Corporation*

Circle (77) on Free Info Card **See us at NAB Booth #6709**

RF TECHNOLOGY, INC. **11910**
Featuring: 1.2-16GHz microwave systems, UCL analog/digital portable, ACL analog/digital fixed, UPL ultra portable; Pylon series central receive systems; SNG-T C, X, Ku, Ka flyaway systems in single, dual, tri-band packages; SVX-T C, X, Ku, KA band digital upconverters; DST-140 Ku band 1m antenna with Intelsat/Eutelsat derived feed.
Circle 590 on Free Info Card

RICHARDSON ELECTRONICS, LTD. **7107**
Power transmitting tubes, UHF power devices, power tetrodes.
Circle 591 on Free Info Card

RIVER CITY SOUND PRODUCTIONS **5858**
Production music libraries.
Circle 592 on Free Info Card

ROHN **11037**
Featuring: guyed towers, self-supporting towers; lighting equipment; safety devices.
Circle 593 on Free Info Card

ROLAND CORPORATION **3612**
Audio workstations; audio announcement recorder; anti-feedback processor; 3-D sound processor.
Circle 594 on Free Info Card

RORKE DATA, INC. **6232**
Introducing: StudioNet: ultra SCSI and fibre-channel RAID; Fibre-channel network switches, hubs; MaxArray Ultra.
Circle 595 on Free Info Card

RULES SERVICE COMPANY **4956**
FCC rules, regulations published monthly in loose-leaf and computer formats; copyright, patent, trademark rules.
Circle 596 on Free Info Card

R.V.R. ELETTRONICA S.R.L. **1818**
Circle 597 on Free Info Card

RYCOTE MICROPHONE WINDSHIELDS, LTD. **3726**
Featuring: wind attenuation and positive microphone support and isolation from movement and vibration, integrated system includes Windshield, Suspension, Hi Wind Cover and Windjammer.; Rycote Softies slip-on cover with integral synthetic fur exterior and robust shockmount; Mono Extended Ball Gag for Neumann KM100, Schoeps CCM series microphones; Camera Mount Softie for Sony DVW700.
Circle 598 on Free Info Card

SADIE INC. **1001**
Octavia modular digital editor; SADiE mobile field recorder; Sascia ATM networking; SADiE 3 workstation software; Timesynch software for syncing dailies; SADiE portable digital editor.
Circle 599 on Free Info Card

SANDAR ELECTRONICS **11864**
Video routers; audio routers; 16x16 and 32x32 140 and 270Mb/s routers; systems to 300MHz bandwidth; audio conference system; software for PC router control.
Circle 600 on Free Info Card

SATELLITE COMMUNICATIONS MAGAZINE **5444, S 1760**
Circle 601 on Free Info Card

SCA DATA SYSTEMS, INC. **1909**
Subcarrier transmission products; ethnic broadcasting receiver; high-speed data and audio system; RDS, phase-locked paging and super high-speed generators.
Circle 602 on Free Info Card

SCALA ELECTRONIC CORPORATION **9053**
Featuring: Flexible coaxial cable, coaxial connectors; low power FM broadcast antennas.
Circle 603 on Free Info Card

SCALA INC. **I 4949**
Introducing: Scala Infochannel IC200.
Circle 604 on Free Info Card

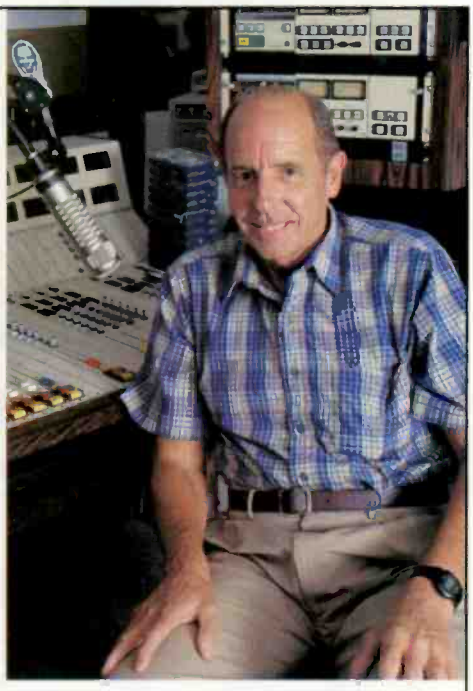
Colored listings indicate issue advertisers

Lindy Williams
V.P. Engineering
Lotus Communications
Los Angeles, California

"We've replaced some 'very expensive' condenser microphones with the RE27N/D ...now the GM wants the guest mic replaced, as well as the production studio and the newsroom microphones. You're blowing my engineering budget!"

Steve Lariviere
Chief Engineer
WSNE
East Providence, Rhode Island

"We replaced six expensive German condenser microphones in favor of the RE27N/D. What a great sound!"



Marv Collins
Chief Enginneer
KFI-KOST-KACE
Los Angeles, California

"The RE27N/D has the fullness of a ribbon with the punch of a shotgun condenser microphone. The pattern is very good, giving good backside rejection of noise. Congratulations on building such a fine microphone."

RE27N/D

Studio Dynamic Microphone

The new broadcast standard.

See your local EV dealer, for a test drive.

ElectroVoice

Electro-Voice, Inc. a Mark IV company
600 Cecil Street · Buchanan, MI 49107
616/695-6831 · 800/234-6831
616/695-1304 Fax

Circle (89) on Free Info Card

SCHEDUALL BY VIZUALL, INC. S 1517
Introducing: ScheduALL complete computerized facility management system for Windows 95 and NT; scheduling modules for facility areas, equipment/personnel, project management, library/labeling, invoicing/accounts receivable, production reports, bidding.
Circle 605 on Free Info Card

SCHOEPS/POSTHORN RECORDINGS 4842
Schoeps condenser microphones and accessories.
Circle 606 on Free Info Card

SCIENTIFIC-ATLANTA INC. 6713
Satellite communications equipment, earth station antennas, video receivers, antenna controllers; MPEG-based digital video compression system.
Circle 607 on Free Info Card

SCOTT STUDIOS CORPORATION 2007
Introducing: Spot Box hard drive cart replacement system; Digital Air Studio with touchscreen, hot keys, Cart Walls; Voice Trax permits recording while announcer hears songs, spots, jingles in headphones; WinNews records, edits actualities with cut stacking; Net Catcher records network program unattended for delayed playback with option to include commercials if desired.
Circle 608 on Free Info Card

SELCO PRODUCTS COMPANY 1922
Equipment replacement components, introducing: locking knobs, Soft Touch slider knobs and 3-shot push-on knobs.
Circle 609 on Free Info Card

SENCORE 11976
Circle 610 on Free Info Card

SENNHEISER ELECTRONIC CORPORATION 6760
Introducing: MD425 supercardioid dynamic mic; EM3031-U single channel UHF true diversity receiver; EM3032-U 2-channel UHF true diversity receiver; SKM3072 UHF handheld transmitter, 16 switchable frequencies, 50mW output power; HDC25 active noise cancellation headphones; HMDC25 active noise cancellation headphones with dynamic mic.
Circle 611 on Free Info Card

SHIVELY LABS 3301
Introducing: high power UHF; FM antennas in side-mount, panel designs; patch panels; low power UHF, MMDS antennas; filters, combiners, compressor-dehydrators; FM, UHF translators; omni and directional pattern studies.
Circle 612 on Free Info Card

SHURE BROTHERS 5613
SCM 810 automatic mixer; SCM 800 manual mixer; LX wireless microphone systems; Beta series wired microphones.
Circle 613 on Free Info Card

SIERRA AUTOMATED SYSTEMS & ENG. CORP. 4027
Introducing: GPi-1600 PC automation package; GPI-1600 SI salvo switching; SlimLine console mount controllers; 16000 series 32x32, 64000 series 256x256 audio routers; 32000 series 128x128 audio router with full summing; 32000 series mix-minus, IFB systems; MMMS 3200 mix-minus, surround mixing system.
Circle 614 on Free Info Card

SIRA SISTEMI RADIO 9053
Antennas and accessories for TV and FM broadcasting.
Circle 615 on Free Info Card

SISTEMAS RADIANTES F. MOYANO, S.A. 2412
Circle 616 on Free Info Card

SMARTS BROADCAST SYSTEMS 4014
Introducing: Right Touch touch-screen with 20 buttons on each screen and jack specific buttons; editing capability for phone drops; touch-screen control for on-air commercials, music log and data.
Circle 617 on Free Info Card

SOLID STATE LOGIC 2612
Introducing: AltiMix post-production system complementing Axlom and Aysis digital console systems; uses DiskTrack to store video and audio in shared hardware environment; advanced editing tools; dynamic links to console automation data; numerous advanced features; Featuring: Aysis, Axiom systems.
Circle 618 on Free Info Card

SOLUTIONS CUSTOM FURNISHINGS S 5658
Featuring: DUO ergonomic desk and monitor bridge, ready-to-assemble furniture systems fit in corner; Crescent modular desks, monitor bridges, undercounter racks; Arc modular desk, 3-monitor bridge, undercounter rack; Custom free consultation on custom consoles and technical casework.
Circle 619 on Free Info Card

SONIC FOUNDRY S 2853
Circle 620 on Free Info Card

SONIC SCIENCE M 8332
Sound effects and music libraries; effects retrieval systems.
Circle 621 on Free Info Card

SONIC SOLUTIONS S 4132
Introducing: Sonic Studio digital audio workstation with enhancements in CD premastering, radio broadcast, audio postproduction and DVD premastering, 24-bit 96kHz high density audio, Open Music System support, support for Sony PCM 9000 master disc recorder; featuring DVD Creator premaster system for DVD format.
Circle 622 on Free Info Card

SONIFEX S 1933
Circle 623 on Free Info Card

SONY ELECTRONICS INC. 5929
Intrducing: SMS-10P monitor speaker with integral amplifier. DARS-MP metal particle audio tape for DTRS format.
Circle 624 on Free Info Card

SOUND IDEAS M 7338, 5859
Introducing: Series 6000 Extension sound effects library; Turner Broadcast music library.
Circle 625 on Free Info Card

SOUNDSCAPE DIGITAL TECHNOLOGY M 7666
Hard disk recording systems with all standard DAW functions.
Circle 626 on Free Info Card

SOUNDTRACS USA, INC. S 5763
Introducing: Virtua digital mixing console, 64 inputs to mixdown; 48 full inputs with 4-band EQ, dynamics, aux sends, group, master outputs, 16 return inputs; Jade S 24 bus automated production console, moving fader automation LCRS panning, 24 group in-line format assignable dynamics processor, EQ.
Circle 627 on Free Info Card

SPACEWISE BROADCAST FURNITURE 2326
Circle 628 on Free Info Card

SPEAKER ARRAY LOGIC S 4276
Expanding circular wave studio monitor system incorporating a specially designed FIR digital filter.
Circle 629 on Free Info Card

SPECIALIZED PRODUCTS COMPANY I 3654
Tools and toolkits for industry technicians.
Circle 630 on Free Info Card

SPOTMAGIC, INC. S 6166
Circle 631 on Free Info Card

SPRAGUE MAGNETICS 1822
Tape head, DAT head reconditioning; hard, floppy and optical drive repairs; computer/audio DAT drive repair; computer and audio accessories.
Circle 632 on Free Info Card

SPRINT M 7451
Featuring: telecommunications services, internet services.
Circle 633 on Free Info Card

SSE TELECOM M 7747
Introducing: satellite modems, transceivers and converters; complete earth stations, flyaway and transportable; microwave modems.
Circle 634 on Free Info Card

STACO ENERGY PRODUCTS COMPANY 11486
Introducing: SVR Stepper Voltage Regulators in 19-inch rack, floor mount enclosures with single-phase ratings to 15kVA, full range correction in less than one sec; UPS True-On-Line to 10kVA single-phase, 12-150kVA three-phase; AVR/MVR voltage regulators; PLC/MLC power conditioners.
Circle 635 on Free Info Card

STAINLESS INC. 6811
Complete tower design, fabrication, erection, modification and maintenance; inspections and structural analysis of existing towers, full service field operations for antenna installations, repairs, regular tower maintenance.
Circle 636 on Free Info Card

STOREEL CORPORATION 8837
Room Stretcher tape storage for maximum density storage for small formats; Rail Rider provides single-entry access in narrow depths; Stor-Max for double-entry access in lengths 3-18' without raised flooring or motors.
Circle 637 on Free Info Card

STUDER PROFESSIONAL AUDIO, INC. 6948
24-bit MO-recorder.
Circle 638 on Free Info Card

STUDIO TECHNOLOGIES, INC. 2104
Introducing Model 770 audiomixer/IFB; Model 750 audiomixer; IFB Plus series mobile talent cueing systems; StudioComm series central controllers, control consoles and accessories; StudioTools series distribution amplifiers.
Circle 639 on Free Info Card

SUPERIOR BROADCAST PRODUCTS 2527
Circle 640 on Free Info Card

SUPERIOR ELECTRIC 1626
Introducing: STABILINE WHR11NSD11R5U rack-mount automatic voltage regulator; Featuring: power protection equipment; UPSs, power conditioners, transient suppressors, RFI filters; AC disturbance monitors.
Circle 641 on Free Info Card

SUPERSCOPE TECH/MARANTZ 2102
CDR620 compact disc recorder; IS5022, IS5021 digital sound processors; VPS 200 video presentation system; PMD 350 combination CD player/tape deck; portable audio presentation products.
Circle 642 on Free Info Card

SVETLANA ELECTRON DEVICES 1424
Introducing: 3CX6000A7/YU148 power triode; Russian-made devides are full power tested at factory before shipping.
Circle 643 on Free Info Card

Continued on page 95

For AM, FM, SCA
and TV modulation monitors.

WHEN ACCURACY COUNTS...COUNT ON...

Call (610) 687-5550 or write for more information on Belar AM, FM, Stereo, SCA and TV monitors.
FAX: 610-687-2686
http://www.belar.com

BELAR
ELECTRONICS LABORATORY, INC.
LANCASTER AVE. AT DORSET. DEVON, PA 19333

Circle (105) on Free Info Card

Colored listings indicate issue advertisers

Move Up from Carts to Touchscreen Digital Audio

Play Anything...At A Touch

The ***best*** way to improve your radio station is to put all your spots, sounders and sweepers ***on-line*** and ***ready to play instantly*** from hard disk. Creative talent sounds better than ever with ***Scott Studios'*** new touchscreen digital audio system.

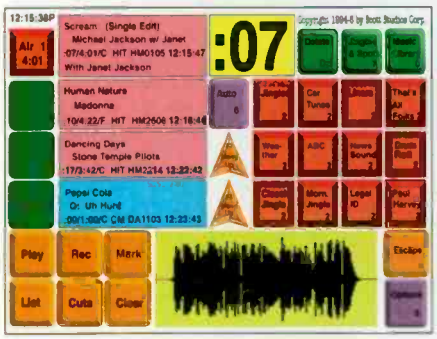
Here's how it works: Six buttons on the left of the large computer touchscreen play what's on your log. Scheduled spots, songs, promos, PSAs and live scripts come in automatically from your production studios, traffic, music and copy computers. Jocks can revise sweeps at a touch (with the arrows at mid-screen), or work with the full day's log and add or rearrange anything.

On the right, 17 "hot keys" start ***unscheduled*** jingles, sounders, effects, comedy or promos ***on the spur of the moment***. Your morning show will benefit from 26 sets of 17 user-defined instant audio "hot keys".

You can ***preview anything*** in a cue speaker at a touch. The Scott hard drive even lets you listen to endings ***while*** that song is playing on the air.

And ***nothing*** beats the Scott System for easy levels. Touch the label on the screen, moving right to left to fade as desired. If you'd rather adjust levels on the console, channel numbers show clearly on each start button.

The Scott Studio System is your *best* way to make the move to digital audio and eliminate troublesome carts. The touchscreen instantly plays whatever you want. All scheduled spots, jingles, promos, scripts and songs come in from your traffic, copy and music computers.



Phone Recorder On Screen

Touch ***one button*** and you're recording calls to hard disk. Another button and you've got the world's easiest editor. When it's ready, one touch and your call's on the air. The phone recorder only adds $1,000 to the system.

The *Best* Digital Audio

When spots, promos, PSAs, or any other digital audio events are recorded, they're immediately playable in ***all*** your Scott System air studios. Nobody wastes time carrying carts down the hall or redubbing spots for additional stations.

One question you ***don't*** have to worry about is "What if it breaks?" The Scott System comes complete with ***every*** spot and jingle stored ***redundantly*** on ***two*** hard disks. It's a snap to switch to the "hot standby" system! You get touchscreen convenience, digital quality, and backup redundancy for no more money than cart machines and commercial tapes.

The World's Fastest Requests!

Touch either of the two buttons at the top right of the main screen to see our "Wall of Carts" with all your audio ***on-line!*** Touch the spot, song, jingle, sounder, promo, PSA or comedy you want and it plays ***instantly***. Or, you can put it anywhere you want in the day's schedule.

During play, all Scott screens include large digital timers that automatically count down intro times, and flash warnings 60-, 45-, and 30-seconds before the end. You also get clear countdowns the last 15 seconds of each event.

Instant Requests from Hard Disk

There's no way to play requests faster than with the Scott System! Touch the music button and first letter of the title or artist's name. You get a "Wall of Carts" with songs that play at a touch!

All your music will be pre-dubbed ***free*** from your playlist. Scott Studios has radio's highest quality music on hard drive.

The Full Day's Log

Scott Studios lets you see the whole day and make any changes you want.

Large & Small Have Made the Move!

The Scott System ***leads the industry*** with major broadcasters like Disney/Capitol Cities/ABC, Westinghouse/CBS, Chancellor/Shamrock, Alliance, Salem, Liberty, Saga, Liggett, Regent, Tichenor, Benchmark, Max, Atlantic, and Ralco in Canada. Scott Systems are in Detroit, D.C., Dallas, Houston, Philadelphia, San Diego, Denver, San Antonio, Ft. Lauderdale, Cincinnati, Dayton, Lansing, Las Vegas, and smaller markets coast-to-coast from Bangor to Bakersfield.

Scott Studios Corp.
13375 Stemmons Freeway, Suite 300
Dallas, Texas 75234 USA
8 0 0 7 2 6 - 8 8 7 7
(800) SCOTT-77

Circle (90) on Free Info Card

PUBLIC RADIO END-TO-END

FROM ITS NETWORK HQS TO ITS STATIONS, PUBLIC RADIO'S FACILITY DESIGN IS AS QUALITY- AND COST-CONSCIOUS AS ITS PROGRAMMING.

Photo: Studio 4A at NPR headquarters in Washington, DC, offers sufficient space for large ensembles and an audience. Isolated room in background can be used for Foley, vocals or announcer.

Public radio in the United States is often thought of as a shoestring operation. Recent federal and state funding cuts have only squeezed its budgets further. Yet its audience continues to skyrocket, with a growing number of these listeners willing to voluntarily contribute to their stations on a regular basis, like subscribers to a magazine or a newspaper. The unique programming of public radio is what draws these listeners, and this fare isn't easy to produce — either at the national or local level.

To preserve and improve this vital asset, many public radio operations are

Excellence In Broadcasting

Award winning innovation in product design combined with high quality components and manufacturing excellence provides broadcasters worldwide with the ultimate in RF product technology. You can see it all in the Continental Electronics booth at NAB 1997; #2606 in the Radio/Audio Hall! On display will be products from all three members of the C.E.C. family, including solid-state AM, FM and TV transmitters, a truly digital FM exciter, and cutting-edge DAB transmission products.

- **Continental Electronics Corporation**
- **TELEFUNKEN Sendertechnik**
- **Continental Lensa S.A.**

Plus, Continental's Broadcast Supply Division can provide you with the full spectrum of broadcast equipment, including local and remote transmission products, processors, consoles and other studio gear, and much more!

With more than a half-century of commitment to quality and reliability, plus the latest in technical advancements, it's easy to see why an increasing number of broadcasters are looking to Continental Electronics Corporation for RF excellence.

NAB Booth #2606

If you have RF technology in your future, come see where Continental is taking the future of RF. Refuse to compromise... call Continental first!

800-733-5011

Continental Electronics Corporation

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

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

1.97.106

Circle (78) on Free Info Card

PUBLIC RADIO END-TO-END

enhancing their production facilities. Ever familiar with tight and fixed revenues, these broadcasters have seemingly increased the elasticity of the dollar as they stretch funds to provide a conducive environment for high-quality radio production.

These pleasant and cost-effective work spaces offer good lessons to the radio industry at large, particularly as commercial broadcasters also face the need for increased spatial efficiency and improved local production capability. (See sidebar, p. 88.)

For two good examples of this work, this article examines the network headquarters of National Public Radio in Washington, DC, and a local public radio facility in Interlochen, MI.

The view from the talk-show host's seat in NPR's Studio 3A, home for many of the network's call-in programs. Note floor-to-ceiling window to control room with large isolation gap between panes.

National Public Radio

From its inception in 1971, National Public Radio (NPR) had studios in Washington, DC, that evolved in much the same way as its growing production and broadcast operations: as needs arose, space was converted, renovated,

Mom and Pop Sold the Station Years Ago!

Today's radio is a multi-billion dollar national corporation, with scores of semi-autonomous branch offices; a treacherous landscape where the weak die like dogs. Today's radio network can't just deliver audio. Today's radio network requires high-speed LAN connections, telephone calls, Internet connectivity, maybe some CD quality digital audio, and people who know that "ATM" is more than that thing down at the local bank.

Today's radio requires the same corporate infrastructure as any other big business and NSN can deliver.

NSN has been providing wide area network solutions to radio and other businesses for years. We know when to use frame relay, ATM, and fiber, or when satellites provide the best solution. We speak TCP/IP, since we're a global Internet service provider. You don't need a new MIS department - you need NSN.

NSN. Call the radio people who know

that there's more to it these days than just great audio.

800 • 345 • VSAT 8728
Fax 970 • 949 • 9620
http://nsn.net
e-mail: sales@nsn.net

NSN NETWORK SERVICES℠
P.O. Box 7510
Avon, CO 81620

Circle (79) on Free Info Card

MASTER CONTROL

The world's finest on-air system.

Live Assist • Voice Tracking • Split Spot Feeds •

Hundreds of Cities Worldwide

Satellite Automation • News & Talk Radio Ready • Novell or NT •

RCS
Sound Software

(914) 723-8567 • www.rcsworks.com

Circle (80) on Free Info Card

PUBLIC RADIO END-TO-END

Inter ochan Public Radio's Studio A serves as its performance room.

reclaimed and adapted without the luxury of ever having enough or having it laid out in the organized fashion that the staff desired. Eventually, the need for a new facility became clear, and in 1994, National Public Radio relocated to a new 152,000-square-foot broadcast center. The new facility offers improvements over NPR's old location in the areas of technology, work environment, amenities, security and space.

Following an exhaustive real-estate search, NPR elected to purchase a building rather than lease space. The building that was selected (formerly a bank operations center) has a triangular footprint, comprising two adjoining structures built some 10 years apart. Each has seven floors, but not all of them align between the structures, and each half had its own elevator and utilities core. A significant renovation was required, and the project presented the design team with a formidable task in space planning to satisfy departmental adjacencies, allocate the available space wisely, and accommodate the technical requirements for the studio acoustics and equipment needs.

These pleasant and cost-effective work spaces offer good lessons to the radio industry at large.

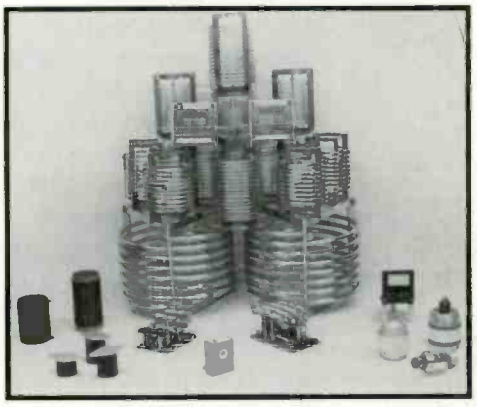
To these ends, NPR and its project coordinator Maury Schlesinger turned to Russ Berger Design Group (RBDG) of Dallas, and the Washington, DC, and Butler, PA, offices of Burt Hill Kosar Rittleman Associates (BHKR). RBDG provided layout and design for the audio production studios within the new facility, and coordinated them with BHKR's architectural and engineering design, along with technical systems integration by Harris Corporation's Systems Division, based in Florence, KY.

NPR's new facility offers improvements in technology, work environment, amenities, security and space.

Looking into Control Room B from Studio B at Inter ochan Public Radio. Note diffusor panels on rear wall and ceiling section of control room.

From the onset, structural modifications to the existing building were deemed necessary if a proper acoustical environment was to be achieved in the technical areas. While the design team found creative ways to construct some of the studios within the existing clear height, adequate volume for the

QUALITY AM ANTENNA PRODUCTS



COMPONENTS

- •Inductors
- •Capacitors
- •Lighting Chokes
- •Static Drain Chokes
- •Contactors
- •RF Plugs & Jacks
- •Meter Switches
- •Insulators
- •Antenna Sample Loops
- •Equipment Boxes
- •Copper RF Wire, Tube, and Strap
- •Coaxial Cable, Feeder Systems

Visit Us @ WWW.LBAGROUP.COM

Offered in a wide variety of types and ratings, LBA RF Components are intended for application in Medium Wave/AM antenna and transmitter equipment with power levels to over 500kW. LBA products are built to the highest standards to ensure long life and reliability.

Antenna Tuning Units - Combiners - Matching Networks

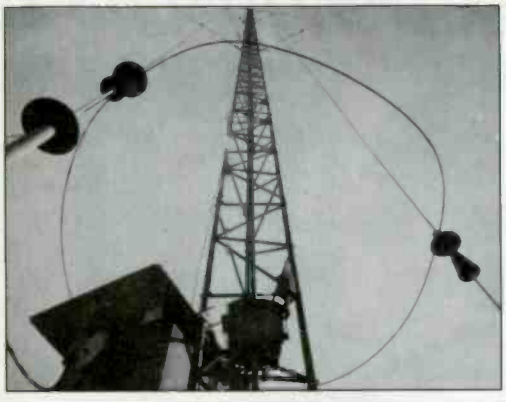
ANTENNA EQUIPMENT

- •Tunipole™ Folded Unipole Antennas
- •Combipole™ Multiple Frequency Antennas
- •Detunipole™ Detuning Systems
- •Antenna Tuning Units, Diplexers, Triplexers
- •Transmitter Combiners
- •PowerTopper™ Toploading Systems
- •Basemaxa Base Enhancement Systems

LBA is the world leader in single and multiple station folded unipole antenna systems for high efficiency, wide-band AM transmissions at all power levels. LBA systems are found worldwide from Alaska to Argentina, Kuwait to Saipan.

LBA Technology, Inc.
210 W. Fourth Street • P.O. Box 8026
Greenville, North Carolina 27835

TOLL-FREE - 800-522-4464
919-757-0279 • FAX 919-752-9715
E-Mail: lbatech@www.lbagroup.com

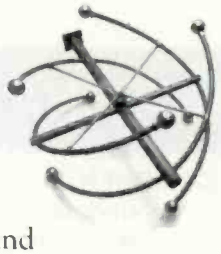


TUNIPOLE™ - Folded Unipole Antenna Systems

©1996 An LBA Group Company Se Habla Español

FM QUADRAPOLE

why settle for 2 when you can have 4?



DCR-M Quadrapole
- Broadband
- Low ice sensitivity
- Superior H/V ratio
- Excellent pattern performance

For Multistation applications our DCR-MBR offers these additional features
- Low weight & windload
- Station combining up to 12 MHZ
- Reduced downward radiation

Stop by our Booth # 7976 at NAB to see our Multistation FM system display and...

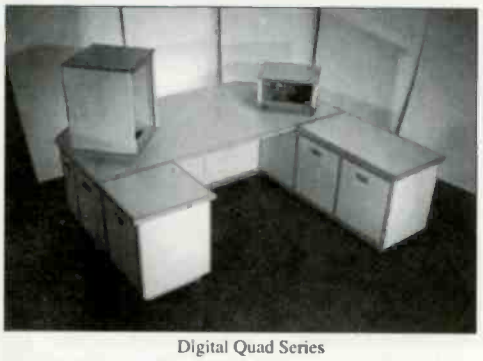
Register to WIN a BOSE Wave® Radio

DIELECTRIC

Tower Road • Raymond, ME 04071
(207) 655-4555 • Fax (207) 655-7120
email • dielectric@maine.com
www.dielectric.com

Circle (57) on Free Info Card

"FROM QUINCY TO GUAM ITS-THE QUALITY CHOICE!"



Digital Quad Series

SOME STANDARD FEATURES:
- Heavy Duty And Modular
- 1 1/2 Inch Thick Top Surfaces
- 1 1/2 Inch Sidewall Framing
- Custom Designing
- Name Brand Laminants
- 19 Inch Heavy Duty Rack Rails
- Digital Workstation Systems
- Solid Oak Trim & Kickboards
- Combo Rack/Shelf Systems
- Removeable Doors

WORLDWIDE SALES AND MANUFACTURING-
TUCSON, ARIZONA 520-531-1090
WEBSITE CATALOG & NEWSLETTER-
http://www.flash.net/~spacwise/home.htm
E-MAIL-spacwise@flash.net
Fax: 520-531-1078

"THE BROADCASTERS FURNITURE STORE"™

SPACEWISE®

800-775-3660

"AFFORDABLE" QUALITY MODULAR STUDIO FURNITURE AND ACCESSORIES!

Circle (58) on Free Info Card

PUBLIC RADIO END-TO-END

larger production studios was created by removing a portion of the fifth floor structural slab to open up double-height space. Because the building had post-tensioned floor slabs (in which the structural integrity relies on steel tendons tightened within the concrete after it is erected), this modification was, in a word, challenging.

One highlight of the technical facilities (and a beneficiary of the double-height space) is Studio 4A, a large multitrack recording and mixing facility (see photo, p. 80). The room can handle a 40-piece orchestra, a jazz band or

IPR's record library is a clever integration of storage and working space.

a radio drama production with a studio audience, giving NPR the opportunity to produce a wider range of programs than ever before.

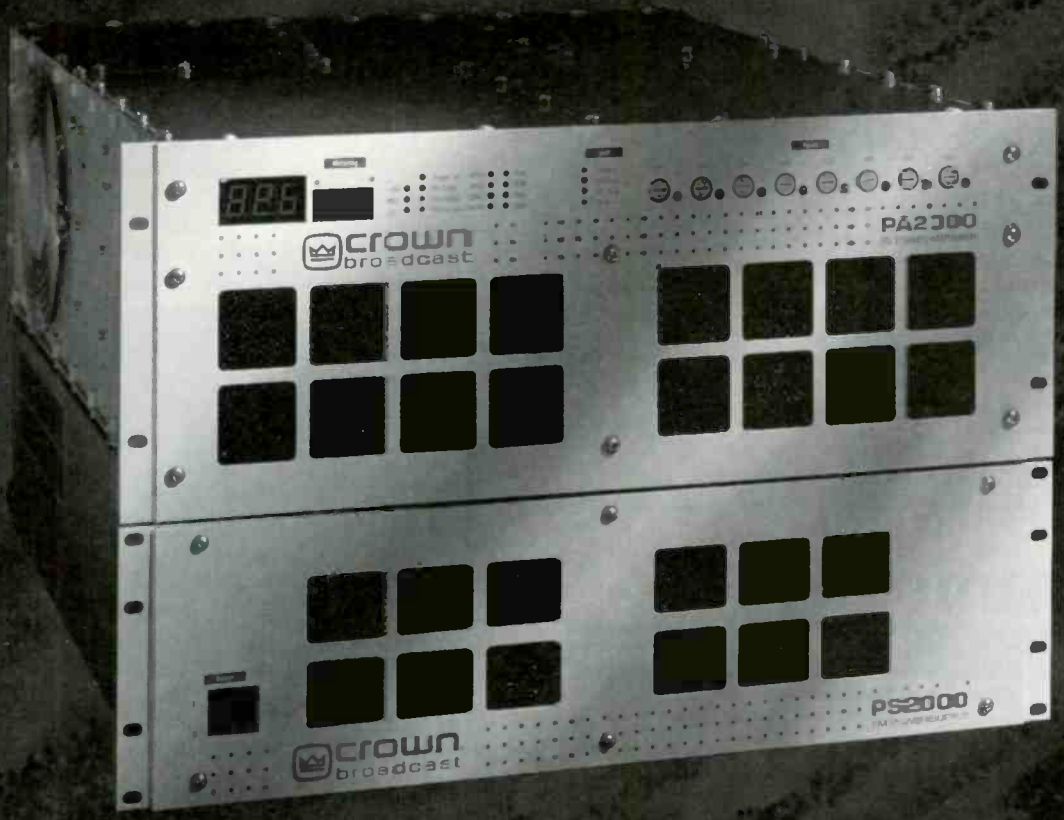
In total, the new facility houses seven suites that have control rooms and studios for news and performance, eight stand-alone production control rooms, nearly two dozen edit booths, a variety of feed/transfer rooms, and the master control and system technical center that tie the entire facility together. There are also auxiliary technical spaces for telecommunications, engineering services, a satellite depot, computer information services, numerous equipment rooms and a roof-mounted satellite teleport.

To fulfill NPR's acoustical and technical needs within an existing structure, the construction featured floating floors and ceilings with an integral system of wire management, which extended to a more comprehensive cabling infrastructure for vertical access between floors and distribution on each level.

Space planning for the facility focused on the efficiency of day-to-day operations, as well as the ability to accommo-

Continued on page 90

Efficiency: *(e-fish'en-see) n.* 1. the most effective use of available resources; 2. great things in small packages; 3. Crown's new FM 2kW amplifier.



Stop the presses on all dictionaries! We're redefining efficiency with our new 2 kW FM amplifier. This **broadband** amplifier requires no field or factory tuning and provides **75–80% RF efficiency** across the band. The design features **hot-pluggable, 500-watt power modules** and a responsive protection mode. The separate DC supply is **power factor corrected** and 90% efficient. Both units are **lightweight and compact** for easy installation and overnight shipping if required. Use the amplifier and supply with your existing exciter or upgrade to a Crown exciter for an unbeatable transmitter package.

50 YEARS Lasting Values

crown® broadcast

Phone: 800-294-3050; Fax: 219-294-8222
1718 W. Mishawaka Rd., P.O. Box 1000, Elkhart, IN 46515-1000

Circle (59) on Free Info Card

SATELLITE SYSTEMS

Satellite Equipment for Radio

Off the air? Looking for quick repair service?

Rely on us!

Satellite Systems is respected industry-wide for prompt, accurate service to radio stations and networks.

Contact us for Ariel and Zephyrus 700 SCPC receivers. Upgrade your Fairchild Dart 384 and Scientific Atlanta 7300/7325 to LNB receivers-use existing equipment as trade-in.

Pre-and post-service technical support, along with a 6-month warranty.

Turn to the leader in repair, upgrades new equipment, used equipment and accessories. We can answer all of your questions.

SATELLITE SYSTEMS

615 East Brookside Colorado Springs, CO 80906
Phone: (719) 634-6319 Fax: (719) 635-8151

Circle (60) on Free Info Card

Three Russian Tubes every Broadcast Engineer should know.

Svetlana
ELECTRON DEVICES

Featured at:
NAB'97
Booth #1424

Designed and manufactured to exacting standards, Svetlana Tubes are built rugged to last longer.

Call Svetlana For All Your Vacuum Tube Needs!

www.svetlana.com

Headquarters: Phone 205-882-1344 / Fax 205-880-8077
Marketing & Engineering: Phone 415-233-0429 / Fax 415 233-0439

Circle (61) on Free Info Card

PUBLIC RADIO END-TO-END

Designing for consolidation

By Richard Schrag

"Those who cannot remember the past are condemned to repeat it," admonished George Santayana in his most oft-cited phrase. But in more than doubling the size of their studios in Dallas this year, the folks at Susquehanna Broadcasting not only *remember* the past, they have *chosen* to repeat it. Two new stations will be housed in a facility that draws on the success of the 10-year-old stations located just three floors up.

Proper traffic flow is critical to good multistation facility design, as provided by this central hallway at KPLX/KLIF, Dallas. (Copyright Art Beaulieu Photography.)

When country station KPLX-FM (99.5MHz) and all-talk station KLIF-AM (570kHz) built new facilities in 1987, station manager Dan Halyburton and chief engineer Norm Philips were determined to plan an infrastructure that would last. The site selected for their studios was an upper floor of a high-rise office building near downtown Dallas.

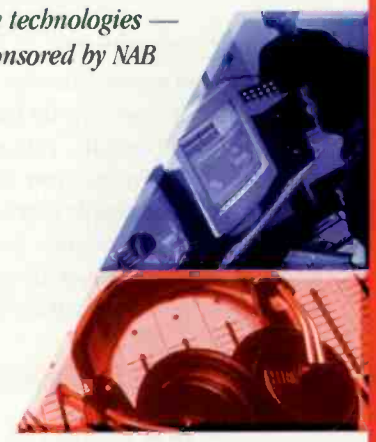
KPLX/KLIF station management enlisted the help of Russ Berger Design Group for acoustical and technical design along with Benson, Hlavaty and Associates for interior design. This team struggled with the building's difficult footprint — two offset arc segments — to define a space plan with adjacencies and traffic flow suited to the complex day-to-day operations of a radio station. Particular attention was paid to sound isolation, the acoustical environment in the studios, HVAC noise and vibration control, comprehensive wire management systems, and the accessibility and storage of materials and equipment. Every decision was evaluated in the context of the facility's long-term flexibility.

Advancements in broadcast technology have been integrated into the facility without major renovations.

In the nearly 10 years since then, that flexibility has

TUNE-IN TO NAB...YOUR RADIO CONNECTION.

With all the changes the radio industry is going through — deregulation, consolidation, new technologies — how can you survive? And thrive? You can start by attending two can't-miss events. Both sponsored by NAB and filled with the tools you need to successfully navigate this new era.

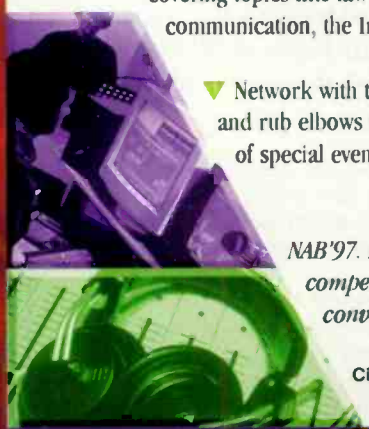


NAB97

Conferences: April 5 & 6-10, 1997
Exhibits: April 7-10, 1997
Las Vegas, Nevada USA

When it comes to radio, NAB'97 really pours it on. With two targeted Radio/Audio Pavilions, NAB'97 is setting the pace of convergence. At NAB'97, you'll:

- See the hottest new technologies, products and services for radio broadcasting and audio production; plus explore the latest innovations for satellite communication, telecommunications, multimedia and the Internet.
- Learn tools and techniques to succeed at the NAB Radio Management Conference and RAB Sales and Marketing Conference plus have full access to 10 additional conferences covering topics like law & regulation, satellite communication, the Internet and more.
- Network with thousands of your colleagues and rub elbows with industry leaders at dozens of special events.



NAB'97. Everything you need to compete in the world of convergence.

Circle (103) on Free Info Card

RADIO THE NAB SHOW

September 17-20, 1997
Morial Convention Center
New Orleans, Louisiana

This event is a magnet for the best and brightest who are leading the industry into the 21st century. So, come to New Orleans in September and get ready to super-charge your business:

- Learn from radio's leading managers in dozens of interactive and idea generating sessions.
- Sharpen your edge in sessions on management, programming and production, as well as in the Radio Advertising Bureau's Sales & Marketing program.
- Hone your skills in NAB's new Engineering Certification Program.
- Meet nearly 200 suppliers of Radio/Audio technologies, products and services, follow up on your NAB'97 contacts and wrap up end-of-year purchases.
- Network at the one event that's a who's who of radio.

The NAB Radio Show. It's a hot bed of ideas, opportunities, and entertainment. If you're a radio professional, this is the one event you can't afford to miss!

Win a free hotel stay in New Orleans!
Check our website for details.

Register on the Web! Check our website at **www.nab.org/conventions/** for all the latest information on NAB'97 and The 1997 NAB Radio Show conferences, exhibitors, registration and housing.

For more information, complete this form and fax to: (202)429-5343

BER

Please send me information on NAB'97 ❑ Attending ❑ Exhibiting

Areas of Interest *(Check all that apply)*: ❑ Radio/Audio ❑ Television/Video/Film ❑ Multimedia ❑ Internet/Intranet ❑ Telecommunications ❑ Satellite

Name _____ Title _____

Company _____ Call Letters _____ ❑ AM ❑ FM ❑ TV

Address _____

City _____ State _____ Zip(Postal Code) _____ Country _____

Phone _____ Fax _____ E-Mail Address _____

For up-to-the-minute registration, exhibitor and program details:

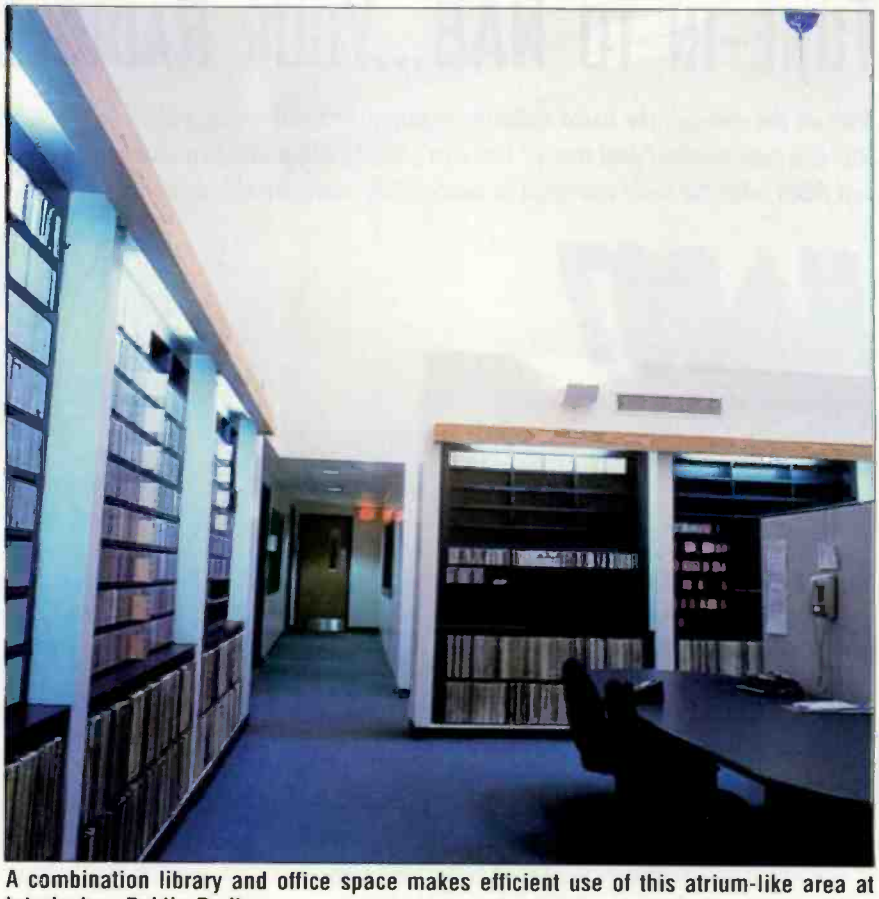
- Visit the NAB Website at www.nab.org/conventions/
- Call the NAB Fax-On-Demand Service at (301)216-1847 from the touch-tone handset of your fax machine and follow the voice instructions.
- Or for information on attending, call (800)342-2460 or (202)775-4970. For information on exhibiting call (800)NAB-EXPO or (202)775-4988.

PUBLIC RADIO END-TO-END

Continued from page 86

date public tours, whether for government VIPs, potential private funders or a busload of Cub Scouts. This provided a major improvement over the past. The hundreds of people that visit NPR in Washington each year previously observed the broadcasts by perching themselves precariously at the elbow of the director, in an already cramped control room. Now, visitors can watch the production of popular programs like *All Things Considered, Morning Edition* and *Talk of the Nation* from their own glassed-in viewing areas without impeding the show's production.

Fiber-optic cable connects the IPR facility to performance spaces elsewhere on the campus.



A combination library and office space makes efficient use of this atrium-like area at Interlochen Public Radio.

Interlochen Public Radio

At the other end of NPR's satellite feed, Interlochen, MI, a new 9,800-square-foot facility has been constructed to house the operations of Interlochen Public Radio (IPR), operators of WIAA-FM (88.7MHz) and WIZY-FM (100.9MHz). The facility was designed as an addition to the existing (and cramped) home of WIAA-FM, and it provided the operation with 7,600

been tested repeatedly as the stations moved toward tapeless operation, incorporated digital editing capabilities and initiated an extensive Internet presence for KLIF with what they claim as the first live Internet broadcast and the first radio/TV/Internet "triplecast." The stations have seen significant advancements in broadcast technology integrate seamlessly into the existing facility without requiring major renovations.

Now Susquehanna has acquired *The Ticket* (KTCK-AM, 1310kHz), an all-sports station, and *The Zone* (KKZN-FM, 93.3MHz), a Triple-A station, and is building new studios on another floor of the same high-rise office building. This time around, RBDG is providing architectural and interior design services, as well as acoustical and technical expertise. Having tested some alternate solutions, the design team returned to a space plan that nearly matches the existing studios upstairs. The new layout incorporates larger control rooms and a live studio for music production, but interdepartmental relationships have been preserved.

While the "bones" of the facility's design resemble its predecessor, the new stations require a much different aesthetic. Interior finishes are more in keeping with the new stations' formats, reflecting the age and sensibilities of the staff and their listeners. This includes the selection of more utilitarian materials in assemblies that expose the raw construction elements and use off-the-shelf hardware as part of the desired "look."

Not everything about the original station design has been retained, either. In some cases, materials and applications have been selected for better durability, and throughout the facility, the team has sought less-expensive means of achieving comparable results. One area of improvement is the opportunity to use newer lighting technology as a more integral part of the design, with lamps and fixtures that are task-specific and serve as focal points in the finish-out.

Good planning and solid design yield a foundation that will stand the test of time.

KPLX and KLIF have already proved that good planning and solid design yield a foundation that will stand the test of time. As construction of their younger siblings is completed, there's a good chance that all these studios will be around for at least another 10 years.

Richard Schrag is a consultant with Russ Berger Design Group, a recording and broadcast studio design firm in Dallas.

square feet of new space.

The stations are licensed to Interlochen Center for the Arts, a well-known private high school and summer camp for the performing and visual arts founded in 1928. (The center has had a long affiliation with radio, acting as a frequent summer venue for broadcasts of the NBC orchestra under Arturo Toscanini in the 1930s. WIAA began broadcasting from the center in 1963, followed by the addition of WIZY in 1989.)

The design was developed by the Walters-Storyk Design Group of Highland, NY, working with local architect Terry Clark of Clark, Walter, Sirrine and Travis. The new facility includes five studios, five control rooms, a record library, eight offices, an engineering shop and a duplication area. The space's programming was based upon IPR's plans to add a second 24-hour station, produce programs for national distribution (including multitrack projects for CD release) and lease studio space to outside clients when not needed for station work.

Three studios, including a 600-square-foot performance studio, all feature floating walls of double- or triple-drywall construction and floating floors. A quiet HVAC system serves the entire facility. Comprehensive routing offers interconnection between all rooms, and fiber-optic cable connects the facility to several performance spaces elsewhere on the Interlochen campus.

The record library is a clever integration of storage and working space. Shelves around the room's perimeter house some 10,000 recordings, while six modular work-cubicles occupy its central space. A 20-foot ceiling peak in the room provides an airy, open feeling. (The room's height is a fringe benefit of the adjacent studios' requirements for high volume and large HVAC ductwork.)

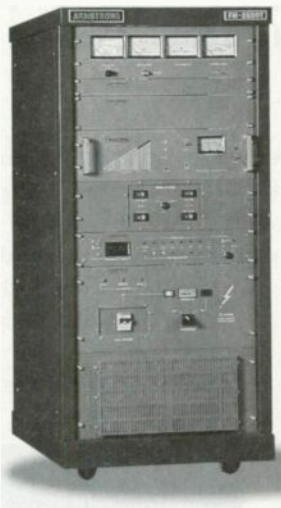
Unlike many expansion projects, the facility offers some capacity for future production growth. Within its walls, Interlochen Public Radio should be well-equipped to serve its audience as a public radio outlet in northwest Michigan.

Thanks to Kelly Naumann and Richard Schrag of Russ Berger Design Group, John Storyk of Walters-Storyk Design Group and Howard Sherman of Howard Sherman Public Relations for their input to this article.

NPR photos courtesy of Russ Berger Design Group. IPR photos courtesy of Walters-Storyk Design Group.

FOR A FIRST LOOK AT NAB 97 NEW PRODUCTS AND THE 1997 *BE* RADIO PICK HITS, SURF OUR ON-LINE SHOW DAILY.

ARMSTRONG
FM TRANSMITTERS
Engineered for Reliability



- Power Levels from 1kW to 30kW
- High Efficiency, Grounded Grid Single Tube Design
- Wideband Quarter Wave Cavity for Lowest Synchronous AM
- Solid State Driver with Patch Around Capability
- Optional Automatic Power Control & VSWR Foldback
- INEXPENSIVE!

ARMSTRONG
TRANSMITTER CORPORATION

In New York:
4835 N. Street Road
Marcellus, NY 13108
(315) 673-1269 • Fax (315) 673-9972

In Florida:
3100 N.W. 72 Av. #127
Miami, FL 33122
(305) 471-1175 • Fax (305) 471-1182

Circle (43) on Free Info Card

PHASETEK INC.

•CUSTOM AM/MW PHASING SYSTEMS•
•AM/MW ANTENNA TUNING UNITS•
•DIPLEXERS AND MULTIPLEXERS•
•DETUNING UNITS/UNIPOLE KITS•
•COMPLETE LINE OF RF COMPONENTS•

PHASETEK INC.
550 CALIFORNIA ROAD
UNIT 11
QUAKERTOWN, PA 18951
PHONE: 215-536-6648 FAX: 215-536-7180

FOR MORE INFORMATION
OR
TO PLACE AN ORDER, CONTACT:

Circle (44) on Free Info Card

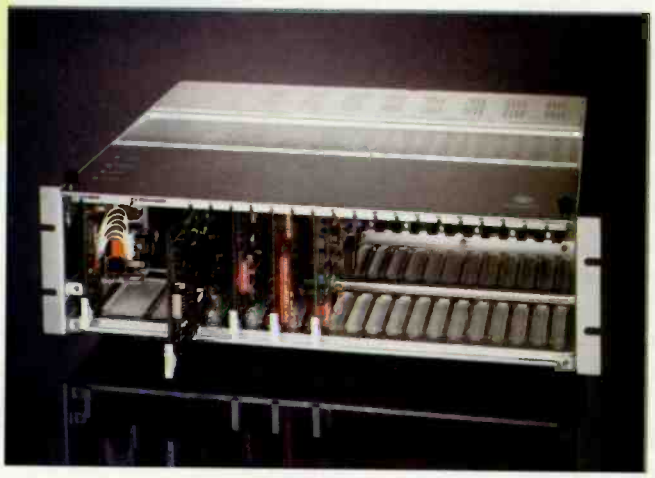
Intraplex TDM-160 T-1 multiplexer

By Christopher H. Scherer, CBRE

Transferring audio from one point to another is common in every facility. There are countless possibilities for every possible need. However, if your application calls for high capacity without using RF, the options quickly diminish. The introduction of T-1 services by telephone companies allowed wide bandwidth over a dedicated land line, using the appropriate terminal equipment. Among such hardware is the Intraplex TDM-160 T-1 multiplexer, which gives several options for bidirectional audio transfers using a variety of transfer modes for high-quality transmission.

Performance at a glance:

- Modular terminal equipment for T-1 circuits
- Wide range of modules available
- Variety of compressed and uncompressed audio options
- Easily reconfigurable without telco intervention



T-1 technology isn't really that new. Its time-division multiplexing (TDM) helped reduce the huge amount of copper wire originally required by telephone companies. With the employment of multiplexing, a single twisted pair can carry 24 telephone conversations.

To understand how the TDM multiplexer works, it helps to understand what a T-1 circuit is. A T-1 circuit is made up of 24 "time slots" in each direction, each of which has a 64kb/s capacity, for a total bidirectional capacity of 1.536Mb/s.

System overview

The basic TDM-160 system consists of a rack-mounted shelf housing modules particular to the application. A variety of modules are available for voice, synchronous data, asynchronous data, program audio and order wire. Because of the numerous possible linking configurations, this report considers a two-unit, point-to-point system (TDM-163), the configuration currently used at WMMS-FM. Table 1 shows a complete list of Intraplex TDM-series modules and their functions.

Countless configurations are possible by mixing and matching modules as needed. As you would expect, different modules require different bandwidths to perform their functions. These differing bandwidth requirements are satisfied by the allocation of T-1 circuit's time slots. Note also that bandwidth on each of the two circuit's two directions can be allocated independently. (For example, one direction can be configured to carry six 256kb/s signals while the other direction could carry 24 64kb/s signals.)

MODULE	DESCRIPTION	APPLICATION
CM-3A	Common Module (required)	Coordinates transmission/reception
DS-64NC	Wideband Synchronous Data	Data transfers from 8kb/s to 1.536Mb/s
D-100	Variable Rate Data	Non-standard data rate transfers
DS-961D	5-port RS-232	RS-232 from 1.2kb/s to 19.2kb/s
DA-191A	4-port asynchronous up to 9.6kb/s	Asynchronous data transfers
VF-15/VF-16	PCM coding (64kb/s)	2-wire voice grade
VF-17/VF-18	ADPCM coding (32kb/s)	2-wire voice grade
VF-25 (was VF-5A)	PCM coding (64kb/s)	4-wire E & M
VF-27	ADPCM coding (32kb/s)	4-wire E & M
VF-5B	PCM coding (64kb/s)	4-wire E & M, mobile radio applications
PT/PR-150A	16-bit coding, apt-X data compression	7.5kHz or 15kHz program channel
PT/PR-250	16-bit coding, ISO/MPEG Layer II data compression	7.5kHz or 15kHz program channel
PT/PR-350	16-bit coding, no data compression	7.5kHz or 15kHz program channel
PT/PR-D350	16-bit coding, no compression, AES3 digital I/O	7.5kHz or 15kHz program channel
PT/PR-355	14-bit coding, J.41 compression	7.5kHz or 15kHz program channel
PT/PR-D355	14-bit coding, J.41 compression, AES3 digital I/O	7.5kHz or 15kHz program channel

Table 1. Modules available for Intraplex's TDM-160 series of T-1 terminal equipment.

The rack frame

The basic rack frame occupies 3RU. It has slots for two power supplies (main and optional redundant), a CM-3A card and 17 slots for channel modules. A 3RU expansion shelf can be added to increase the number of channel modules if needed.

For each channel module installed, there must also be an associated rear-panel module adapter equipped with

the desired audio connectors (chosen from the wide variety that Intraplex offers).

The front panel is a flip-up door to provide access to the channel modules. The power supply cards have status LEDs to monitor the system status with indicators for power, normal, supply fail, alert and alarm. There are also several indicators on the CM-3A card to help diagnose system problems.

Each rack frame is connected to a channel service unit (CSU) for communication to the T-1 circuit.

Channel modules

The channel modules used at WMMS were chosen for their audio quality, time-slot usage and specific application. Three types of channel modules are currently being used: PT/PR150A, PT/PR350 and VF-5A. Figure 1 shows how the TDM-163 rack is populated with these modules at WMMS.

Program channel modules are used in pairs: a PT (program transmit) and PR (program receive). These are each one-way communications. The VF-5A cards are bidirectional. All of the cards have remote-controllable functions for module configuration changes. The 150A cards occupy two T-1 time slots each when used in the 7.5kHz mode (128kb/s), and four slots each in the 15kHz mode (256kb/s). The 350 card (uncompressed) occupies 18 slots and the VF-5A cards occupy two slots each (one for each direction of a "four-wire" path).

Setup and operation

A question often asked is, "Why use a multiplexed T-1 instead of multiple program loops?" The most obvious answers are cost and simplicity. Instead of having five 15kHz stereo loops, six 7.5kHz mono loops and two or three data circuits installed, it is easier to deal with one T-1. There is more spent up front on terminal equipment, but that cost is recovered over time from the savings on telco charges.

Most phone companies don't like supplying equalized lines anymore either, and the cost of T-1 is quite

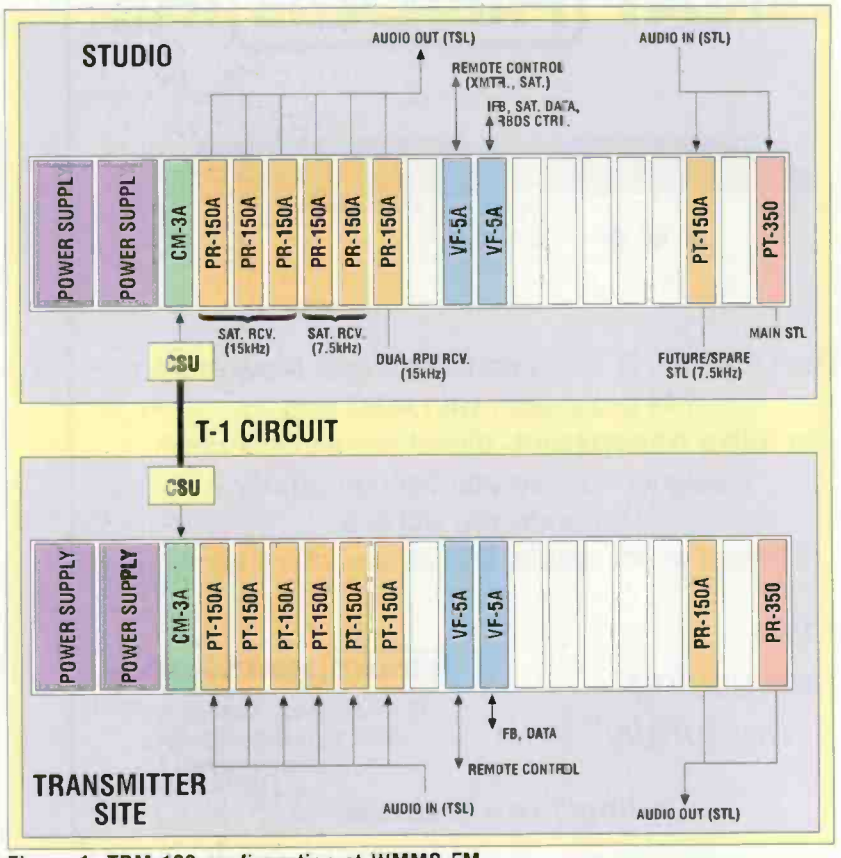
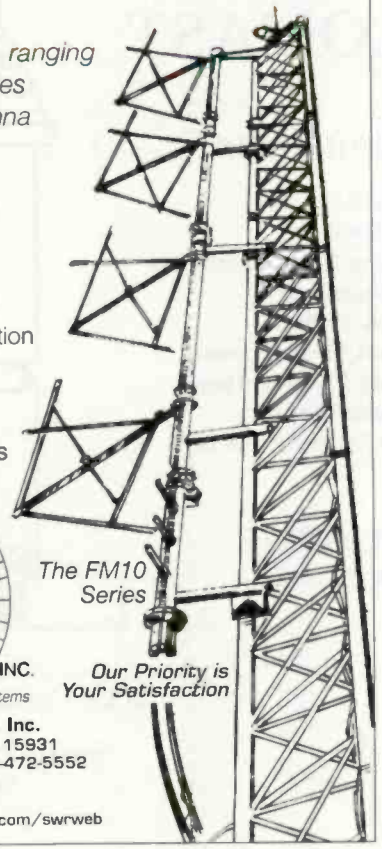


Figure 1. TDM-163 configuration at WMMS-FM.

The FM Series

SWR's FM antennas, ranging from educational series to multi-station antenna arrays, are highly customized to meet broadcaster's needs.

Options
- Circular, horizontal, or vertical polarization
- Beam tilt
- Null fill
- Customized directional patterns



The FM10 Series

SWR INC.
Antennas and Transmission Line Systems

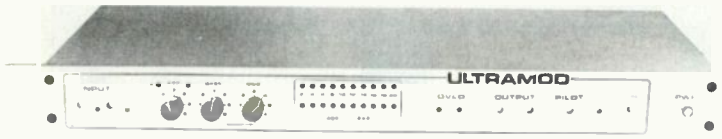
Our Priority is Your Satisfaction

Systems With Reliability, Inc.
P.O. Box 856, Ebensburg, PA 15931
1-814-472-5436 FAX 1-814-472-5552
Sales: 800-279-3326
E-Mail: swr@third-wave.com
http://homepage.third-wave.com/swrweb

Circle (62) on Free Info Card

See us at NAB Booth #5609

HNAT HINDES inc



The UM-2000 is a self contained split band stereo
FM processor, with AGC and
an -**ultra transparent**- digital stereo generator.
Designed to give you concert quality,
at a price you will like.
Contact us for details and dealer information.

audio
processing
"hnaturally"

HNAT HINDES inc
42 Elaine Street, Thompson, CT
(860) 935-9066, 935-4242
Fax: (860) 935-9919

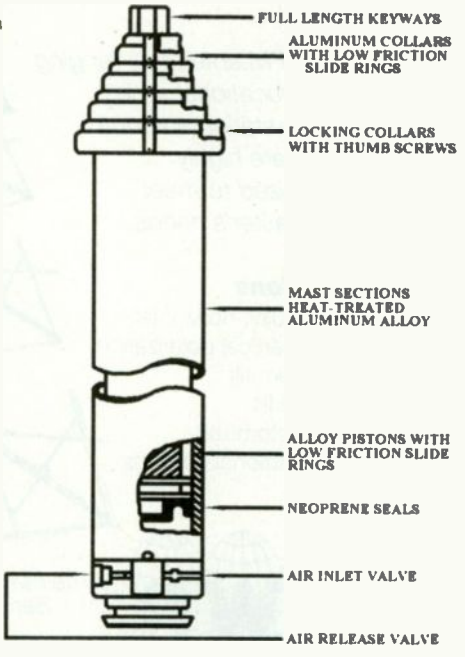
http://www.hnat.com

Circle (64) on Free Info Card

OUR MAST GETS IT UP FAST

TELESCOPIC PNEUMATIC MASTS

HILOMAST



Applications

- **Remote ENG**
- **Communications**
- **Field Strength Measurements**
- **Pop-up Jamming**
- **Remote Surveillance**
- **Noise Level Measurements**
- **Temporary Floodlighting**
- **Enviromental Sensors**
- **Military Communications**

COMPETITIVE PRICING

for Futher Information Contact Jim Osborne
ALLEN OSBORNE ASSOCIATES, INC.
756 LAKEFIELD RD. Bldg. J
WESTLAKE VILLAGE, CALIFORNIA 91361
Tel:(805)495-8420 Fax:(805)373-6067
aoa@netcom.com

Circle (63) on Free Info Card

See us at NAB Booth #S2258

practical. Another reason is quality. All of the audio over the T-1 is digital. WMMS uses data compression on the satellite feeds coming into the studios from a dish at the transmitter site for economy of space.

Once the TDM is installed and all the modules are set up, you will probably never have to touch it again. Set up of the channel modules does take a good understanding of the time slot usage of each module installed. This is not a difficult task, but care must be taken to ensure that your setup is correct. As with any installation, careful planning and an outline will make this an easy task.

The alarm status relay closure is used like the squelch contact on the microwave STL, in case there is a T-1 network problem. A few years ago, it was not uncommon to experience occasional interruptions in T-1 service, but the reliability factor today is extremely high.

Broadcaster's use of T-1 circuits has grown dramatically over the past few years. Add T-1's flexibility and high capacity to its reasonable monthly costs (typically less than two equalized loops), and you have the medium for some flexible audio signal transport. Take maximum advantage of this technology with flexible terminal equipment that can change and grow to fit your needs. The wide variety of T-1 channel modules makes the TDM-160 practical for many applications.

Chriss Scherer is chief engineer at WMMS-FM, Cleveland.

Editor's note: *Field reports are an exclusive* BE Radio *feature for radio broadcasters. Each report is prepared by well-qualified staff at a radio station, production facility or consulting company.*

These reports are performed by the industry, for the industry.

Manufacturer's support is limited to providing loan equipment, and to aiding the author if requested.

It is the responsibility of BE Radio *to publish the results of any device tested, positive or negative. No report should be considered an endorsement or disapproval by* BE Radio *magazine.*

Continued from page 78

SWITCHCRAFT, INC., A RAYTHEON COMPANY **2924**
Audio connectors, jacks, plugs, audio and video patch panels, patch cords, molded cable assemblies, audio accessories, switches, jackfields, jack panels, power cords and EAC power receptacles.
Circle 644 on Free Info Card

SYSTEMS WITH RELIABILITY (SWR, INC.) 5609
Introducing: FMU FM antenna, ultra power antenna rated 50kW; Rigid RF Component catalog.
Circle 645 on Free Info Card

SYMETRIX, INC. **1817**
Introducing: Model 628 digital voice processor premium quality mic preamp, de-esser, downward expander, compressor and 3-band parametric equalizer with analog and digital outputs, 128 processing presets, wired remote control; Model 532E 1/3-octave graphic equalizer for 31-band control, high-pass and low-pass filters, dynamic range greater than 112dB.
Circle 646 on Free Info Card

SYSTEMS WIRELESS, LTD. **11259**
Introducing: UHF frequency agile products, including UDR200B wireless mic receiver, UM200B wireless beltpack transmitter, UT200 handheld transmitter.
Circle 647 on Free Info Card

TAI AUDIO, INC. **S 6033**
Rental, sales and service of audio for film, video, television, studio, broadcast and live sound, wired and wireless mics, walkie talkies, wired and wireless intercoms, IFB, analog and digital recorders, cart machines, mixers, boompoles, playback systems, telephone interfaces, adapters, cables, cases, connectors, portable DAs, portable sound booths, tape, batteries and expendables.
Circle 648 on Free Info Card

TALK AMERICA RADIO NETWORK **S 2053**
Circle 649 on Free Info Card

TAMRAC, INC. **S 5766**
Circle 650 on Free Info Card

TAMUZ DONGSEO ELECTRONICS **2426**
Featuring: portable audio mixer; audio DAs; AV routers; A/V color LCD monitor; audio monitor; tally control; coordination switcher; TVR remote control.
Circle 651 on Free Info Card

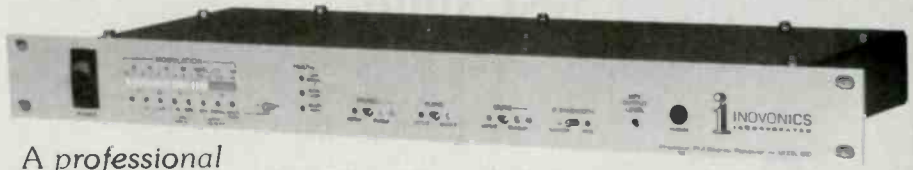
TANNOY-TGI NORTH AMERICA INC. **S 1833**
Circle 652 on Free Info Card

TASCAM **6952**
Introducing: Tascam Digital mixer; featuring, audio consoles, multitrack and DAT recorders.
Circle 653 on Free Info Card

TC ELECTRONIC **1721**
Introducing: DK Audio MSD200 master stereo display; TC Electronic DBMax digital broadcast maximizer; TC Finalizer studio mastering processer; TC M2000 studio effects processor.
Circle 654 on Free Info Card

Continued on page 103

FM "Relay" Receiver



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

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

MODEL 630 FM "RELAY" RECEIVER

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

Circle (65) on Free Info Card

KART-A-BAG®
"SERIOUS WHEELS"
TO MOVE YOUR EQUIPMENT

Daily Free Cart Drawing

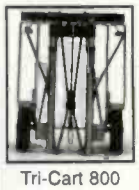
YES OR NO?

☐☐ **Do you carry or move lots of equipment, every day?**
☐☐ **Do you arrive exhausted at a site after moving equipment in and out?**
☐☐ **Do you need a work table when you arrive?**
☐☐ **Do you have a cart but can't take it on a location because it is to big to fit into your car?**

Kart Master HD 500S - Storage

Kart Master HD 500S

Tri-Cart 800


Tri-Cart 800 Storage

If your answer is "yes" to any of these questions, you should visit us at NAB booth at S2060. For 30 years Kart-a-Bag has manufactured heavy duty telescoping hand trucks which all carry a 10 year limited warranty. Kart-a-Bag's Kartmaster HD500S won one of the 10 "Pick Hits" from Video Systems magazine at the NAB 95' for best new design.

www.kart-a-bag.com E-mail: bks@kart-a-bag.com
for complete information (in foreign languages)
free catalogue and pricing information
FAX: 815-723-2495 INTERNATIONAL: 815-723-1940
8 a.m.-4 p.m CST (M-F); U.S. 800-423-9328
Kart-a-Bag, Division of Remin,
510 Manhattan Rd. Joliet, Il 60433

Circle (66) on Free Info Card

Gentner GSC3000

By Gary Smith

Several new technologies are converging to make the management of multiple transmitters an easier task. The key technologies include the latest generation of microprocessor-based transmitter site controllers, low-cost spread-spectrum transceivers that act like high-speed data modems and the ubiquitous Windows PC.

Trumper Communications uses new GSC3000 site controllers from Gentner to keep tabs on its AM and two FM stations. Using the GSC3000 I/O units, all three stations can be monitored on a single screen from the PC on the chief engineer's desk. Remote-control data comes from KISN-AM via modem and standard dial-up phone line, while KISN-FM and KUMT-FM on Utah's Farnsworth peak are monitored via spread-spectrum transceivers.

Performance at a glance:

- Windows-based multiple site controller
- High capacity with modular design
- Easily interfaced to dial-up or RF communication paths
- User-programmable for customized control and monitoring
- Offers flexible automated management of remote facilities
- Total capacity of more than 65,000 channels of control, status and metering

The FM transmitters on the peak are about 150 feet apart. Their GSC3000 I/O units are connected via twisted pair cable. It's a standard CAT 5 unshielded cable that runs past a nine-unit combiner directly under the community antenna where KUMT's transmitter is located. There's plenty of RF on the peak with eight other high-powered FMs. Also nearby is a VHF-TV transmitter running about 1.5MW. The potential for RF problems is great, but there has been absolutely no problem.

Using the GSC3000, multiple stations can be monitored on a single screen from the PC on the chief engineer's desk.

Room to grow

It would be possible to interface up to 16 site-control units at any given site and control them all via one spread-spectrum transceiver set. Using spread spectrum also preserves FM subcarriers for commercial use. The facility generates $2,000 a month from a single subcarrier and four are available. The spread-spectrum set costs less than one month's rent on one subcarrier. Also, if the transmitter goes off the air, remote-control status capability remains. In addition to its low cost, spread spectrum is easy to get up and running and there are no licensing requirements. (See "RF Engineering" p.16.)

The KUMT-FM transmitter was a new installation that provided the opportunity to wire it from the ground up using Gentner's command relay unit and wiring interfaces. The main transmitter and a 1,000W solid-state transmitter were configured for full remote control and metering functions. The new wiring interfaces and command relay unit were powered directly off the GSC3000 I/O, so no power strip or additional power capability was required (as you would do on the VRC relay interface, which has to have its own power supply). The new wiring interface and command relay units receive their power from the I/O unit itself.

One user's application

The GSC3000 I/O unit provides 16 command functions, 16 metering functions and 16 status functions. At Trumper, we haven't used all of the status functions yet, but we will, so we can monitor every aspect of the remote control and the antenna coaxial switch. The antenna coaxial switch has four contact closures, two for

There's no reason to miss the NAB Convention this year.

In fact, invite your whole crew to attend the 1997 NAB Convention on *Broadcast Engineering's* ground breaking Internet Show Daily site. Be there all five days beginning April 6, hearing the buzz, getting news as it occurs, and learning about new products as they're announced. All this with a click of your mouse.

Broadcast Engineering's industry leading editorial team will cover topics including networking, compression, recording formats, digital production and transmission, video servers, effects and editing systems, and offer new product introductions and marketing partnerships from the convention floor.

PLUS you'll get your first glimpse of *Broadcast Engineering's* coveted Pick Hit award winners on the Internet Show Daily immediately following the show.

Now all of your staff will have the latest show information at their desks while they're keeping your signal on the air and productions on time.

The industry's first Internet Daily features *Broadcast Engineering's* editorial staff and includes topical updates from the editorial teams of *BE Radio, Lighting Dimensions, Millimeter, Satellite Communications, TCI, Video Systems,* and *World Broadcast News.* Cover all the NAB'97 hot buttons with the industry's leading group of communications magazines.

Be a part of the NAB Convention with the best at **http://www.broadcastengineering.com** April 6 through September 12, 1997. For Internet Daily advertising opportunities, contact The Eidolon Group Inc., 800-901-8202 or e-mail robt@eidolongroup.com.

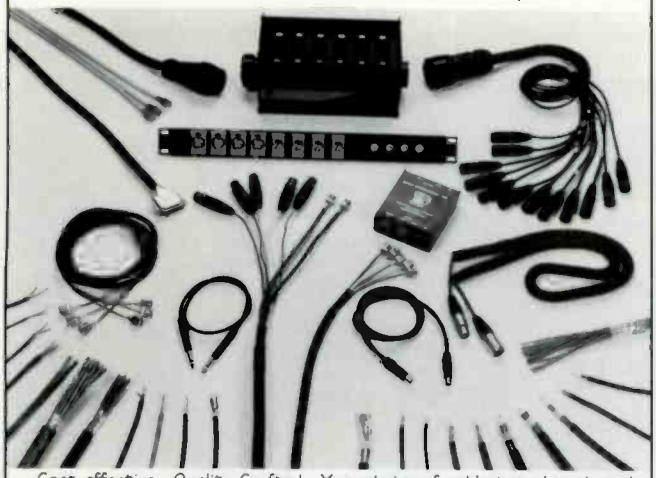
BE Radio

EIDOLON™

The stuff that dreams are made of...™

Circle (45) on Free Info Card

More Reasons to Choose Gepco



Cost-effective. Quality Crafted. Your choice of cable type, length and color from our extensive selection. Delivered to you on time. Gepco manufactures custom cable assemblies, audio and video snakes, breakout boxes, panels, patch bay wiring harnesses, direct boxes and prepackaged cable assemblies for point-of-sale display. All Gepco cable and custom products are made in the U.S.A.

We are authorized distributors for ADC, Kings, Neutrik, Switchcraft, EDAC and many more. Gepco stocks audio and video cable in bulk and will custom-cut to any length requirement for no extra charge.

1-800-966-0069

Ask your Gepco sales representative for a free catalog
Cable, Connectors and Custom Products

GEPCO INTERNATIONAL, INC. 2225 W. Hubbard, Chicago IL 60612
312-733-9555 Fax: 312-733-6416 TOLL-FREE: 1-800-966-0069

Circle (47) on Free Info Card

Coaxial Dynamics'
NEW Line of
Liquid/Air
Terminations
are quickly becoming
the choice of
"Chief Engineers"
for testing, adjusting
and alignment of
R.F. Transmitters.

The NEW design
of the Coaxial
Liquid/Air Cooled Loads
gives you the capability
to handle requirements
from 1 Kw to 10 KW.

COAXIAL DYNAMICS, INC.
SPECIALISTS IN RF TEST EQUIPMENT & COMPONENTS

15210 Industrial Parkway, Cleveland, OH 44135
216-267-2233 800-COAXIAL FAX: 216-267-3142
E-Mail: coaxial@apk.net
Web Site: http://www.coaxial.com

Circle (46) on Free Info Card See us at NAB Booth #3909

Field Report

The I/O units for the GSC3000 occupy 1RU apiece, and each one offers up to 16 channels of control, status and metering. As many as 16 of these I/O units can be used at each site (256 channels per site), and up to 256 such sites can be monitored from a single GSC3000 PC-based control terminal (65,536 total channels). Eight-channel I/O units are also available for smaller sites.

each position. We use one to tell the remote control what position it's in, and the other to directly interlock the transmitters. We programmed macros that are started either by pushbuttons or automatically from within a GSC3000 I/O unit for powering down the main transmitters, switching the antenna switch and powering up the auxiliary transmitter. This can be a one-button command.

Gentner's new site-controller systems provide a state-of-the-art way to control transmitters.

The GSC3000 and spread-spectrum radio could revolutionize multi-user sites if the users standardize on the solution. For example, if all the transmitters on Farnsworth peak used the GSC3000, one engineer could monitor the vital functions of each transmitter from a single Windows PC (3.1 or Win95). In addition, each group of station owners could dial into an attached modem and, with their pass codes, access their I/O units and make necessary changes.

Gentner's new site-controller systems provide a state-of-the-art way to control and monitor multiple transmitters. Coupled with spread-spectrum transceivers and a Windows desktop or laptop PC, the GSC3000 provides unprecedented monitoring, control and automation capability.

Gary Smith is chief engineer for Trumper Communications, Salt Lake City.

Editor's note: *Field reports are an exclusive* BE Radio *feature for radio broadcasters. Each report is prepared by well-qualified staff at a radio station, production facility or consulting company.*

These reports are performed by the industry, for the industry. Manufacturer's support is limited to providing loan equipment, and to aiding the author if requested.

It is the responsibility of BE Radio *to publish the results of any device tested, positive or negative. No report should be considered an endorsement or disapproval by* BE Radio *magazine.*

Coming in the May/June issue of BE Radio:

Cover Story: *NAB '97 Review*

The industry's premiere product showcase is covered by our experienced staff of technology reporters. They provide a most readable and useful review of the ever-expanding NAB show.

Feature: *Pick Hits of NAB '97*

A profile of the top 20 new radio broadcasting products introduced at NAB '97, as chosen by *BE Radio's* exclusive and elite panel of industry gurus.

Contract Engineering: *Antenna Registration*

New FCC procedures govern how broadcast towers are handled by regulators. Learn about all the changes and other vitally important steps that tower owners must undertake to assure compliance.

Managing Technology: *Buying New Technology*

The process of assessing, choosing and purchasing equipment for radio stations has changed in the last few years. Managers will find what they need to update their skills in this area.

RF Engineering: *Lightning Protection*

Both classical and recent techniques for lightning protection of broadcast facilities are covered by our specialist on antennas and radiation, a veteran consulting engineer.

All this plus product reviews, industry news, business briefs and more, in the next issue of *BE Radio*.

And until your next issue arrives...

Find out the latest NAB information at our new *NAB '97 Internet Daily*, a website with up-to-the-minute data direct from the show floor. It's on-line from April 6 through September 12, 1997 at:

www.broadcastengineering.com

NEW!

A Listener Information System that's designed for broadcasters!

Audio OnLine™ is ideal for...

Concert info... Weather/ski/surf reports...
School closings... Traffic updates...
Voting lines... Contest rules... Sports scores...

- Answers 2-16 phone lines
- Hundreds of messages
- Hours of recording time
- On screen call counter
- Installs in any 386+ PC in minutes

FAX-on-Demand Doc #124 (818) 355-4210
Internet: http://www.henryeng.com

HENRY ENGINEERING

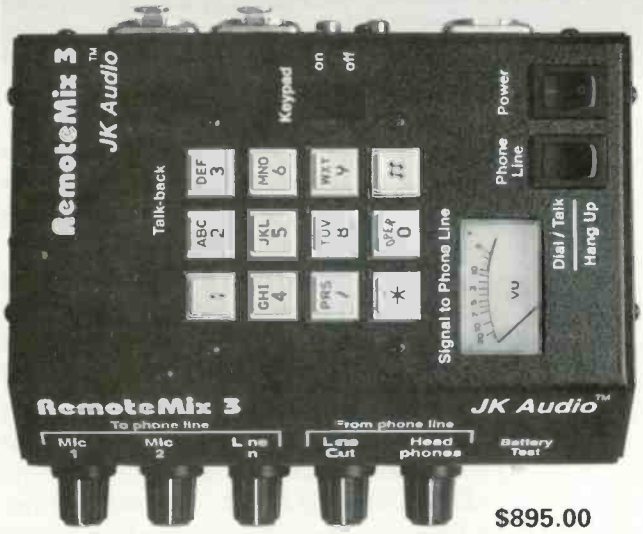
HENRY ENGINEERING
503 Key Vista Drive
Sierra Madre, CA 91024 USA
TEL (818) 355-3656
FAX (818) 355-0077

Circle (48) on Free Info Card

RemoteMix 3

Phone Line Hybrid AND Universal Handset Interface in ONE

➢ Analog ➢ Digital ➢ ISDN ➢ PBX



$895.00

JK Audio Remote Broadcast Gear

Call 800 JK AUDIO (800-552-8346)
815 786-2929 • Fax: 815 786-8502
www.jkaudio.com

Circle (49) on Free Info Card

Comrex HotLine

By Greg M. Savoldi

Broadcasters have used ISDN circuits in the Columbus, OH, market for about four years. Initially, it took a network interface, terminal adapter, codec and outboard mixer to facilitate a remote broadcast. Install that equipment in a portable rack kit and you could get some great audio to and from most large cities. The phone company needed several weeks of lead time to provide the circuit, and, after some start-up difficulties, you could generally get an ISDN *bearer channel* (B-channel) to provide 10kHz of bidirectional audio. In its time, this was cutting-edge digital.

Performance at a glance:

- Reliable POTS codec
- Automatically selects optimum data rate for each call
- Provides 5kHz to 10kHz mono audio
- Easy to use by non-technicians
- Rugged yet compact and lightweight

ISDN vs. POTS

Today, ISDN is probably available at your home, its technology and service is affordable and its reliability is good. Codecs have graduated into all-in-one machines that are literally plug-and-play. In most cases, you need simply to add a mic and headphones and you're up. But you still have to order the ISDN line. The best turnaround time is usually about a week, which is not a problem for planned remote venues. In fact, Jacor does several of these regularly scheduled remotes in the Columbus market, in addition to taking daily feeds from our sister Jacor markets for several programs. We have four ISDN circuits currently on-line at Jacor's Dublin Road facility in Columbus to provide those capabilities.

But what if you have an immediate need? The Comrex HotLine can give you up to 10kHz bidirectional audio over a standard POTS ("plain old telephone service") phone line (you'll need identical units at both ends, of course). It carries an RJ-11 port for easy connection to any standard phone line, is AC powered and is preprogrammed for direct dial-up via its *Q-Dial* function.

HotLine will negotiate the best data rate possible on each line to ensure a reliable link, free of dropouts, glitches and digital audio bursts. With a selection from the built-in keypad, HotLine will analyze the line in use and determine the best compromise of audio bandwidth (frequency response) vs. reliable data transmission. For example, at 21.6kb/s, HotLine provides 6kHz of audio, 7kHz at 24kb/s (typical for local calls) and 10kHz at 33kb/s. If necessary, the HotLine can drop to as low as 12kb/s and still provide usable 4.5kHz audio.

Putting it to use

HotLine provides a switchable on-board mic pre-amp to keep the gear count low. For users who have a problem with good mic technique and/or expect a wide variance in levels, an outboard mixer with a peak limiter should be employed to catch the spikes, however. HotLine has a peak limiter built-in, but you may find that you need something with a bit more control. The unit weighs only 2.3 pounds and fits comfortably in a briefcase or soft bag. It's also simple for the non-engineer to use. When initiating a call, status is displayed on a built-in display screen (like a fax machine), and after about 15 seconds, the line is ready for use.

During coverage of the 1997 Rose Bowl, we linked with a field reporter at 21.6kb/s on numerous occasions via POTS lines. While our ISDN was experiencing problems, we fed the pre-game tape down the HotLine system via its 1/8-inch mini-phone jack and the piece went to air without anyone in the programming department noticing.

As for drawbacks, it depends on the application. ISDN is still the choice for highest quality, greatest reliability and lowest throughput delay, but HotLine provides good quality audio with a tolerable delay time of about 120ms each way. (It's long enough that you'll need to generate a mix-minus backfeed from the studio when doing interviews or other two-way chatter, even for local calls.) HotLine is at its best for spot news, sports, simple remotes and one-shot reports from the field, and it's also an excellent back-up to satellite and ISDN feeds.

Greg Savoldi is director of engineering for Jacor Broadcasting, Columbus, OH.

Continued from page 95

TCI (THEATRE CRAFTS INTERNATIONAL) MAGAZINE 5444, S 1760
Circle 655 on Free Info Card

TDC, INC. (FORMERLY TALLY DISPLAY CORP.) 8679
Introducing: Tally Back gives tally to camera assigned to a router; large-scale signs displaying news headlines, scores, super-titles, etc.; BCD encoders to access up to 32 prestored messages on a display.
Circle 656 on Free Info Card

TECHFLEX, INC. 11160
Featuring: FLEXO expandable sleeving for protection of A/V cable, wire, harnesses.
Circle 657 on Free Info Card

TECHNI-TOOL 11337
Source for Tektronix, Fluke products; also fiber optics, field service, rework, connect, interconnect equipment; service chemicals, service control.
Circle 658 on Free Info Card

TECHNOSYSTEM S.P.A. 3127
Mod TTU44-UC 40kW IOT, Mod STU-35 5kW UHF, Mod STV-41 10kW VHF TV solid-state transmitter.
Circle 659 on Free Info Card

TEKNICHE LIMITED 8817
Introducing: IXION standards converter; TACS technical assessment and control system network management; Genesis Digital Interface products; 6047/6048/6049 series 4:1 audio compression products; 6055E/6056E AES multiplexers/demultiplexers; 6059T dual stereo channel tracking audio delay; 6069 rack controller carrd; DX210/DX120 format translators; HIRes 1440 H/V aperture correction functions for TK1440.
Circle 660 on Free Info Card

TEKTRONIX INC. 9914
Introducing: WFM601A monitor for component signal levels and timing; WFM601E for transmission path analysis; TEK 764 SDV option adds embedded audio demultiplexing to digital audio monitor; MTS100 MPEG protocol test set in rack-mount version; Profile PDR 2000 professional disk recorder storage products; M-2100 digital master control system; Tektronix TekCare Services; MPEG real-time analysis. Also introducing NewStar for Windows, NewStar Web Publisher, EditStor, CCapture, NewStar LAN browser.
Circle 661 on Free Info Card

TELECAST FIBER SYSTEMS, INC. 9281
Featuring Adder audio digital multiplexer with multidrop audio network; Viper V/A/Intercom/data system for OB, fixed applications; Sidewinder snake for OB, ENG.
Circle 662 on Free Info Card

TELEPAK SAN DIEGO 5532
Featuring: Telepak soft cases of durable, water and stain-repellent nylon pakcloth with resilient high-density padding shock absorbancy; designs to custom fit equipment.
Circle 663 on Free Info Card

TELEX COMMUNICATIONS, INC. 8510
Featuring: digital-to-analog system; Audiocom US-2000A user station; Audio ES-4000A expansion station; LCP-100 level control panels for ADAM intercom matrix; UHF wireless intercom; Windows NT/95 keypanel for Matrix intercom; ProStar UHF wireless, ProStar VHF wireless mic systems; HT-series mic with Audix heads; TD series vocal mics; Cobalt series instrument mics.
Circle 664 on Free Info Card

TELOS SYSTEMS I 5250, 3006
Introducing: Zephyr Express, Audioactive Internet audio.
Circle 665 on Free Info Card

TENTEL CORPORATION 5511
Circle 666 on Free Info Card

TERACOM COMPONENTS 1324
Introducing: DTTV combiner for UHF transmission systems.
Circle 667 on Free Info Card

TFT, INC. 3003
EAS 911 emergency alert system encoder/decoder with 2 audio inputs, RS-232 digital I/O; EAS 941 remote control/status board for multiple studio control of EAS911; EAS 940 program/transmitter interrupt unit; EAS 930 multi-module receiver with chassis, power supply AM/FM/7-channel NOAA weather radio receiver modules; Model 8900 Reciter STL receiver exciter.
Circle 668 on Free Info Card

THOMCAST 7414
Introducing: Digital Advantage TV transmitter; IOX transmitter, solid-state VHF transmitter; Crystal VHF B III and L-band DAB transmitter; Skywave 2000 AM digital radio broadcasting; S7HP high power AM transmitter; MMDS transmission products.
Circle 669 on Free Info Card

THOMSON COMPONENTS & TUBES 5751
Circle 671 on Free Info Card

360 SYSTEMS 1724
Introducing: enhanced versions to ShortCut - standalone digital audio call-in editor; DigiCart/II - random access digital audio recorder.
Circle 250 on Free Info Card

TIESSECI S.N.C. 3918
Circle 672 on Free Info Card

TIME BASE CONSOLES 5441
Introducing: freeform, modular, custom consoles, console accessories; NICCABI rack systems; monitor, speaker stands.
Circle 673 on Free Info Card

TIMELINE VISTA, INC. 2027
Featuring: MMR-8 multitrack recorder replaces magnetic dubbers with magneto-optical or hard disk; MicroLynx SMPTE, MIDI time code equipment; Lynx-2 products.
Circle 674 on Free Info Card

TM CENTURY, INC. 3001
Radio station automation, Digital Commercial System with hard disk storage.
Circle 675 on Free Info Card

TOKO AMERICA, INC. 9567
VAST-p transportable communication system with live, store-and-forward full motion video, audio transmission over Inmarsat A/B, ISDN/Accunet/T1, telephone, cellular, Ku-/C-/X-band communication channels.
Circle 676 on Free Info Card

TORPEY CONTROLS 11238
All-digital display operating from SMPTE, ESE, DQS, Leitch codes; 1-, 4-inch LED digital displays; master clock drivers, impulse clocks, count up/down timers.
Circle 677 on Free Info Card

TRF PRODUCTION MUSIC LIBRARIES 6461
Introducing: Musictrack production music library; newly released library CDs from Bosworth, Pyramid, Image; newly released sound effects CDs.
Circle 678 on Free Info Card

TROY SOUND WALL SYSTEMS S 1633
Circle 679 on Free Info Card

TWR TELECOM/LIGHTING INC. 3904
Featuring: towers, antennas, tower lighting systems; microwave relocation and equipment.
Circle 680 on Free Info Card

U

UNITED AD LABEL S 3029
Introducing: packaging solutions, laser and inkjet printer labels.
Circle 681 on Free Info Card

USA DIGITAL RADIO 27/28
Circle 682 on Free Info Card

U.S. TAPE & LABEL CORPORATION 2824
Labels, promotional products.
Circle 683 on Free Info Card

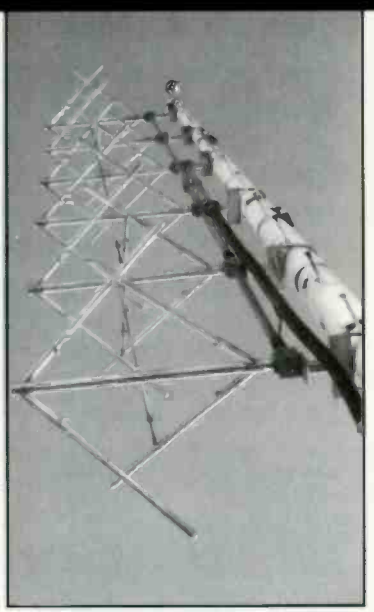
UTILITY TOWER COMPANY 2204
Tower products and services for AM, FM, TV, microwave and other communications.
Circle 684 on Free Info Card

V

VALENTINO PRODUCTION MUSIC LIBRARY 6411
Featuring: music and sound effects audio CD libraries.
Circle 685 on Free Info Card

Continued on page 106

ULTRA TRACKER



Booth 8672 @ NAB '97

What's Lean

Clean

And Turns Your

Competition

Green?

ULTRA TRACKER

The First Innovation In FM Antennas In 30 Years

ANTENNA CONCEPTS INC.
6601C Merchandise Way
Diamond Springs, CA 95619

Tel: (916) 621-2015 ▲ Fax: (916) 622-3274

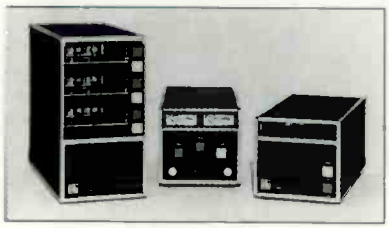
Circle (26) on Free Info Card

Business/People

Business

BBC Broadcast Facilities, Bristol, UK, purchased three **Harris** DRC1000 digital radio consoles for its new digital sound studios. This represents the first UK purchase of the DRC1000, which has already been sold to studios in Belgium, Greece, Germany, Thailand and Singapore, as well as several installations in the United States.

Broadcast Electronics, Quincy, IL, acquired **Cellcast, Inc.** and its remote cellular broadcasting product line from **Artran Corporation**, Springdale, AR. The Cellcast product line will be integrated into the company's **Marti Electronics** division.



Diagnostic/Retrieval Systems, Inc., Parsippany, NJ, announced the acquisition by its DRS Ahead Technology subsidiary of the manufacturing, sales and service rights for the Audio Tape Cartridge Machine and Digital Program Repeater product lines from **International Tapetronics Corporation**, Bloomington, IL.

Sky Radio Network, Sydney, Australia, selected Capella Live PC-based codecs from **Digital Courier International** (DCI), Vancouver, Canada, to distribute audio and data to its network stations in Australia.

Mark IV Industries, Buchanan, MI, has sold its professional audio division, Mark IV Audio, to **Greenwich Street Capital Partners**, New York. The company's new name is **EVI Audio**.

Russ Berger Design Group, Dallas, designed a 62,400-square-foot telecommunications facility to house Dallas-based KERA-TV Channel 13, KERA-FM 90.1 and KDTN-TV Channel 2.

People

John Marino was promoted to vice president, science and technology for the National Association of Broadcasters, Washington, DC.

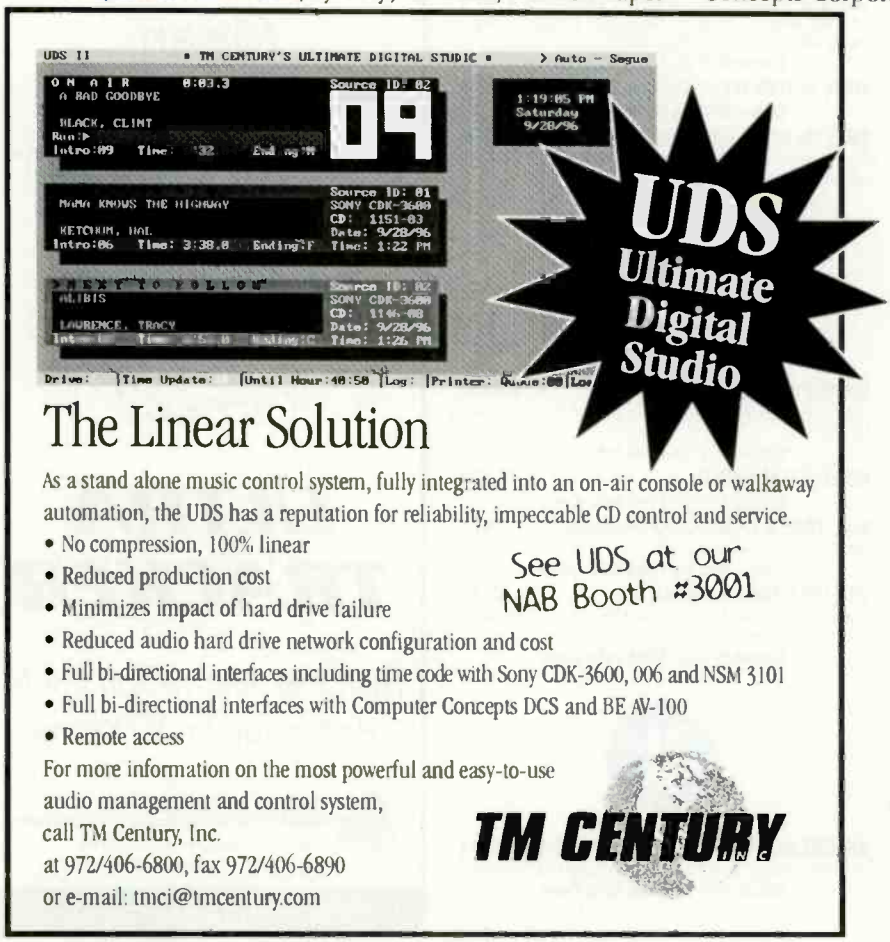
Ted Lantz was appointed sales manager and **Dave Buck** was named Northeast sales manager for Computer Concepts Corporation, Lenexa, KS.

Peter Lee joined 360 Systems as European sales manager based in the company's new sales office near Amsterdam, The Netherlands.

Broadcast Electronics, Quincy, IL, announced the appointment of **Mike Peterson** as digital design engineer, **Jerry Brown** as Southeastern region sales manager, **John J. Monahan** as RF customer service engineer, **Eric Jackson** as senior design engineer and **Hector Brown** as international digital VAR coordinator.

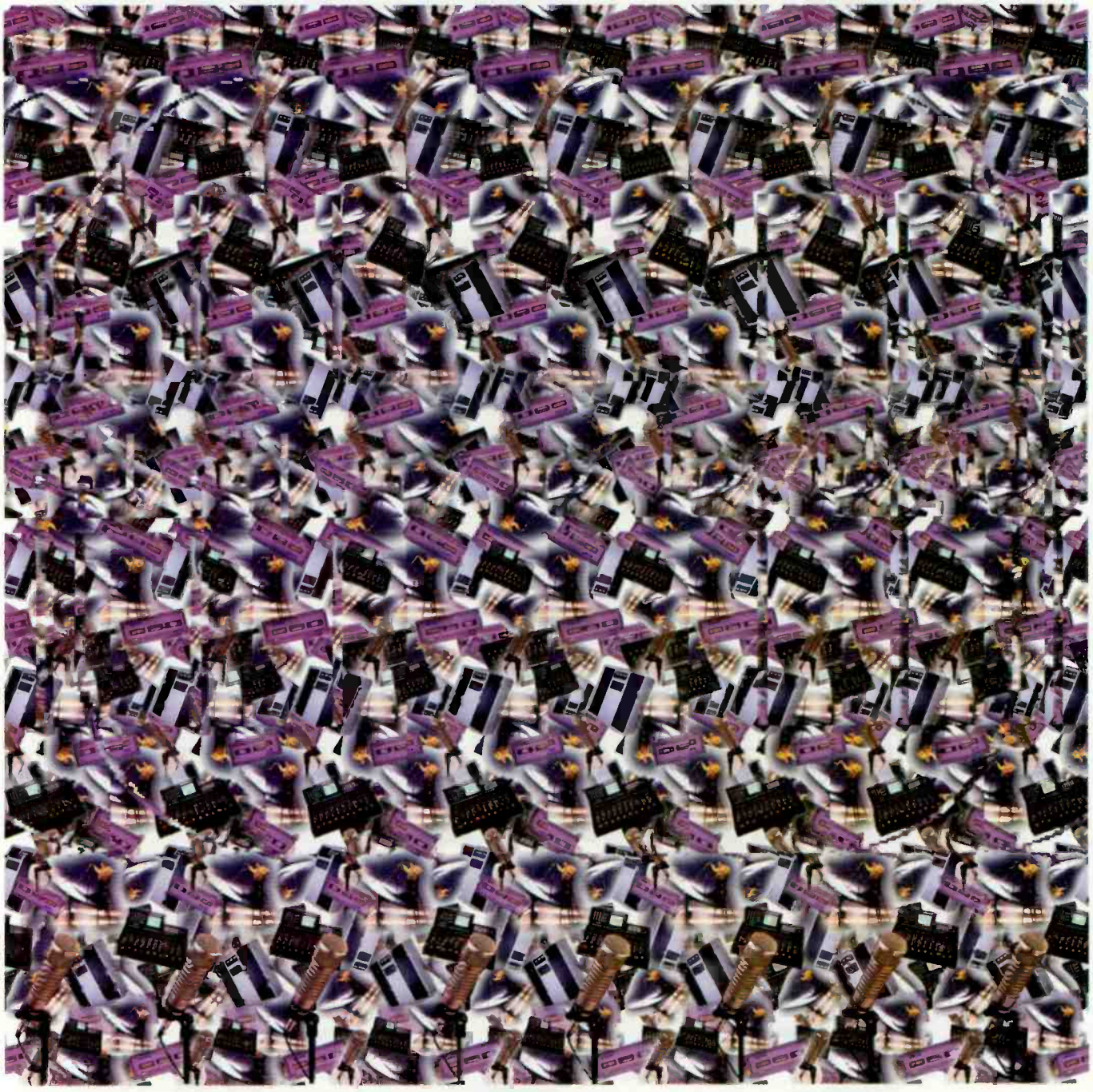
George Tatalovich was appointed U.S. field service manager for Leitch Inc., Chesapeake, VA.

Garry Greth was appointed sales engineer by Aphex Systems, Sun Valley, CA.



Circle (27) on Free Info Card

A NEW DIMENSION IN RADIO . . .



You've Asked For It *and*
Waited Quite Some Time.
And Now, *after all this time,*
It's *Almost* Here.
It Is About To Arrive.

HARRIS

Watch Your Mail Box Just Before NAB

Circle (104) on Free Info Card

Continued from page 103

VIDCAD DOCUMENTATION PROGRAMS, INC. 9664
Featuring VidCAD PowerTOOLS, CAD software to increase engineering productivity.
Circle 686 on Free Info Card

VIDEOQUIP RESEARCH LIMITED 1502
Introducing: DDA-105 AES/EBU 1x4 distribution amp; RS-410A AES/EBU 4x1 router; CDA-104 1x4 composite FM distribution amp; RS-415 4x1 S-VHS video router.
Circle 687 on Free Info Card

VIDEO SYSTEMS MAGAZINE 5444, S 1760
Circle 688 on Free Info Card

W

WALTERS-STORYK DESIGN GROUP S 1503
Featuring: architectural and acoustic design services.
Circle 689 on Free Info Card

WARD-BECK SYSTEMS LTD. 11025
Introducing: Renaissance radio and TV audio consoles; ABB-1 digital audio monitor; analog audio DAs, digital DAs; M445 extended range meter/monitor system; PODS low-cost audio problem solvers.
Circle 690 on Free Info Card

WAVE:SPACE, INC. 1304
Circle 691 on Free Info Card

WEATHER CENTRAL INC. S 204, 11573
Liveline Genesis; MetLine with satellite-delivered data.
Circle 692 on Free Info Card

WEATHERNEWS S 5674
Provider of color graphics system with animations including 3-D fly-by satellite animations.
Circle 693 on Free Info Card

WEGENER COMMUNICATIONS 11940
Featuring: MCPC digital video transmission system; Level V control system; DVR 395 digital video receiver.
Circle 694 on Free Info Card

WENGER CORPORATION S 4958
Introducing: sound isolation rooms, now with horizontal window feature.
Circle 695 on Free Info Card

WEST PENN WIRE/CDT S 6138
Featuring: RGB sync coax 3-4-5, plenum type connectors for RGB cables; miniature 75-ohm coax, PVC, plenum types in colors; Tri-shield coax; Aquaseal moisture resistant coax.
Circle 696 on Free Info Card

WHEATSTONE CORPORATION 1212
Featuring: radio and TV audio mixing consoles, rackmount signal processing, control room furniture systems; audio console prewire systems.
Circle 697 on Free Info Card

WHIRLWIND 5747
Introducing: MD-1 belt-pack mic preamp/line driver with integral headphone monitoring and phantom; Whirlwind audio utility products; audio/video connection, cabling, distribution products; US Audio mixers, amplifiers.
Circle 698 on Free Info Card

WHO DID THAT MUSIC?/GROOVE ADDICTS 1919
Station ID/image jingle packages, news, weather, sports packages and music production library.
Circle 699 on Free Info Card

WILL-BURT 11800
Featuring: electro-mechanical telescoping masts with height to 38 feet; NightScan Chief elevated lighting system for nighttime ENG operation.
Circle 700 on Free Info Card

WILSON CASE M 8325
Featuring: ATA-300 reusable, protective transport shipping cases for the industry.
Circle 701 on Free Info Card

WINSTED CORPORATION S 6126, 6921
Introducing: V8801 economy series vertical rack; 78.75-inch H rack with front and rear adjustable tapped rack rails, removable side panels and hinged door; grounding buss bar, electrical knockouts. Featuring: Digital Desks, Modular System/85 rack cabinets, consoles.
Circle 702 on Free Info Card

WIREWORKS CORPORATION 7206
Manufacturer of professional audio, audio/video and control cable assemblies for live performance, theatre and broadcast industries; multipin disconnectable cabling components, transformer-isolated microphone splitters, audio/video multipin cable assemblies; mic and speaker cable assemblies, cable testers; Bandits cable markers; custom panels; CS-series microphone cable.
Circle 703 on Free Info Card

WOHLER TECHNOLOGIES, INC. LA 501, 9773
Introducing: digital SDI, AES mixers; AM series in-picture on screen audio level meters; digital delay systems; self-powered speaker systems; signal alarm systems; audio routers.
Circle 704 on Free Info Card

WORLD BROADCAST NEWS MAGAZINE 5444, S 1760
Circle 705 on Free Info Card

X

XING TECHNOLOGY CORPORATION I 4853
StreamWorks compression product line.
Circle 706 on Free Info Card

Y

YALE ELECTRONICS, INC. 11265
Distributors; exhibit of antique radio equipment to commemorate 75 year anniversary.
Circle 707 on Free Info Card

YAMAHA CORPORATION OF AMERICA 3021
Introducing: 03D digital recording mixer for audio post and music recording, interfaces directly with digital audio workstations for automated digital mixing; MX12/4 4-buss mixer features 12 inputs, XLR mic and 1/4-inch TRS jack inputs; REV500 reverberation unit using 3rd generation DSP chip for dense reverb and smooth decay, 20-bit A/D, D/A converters, integral source for snare drum, cross stick, pulse enabling reverb parameters.
Circle 708 on Free Info Card

Z

ZACK ELECTRONICS M 7269
Distributor for Amphenol, Erem, Neutrik, Ideal Industries, Tektronix, Cooper Tools, Switchcraft.
Circle 709 on Free Info Card

ZAXCOM INC. 10270
Introducing: Deva portable, removable hard disk recorder and digital mixer for field recording.
Circle 710 on Free Info Card

ZERO STANTRON 5625
Featuring: Design Consoles engineered for durability in two sizes that include a monitor bridge with table top, cable raceway, angular positioning and other accessories; CAB/Cad design software bay-by-bay design methodology with auto selection of doors, panels, sides, integral logic, accessories.
Circle 711 on Free Info Card

DELTRON GOTHAM
INTERCONNECTS MAKE SWEET MUSIC

AUDIO CABLES
- Microphone cables
- Digital cables
- Multipair cables
- Ultraflexible
- Double shielded
- Digital multipair cables

DGS PRO-AUDIO
Deltron/Gotham
US Sales & Stocking Warehouse
800-292-2834

CONNECTORS
- XLR's, 1/4" phone, phono, and Midi's
- New-foolproof channel identification for XLR's
- New-silent version 1/4" phone plug

Circle (28) on Free Info Card
See us at NAB Booth #3728

Colored listings indicate issue advertisers

News

NRSC completes high-speed datacasting lab tests

The National Radio Systems Committee (NRSC) has concluded the laboratory phase of its tests on three proposed formats for high-speed datacasting (HSD) via FM subcarriers. The three proponents are Seiko, Digital DJ and The Mitre Corporation. (See "RF Engineering," November/December 1996.)

Results of the tests, conducted at NASA's Lewis Research Center in Cleveland, have been distributed to proponents and committee members, but pending some clarifications, have not yet been released to the industry at large. A final vote to do so is expected at the next full committee meeting on April 5 at NAB 97 in Las Vegas.

HSD evaluation will then move to a series of field tests, also to be conducted in Cleveland, using the same vehicle used for DAB field testing in San Francisco last year. A final plan for the HSD field tests is expected shortly, with the process scheduled to begin in the spring and run for two to three months.

For field testing, the HSD proponent systems will be broadcast on two Cleveland FM stations, selected for their differences in processing styles. WGAR-FM (99.5MHz) is an aggressively processed station, while WKSU-FM (89.7MHz) is a lightly processed public radio facility.

The tests are being managed by well-known consultant Tom Keller, who will deliver a paper on the HSD lab tests at NAB 97. Also at the show will be a new book on datacasting, "FM Subcarrier Market Report/Technology Guide," prepared by the NAB's Office of Science and Technology.

The goal of the NRSC's HSD tests is to produce a voluntary standard for high-speed FM datacasting, which may take the form of one, more than one or none of the currently proposed systems. A final decision is expected by year's end.

Frequency coordination under way for Oklahoma City bombing trial

With the number of news media personnel covering the Oklahoma City bombing trial expected to reach 3,000, frequency coordination efforts have been mandated. A media pool group has been established at the trial site in Denver to coordinate and register all two-way radios, walkie-talkies and portable microwave systems. The pool is working in concert with the Denver FCC office, which will verify compliance with spot checks of spectrum usage. All radio, television, print and wire-service operators will be required to register their wireless systems.

A removable sticker will be issued to each communication device that has been registered and frequency-coordinated, and federal marshals will remove any RF units not carrying such a sticker in the press area at the federal courthouse. Wireless microphones will be exempt from the process.

For more information or to register a frequency request, contact Wayne Wicks of the media pool office at 303-871-1892 (voice) or 303-698-4700 (fax).

Las Vegas amateur radio repeater available for NAB 97 attendees

Broadcasters and other interested parties attending NAB 97 can bring their VHF and UHF amateur radios along and use the Las Vegas Radio Amateur Club's repeaters during the show. Both of the club's VHF and UHF repeaters are located atop the Tropicana Hotel at the south end of the Las Vegas Strip.

For VHF, the 146.94MHz repeater uses a standard -600kHz input offset (146.34MHz input). Its usual 100Hz control tone will be turned off during the convention. The UHF repeater is at 449.700MHz, also with a standard offset and no control tone required.

Local broadcasters, SBE Chapter 128 and club members will monitor the repeaters to provide assistance as needed during the convention. For more information, contact Steve Scott at KUPN-TV, 702-382-2121 or via E-mail at kd8s@skylink.net, or the Las Vegas Radio Amateur Club at P.O. Box 27342, Las Vegas, NV 89126.

VACUUM CAPACITORS

- Variable or Fixed Types
- Capacitance Ranges from 3pF to 6600pF
- Peak Test Voltages to 100kV
- Current Ratings to 1000 Amperes

Ideal for Semiconductor Fabrication, Broadcasting, RF Heating/Drying, Medical (MRI), Avionics, Scientific, and other RF power applications.

COMET North America, Inc.
89 Taylor Avenue, Norwalk, CT 06854 USA
Phone (203) 852-1231 Fax (203) 838-3827

Circle (8) on Free Info Card

AUDIO LEVEL INDICATORS

These high-quality, audio level meters give you near-spec performance at a very favorable price. Rugged, space-efficient core magnet design with taut-band suspension is ideal for broadcast or recording equipment in studio, stage, or location applications. Dials are buff with black and red markings. Styles are available for front- or back-of-panel mounting, with and without bezels. Request catalog today.

SELCO ▲ ▼ SELCO

HANDSOME

COLLET KNOBS

Selco's collet knobs meet the highest standards of precision, durability, performance, and beauty. Solid brass hardware is permanently bonded to a matte-finish, 94V-2 nylon body. Black or gray, with snap-on caps in a wide selection of standard and special colors. Full range of sizes, types, and accessories. Attractive OEM prices.
Request full-color knob catalog today.

selco PRODUCTS CO.
7580 Stage Road, Buena Park, CA 90621
(714) 521-8673, or (800) 229-2332
FAX (714) 739-1507

Circle (9) on Free Info Card
Circle (102) on Free Info Card

R/SVP BETTER THAN EVER!

SAME LOW PRICE.

- Now with input level selector. Connect +6dbm line out or cassette to R/SVP for -10dbm to telco.
- Highest quality electret mic mixes with external input or mutes.
- Continuous monitoring.
- 600 ohm transformer input/output.
- Two year warranty.
- Made in U.S.A.

R/SVP	$149.75
SVP (no record out)	$130.25

SOUND AMERICA
SERVING BROADCASTERS FOR 25 YEARS
800-688-8208

Circle (11) on Free Info Card

Easily Wind
Air Hose, Power Cords,
Coaxial Cable & Rope

StopTangles

Distributed By NALPAK SALES I

619-258-1200
Fax: (800) 4-NALPAK
www.nalpak.com/nalpak
NAB SHOW BOOTH #11644

Circle (10) on Free Info Card

Reader Feedback

READER RESPONSE
E-mail: beradio@intertec.com
FAXback: 913/967-1905

A new spin on webcasting

Regarding your January/February 1997 "Editorial:" Up until recently, I assumed that web radio listening would never be more than just a novelty. Could you ever afford enough massed servers and a wide-enough digital pipe to your Internet Service Provider (ISP) to handle your audience? Or, more to the point, at least an audience large enough to make a profit?

What would it take? The numbers will change with improved algorithms, but let's estimate that to serve 4,000 simultaneous web listeners, you'd need a T3 line to your ISP. But as one wag observed on a CompuServe forum recently, "Well, my station has a quarter-hour of 100,000 listeners... what do I tell the other 96,000?"

Enter a new idea which, while simple in concept, may leave conventional broadcasting in the dust. A group of companies with Internet interests, including Netscape and Progressive Networks (RealAudio), has proposed a modification to the Internet's protocol to allow true broadcasting. The modified protocol would require only a *single datastream* from the broadcaster's server to the Internet, which would then serve anyone who wanted to listen (or watch) a real-time program.

The protocol is called *IP/Multicast*, and work is proceeding toward its adoption. Helping things along is the fact that Microsoft is fully involved, working on its "Netshow" software. The next Windows operating system release, Windows 97, will contain software that is "IP/Multicast-aware."

Think of the impact! Anyone with modest equipment could have an instant worldwide broadcast station. What would it take to make yours stand out from the crowd?

Futuristic thoughts aside, for radio broadcasters, this may solve pesky reception problems in city office buildings: employees with desktop PCs would simply connect to the station's web stream instead of fiddling with the radio. Evening and weekend listening might be enhanced with listeners tapped in while surfing the web or checking E-mail. That lucrative market just out of your signal's reach may now be approachable. And as a broadcaster, I'd hope that any new "broadcast protocol" for the Internet would include activity metering — instant ratings!

Broadcasters should monitor this development; if adopted, the Internet *will* be a part of their near future.

JIM PERRY, CHIEF ENGINEER
WFLN, PHILADELPHIA

Digital downsides

"Downsides of the DAW" (January/February 1997) definitely exist. The isolation is indeed a major factor. During the years I was producing spots/promos, the best times were the last-minute collaborative ideas. Related issues include the need to remember the "big idea" in a production and keeping audience in mind, as well as good writing. Although I am fond of telling people that I can produce great things from unique sounds/music tracks and working backwards to the message, a strong idea with good writing is still absolutely necessary.

In addition, I have found with DAWs that I am spending most of my days in front of a video screen, with the resultant eyestrain. A 17-inch monitor is highly recommended. Dual monitors as in the NPR photo (p. 28) help, too.

R. NEAL SHAMBAUGH, PRODUCTION MANAGER, VISUAL COMMUNICATIONS
VIRGINIA TECHNICAL UNIVERSITY,
BLACKSBURG, VA

GET IN ON THE GROUND FLOOR!

BE Radio

Advertise in BE Radio's new section called "The Gallery" and expose your products and services to more than 12,500 product buyers every issue.

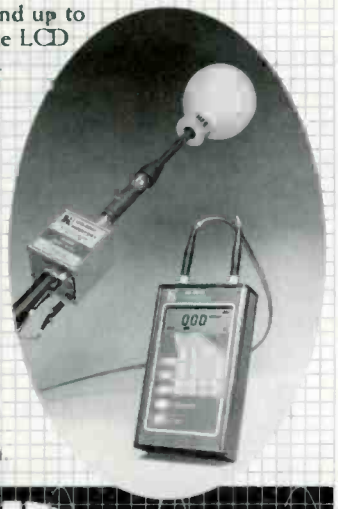
It's easy . . .
it's cost effective . . .
and it's only a phone call away!

Call Steven Bell, national marketing manager, at 913/967-1848 for all the details today!

Broadband RF/Microwave Meter

✓ LCD with bar graph
✓ Built-in datalogging and recorder output
✓ Fiberoptics for improved accuracy

The flexible HI-4000 series allows an extremely wide measurement range by exchanging a variety of electric and magnetic probes using the same readout. The readout records highest field value and up to 150 logged readings, and the LCD display includes a bar graph. Options include a computer interface with software for complete field evaluation.



Holaday can help.

From DC to 40 GHz, Holaday manufactures meters, area monitors, and personal monitors for accurate evaluation of RF exposure and emission.

Holaday has the answers to your needs in EMF measurement and protection.

EMF METERS
Holaday has the Answer

Holaday Industries, Inc
14825 Martin Drive
Eden Prairie MN 55344

Phone (612) 934-4920
Fax (612) 934-3604

Circle (13) on Free Info Card

Buy simplicity, reliability and service

EAS

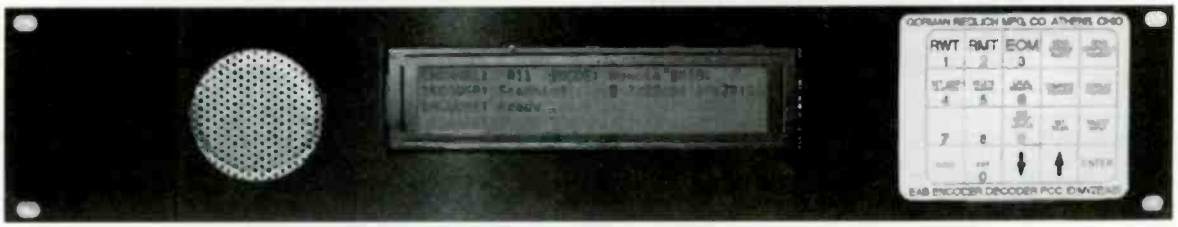
Price $1750.00

Equipment required for F.C.C. Jan. 1, 1997 deadline

Phone 614-593-3150

GORMAN-REDLICH MFG. CO.
257 W. Union St. Athens, Ohio 45701

FAX 614-592-3898



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

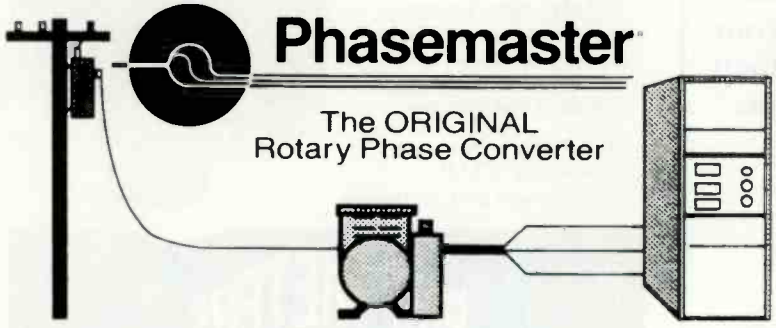
Web Site: www.gorman-redlich.com

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

Circle (15) on Free Info Card

"We thought we found an outstanding transmitter site. It was affordable, had good access and no interference. But it DIDN'T have 3-phase power, and the utility wanted a fortune to bring it in."

Sound familiar? It happens often. But you don't have to be a prisoner of your utility! The Phasemaster Rotary Converter produces the true equivalent of utility 3-phase from any existing single-phase supply, and at tremendous savings.



Now you can expand your site selection options and save money, too!

Phasemaster is recommended by industry consultants, utility companies and most major transmitter manufacturers.

Over 500 AM, FM and TV stations are running reliably on Phasemaster converters. If you want to learn more about how Phasemaster can save you big money, we'd like to send you a copy of the NAB Engineering Conference paper about applying Phase Converters on Broadcast Transmitters.

KAY INDUSTRIES, INC.
604 North Hill Street, South Bend, IN 46617
800/348-5257 • FAX 219/289-5932
– See us at NAB Booth 4116 –

Circle (16) on Free Info Card

GOLDLINE
MANUFACTURED IN U.S.A. SINCE 1961

Three Test Instruments in One!

TS-1 AUDIO TEST SET

Also available as a rack mount model.

Audio Oscillator dB Meter Frequency Counter
Now available with balanced output plus fine tune adjust

Send for Free Catalog:
GOLDLINE
Box 500, West Redding, CT 06896
Telephone: (203) 938-2588
FAX: (203) 938-8740
web: http://www.gold-line.com

Circle (12) on Free Info Card

BUY FROM THE LEADER!

Whirlwind can deliver the stock or custom plates, panels, rack mounts, or floor boxes you need, at a good price and on schedule. Steel, aluminum, laminate — one panel or thousands, custom business is our daily business.

And because we understand systems, your order will come out the way you want it. Our years of custom work for the major networks, theme parks, casinos, and reinforced sound applications are at your service whenever you call.

So whether you want it blank, punched, engraved, loaded with connectors, or completely harnessed and ready to go, we'll provide you with a prompt quote, great delivery, and no-comprise Whirlwind product quality. You don't want to punch, label, and wire another panel, do you? Call us toll free today!

The Leader in Panels **whirlwind** ***888-733-4396***

Circle (14) on Free Info Card

FIRST STRIKE CAPABILITY

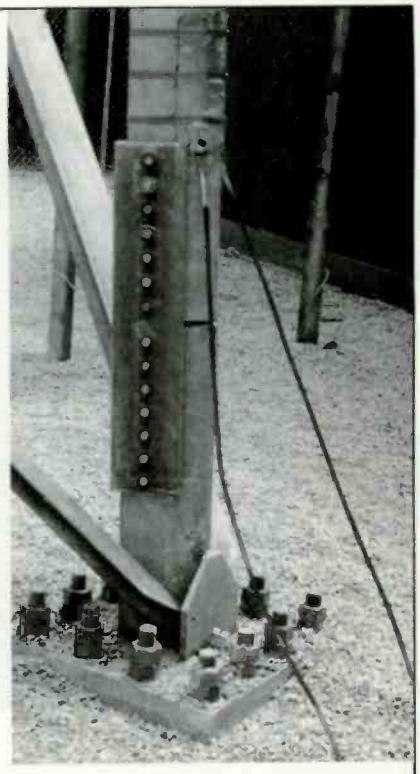
Lightning Master® **TOWER LEG GROUNDING STRAPS** are designed to supplement and upgrade your existing low-resistance tower grounding with a **LOW-IMPEDANCE PATH** to ground for high frequency transients produced by lightning strikes to and near your tower.

This strap offers:

* a large surface area contacting the tower leg
* a gentle transition to the grounding leads
* long leads designed to be exothermically welded directly to ground rods

Don't take chances, insist on Lightning Master® **TOWER LEG GROUNDING STRAPS** for a **LOW-IMPEDENCE PATH** to earth ground.

Other products offered by Lightning Master®
* Structural Lightning Protection
* Transient Voltage Surge Suppressors
* Bonding and Grounding Products



PHONE:800 749 6800
FAX: 813 461 3177

LightningMaster Corporation

Circle (30) on Free Info Card

PRECISION TIMING

Designed for "Precision Timing", ESE Master Clocks & Accessories have been meeting industry needs for more than 25 years. Whether using GPS, WWV, Modem, internal crystal or line frequency accuracy, all ESE Master Clocks can drive digital or analog slave clocks, as well as interface with video or computer based systems.

ESE

PRACTICAL SOLUTIONS SINCE 1971

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

Circle (29) on Free Info Card

See us at NAB Booth #7227

ERI, SHPX series FM Antenna and λ Mounting System

ERI®

your single source for:

FM Antennas and Filters
λ Mounting System
Towers & Poles
Lightning Protection
Grounding Systems
Installation & Service

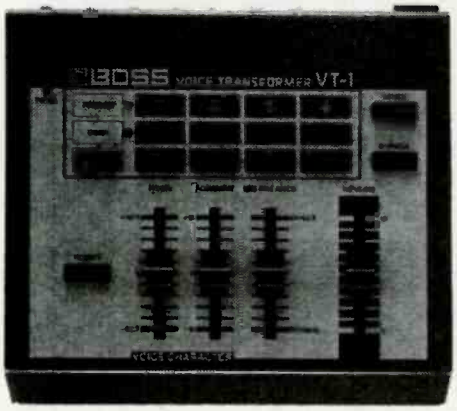
Call for special package price.

ERI ELECTRONICS RESEARCH, INC.
812-925-6000

Circle (32) on Free Info Card

For 36 years
ABG
Audio Broadcast Group Inc.

Need a change of voice?



Roland introduces the BOSS VT-1 Voice Transformer, which does exactly what it says. The VT-1 gives you total control over everything you can do with your voice. Because you finally have independent control over pitch and formant. The VT-1 also offers high-quality digital stereo reverb because it's virtually essential for voice processing. Apart from being the ultimate DJ effects unit, the VT-1 can benefit any application related to voice.

PERFECT FOR ANY APPLICATIONS FEATURING VOICE.

Extremely useful for DJs, the VT-1 lets you configure User Patches with completely different voice characters and rapidly switch between them to take on different roles. The Robot button is perfect for use as a vocoder that doesn't need a keyboard, so you can use it for DJing techno and dance music programs. The VT-1 is an ideal tool for broadcasting applications as well as for video narrations.

Please call today for ABG pricing and delivery.

$395.00 List

MIDWEST SALES OFFICE
2342 S. Division Avenue
Grand Rapids, Michigan 49507
Phone: 800-999-9281
Fax: 616-452-1652

REACH US ANYTIME VIA ELECTRONIC MAIL
internet: support@abg.com
web site: www.abg.com

SOUTHEAST SALES OFFICE
P.O. Box 2619
Smithfield, North Carolina 27577
Phone: 800-369-7623
Fax: 919-934-8120

WESTERN SALES OFFIC
P.O. Box 1638
Palmdale, California 93550
Phone: 800-858-9008
Fax: 805-273-3321

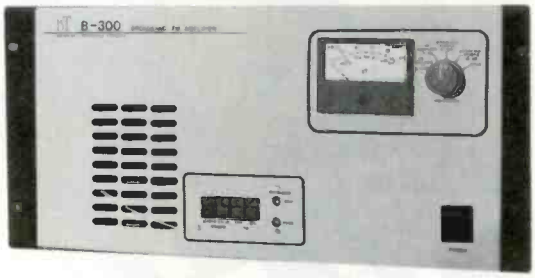
ABG ... YOUR SINGLE SOURCE SOLUTION.

Circle (31) on Free Info Card

BROADBAND FM RF AMPLIFIERS

Three power levels to meet your needs:

300 Watts • 600 Watts • 1.2 Kilo-watts



Features:

- 100% solid state
- No tuning required
- Rugged power supply
- VSWR, current & temperature foldback
- Power trim standard
- Full remote control capability, with outputs for all main parameters
- Compact 19" rack mount design

Broadcast Technology Company

P.O. Box 751, Lamar, Colorado 81502

Phone: 719-336-3902

Circle (33) on Free Info Card

POWERFUL DIAL-UP CONTROLLER

Shown with optional Rack Mount

The new CircuitWerkes DR-10 Dial-up remote control is perfect for studio & automation control. With features not found anywhere else, you might be amazed at the DR-10's list price of only $439.00.

- 10 Dry relay contacts out (2 are DPDT for audio, etc.).
- Auto-answers on user selectable ring number and auto-disconnects at call's end.
- Each relay can be independently set to function as a momentary closure, latching closure with distinct on/off codes, or interlocked latching with other relays.
- Up to 8 digit user set password prevents pirating.
- Any relay can be assigned to any tone(s).
- Each relay is programmable to beep when activated.
- Two-tone & detection delay modes eliminate falsing.
- 4 Status inputs can dial 4 numbers and control relays.
- A simple, built-in audio hybrid lets you control equipment while monitoring a local audio source.
- Provides an active, balanced, phone line audio output.
- All outputs appear on easy to use screw terminals.
- Program it with any DTMF phone or encoder.
- Retains its settings after a power failure.

CircuitWerkes

(352) 335-6555 / Fax 331-6999

3716 SW 3rd Place, Gainesville, FL 32607

Circle (34) on Free Info Card

THE "LAST" SURGE PROTECTOR YOU WILL EVER HAVE TO BUY!

HP PROTECTOR®

HP Series
Now With
160,000 Amps
Per Phase
Peak Surge Current

That's right! With the purchase of the "Protector" comes a 10 year unlimited, free-replacement warranty! (Even if destroyed by lightning)

- ✓ Forget the Modules!
- ✓ Forget the Fuses!
- ✓ Forget the other guys!

Energy Control Systems is your choice for "unlimited replacement protectors"

"Our FM site went off the air during a heavy electrical storm. Further investigation revealed the HP 'Protector' had been destroyed, evidenced by its charred appearance. (see photo on left) I sincerely believe, without the protector, we probably would have sustained major equipment damage, and been off the air for a considerable length of time. As it turned out, the only thing damaged was the 'Protector' itself. The time we were off the air was minimal."

— KRKZ/KWKW Radio, Oklahoma

HP-3Y 3 phase WYE or HP-3D 3 phase DELTA ... $1,645.00
HP-1S single phase 120/240 ..... $1,195.00

Energy Control Systems

Fort Worth, Texas 800-383-6956

Circle (35) on Free Info Card

Take Control
Via Telephone

New Features and Rackmount Chassis! $399 List

DC-8A
Dial-Up Remote Control

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

Voice: 360 . 428 . 6099
Fax-on-demand: 206 . 727 . 8122

BROADCAST tools inc.

E-mail: bti@halcyon.com Internet: www.broadcasttools.com/bti/

Circle (36) on Free Info Card

BESCO INTERNACIONAL

World Leader in AM - FM Transmitters

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.

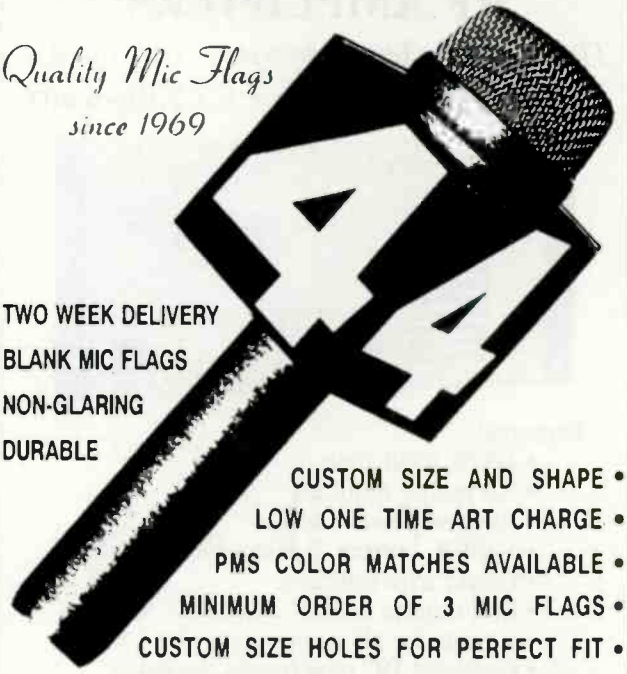
Dick Witkovski — *President*
Robert Malany — *National & International Sales*
Rich Witkovski — *Sales and Service*

Besco Internacional
5946 Club Oaks Drive, Dallas, TX 75248
Phone (214) 630-3600 Fax (214) 226-9416

Circle (38) on Free Info Card

The MIC FLAG Co.

Quality Mic Flags since 1969



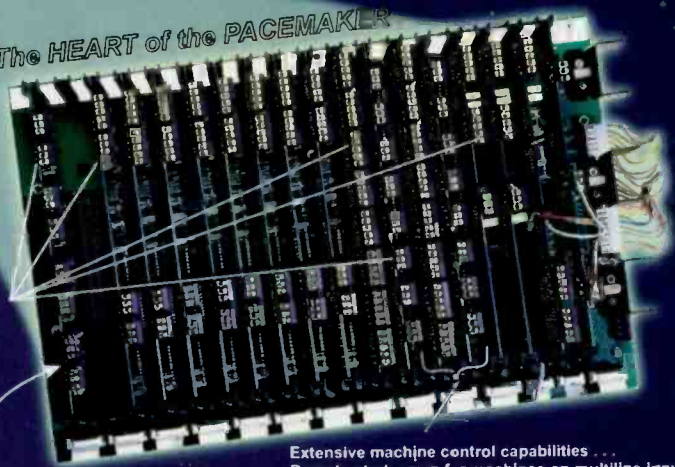
- TWO WEEK DELIVERY
- BLANK MIC FLAGS
- NON-GLARING
- DURABLE

CUSTOM SIZE AND SHAPE •
LOW ONE TIME ART CHARGE •
PMS COLOR MATCHES AVAILABLE •
MINIMUM ORDER OF 3 MIC FLAGS •
CUSTOM SIZE HOLES FOR PERFECT FIT •
PRICES/QUESTIONS ANSWERED IMMEDIATELY •
DEALING DIRECTLY WITH THE MANUFACTURER •

PLEASE CALL FOR LIT./SAMPLES/PRICES 203-483-0319 fax 203-483-7585

It's What's Inside That Counts

The HEART of the PACEMAKER



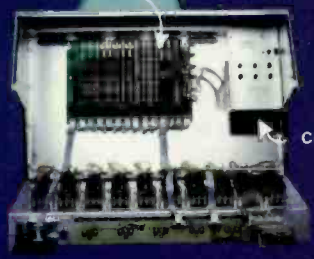
Easy Access to all cards

Screw down the wire and plug in the connector . . . No crimping or soldering

Extensive machine control capabilities . . . Remote starts even for machines on multiline inputs

Cable entry from bottom or top . . . Installation planning is EASY

4 mic preamps standard . . . Assign them anywhere you want



Conservatively rated power supply

All front panel parts plug in . . . for quick service

Pacemaker 1032 (shown)

Also available with 6, 8, and 16 channels.

Only from . . .
Pacemaker AUTOGRAM CORPORATION
Plano, Texas (800) 327-6901

It's What's Inside That Counts!

AUTOGRAM CORPORATION

Circle (39) on Free Info Card

TRANSCOM CORP.

Serving the Broadcast Industry Since 1978

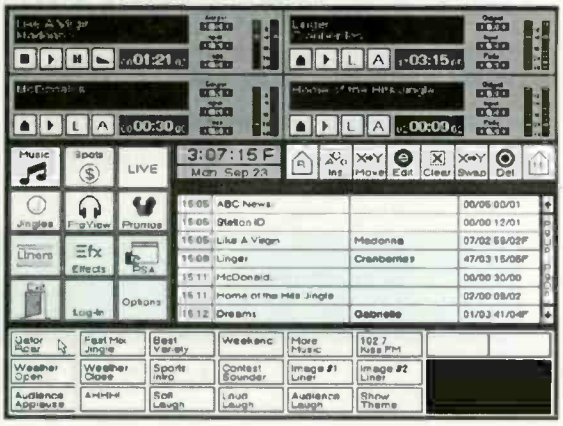
Fine Used AM & FM Transmitters and Also New Equipment.
For the best deals on Celwave products,
Andrew cable and Shively antennas.

100W	FM	1985	Harris FM100K
2KW	FM	1971	Collins 831 D-1
5KW	FM	1969	RCA BTF 5D
5KW	FM	1968	RCA BTF 5H
20KW	FM	1974	Collins 831 G2/Cont 816R2
20KW	FM	1967	Collins 830H-1B
20KW	FM	1977	RCA BTF 20E1
20KW	FM	1973	Collins 831G
20KW	FM	1974	Harris FM20H/K
1KW	AM	1978	Harris MW-1
1KW	AM	1982	Harris MW-1A
1KW	AM	1980	Continental 314R-1
10KW	AM	1980	Harris MW-10
10KW	AM	1976	Continental 316F
25KW	AM	1982	CSI T-25-A
50KW	AM	1978	Harris MW50C3 (1100 KHZ)
50KW	AM	1978	Continental 317C-1
50KW	AM	1973	Continental 317C
50KW	AM	1981	Continental 317C-1
50KW	AM	1982	Harris MW-50B

1077 Rydal Road #101, Rydal PA 19046
800-441-8454 • 215-884-0888 • FAX No. 215-884-0738
IF YOU WISH TO VISIT OUR HOME PAGE,
WE ARE AT www.trcorp.com
IF YOU WISH TO E-MAIL US, WE ARE AT transcom@trcorp.com

Circle (20) on Free Info Card

Pristine RAPIDFIRE ...the Digital Studio System for the Station that *Wants To WIN!*



Pristine RapidFire is the industry's most powerful, fun to use, digital studio system! RapidFire will save you thousands of dollars over other high-end digital systems while offering superior features and bulletproof reliability. RapidFire's *Quick Pick* makes it easy to add or change music, commercials, jingles, promos, liners, and last minute insertions simply by *point and shoot*. RapidFire uses only professional quality audio cards featuring Dolby-AC2 or MPEG at a 48 kHz sample rate. You can even playback three audio sources while recording a fourth, all at the same time. Call us to find out how easy and affordable it is to harness the power of Pristine RapidFire for your station!

The Next Generation In Broadcast Software

West & International
310-670-7500
Fax 310-670-0133

Pristine Systems

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

http://www.pristinesys.com

Circle (17) on Free Info Card

UNIVERSAL XE-1000

SCPC AUDIO RECEIVER

AN AFFORDABLE QUALITY SCPC 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).

REMOTE ACCESS AUTOMATION (OPTION)

CALL OR FAX FOR PRICING AND COMPLETE INFORMATION

Phone: (614) 866-4605 Fax: (614) 866-1201

UNIVERSAL ELECTRONICS, INC.
Communications Specialists
4555 Groves Road, Suite 12 Columbus, OH 43232-4135

Circle (19) on Free Info Card

Station Yourself Under a KD Kanopy

Why KD Kanopies?

- ▲ Lightweight **Aluminum** Frame
- ▲ Custom Silk Screened Graphics
- ▲ Variety of Colors & Accessories
- ▲ Water Resistant & Fire Retardant Fabric
- ▲ **FREE** Heavy Duty Carry Bag & Stakes
- ▲ Rust Proof
- ▲ Durable
- ▲ Sets Up in 30 Seconds
- ▲ No Loose Parts or Ropes
- ▲ 8'x8', 10'x10' & 10'x20'

KD Kanopy®
1-800-432-4435
http://www.kdkanopy.thomasregister.com
E-mail: QCEPØ2A@PRODIGY.com

Circle (18) on Free Info Card

BE Radio GALLERY

Here's A Gift From Our Engineers and Accountants...

From our engineers:
>100 dB signal to noise
<.005% harmonic distortion
+/- 0.1 dB 20Hz to 20KHz frequency response
> -90dB crosstalk

From our accountants:
$399.00*
*including external power supply

"Distribute your audio, not your whole budget"

DA-8S Distribution Amplifier

Zercom CORPORATION BROADCAST

800-950-4260
Available through all major dealers

Circle (21) on Free Info Card

BE Radio CLASSIFIED

FOR SALE

Quality FM Transmitters & Antennas at Reasonable Prices

FM Transmitters		FM Antennas		
20 watt Exciter	995.00	1 bay	500 w	395.00
120 watt	2,500.00	1 bay	1 Kw.	495.00
300 watt	2,990.00	2 bay	800 w	1,200.00
1 Kw.	6,990.00	2 bay	2 Kw.	1,790.00
2.5 Kw.	12,990.00	3 bay	3 Kw.	2,300.00
5 Kw.	24,990.00	4 bay	800 w	1,990.00
10 Kw.	29,990.00	4 bay	4 Kw.	2,990.00
15 Kw	35,000.00	6 bay	5 Kw.	4,990.00
20 Kw.	39,990.00	6 bay	10 Kw.	7,500.00
20 watt Translator	2,500.00	8 bay	10 Kw.	10,500.00

Contact Jimmie Joynt
Superior Broadcast Products / Factory Direct Sales
Ph. 800/279-3326 972/473-2577 Fax 800/644-5958 972/473-2578
17194 Preston Rd. Suite 123-297 Dallas, TX 75248

SOFTWARE

WinRADIR: THE RADIO STATION DATABASE
12,000+ U.S. licensed stations are contained in a database specifically designed for Windows! Searches on calls, formats, markets, etc. Gives phone/faxes/web site addresses, prints mailing labels. Only $179.95/yr (incl. quarterly updates).
1-800-277-8224
Internet: http://www.aceinfo.com/bbh/info

EQUIPMENT WANTED

WANTED
OLD BROADCAST GEAR
Compressors, limiters, microphones, consoles, EQ-tube or solid-state
Broken or working
MIKE STATES BOX 81485
(907) 456-3419 PH/FAX Fairbanks, AK 99708

SERVICES

D.L. MARKLEY
& Associates, Inc.
CONSULTING ENGINEERS
2104 West Moss Ave.
Peoria, Illinois 61604
(309) 673-7511
FAX (309) 673-8128
Member AFCCE

JOHN H. BATTISON P.E.
CONSULTING BROADCAST ENGINEER,
FCC APPLICATIONS AM, FM, TV, LPTV
Antenna Design, Proofs, Fieldwork
2684 State Route 60 RD #1
Loudonville, OH 44842
419-994-3849

RUSS BERGER DESIGN GROUP INC
INDEPENDENT CONSULTANTS SPECIALIZING IN: RECORDING & BROADCAST FACILITY DESIGN & PLANNING, ARCHITECTURAL ACOUSTICS, NDISE & VIBRATION CONTROL, & TECHNICAL SYSTEMS DESIGN
4006 BELTLINE SUITE 160 DALLAS TEXAS 75244
972/661-5222 FAX 972/934-3935

CHAN & ASSOCIATES
Strategic Marketing • Public Relations • Advertising
1307 Shadow Lane, Suite C
P.O. Box 5509
Fullerton, CA 92838-0509
Phone: (714) 447-4993
Fax: (714) 578-0284
Pager: (714) 506-1357
Email: cjchan@ix.netcom.com
CompuServe: 74601,2707
Curtis Chan
President

EXEgesis Technologies
Technology Consultants
Design- Project Management- Systems Integration - Installations
Audio, Video, Data, RF, LAN & WAN
Kevin McNamara, President
P.O. Box 278
New Market, MD 21774
301.865.1011 *Voice/FAX*
EXEGESIS1@AOL.COM *E-Mail*

H&E HAMMETT & EDISON, INC.
CONSULTING ENGINEERS
RADIO AND TELEVISION
DANE E. ERICKSEN, P.E.
Box 280068
San Francisco, CA 94128
707/996-5200 707/996-5280 Fax

AD INDEX

	Page Number	Reader Service Number	Advertiser Hotline
Acoustic Systems	74	75	512-444-1961
Ahead Technology	66	99	408-226-9991
Antenna Concepts	103	26	916-621-2015
Armstrong Transmitters Corp.	91	43	315-673-1269
Audio Broadcast Group	112	31	800-999-9281
Audio Processing Tech. Ltd.	31	37	+232-371-110
Auditronics, Inc.	119	2	901-362-1350
Autogram Corporation	114	39	972-424-8585
BE Radio	39		913-967-1848
Belar Electronics Laboratory	78	105	610-687-5550
Besco Internacional	114	38	214-630-3600
Broadcast Technology Co.	113	33	719-336-3902
Broadcast Tools Inc.	113	36	360-428-6099
Circuitwerkes	113	34	904-331-5999
Coaxial Dynamics, Inc.	98	46	216-267-2233
Comet North America Inc.	107	8	203-852-1231
Computer Concepts Corp.	75	76	913-541-0900
Comrex Corp.	65	98	508-263-1800
Comrex Corp.	MAP		508-263-1800
Continental Electronics	81	78	214-381-7161
Crown Broadcast	87	59	219-294-8000
Dalet Digital Media Systems	64	97	+140-380-139
DBM Systems Inc.	55	92	601-857-8573
DGS Pro Audio	106	28	800-292-2834
Dielectric	86	57	207-655-4555
Electro-Voice	77	89	616-695-6831
Enco Systems Inc.	MAP		810-476-5711
Enco Systems Inc.	73	74	810-476-5711
Energy Control Systems	113	35	800-383-6965
Energy-Onix	30	42	518-758-1690
Equi=Tech Corporation	37	67	514-597-4448
ERI Electronics Research Inc.	112	32	812-925-6000
ESE	111	29	310-322-2136
Euphonix	67	100	415-855-0400
Fidelipac Corporation	63	96	609-235-3900
Fostex Corp. of America	47	72	800-7-FOSTEX
Gentner Communications	15	24	800-945-7730
Gepco	98	47	312-733-9555
Gold Line	110	12	203-938-2588
Gorman Redlich Mfg. Co.	109	15	614-593-3150
Hannay Reels	58	95	518-797-3791
Harris Corp./Broadcast Div.	3	4	217-222-8200
Harris Corp./Broadcast Div.	25	50	217-222-8200
Harris Corp./Broadcast Div.	26	51	217-222-8200
Harris Corp./Broadcast Div.	27	52	217-222-8200
Harris Corp./Broadcast Div.	28	53	217-222-8200
Harris Corp./Broadcast Div.	105	104	217-222-8200
Henry Engineering	99	48	818-355-3656
Hnat Hindes	94	64	203-935-9066
Holaday Industries	109	13	612-934-4920
Innovative Devices, Inc.	49	82	250-260-2861
Inovonics	95	65	800-733-0552
Internet NAB Show Daily	97	45	800-901-8202
Intraplex, Inc.	48	73	508-692-9000
Itelco	45	71	305-715-9410
Jampro Antennas, Inc.	76	77	916-383-1177
JK Audio	99	49	800-JK-AUDIO
Kart-A-Bag	95	66	800-423-9328
Kay Industries	110	16	219-234-0171
KD Kanopy	115	18	800-432-4435
Kintronic Labs Inc.	24	40	432-878-3141
LBA Technology Inc.	85	56	800-522-4464
Ledtronics, Inc.	56	934	310-534-1505
Leitch Incorporated	7	22	800-231-9673
Lightning Master Corporation	111	30	813-447-6800
Logitek	9	23	713-782-4592
Mackie Designs Inc.	2	1	800-258-6883
Mediatouch	13	7	204-786-3994
MIC Flag Co.	114		203-488-4267
Murphy Studio Furniture	68	101	619-698-4658
NAB Broadcasters	89	103	202-429-5350
Neumann (USA)	11	6	860-434-5220
Neutrik Canada	38	68	514-344-5220
NPR Satellite Services	51	84	202-414-2613
NSN Network Services	82	79	800-345-VSAT
OMB America	33	54	305-477-0974
Orban	5	5	510-297-2774
Allen Osborne Assoc.	94	63	805-495-8420
Phasetek Inc.	91	44	215-536-6648
Prism Media Products Inc.	57	94	201-299-7790
Pristine Systems Inc.	115	17	864-292-0300
QEI Corporation	70-71	87	800-334-9154
Radio Computing Services	83	80	914-723-8567
Radio Soft	40	70	904-426-2521
Reel-A-Pail Inc.	108	10	320-286-6506
Satellite Systems	88	60	719-634-6319
SCA Data Systems, Inc.	72	88	310-315-9930
Scott Studios Corp.	79	90	800-330-3004
Selco Products Co.	107	9, 102	800-229-2332
Sennheiser Electronics Corp.	50	83	203-434-9190
Silicon Valley Pwr Amplifier	54	85	408-986-9700
Smarts Broadcast Systems	69	86	800-747-6278
Sound America	108	11	912-238-1771
Spacewise Broadcast Furniture	86	58	800-775-3660
Studer Professional Audio	17	25	411-870-7511
Svetlana Electron Devices	88	61	205-882-1344
S.W.R. Inc.	93	62	814-472-5436
Tannoy/TGI North America Inc.	29	41	519-745-1158
T.C. Electronic USA	41	81	805-373-1828
Thomcast	53	91	349-031-00
TM Century Inc.	104	27	800-299-2121
Transcom Corporation	115	20	215-884-0888
Universal Electronics Inc.	115	19	614-866-4605
Wheatstone Corporation	120	3	315-452-5000
Whirlwind	110	14	510-284-8417
Zercom	116	21	218-765-3151
360 Systems	34, 35	55	818-991-0360
360 Systems	MAP		818-991-0360

SALES OFFICES

NATIONAL & INTERNATIONAL
Steven Bell
9800 Metcalf Avenue
Overland Park, KS 66212-2215
Telephone: (913) 967-1848
FAX: (913) 967-1900
E-mail: steven_bell@intertec.com

CLASSIFIED ADVERTISING
Jeff Utter
Telephone: (800) 896-9939
(913) 967-1732
FAX: (913) 967-1735

WESTERN U.S.
Sue Horwitz
809 South Orange Drive
Los Angeles, CA 90036
Telephone: (213) 933-9485
FAX: (213) 965-1059
E-mail: 76345,2624@compuserve.com

LIST RENTAL SERVICES
Lori Christie
Telephone: (913) 967-1875
FAX: (913) 967-1897

BE Radio

EDITORIAL
Skip Pizzi, *Editor*
Brad Dick, *Editorial Consultant*
Dawn Hightower, *Senior Associate Editor*
Deanna Rood, *Associate Editor*
Jim Saladin, *Editorial Assistant*
Tom Cook, *Senior Managing Editor*
Carl Bentz, *Directories Manager*

ART
Stephanie L. Masterson, *Art Director*

BUSINESS
Raymond E. Maloney, *President*
Cameron Bishop, *Senior Vice President*
Dennis Triola, *Publisher*
Judson Alford, *Associate Publisher*
Eric Proffitt, *Marketing Coordinator*
Kathy Volkland, *Advertising Coordinator*
Annette Hulsey, *Classified Advertising Coordinator*
Doug Coonrod, *Corporate Art Director*
Barbara Kummer, *Circulation Director*
Leann Sandifar, *Circulation Manager*
Customer Service: 913-967-1711 or 800-441-0294

TECHNICAL CONSULTANTS
Jerry Whitaker, *Contributing Editor*
Yasmin Hashmi, *International Correspondent*
Stella Plumbridge, *European Correspondent*
Russ Berger, *Broadcast Acoustics*
John H. Battison, P.E., *Antennas/Radiation*
Dane E. Ericksen, P.E., *Systems Design*
Donald L. Markley, *Transmission Facilities*
Harry C. Martin, *Legal*
Curtis Chan, *Audio/Video Technology*
Kevin McNamara, *Computer Technology*

MEMBER ORGANIZATIONS
Sustaining Members of:
- Acoustical Society of America
- Audio Engineering Society
- Society of Broadcast Engineers

Member, American Business Press
Member, BPA International

BE RADIO (ISSN 1081-3357) is published bimonthly (except an additional issue in August) and mailed free to qualified recipients by Intertec Publishing Corporation, 9800 Metcalf, Overland Park, KS 66212-2215. Non-qualified persons may subscribe at the following rates: USA and Canada, one year, $30.00; all other countries, one year, $35.00 (surface mail), $70.00 (air mail). Periodicals postage paid at Shawnee Mission, KS, and additional mailing offices. Canada Post International Publications Mail (Canadian Distribution) Sales Agreement No. 0956244.
POSTMASTER: Send address changes to *BE Radio*, P.O. Box 12937, Overland Park, KS 66282-2937.
BE Radio is edited for corporate management, technical management/engineering and operations and station management at radio stations and recording studios. Qualified persons also include consultants, contract engineers and dealer/distributors of radio broadcast equipment.

SUBSCRIPTIONS
Authorization to photocopy items for internal or personal use, or the internal or personal use of specific clients, is granted by Intertec Publishing provided that the base fee of U.S. $2.25 per copy, plus U.S. $00.00 per page is paid to Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923. The fee code for users of the Transactional Reporting Service is ISSN 1081-3357/1997 $2.25+00.00.
For those organizations that have been granted a photocopy license by CCC, a separate system of payment has been arranged. Prior to photocopying items for educational classroom use, contact CCC at 508-750-8400.
Organizations or individuals with large quantity photocopy or reprint requirements should contact Chris Lotesto, 312-840-8407. Microfilm copies of *BE Radio* are available by calling/writing UMI, 300 North Zeeb Rd, P.O. Box 1346, Ann Arbor, MI 48106-1346. Phone: 313-761-4700 or 800-521-0600.

CORRESPONDENCE
Editorial and Advertising: 9800 Metcalf, Overland Park, KS 66212-2215. Phone: 913-341-1300; Edit. Fax: 913-967-1905. Advt. Fax: 913-967-1904.

© 1997 by Intertec Publishing.
All rights reserved.

INTERTEC PUBLISHING
A PRIMEDIA COMPANY

A DAB scorecard

By Skip Pizzi, editor

There won't be any DAB demos at NAB 97, but there's still plenty of action and intrigue in the land of digital radio broadcasting. Here are a few tidbits.

L-band coordination

The most obvious DAB activity in the Western hemisphere is taking place in Canada, where broadcasters continue to gear up for launch of Eureka 147 service in the L-band later this year.

Less obvious are some critical negotiations currently taking place to coordinate the use of this spectrum along the U.S.-Canada border. The United States will continue to use the L-band for aeronautical test telemetry, both civilian and military, and protection requirements for U.S. L-band telemetry are particularly stringent. Negotiations are ongoing, and until an agreement is reached, it's unlikely that Canada can launch its DAB service.

San Francisco test fallout

Meanwhile, a war of words continues between Eureka 147 and other proponents in the aftermath of the San Francisco DAB field tests conducted by the Consumer Electronics Manufacturing Association (CEMA). One point of contention is just how well and efficiently Eureka covered the test market. IBOC supporters are citing the relatively high ERP values from three Eureka transmission sites, which provided downtown-only coverage, while Eureka supporters quote their extremely low TPO numbers (high-gain L-band transmit antennas were used), plus an even lower "power per channel" figure that's divided across the six channels of the multiplexed system.

The IBOC camp concludes that Eureka 147 should be considered essentially as a "cellular" system, and asks that broadcasters acknowledge it will require many multiplexed transmitter sites for adequate urban coverage.

Satellite DAB

The FCC's allocation for Satellite DAB (S-DARS) has been reduced from its original 2,310-2,360MHz to 2,320-2,345MHz. Four proponents remain in contention for this spectrum, but it is likely that only two licenses will be awarded (or auctioned, yet to be determined). Pioneer's Preferences have been denied to the S-DARS applicants who applied for them, but no date has been set for disposition of this spectrum. Meanwhile, the rest of the original allocation has been re-assigned to the *Wireless Communication Service* (WCS), and slightly expanded to include 2,305-2,320MHz and 2,345-2,360MHz. Auctions will be held for these WCS bands by April 15, 1997. Bidding will be open to any appropriate entity, including the four S-DARS applicants. The WCS bands can be used for terrestrial fixed or mobile communications, radiolocation or, (above 2,310MHz) S-DARS.

In late February, CEMA called for the FCC to hold off on any S-DARS licensing because of the technology's poor performance in an urban mobile environment. If S-DARS licenses are nevertheless granted, CEMA asks that the commission at least define licensees' obligations to provide "seamless service" throughout their coverage areas. Basing its comments on the San Francisco test results of the VOA/JPL system, (the only S-band DBS radio format to be comparatively tested to date), CEMA contends that acceptable S-band DAB service for mobile, urban listeners will only be possible with extensive use of terrestrial gap-filler transmitters.

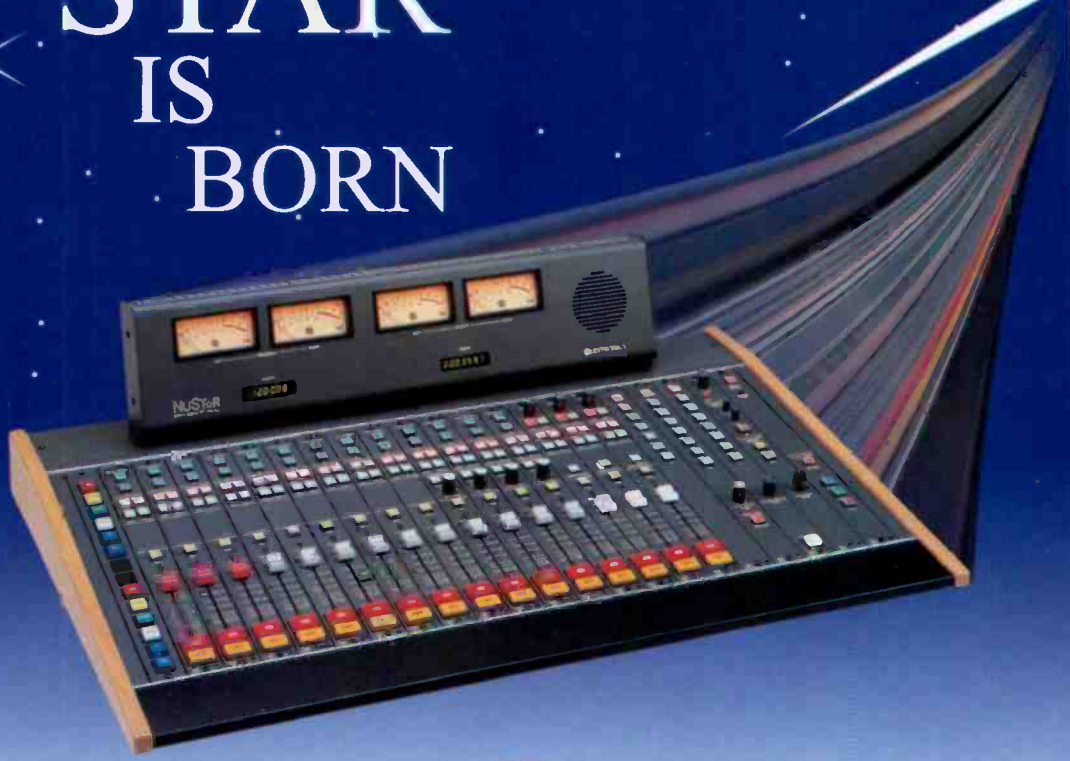
NAB 97 may also shed some further light on the Eureka TDMA and WCRB/Sanders proposals unveiled at NAB 96 (see "Editorial," May/June 1996), and perhaps some other DAB surprises, although nothing that is likely to have an impact on U.S. radio listeners for many years. For the U.S. DAB league, it's a rebuilding year.

USADR developments

USA Digital Radio will have an exhibit in the "Technology Showcase" at NAB 97, but there will be no hardware shown. After essentially admitting that its previous systems were never fully ready for testing, the IBOC proponent is now in a serious retooling mode, sinking significant resources at present into AM and FM channel characterization and evaluation of several new carrier waveforms. Once these studies are complete, USADR plans to apply the data to new software-based DSP designs. Using cutting-edge software with programmable DSP and a library of RF modules, the proponent claims its development of test hardware will proceed more quickly and successfully than past efforts, which were based on building hardware from theoretical concepts and then adding corrective fixes as the system was tested and refined.

Development is currently centered at the Baltimore facilities of Westinghouse Wireless Solutions (WWS), where approximately 30 people are currently involved (including both in-house staff and outside contractors). About 20 are devoted to the project full time. Based on lessons learned from the San Francisco tests and WWS's own evaluations, they have a tough task ahead, with far less bandwidth to work with than past designs used. Insiders also report that the proponent's previously divergent AM and FM IBOC formats are now becoming increasingly similar as work progresses.

A NEW STAR IS BORN



NuSTAR

DIGITAL IS HERE!

✧ *FIRST* **USABLE** ✧ *FIRST* **AFFORDABLE**

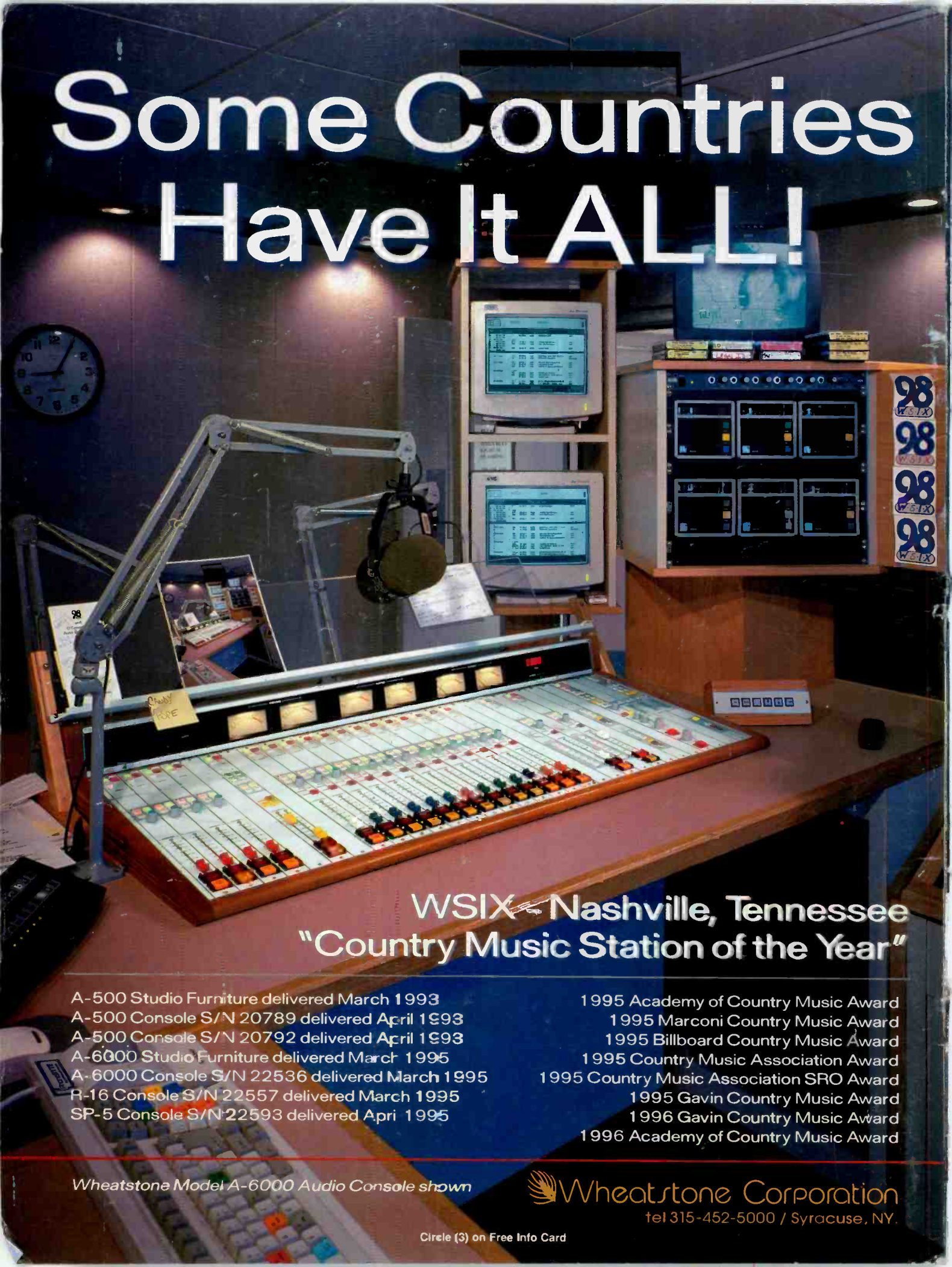
- ✧ **DSP with ANALOG and DIGITAL INPUTS and OUTPUTS**
- ✧ **SAMPLE RATE CONVERSION Standard on DIGITAL INPUTS**
- ✧ **Optional SAMPLE RATE CONVERSION on DIGITAL OUTPUTS**
- ✧ **16 BIT CD QUALITY ; 24 BIT READY**
- ✧ **UNIVERSAL "CONTROL SURFACE" and RACK MAINFRAMES**
- ✧ **FULLY MODULAR and UPGRADE READY**

GET YOUR BROADCAST *DIGITAL* AUDIO CONSOLE TODAY!

AUDITRONICS®

3750 Old Getwell Road, Memphis, TN USA (901) 362-1350
FAX (901) 365-8629

Circle (2) on Free Info Card


Some Countries
Have It ALL!
WSIX Nashville, Tennessee
"Country Music Station of the Year"
A-500 Studio Furniture delivered March 1993
A-500 Console S/N 20789 delivered April 1993
A-500 Console S/N 20792 delivered April 1993
A-6000 Studio Furniture delivered March 1995
A-6000 Console S/N 22536 delivered March 1995
R-16 Console S/N 22557 delivered March 1995
SP-5 Console S/N 22593 delivered Apri 1995
1995 Academy of Country Music Award
1995 Marconi Country Music Award
1995 Billboard Country Music Award
1995 Country Music Association Award
1995 Country Music Association SRO Award
1995 Gavin Country Music Award
1996 Gavin Country Music Award
1996 Academy of Country Music Award
Wheatstone Model A-6000 Audio Console shown
Wheatstone Corporation
tel 315-452-5000 / Syracuse, NY.
Circle (3) on Free Info Card