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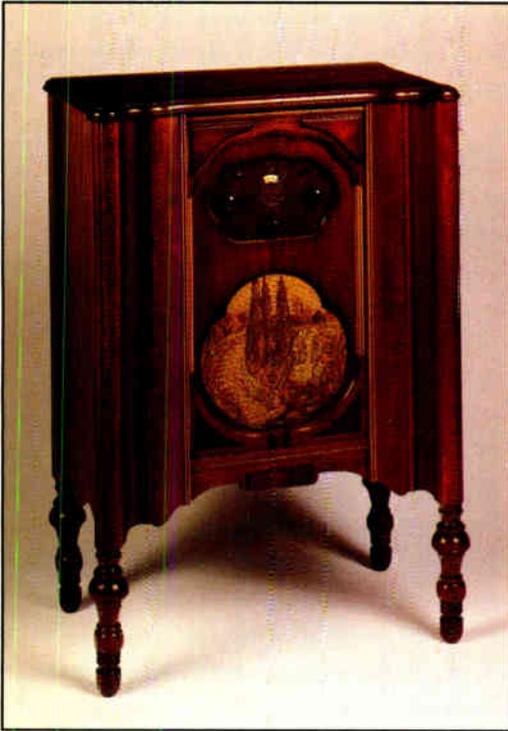
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World Radio History

RADIO WORLD 1993



On the Cover...

Pictured is a 1929 Atwater Kent Model No. 1055C console from the collection of the late Joseph R. Pavék. The radio is a seven-tube, AC-powered unit with a screen grid. It, and the rest of the collection, are housed at the Pavék Wireless Museum in St. Louis Park, Minn. (see story, page 30).

Special thanks to Stephen Raymer, managing director of the museum.

Editorial

Editorial Director: Marlene Lane
 Editor: Lucia Cobo
 Listings Editor: Caroline Behan

Production

Director: Kim Lowe
 Regan Deatherage
 Lisa Lyons
 Lisa Mamo
 Julianne Stone

Contributors

Alex Zavistovich
 John Gatski
 John Bisset
 Thomas McGinley
 James Wold
 Steve Crowley
 Nancy Reist
 Harry Cole
 Marjory Roberts Gray
 Ed Shane
 Ray Rosenblum
 Mike Meeske
 Dain Schult

Advertising

Simone Mullins
 Dale Tucker
 Skip Tash

Radio World

Publisher
 Stevan B. Dana
Associate Publisher
 Carmel King
Editor
 Alex Zavistovich
Circulation Director
 Tiana Hickman
Comptroller
 Anne Clark

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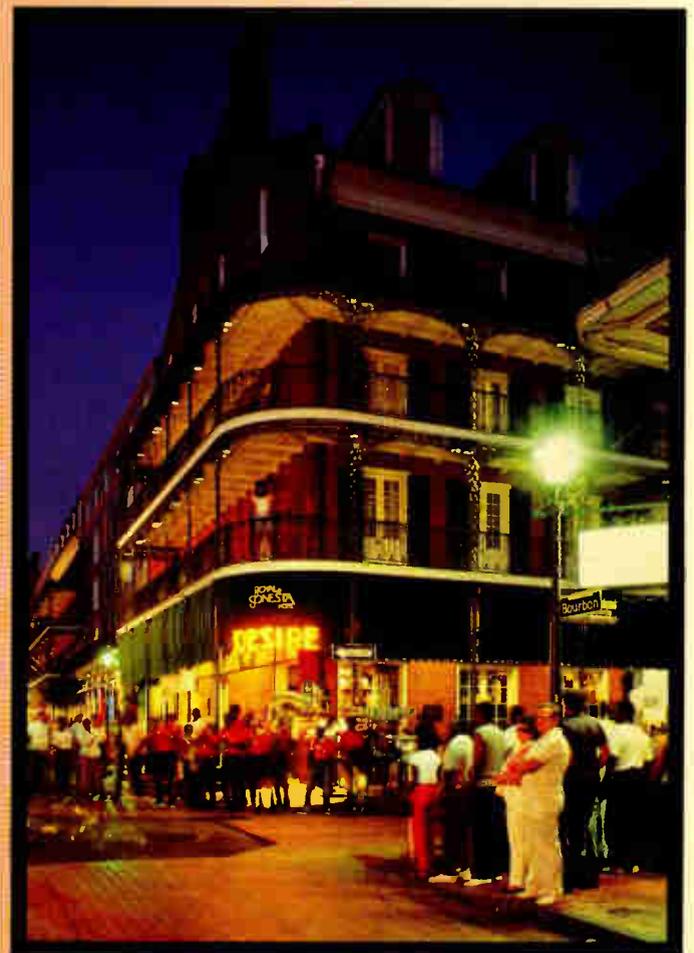
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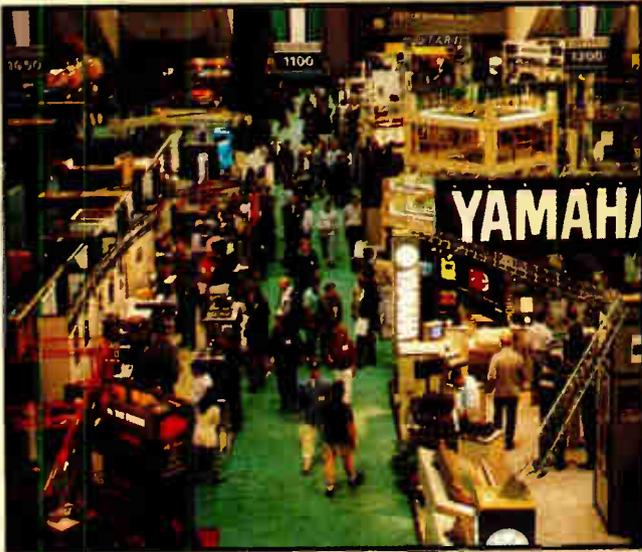


Top left: Denon's TV-680NAB AM/FM "Super Tuner" proved itself worth the four-year wait with AMAX enhancements and Motorola-developed C-QUAM.

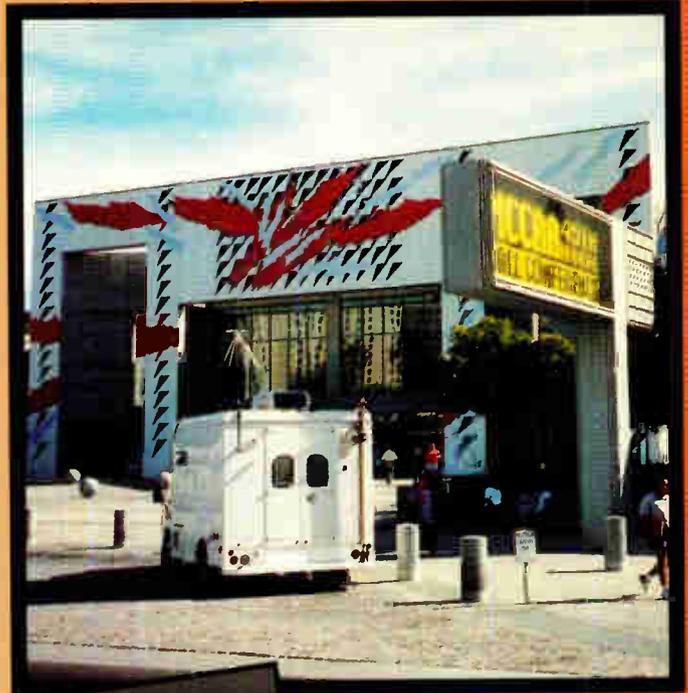
Top right: Despite ongoing and passionate discord, the DAT bill made it through Congress in 1992.

Bottom: The NAB's spring show in Las Vegas drew 52,704 registrants, including an increasingly visible and growing international contingent. The Radio Show, set in New Orleans, wowed broadcasters with the fixed in-band, on-channel tests of DAB from USA Digital Radio. And the food was good, too.

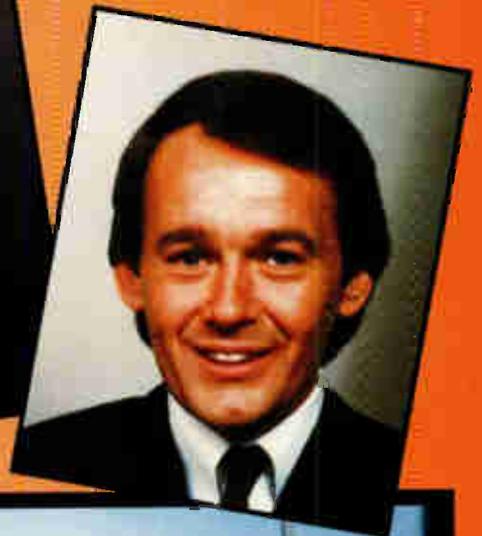




Top: The 93rd AES show (left) drew large crowds and featured scores of new products. Although the SBE gathering (right) showcased quality products as well, attendance was a mere shadow of previous years.



Right center: The political showdown of the year ensued when FCC Chairman Sikes (left) proposed relaxing station ownership limits. Threats from congressional leaders, including Rep. Edward Markey (right), to enact the 12AM/12FM limit into law forced the FCC to reduce the new limits from 30AM/30FM to 18AM/18FM.



Left center and bottom right: Devastation in LA during the worst rioting in U.S. history prompted KFI to broadcast from CE Marv Collins' living room.



1992 Mandate: 'Out with the Old'

by Alex Zavistovich

In the winter months of December through February, news sometimes takes a back seat to news analysis. Many editors are faced with taking a long look at the big picture—, to come up with a synopsis of the year's news highlights. I'm no exception.

This past year was full of key stories for broadcasters. What with technological improvements, management issues, the election...it was all pretty hard to follow, especially if you had to deal with the day-to-day problems of keeping a radio station on the air in this economy.

★★★

Leading the list in what was hot for this year was the election of Bill Clinton as president. Clinton unseated incumbent George Bush in a vote that was a landslide in the electoral college, but much closer in the popular vote.

At this writing, Clinton's effect on broadcasters is still uncertain. As with

most Democratic presidents, the trend, I think will clearly be toward re-regulation, away from a "marketplace" mindset.

On the technological side of things, one of the hottest developments of the

RBDS was too much of a competitive edge for FMs. Enter ID Logic B, a receiver-based memory chip that would store AM formats in the tuner itself. That was a good enough compromise to push the standard forward, but receiver manu-

As with most Democratic presidents, the trend, I think, will clearly be toward re-regulation.

year was the approval of the radio broadcast data system (RBDS). Although not formally introduced until the Winter CES show in Las Vegas last month, the RBDS voluntary standard was drafted last year, and came close to winning a record for how quickly it was put together.

The only stumbling block came at the eleventh hour, when the NAB required a provision in the standard for AM broadcasters who felt format scanning on

facturers late in 1992 weren't so sure they would conform to that particular part of the voluntary standard.

The RBDS technology would allow stations to send a variety of digital information on their 57 kHz subcarrier, including emergency alerting information, which brings us to the Emergency Broadcast System (EBS). It wasn't EBS itself that was hot in 1992; the hot topic was how to fix it—or replace it.

Almost every comment filed with the FCC (except for those from companies that manufacture EBS gear) complained about the antiquated EBS system, leading the FCC to institute an overhaul proceeding, culminating on Dec. 11, 1992 in a demonstration of new alerting technology. The verdict has yet to be reached on a new emergency system, but the SAGE 1 system, which employs RBDS technology, is definitely a front runner.

In other technological developments, the USA Digital brain trust of Gannett, Group W and CBS scored a hit with the industry at the NAB Radio Show, demonstrating its Project Acorn digital audio radio service for AM and FM. Aided by a digital signal processing chip developed for the military, USA Digital proved its detractors wrong by showing that a digital signal can indeed be combined with an analog signal at the transmit end, then pulled out at the receive end none the worse for wear. Project Acorn's susceptibility to multipath interference is still unknown, but USA Digital's progress definitely lit a fire under the whole digital audio issue, which otherwise was languishing in a swamp of bureaucracy.

★★★

In the world of programming, personalities were hot; the call-in talk show format

continued on page 21 ►

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World Radio History

A New DAB Perspective Is Vital to Industry's Future

by Steve Crowley

After it's switched on, an electrical circuit reaches a steady state—following initial transients and noise. The commotion over DAB approached a steady state in 1992. We're starting to see bounds to the DAB problem/challenge; at least as that problem/challenge is seen today.

A source of further filtering was, and will be, the Electronic Industries Association's subcommittee on Digital Audio Radio. As of this writing, 10 proponents have said they will have hardware for the EIA subcommittee to test in 1993. Following the testing, the subcommittee will analyze the data and, it hopes, recommend a standard to the FCC.

What about broadcasters?

Broadcasters have questions concerning how much weight they carry in the EIA voting process. Regardless, broadcasters do carry great weight with the FCC, and their opinions will be heard.

The World Administrative Radio Conference 1992 (WARC 92) ended with the U.S. and India alone on the 2310-2360 MHz island. Satellite CD Radio says it's ready to serve the U.S. now. It filed an application with the FCC in September, 1992 to tidy up a few things. By the time you read this, the deadlines established for filing comments and competing applications will have passed. It's on the regulatory fast track.

The FCC issued a Notice of Proposed Rule Making and Further Notice of Inquiry regarding DAB (or DARS). It deals mainly with implementing the S-band WARC allocation, but solicits comment on the feasibility of in-band proposals. With USA Digital planning public demonstrations of its system around the FCC's comment deadline time, it may be able to supply timely input.

Yet, with all the above, DAB is not the source of discussion it was last year. What's hot is low-tech—the FCC's new ownership rules. They allow for consoli-

ation and efficiencies to, what is now, an economically flat industry.

Yet, as I do studies for clients under the new ownership rules, I wonder. What happens after the broadcast industry consolidates under the new ownership rules? What happens as new communications services outside broadcasting increasingly compete for a consumer's ear, time and money?

Some comparisons

What's going to happen in DAB? Will it help struggling stations? Instead of making predictions, I find it much more useful to look at trends. Past trends can be quantified. Conveniently, these trends usually continue in the short term.

So let me take you away from DAB to two communications trends outside the radio industry. The first is data transmission—all forms, including wireless. The second is cellular telephones and other forms of wireless personal communications.

Here's a figure that should interest all broadcasters—a 20 percent annual growth rate. That's what the data transmission and cellular telephone industries are experiencing annually. (I wonder how they'd be

doing in a good economy.)

We see evidence of the exploding data transmission market everyday. Modems are faster, phone companies are sending 1.5 megabits per second over the local loop. My favorite word processing program isn't getting any smaller.

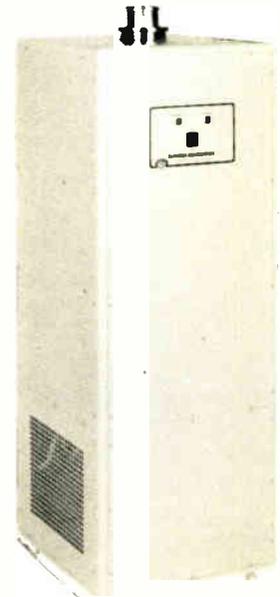
Wireless communications—people love it. Today, cordless telephones (the limited-range ones for home use) outsell hard-wired phones. The FCC has already proposed rules for Personal Communications Services (PCS), which will probably result in more economical and ubiquitous wireless communications.

The amount of money spent on research in these areas is staggering. Whereas the TV industry has trouble scraping up another \$600,000 to finish HDTV testing, AT&T Bell Labs has a budget of \$1.1 billion and Bellcore, the research arm of the regional Bell operating companies, has a

continued on page 17 ►

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U.S. Moves Quickly on RBDS Standard

by John Gatski

With the adoption of U.S. Radio Broadcast Data Systems (RBDS), the broadcast and receiver industries are betting they have a winning technology that will benefit both.

The National Radio Systems Committee (NRSC) has approved an RBDS standard, and already enormous interest has been generated for broadcasters and manufacturers.

The official announcement of the standard's approval was made at the Winter Consumer Electronics Show (WCES) in January as part of the industry-wide promotion of RBDS.

Also at WCES, many receiver manufacturers took part in a joint display and demonstration of RBDS receivers that was warmly received by electronics merchandisers. Several Las Vegas radio stations broadcast the RBDS signals.

On a fast track

The RBDS standard was adopted within a short time period (its U.S. debut demonstration was made in 1989). The rapid turnaround on developing a standard partially was the result of using the already developed European RDS technology as a base—with small variations suited to the

U.S., mostly software differences.

The technology allows station tuning by format, receiver text display, automatic emergency alerting, and automatic switching between transmitters or translators.

RBDS and RDS is transmitted on a 57 kHz subcarrier and broadcast on a station's main FM carrier.

U.S. broadcasters have expressed particular interest in the RDS text function: the capability to transmit call letters and frequency to car listeners. More advanced RDS units will be able to display the

that adding too many formats would make the receiver too complicated for consumers. The general categories, RBDS standard supporters argue, would get listeners in the ballpark, and they could then choose which of the stations play music that suits their taste.

Most of the format objections expressed in the first ballot, however, were not voiced on the final ballot.

Since RBDS currently is not effective for AM, the new standard includes a provision that requires receivers to contain

Using RDS as an EBS replacement has been pushed strongly by the technology's proponents.

name of a song playing and the artist from CDs or digital tapes that have such information contained in the digital subcodes.

RDS's potential as an EBS technology replacement has been pushed strongly by the technology's proponents as well. By early 1992, broadcasters in Jefferson County, Texas, will have completed testing, and most will have switched to the RDS emergency alerting system.

The county, which is dominated by the petrochemical industry, decided to go with the RDS system because it is much more automatic and has fewer links that can fail. Other communities also have expressed interest in using RDS for emergency alerting.

ID Logic B, a technology that allows AM stations to be selected by format. But instead of being activated by a broadcaster's signal, formats are accessed from the receiver's internal computer that is programmed with all U.S. stations' format information.

Looking out for AM

The NAB had threatened to stall the standard in early 1992 because it believed AM interests were not fairly represented within RBDS since it works on FM. The ID Logic proposal was a compromise between the receiver manufacturers and the NAB.

Since the NRSC standard is voluntary, however, some receiver manufacturers have said that they may not add the ID Logic function because they believe it would add a cost that consumers would deem unnecessary.

In 1991, the NRSC's RBDS standard subcommittee had to contend with another objection: a potential problem with Cue Paging, a paging subcarrier that also operates at 57 kHz. It is located on more than 270 broadcasters.

RBDS receiver manufacturers and RDS proponents said adoption of a hybrid RDS—Cue Paging standard would inhibit RBDS functions significantly.

Cue Paging in its original form caused problems with RDS receivers including lengthy delays in text display, according to receiver manufacturers. But Cue Paging said it would make some software changes to its system, and tests in California showed that the two systems could be compatible.

Tune by format

One of RBDS's other most promising features is the selection of stations by format. A station broadcasting the 57 kHz data stream is assigned a code for the type of format it transmits. When the user pushes a particular format button on the receiver, it will scan the other stations, no matter where you are, that are on the format.

There had been some concern by broadcasters on the initial NRSC standard voting ballots that some of the 22 format codes were too general because some stations broadcast format variations that do not fit the general categories. For example, there is one country RBDS format code, but some stations broadcast variations, such as "classic country," "country gold," or "bluegrass" that are not RBDS formats.

Supporters of the RBDS standard said

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World Radio History

Country Thrives, CHR Dims In 1992

by Ed Shane

A Dallas program director wise-cracked over lunch: "I haven't called the office, I wonder if there's another Country station on the air." It's no joking matter. Dallas has an unprecedented fifth station playing Country music.

The spectacular rise of Country during the past two years prompts stations in markets of all sizes to consider Country as a programming option. Cities with only one Country outlet face fierce competitive battles to come.

Any station that doesn't have a direct format competitor today will have a competitor before the end of 1993, even in the so-called "non-Country" markets in the north and east.

Why Country is hot

Listeners find so much excitement in Country today. The production values are excellent. The songs are about real life. There's a sense of tradition and roots—real comfort in a recession or any time.

As important in the rise of Country is the demise of pop music. If there's a one-sentence comment on the status of radio programming, it's "Country is hot; CHR is not."

CHR oversaturated the airwaves with dance music by disposable artists. Songs with a quick recitation were perceived as

rap songs. Some CHRs also played hard street-corner rap because the charts were full of it. That's true. Rap music has nearly doubled in record sales during the last five years. The problem? Rap doesn't define the mass culture the way CHR pop should.

CHR also added heavy metal to its mix, again because the music charts reflected the sales of Guns N Roses, Nirvana, and other rockers. The combination of two harsh, aggressive sounds like rap and rock drove listeners to other formats.

So, inadvertently, CHR created the environment for a new popular music. Country filled the void with a new sound that had none of the threat of the street.

Simultaneously, the traditional demographic base for CHR—teenagers—is disappearing. There are fewer of them compared to other population groups like boomers. The teens that exist are very video-oriented. New technology like interactive CD-ROM units are being aimed directly at teenagers.

What's a CHR to do?

What's CHR's solution? Stations that have remained successful have concentrated on artists like Rod Stewart and Phil Collins to target young adults. Others are adding the "alternative" sound of Modern Rock. Modern Rock, also

called "New Rock" and "Post Modern," is based in new young groups with evocative names like Toad the Wet Sprocket, Nine Inch Nails, 2 Unlimited, and Ned's Atomic Dustbin. There's the excitement of new releases combined



EFM's Rush Limbaugh

with an accessible, acceptable, style reminiscent of the pop-rock of the '60s.

Modern Rock will emerge in the '90s as its own, viable format. There is a success story already from Las Vegas at KEDG-FM. The shift of WAPW(FM) or "Power 99" in Atlanta, from CHR to Modern Rock (as "99X") is prophetic for radio. It joins WHFS(FM) Washington, a station that has successfully programmed New Rock for a number of years, and a handful of other stations as the select few testing the format in a large market.

I don't want to leave the impression that the only formats in radio's future are Country or New Rock. Talk programming is also attracting new listeners every day.

Rush Limbaugh, whom Vanity Fair called "the patron saint of white male chauvinists," has increased in four years from a handful of stations to more than 500. A bumper-sticker I saw the other day said, "Rush is Right." Well, he's certainly been right for radio, especially AM, where he has been the salvation of some stations.

Sports and talk

All sports programming is adding to the number of stations listed in the "Talk" ▶

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format count. The emergence of several sports talk networks gave operators the content needed to augment local talk, commentary, and play-by-play.

All-sports outlets seem to work best when a major professional franchise anchors the package. That helps the station capture the "sports" image, not just the "sports talk" image. It's a subtle but important distinction.

Any discussion of the status of talk radio must include Howard Stern. Yes, he appears on rock stations. Yes, he pushes the edge of good taste. Yet, his product is talk with a "rock attitude." If Stern (and those who support him with access to air time) survive government scrutiny and fines, look for the emergence of full-time programming, probably on nationwide networks like the ad hoc association of Stern stations.

What else is ahead? I've been conducting programmers' meetings lately and brainstorming "Radio 1997"—predicting the radio environment five years into the future.

It won't get easier

It's unanimous among programmers that radio will have to contend with alternative delivery of programming that is radio's turf. Cable systems already offer multiple channels of audio. Telephone companies are exploring ways to deliver audio, video, and interactive services. Satellite-to-home digital audio will play a much greater role in five years.

Cable and other alternative delivery systems are best-suited to carry specific sounds that are not mainstream music: New Age music, 17th Century royal fanfares, 1920s European salon orchestras, 50s jazz, 80s fusion, bluegrass, gospel, etc.

Country will fragment into demographically drawn groupings. Today's hot new Country plays hits and only hits, targeting 18-34 year-olds who have escaped CHR and Rock. The rise of Country's new sound has left some songs out of the mix. Look for one skew of Country to be softer and presented as a "background" station.

Rock programmers predict more niche formats: '60s progressive rock, '70s pop rock, '80s rock, and an Acoustic Rock format. They are all specific outgrowths of today's AOR and Classic Rock formats.

America's immigrant populations will also change the sound of radio. Hispanic and Asian newcomers seek connection with home and culture. What better medium than radio?

Mexican-based Tejano music makes a strong showing already in San Antonio and Houston. Contemporary Hispanic sounds win big in Los Angeles.

The McAllen-Brownsville, Texas, area is the U.S. market closest to Mexico and is a predication of things to come. The radio dial has these Spanish-language formats: Full service, Tejano, soft vocal, Ranchero, Contemporary—almost as many variations as Anglo radio. Major Hispanic population centers will soon see the same. The trade publication *Radio & Musica* displays five different charts, reflecting the diversity in Hispanic programming.

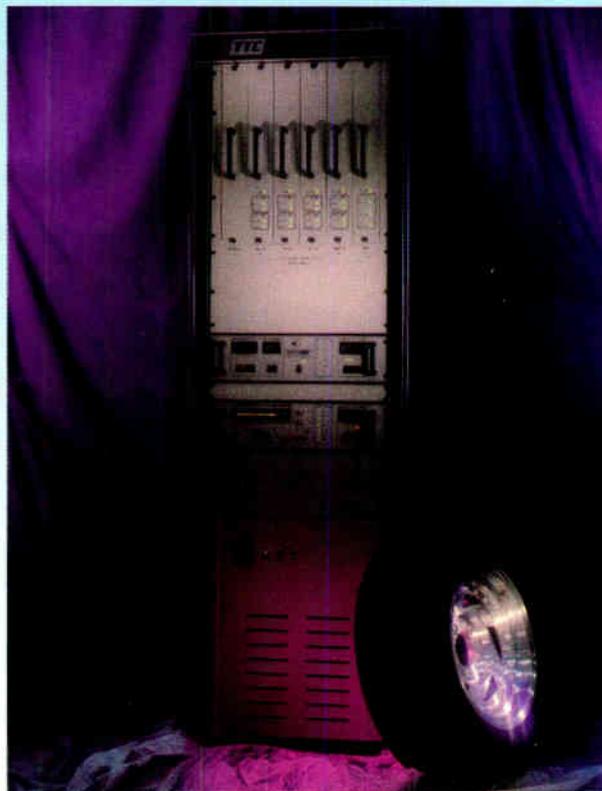
With new ownership rules the radio dial

will change rapidly. Programmers all over the nation will make jokes like my friend from Dallas did. Come to mention it, how many hours has it been since you reviewed the dial in your market?

□ □ □

Ed Shane is a broadcast adviser and founder of Shane Media Services, which provides management, programming, and research consultation to radio. Since 1977 he has helped broadcast companies, both large and small, achieve success for their stations in a variety of formats. His recently published Cutting Through: Strategies and Tactics for Radio, is available at 713-952-9221.

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PC Revolution Ups the Education Ante

by Nancy Reist

OK, I admit it. When I walk the exhibit floor at an Audio Engineering Society (AES) show or a National Association of Broadcasters (NAB) convention, I'm occasionally overwhelmed by conflicting emotions. On the one hand, I find the digital race exhilarating—I'm always awed by how much technology can change in just a few months.

But I teach radio, so for me CD jukeboxes and multi-task digital workstations invariably raise the specter of fully-automated radio stations and students whose only chance for a career with a microphone is at Burger King's drive-through window.

My question is, should radio educators be modifying their courses to keep pace with technological changes? What does the increasing prevalence of computers in radio stations mean for students?

Where news is going

Scot Witt is the Region 7 Radio Television News Directors Association (RTNDA) board director. He is also news director at WDCB, an eclectic public radio station outside Chicago with a strong local news operation.

WDCB has a computerized newsroom and is professionally run. They also have student aids and community volunteers. Witt said he believes the most important skills a student can develop are writing, interviewing, and news judgment. He also said students should learn computer basics, particularly word processing, digital audio production techniques, and operating systems like DOS.

Witt said computers can enhance the jobs of news workers, but he doesn't believe they make good replacements for people in news operations, since strong writing is very important. He acknowledged, however, that some managers have other ideas.

"I was working in an all-news radio station in Omaha. "The sales people used to take people through the news room and say that the computer system wrote the local stories and edited them and put them on the air and the only thing that the radio people did was to anchor. I think there's a real danger in that."

Drew Hayes is operations director of Chicago's WLS, an AM and FM talk simulcast. WLS uses computers in a variety of settings and has a computerized newsroom. He looks for people who are smart and have some knowledge of the world around them. He strongly recommends internships. "The people we've had the most success in hiring have done internship programs. I can't stress the importance of that enough. Also, this sounds silly, but get a job. The folks who end up getting hired are the people who have gotten some background somewhere working in some professional broadcast setting. You have to have some hands-on knowledge."

Leveling the field

Hayes believes that currently computers can actually give new graduates an edge in the job market. "The computerization of radio stations cuts both ways. It's good for the folks who are coming up. It's not as good for those of us who have to kind of learn it as we go. By and large, it's almost an equalizer in that you have kids coming out of college who have tremendous computer knowledge, which sets them ahead of those who are already in the field and have to learn it.

"Computers are clearly the wave of the future for everything,

not just for engineering, but certainly for programming and in news. We've installed a news computer system that does require some computer knowledge and the folks that have the best aptitude to that take to it very quickly. So it levels it out. It also will become over the next 10 years much like a high school diploma: everyone's got one and that will not be enough to set you apart from everyone else."

Ed Cavagnaro, news director at San Francisco's popular AM news station KCBS, also emphasizes both communication and computer skills. He said KCBS put in a newsroom computer system in 1980 and installed a digital studio two years ago. "We need people who really are good communicators, specifically good writers and—if they want to get on the air—they have to be good talkers too. But writing is really the most important thing, that they know how to communicate well in writing so

We need people who really are good communicators—specifically good writers.

—Ed Cavagnaro
News Director, KCBS

that the news on the air is reported clearly and concisely."

As Chair of the Broadcast Communication Arts Department at San Francisco State University, Dr. Ron Compesi has watched many students launch successful careers in both radio and television. He agrees that computer literacy has become an essential component of a good broadcast education. He also agrees that educators need to help students develop their research, writing and general communication skills.

Beyond the technology

Compesi believes that audience analysis remains a critical part of a sound radio education. "We have an obligation to sensitize our students to the diversity of the audience they're serving. There are roughly 70 AM and FM stations in this market, and a lot of those radio stations already have identified a target audience or have focused on a particular kind of program content that they are interested in getting to their audience.

"So we need to let our students know that while there is indeed a mass audience, there are also very specialized audiences and they need to be thinking in terms of targeting to them.

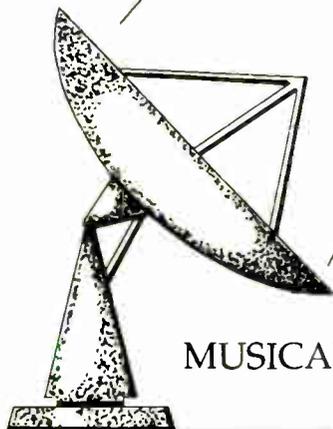
"I think this is a place where we can have a good partnership with local broadcasters, particularly through internships. I see internships as a key element in linking what we do here in the university with the practice of radio in the commercial and the non-commercial environment."

Compesi also considers ethics a crucial part of a broadcast educators' responsibility. "We have to look at the impact that the media have on culture and on children and on values and so on. I still think that broadcasters have a social responsibility to act in the public interest and that students need to be educated in those things.

"We should certainly look at radio and television as commercial media, but also as essential parts of our culture and hopefully as tools that we can use to help make this society a better place to live. I think we've seen that social responsibility is good business."

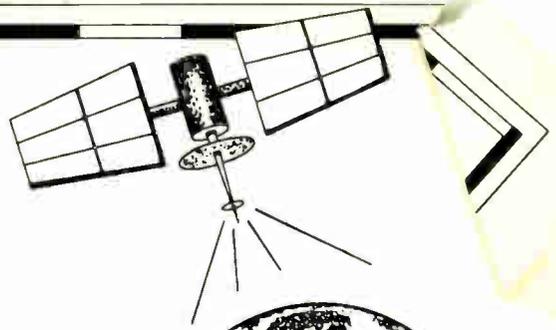
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WORKBENCH

Best Technical Suggestions of 1992

by John Bisset

Some of the best *Workbench* tips are the simplest, and in many cases, the cheapest to execute. Take that homebrew project that needs a case. You can buy an expensive case, but for projects that are mounted under a console, why pay for the "good looks"? Instead, drop by the local hardware or electric supply store and grab an outlet box.

If a single outlet box is too small for your project, double or triple outlet boxes are commonplace. If you like, some of the outlet boxes have nails built in for attaching the boxes to a stud. For under console installations, you can't beat the price (under a dollar) or the convenience.

Larger projects can be mounted in electrical "pull" boxes. Though these are more costly than outlet boxes, they are usually less than the "finished" aluminum boxes.

Studio tips

If your foam soundproof insulation panels come loose, before you grab the glue gun, try anchoring the panels with a couple of

drywall screws. The procedure is quick and practical. If you are constructing a temporary studio, soundproofing using this method is just as effective. When it's time to remove the soundproofing material, a little spackle will take care of the screw holes. Spackling sure beats scraping construction adhesive off a wall!

If you have to wire up multi-pin connectors, pick up a crochet hook at a sewing or department store. The little curved end is ideal for displacing wires to give you room to solder.

When you turn a hunk of aluminum into a useful tool, that's exciting.

EBS tests can be quickly verified by compiling an EBS calendar. The calendar consists of 31 blocks. Whenever a test is sent or received, the operator logs this information in the block that corresponds to that day.

As the logs are reviewed by the chief operator, any compliance problems can be quickly noted and resolved. By then stapling this sheet inside the file folder that holds the logs for that month, if an inspection occurs, you can quickly demonstrate EBS compliance by referring to the calendar. Most engineers will agree that taking the few extra minutes to neatly arrange their logs will pay off big dividends when a station is inspected.

Antenna tips

RPU antennas like a non-conductive mount. An inexpensive, yet effective solution is to use a piece of PVC pipe. Depending on the diameter of the PVC, it may flex when the antenna is attached. Solve the flexing problem, and reinforce the mount by

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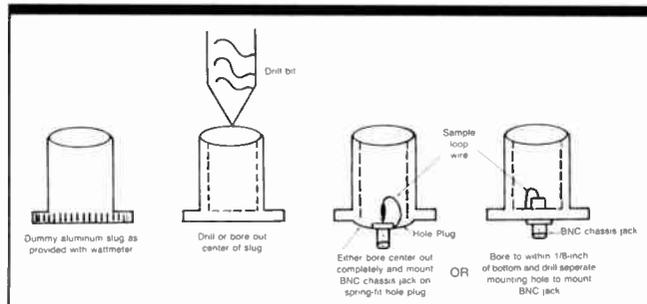
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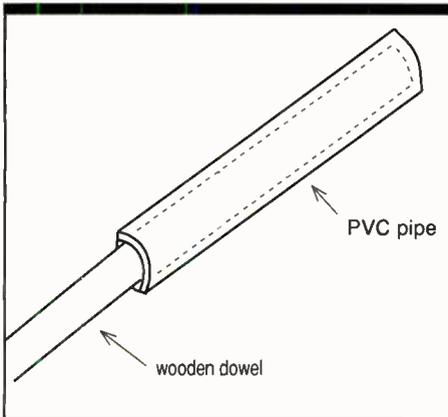


inserting a wooden dowel through the center of the PVC. A good lumber store will have the right diameter dowel to snugly fit inside the PVC pipe.

If you're mounting the RPU antenna permanently outside, don't forget to use black wire ties. The white or clear ties will

deteriorate in the sun and soon break.

Speaking of RPU antennas, if you use a preamp with your RPU or STL, consider a Radio Shack replacement to keep you running, should lightning strike. Radio Shack sells a variety of FM/VHF/UHF preamplifiers that can keep you on the air. The Catalog Number 151113A, for example, is a 20 dB preamp that specs to 890 MHz, but can be pressed to perform in the 950 STL band if needed.



Now if the lightning strikes your FM, we can't suggest a Radio Shack quick fix. However, if there's a paint store near the 'Shack, pick up a gallon of M.E.K. to clean the carbon dirt and sludge from the coax or FM antenna interbay sections.

You must use M.E.K. with plenty of ventilation—certainly not indoors. But you will see that its performance runs circles around alcohol. In fact, just a couple of passes of a rag soaked with M.E.K., and the line is clean. Compare that to isopropyl and you'll see there's no match.

Maintenance tips

While we're at the transmitter site, consider these maintenance tips. If your transmitter has a built-in phase loss or phase reversal protection relay, check to see where it's set. Usually, these are plug-in modules that have a screwdriver or knob adjusted voltage range of 190 to 270 volts.

If the relay is not set to 190 volts, a brownout can cause the transmitter to fail, since the lower voltage may be misinterpreted by the relay as phase loss. Next time you're in the rig, look to see where the setting is.

Do you ever wonder how often your dehydrator is running? Then, consider mounting an elapsed-time indicator across the compressor. These indicators can be purchased to operate on the same voltage as the compressor; however, less

expensive models may want lower voltage, or even a DC input. In such cases, the price of a step down transformer, diode, and filter cap can keep you dollars ahead of the higher voltage indicators.

Finding new uses for things is always fun. When you turn a hunk of aluminum into a useful tool, that's exciting. Here's something exciting—the next time you install a Bird or Coaxial Dynamics line section, don't throw away those dummy aluminum slugs.

Instead, drill out the center and mount a BNC connector on the end. Solder a loop of wire from the center pin of the BNC to the chassis, and you have a very inexpensive RF sniffer. Who knows what the

frequency response is since it's not calibrated, but it can be used to give you a quick relative RF sample for testing purposes.

As *Workbench* begins its third year, I'd like to extend my thanks to the hundreds of engineers who have offered to share their knowhow with their peers through this column. If you have an idea or a solution to a problem, let us hear from you. Fax your suggestion to 703-998-2966.

□ □ □

John Bisset is a principal with Multiphase Consulting, a contract engineering and special projects company. He can be reached at 703-379-1665

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Exploring the New Ownership Limits

by Ray Rosenblum

I can buy out my competition, cut expenses, and perhaps dominate the radio audience in my county with three different channels—AM talk, FM hot hits, and FM oldies.” Yes, you might if your station is in Collegetown, Pa., with enough overlapping signals from Middletown, 35 miles away and from Centerville some 40 miles distant.

These are some of the effects of the recent lowering of the Federal Communications Commission’s rules on duopoly; the old restrictions barring ownership of more than one radio station in the same service or band (AM or FM) in the same market. For isolated small towns with only two FM signals in the entire area, the new rules are still a bar to one company’s ownership of two FM stations in the same community.

A new way to count

However, if even one of the FM stations in, for instance, Collegetown, has a signal of 6kW, 25kW, or 50kW whose primary contour (5 millivolts/meter for AM, 3.16 millivolts/meter for FM) overlaps with five other primary FM signals (no matter where the contours intersect) then the possibilities for owning (or leasing) and operating two FM stations in the

same community are quite legal and proper.

In fact, the new rules say that one can make the six-signal count if either the acquiring or the acquired station has a primary overlap with any other station.

Specifically the new FCC rules provide that if the acquiring station and the acquired station have the proper number

The new rules enable consolidation of stations and program diversity

of primary signal overlaps anywhere in their patterns then the dual ownership is permissible. In our real-life example, Collegetown is a small manufacturing and college community of 16,000 people in a county of 80,000 people.

In Collegetown, the dominant 25kW FM plays current hits while operating in combination with a 1kW fulltime AM station. The AM programs adult contemporary music with lots of local and network talk shows plus sports play-by-play.

Also in Collegetown is a third FM, a 3kW station playing oldies. It has troubles—its revenues are shriveling (from \$20,000 a month to \$10,000), the owners are squabbling, the local merchants don’t love it, and the equipment requires serious improvement and upgrading to 6kW.

Seeking a solution

The AM/FM combination tried to arrange a local marketing agreement (LMA) or time brokerage with the third station for as much as \$6,000 a month.

While the negotiations dragged on, the FCC was wrestling with the precise definitions of a market for purposes of loosening the duopoly rules that have been in effect since the 1940s.

Many believe that the proliferation of FM stations in the 1980s (stemming from the many new channels authorized by Docket 80-90) contributed to the situation where hundreds of AM and FM stations have gone off the air or into bankruptcy. According to recent statistics, more than half this country’s radio stations (many in smaller cities) are losing money.

This situation probably stems not only from the increased number of competi-

tors for a shrinking ad dollar in the current recession but also from the over-leveraged status of many stations struggling to meet their debt service. This is the sad result of inflated station acquisition prices of the 1980s.

It’s logical to conclude that the bad state of radio station finances influenced the FCC’s new opening for duopoly in small and large markets. Perhaps this is a tacit admission from the FCC that it might have erred in authorizing too many new FM radio stations in the past decade.

As the time drew near this year for the FCC to issue its anticipated new rules for duopoly and LMAs, the negotiations involving the three Pennsylvania stations broke off because the partners of the third station could not agree on what to do or how to pay their debt service.

As for the AM/FM combination, the owner was worried that the pending revision in the duopoly rules would not permit him even to lease the second FM.

A new set of rules

When the FCC finally acted, it issued a summary of its rules changes on August 5th with the advice that the rules would be effective when the exact text came forth in some six weeks in the Federal Register. This limbo period lasting until September 16th delayed or even aborted a number of pending business transactions for the sale or lease of radio stations.

When the rules finally emerged from behind the bureaucratic curtain, radio station owners had to hustle to consult their lawyers and engineers. The FCC’s new duopoly rules provide that any proposed application for the assignment of a broadcast license to a competing radio station must demonstrate by an exhibit at the outset that such an application complies fully with the new overlapping contour regulations.

The proposed application must accurately depict the exact locations of all of the station transmitter sites and the exact placement of their primary (5 mV/m for AM and 3.16 mV/m for FM) contours. The applicant also has to demonstrate that the stations depicted are indeed on the air.

In the Collegetown case more than one of the 25 kW or 50 kW stations in Middletown and Centerville overlap pri-

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A New Light on DAB

► continued from page 7
budget of \$500 million. Cable television companies are spending much less, but still more than broadcasters, to research new communications technologies.

Broadcasters want in

Can broadcasters get in on the act? Instead of looking at DAB as audio with ancillary data services, maybe the focus should be on a general purpose data service that happens to include audio. DAB might then become the beginning of a new industry instead of the technological end of an old one.

What about two-way communications? Could DAB incorporate some response capability? Should broadcast licensees be permitted to use their spectrum for non-broadcast purposes?

We have some time to look at these issues. While the growth in data communications is tremendous, it's primarily between business, government agencies and research institutions. It has not yet reached the home because there are prac-

tically no home applications that can make use of the tremendous data rates these networks can provide. And there's no rush to get those networks to the home until applications exist.

DAB as proposed doesn't have to stop. Consideration by the industry, however, should be given to 1) flexible receiver and transmitter architectures to accommodate future services, and 2) a regulatory structure that allows broadcasters to take part in new digital communications services.

Many DAB transmission technologies under development are directly applicable to data transmission. It's an exciting market, not without risk, that broadcasters might be able to take advantage of if they want to.

It's an issue that will take considerable study by many creative people. When it comes to creativity, fortunately, the broadcast industry excels.

□ □ □

Steve Crowley is a consulting engineer in Washington, D.C. He can be reached at 202-223-1101; fax 202-383-2906.

mary signals with either the acquiring stations or the acquired one. As soon as it was demonstrated that six AM or FM primary contours overlapped the combined primary signals of the three stations, it was demonstrated that the resulting combination did not comprise more than 50 percent of the commercial "market signals."

Even with the new rules, AM/FM combinations are still permitted in all markets. However, for purposes of measuring concentration of ownership, an LMA (brokering more than 15 percent of a station's broadcast hours) can count the same as owning another station.

I have used the example of Collegetown to simplify the understanding of the new rules as they might apply to some situations in smaller communities. Of course, one should consult an experienced, knowledgeable attorney who practices before the FCC to get a complete explanation of all the ramifications of the new looser duopoly rules.

The new rules should provide some relief from high, redundant expenses for broadcasters who want to merge radio operations in an effort to maintain diverse services for the "public interest, convenience, and necessity."

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Promotional Money is Worth Tapping

by **Dain Schult**

The dawn slipped through the fog while the acrid odor of gunpowder and smoke wafted through the trenches. A stillness hung over the battlefield. The captain peered through the fog out into the No Man's Land that stretched before him he and surveyed the crumpled bodies of his men who wouldn't be coming back, victims of the fierce hand-to-hand combat that was sapping the strength of his forces. "Why," he thought, "was this happening?"

On the opposite end of this "dead zone" the captain from the other side surveyed the same carnage and reached the same conclusion: "This killing needs to stop. We're really supposed to be on the same side, so why is all of this carnage taking place?"

Just then the morning man walked out of the Control Room to

Ours is a business of constant compromise. When and where can you draw the line?

Here are some ideas for how to draw that line in the dirt:

1) Declare a truce with your program director. No one has to lose face here but any more of the "Can You Top This" mentality regarding promotions and there won't be anything left to save. As the human body must have both food and water to survive, radio has to have both programming and sales to survive.

Why not call it marketing-oriented-programming and "mop" up your competition for a change? But at the same time, programmers should help the sales department keep it positive (programming-oriented sales). If it isn't "win/win" between these two departments, then the battlefield will continue to be littered with your own staff and not that of your competitors.

2) After the truce has been announced, join forces with each other and try something novel: Imagine that you have no promotional budget, period.

Anything you have in the way of promotions you have to create from scratch.

Then operate as if this is really the case.

Is this the scariest thought yet or does this possibly get your creative juices flowing, eager to rise to the challenge?

Money is no answer

Would you create new marketing opportunities on-air and on the street or would you cop out with merely trading for everything you wanted to give away on-air?

Through the years many of us have been lulled into the mindset that somehow more cash thrown into promotions



get a cup of coffee, walking right through the battlefield, being careful not to step on any of the dead bodies littering the ground... just the beginning of another day of conflict between Sales and Programming regarding promotions budgets.

Something has to give

Advertisers are pulling up short of former years' ad budgets. But they want more merchandising promotions to cover the difference. Programmers guard their on-air product zealously and want total control of promotions budgets. What's a harried general sales manager to do?

Whether you turn the graphics on their side or upside down makes no difference, revenues for many stations will be flat at best and closer to down than up. Sure there are stations out there making money but since the Freedom of Information Act doesn't apply to them we may never know who they are or how they're doing it.

Just the same, promotional money is slipping away from stations. Station infighting is sapping the strength of radio in much the same way the recession has effectively kept the U.S. from taking the dominant position of power in helping Eastern Europe and Russia grow into democracy.

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and then thrown on the air will overcome every problem a radio station faces. Now that the gravy train has derailed for many stations the new reality is that quite a few stations are going to begin working this suggestion whether they want to or not.

Anybody can do big money giveaways on the air as a mask for lackluster programming or ratings-driven sales. The true mark for the successful station in the Nineties will be reaching or retaining profitability without sacrificing product quality or market identity.

continued on page 20 ►

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Promotional Money: Worth Tapping

► continued from page 18

In the "golden years" of 1930s radio, advertisers didn't just buy spots, they bought shows. They were sponsors in the true sense of the word. We need more sponsors and fewer spots.

Rather than try to stem any perceived tides of advertiser promotional money slipping away by dropping rates any lower or

picking the adds each week and the overnigher still wearing cut-offs will be accompanying sales people on calls. But until programmers become more marketing-oriented and sales people become more product-sensitive, money is going to continue to slip out the door and not just from the sales end.

What a great moment in time to reinvent history by being creative while everyone else sticks with what worked for them in 1986. What a wonderful opportunity to rediscover the lost pleasures of creativity in all of its forms within both sales and programming.

But will you do it? Are you willing to risk being "different" to make money?

This requires thought and then the willingness to execute new ideas. It also means breaking away from the hard mentality to which radio has fallen.

Because the decade of 1990 is quickly gaining the moniker of "Lean and Mean," it's time to implement "survivalist radio."

Unless the film has snapped in two and the screen is suddenly blank inside your "Theater of the Mind," the opportunity exists for radio that is creative, entertaining and profitable all at once.

□ □ □

Dain Schult is a radio consultant based in Atlanta. Now principal of Radioactivity Inc., he has more than 20 years of experience in all facets of the radio business. He can be reached at 404-767-1840.

Success means reaching profitability without sacrificing product quality or market identity.

offering to tie up more air time with product giveaways that have a response rate lower than junk mail, why not sell the sizzle and leave the steak in the freezer awhile longer.

Creative marketing

Through the lost art of creative radio marketing, the general sales manager working with the program director can literally craft "something from nothing" by tying product giveaways with remotes and by *imagineering* remotes into events worthy of listener's patronage. It may well be possible to draw together several advertiser promotions simultaneously.

The misconception needs to be exploded that if the two departments really work together the sales people will soon be

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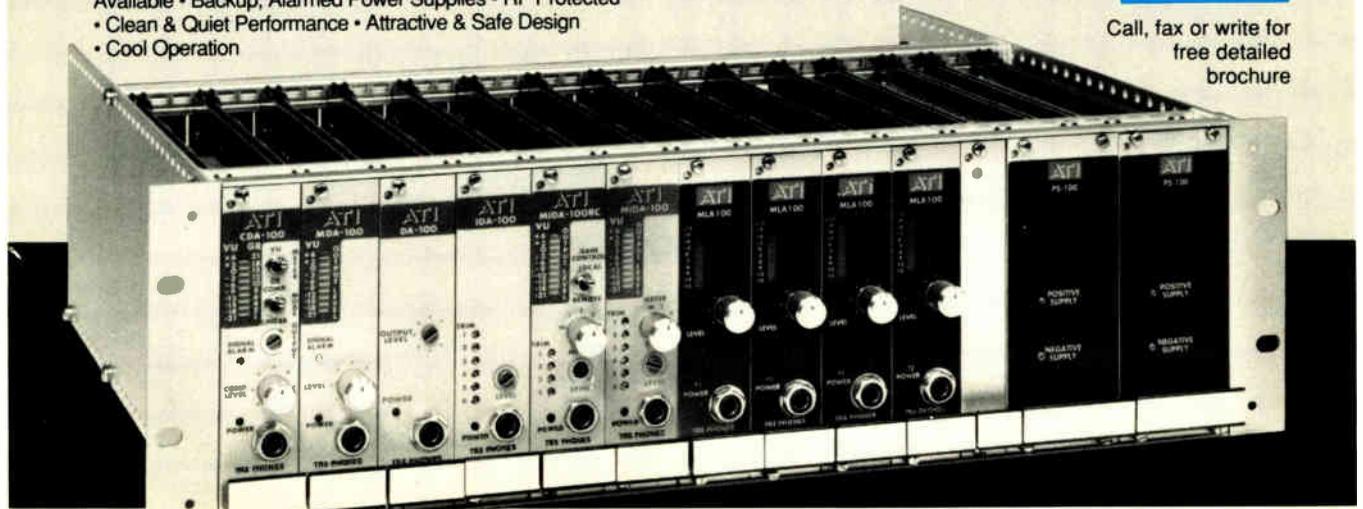
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1992 Mandate: 'Out with the Old'

▶ continued from page 6

that seemed on the rise over the past couple of years was not.

You could even build a case for the hot trend not just being personalities, but the whole genre of "personality-based radio." Consider what's going on at Mel Karmazin's Infinity Broadcasting. Infinity has just signed Washington, D.C.'s Greasemar, who will move to Los Angeles; his show will be simulcast eastward to cities across the country—a West Coast Howard Stern-type thing.

Infinity seems to be establishing a de facto national network for DJs whose following can be argued to be larger than you might expect based on their material. It's the *personalities* that are drawing the listeners in.



Infinity's Howard Stern proved shock-talk sells.

Of course, not just anyone can listen to Stern, the Greaseman or jocks like them for very long. I'm not sure if we're talking about a narrow, deep niche or a broad, shallow niche, but these personalities attract the kind of "out-law" mentality that pervades the rock genre. They're not only air personalities, they're rock stars.

I like the trend.

It harkens back to the personality days of '50s radio, and it's a step away from the soporific style of many AOR jocks or the overblown Big Voice sound of AC air talent.

★ ★ ★

Whether you love him or just love to hate him, one of the hottest personalities in radio in 1992 was Howard Stern. The N.Y.-based jock definitely made news, both with his national urban invasion and his brushes with the FCC.

No, it wasn't all smooth sailing this year for Stern, who saw a backlash against his humor in the form of complaints lodged in Las Vegas and hundreds of thousands of dollars in fines levied against Infinity by the FCC.

Commissioners went so far as accusing Stern of "abusing" his First Amendment rights and suggesting a trip to the woodshed for correction. A proposed sale of Cook Inlet stations to Infinity was even delayed, at least in part attributable to the FCC's actions against Stern.

So, if Howard Stern was hot, who was not? Well, Mark and Brian, I think, peaked in 1991 with their Marconi Award for major market talent. In 1992 the team hosted the Marconis in New Orleans, but only as relief pitchers replacing Tom Snyder and Deborah Norville.

Among the other hot/not combos this year, some lucky folks have found themselves on both sides of the fence. Jay Leno's monologues have been picked up for distribution by Unistar, for example, making him hot for radio. Judging by the tepid response his late-night variety show has met, however, he's not

so hot on TV.

Ditto Madonna, whose book of erotic photographs was the rage in 1992 ("Sex" *does* sell, apparently). Unfortunately, her latest album, "Erotica," didn't fare as well. The best Rolling Stone could say about the release was that it was every bit as cold and crass as her detractors claimed, but somehow that came across as a *good* thing. Hmm.

Billy Ray Cyrus also has a place on both sides of the fence. His souped-up honky tonk "Achy Breaky Heart" was a certified crossover hit. The follow-up single "Some Gave All," however, while going to Number One on the country charts, didn't have the steam to keep the Cyrus machine rolling. He was not a one-hit wonder, but his pop future is uncertain.

Finally, we have Sinead O'Connor (her second year on my list), who stunned the audience of NBC's Saturday Night Live by destroying a photo of the Pope, topping it off with a cheery, "Fight the *real* evil." You've got to love that Sinead—a real publicist's dream. I mean, *zero* public relations savvy.

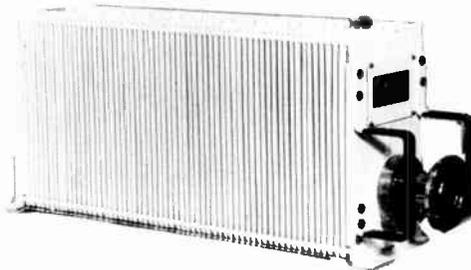
I wonder whether this latest flap managed to put the screws to her album "Am I Not Your Girl?" After all, the release debuted at Number 27 to fairly good critical reviews, then plummeted to Number 198 only two months later. Fame is a fleeting thing...especially when you're dissing the Pope.

That's 1992 in a nutshell. Well, maybe not—there are more things on heaven and earth, Horatio, than are dreamt of in our philosophy, and that's no lie. At least there were some smiles along the way.

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Assess Gear Needs Realistically

by **Thomas R. McGinley**

It used to be that successful stations making good money could buy the latest high-tech gizmo box that promised to give them that elusive "competitive edge" and not even worry about the cost. Those days may be forgotten history.

Will the purchase provide a clear benefit to your air product and ratings?

The advent of the recession, declining station revenues and values, ever increasing competition, and the necessity of becoming lean and mean has forced most stations to be very careful with their shrinking capital equipment budgets. Before purchasing any new broadcast equipment, the chief engineer, program director, and general manager should consider the following questions and guidelines:

A clear benefit

The first and foremost question to ask when buying anything for the radio station is: Will it provide a clear benefit to the air product and improve the prospects for increased ratings and revenue over the long term? Answering this question will help you separate the necessities from the niceties or what you really need from what you want. Ask it every time you consider buying anything to control impulse purchasing.

There are a lot of "nuance boxes" on the market which may or may not make a difference for your station. Since non-technical managers and even program directors often control at least part of the equipment buying process at many stations, it is wise to test drive any equipment in this category first before you buy.

I'm talking about all kinds of processing gear, microphones, special effects boxes, etc. Another category where this is particularly important is much of the new digital equipment including digital audio workstations. Get a one- or two-week demo and try it in your station so that you may evaluate

whether it's worth keeping.

Most equipment vendors allow free demos although some may require a deposit first if you are not an established account. You may also have to pay closer to the retail price if you end up keeping the product. If you pay cash in advance for any equipment to get a discount, be sure and

confirm a written understanding with the vendor in advance that if it doesn't work well for you, you may return it for a refund.

tions and other trade shows, as well as by reading **RW** and other trade magazines, and by networking with other station engineers. Networking can be a superb resource. Just like program directors, and general managers, successful chief engineers and contract engineers are regularly picking the brains and the judgement of other chiefs they know and respect.

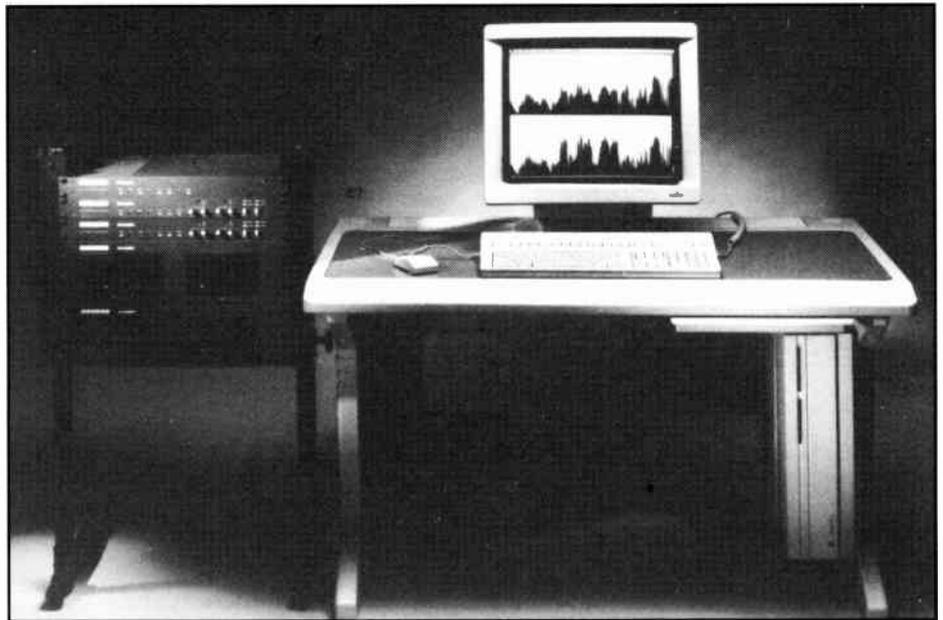
After you have identified a *bonafide* equipment need to solve a specific problem at the station, ask these additional questions to avoid buying something you wish later you hadn't:

✓Do you really need to buy it now or could it wait until a more appropriate time when cash flow is a bit healthier? Always prioritize any list of equipment needs so that you acquire the most important items first.

✓Does the equipment come from an established vendor or manufacturer who can honor a full warranty should something go wrong? Will the vendor really

Rely on your sources

When buying necessities like consoles, tape decks, telephone gear, transmitters,



Can you teach your staff digital audio production?

and antennas, getting the most competent advice and judgement is vital. This is where a knowledgeable and experienced chief or contract engineer becomes invaluable. Radio engineers gain such expertise by constantly searching for new and better products and ways of solving problems.

Engineers enhance their knowledge by attending SBE meetings, NAB conven-

support your needs and concerns after the sale? Some vendors are much better at this than others. Big doesn't always mean better. If a vendor does a good job for you on one deal, reward them with return business. They love customer loyalty and will be more willing to cut better deals and let you have demo gear longer if you're a good customer. ►

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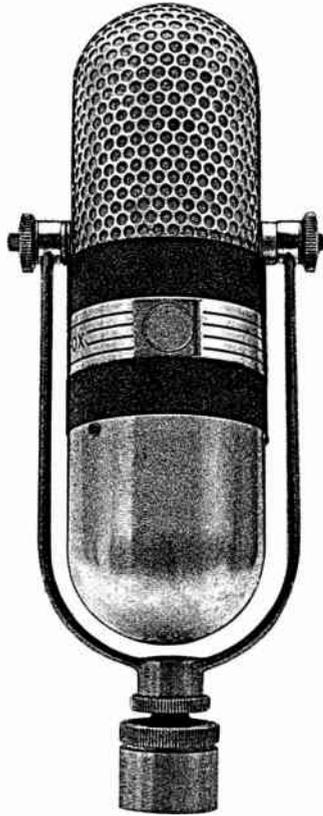


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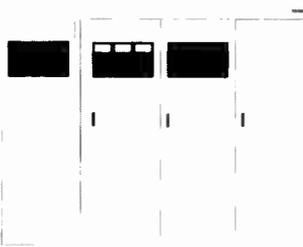
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World Radio History

✓Is the equipment being successfully used by other radio stations similar to yours? New equipment is being introduced to the marketplace everyday. Some of it has not been thoroughly tested for reliability, durability, or suitability. This is where networking really pays off. While the PD may want to be the first in the market to have that super ultra digital audio processor on the air,

A good piece of equipment should deliver at least five years of trouble-free service.

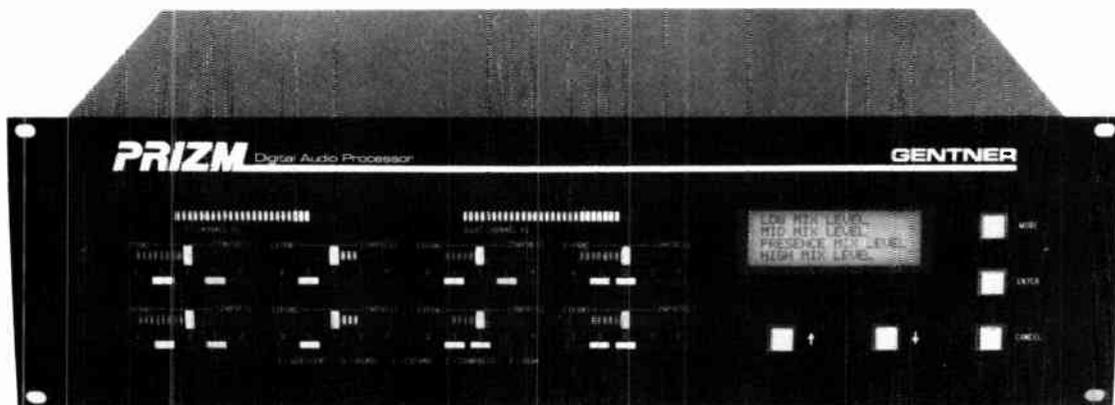
putting such a piece of gear on the air without thorough evaluation to determine if it is really better than what you already have may actually be counter-productive.

It is usually better to let others be the guinea pigs with brand new equipment and then buy it if you really need it after it has been debugged and has established a reliable track record. This may be the single most important guideline to follow to avoid buying equipment which may become quickly obsolete.

✓Does it conform to industry standards regarding input/output interfacing and connections? This is especially important for digital gear as some of it has not been compatible with other digital gear. The western world appears to be gravitating towards an AES/EBU standard but a universal digital standard has not yet been adopted.

✓If it is computer based hardware, are future improvements available via end user software upgrades? Is the hardware platform a known standard available from various vendors? For example, you may not want an automation system or digital workstation which uses non-standard proprietary hardware which can only be supplied and supported by one vendor who can hold you hostage to prices and spare parts availability.

✓Will it give an adequate return on the initial money invested? Any good piece of broadcast equipment should deliver at least five years of trouble-free service if properly used and maintained. Your accountant will want to depreciate capital items (over \$750) over a five- or seven-year life span. Any larger item



Will digital processing enhance your audio chain?

should last at least that long. Smaller items are usually expensed. Be sure that anything you buy will survive its own depreciation schedule.

Will it provide long term improvement or is it likely to be only a short-term fix? It is generally wise not to put big dollars into items that are format- or personnel-specific, otherwise they may become instantly obsolete or unused when the format changes or when the morning show or production man quits.

Should it be fancy?

Such equipment includes items like satellite receiving gear, remote broadcast equipment, automation systems, and keyboard samplers, and may include digital audio work stations. The general manager's biggest fear is buying a complicated piece of equipment or system that only one person wants or will use, only to have it gather dust when that person leaves.

There are many sources for good used equipment which may be completely suitable.

When buying such an item, you have to make the commitment based on the overall station receiving benefit from it. Most of the jocks and production people will simply have to learn to use it. Sometimes it may be smarter to rent or lease such gear when needed over short time periods rather than buying. Some of the larger vendors have limited term leasing programs which allow you to sell the gear back to them with

certain provisions.

Solving equipment needs around the radio station doesn't always have to mean buying new. There are many sources for good used equipment which may be completely suitable and more than adequate. Most stations have a whole room full of gear they are no longer using. One station's junk may be another station's salvation.

Trade for used gear

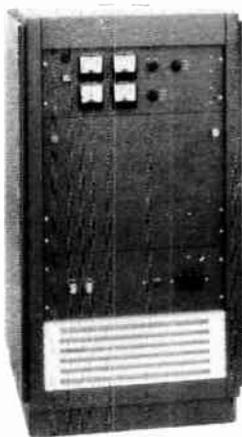
Chief Engineers should be able to take advantage of their networking to identify

may do better, with items which have good resale value, to sell them by yourself in one of the trade magazine used equipment classifieds. Some of the gear you acquire on this basis may already be obsolete by industry standards but if it solves a real problem at a fraction of the price of a new unit, you could become a hero with the owners.

□ □ □

Tom McGinley is director of engineering for Cook Inlet Radio Partners, as well as technical advisor to RW. He can be reached care of RW.

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Are Your Call Letters Really Yours?

by Mike Meeske

Choosing call letters for your radio station can present problems you might not have envisioned. Consider the dilemma of an FM station owned by Liggett Broadcasting of Fresno, California.

In 1990, Liggett adopted a new "Z-Rock" format and changed the call letters from KCLQ to KZRZ. But, KRZR-FM, Fresno, accused Liggett of trademark infringement and obtained a temporary restraining order allowing Liggett to use the call letters KZRZ just once an hour, and restricted Liggett from using KZRZ in advertisements and promotions pending a full hearing on the case.

To avoid further legal action, Liggett changed KZRZ to KFRZ, only to have a Fresno AM station, KFRE, object. Faced with another lawsuit, Liggett chose a new set of calls, KZZF.

Call letter history

Prior to 1983, the Federal Communications Commission approved all call letters and resolved disputes involving the use of similar calls in the same listening area. The FCC's authority stemmed from the belief that the government owned the call letters.

Applicants for new stations or licensees seeking call letter changes could submit a list of call letter choices to the FCC. The commission decides if a given combination would cause confusion with the call letters of an existing station or if the call

letter combination was in good taste.

In 1983 the FCC ended its handling of call letter concerns, and recommended that call letter disputes be settled by local courts under state laws of unfair competition.

Meanwhile, WSM, the famous "Grand Old Opry" station in Nashville, Tennessee, asked the Patent and Trademark Office to register its call letters as trademarks, call letters it had used for 25 years. The Trademark Office ruled that WSM owned its call letters, not the FCC, entitling WSM and all stations to register their call letters for trademark protection.

Symbols, such as call letters, have become more valuable, and are identifiers that are worth protecting.

Additionally, in 1987 the FCC decided to allow identical call signs if stations operate in different services and are not commonly owned or located, as long as the station seeking a call acquires written consent from the station already using the similar call sign.

Thus, an FM station in Utah would have to get written consent from a TV station in Ohio if it wanted to use the same call letters as the TV station.

Trademark protection

Trademark law enables a business to obtain exclusive use of a symbol in a given area. This permits a station to protect its reputation in the marketplace by prohibiting a competitor from using similar or identical call letters.

Trademark protection hinges on whether the public is likely to be confused by similar marks. For example, when people see the Golden Arches they think of McDonald's, not Burger King.

And if people hear your station's call letters and slogan, they should associate the symbols with your station and its programming, and not a competitor. Thus, symbols such as call letters become valuable identifiers that are worth protecting.

Court cases

A number of stations have gone to court since 1983 claiming infringement on their marketing slogans. In two cases, courts ordered broadcasters to stop using call letters that were similar to those used by other stations serving the same or overlapping areas.

In one case, WMEE (FM), Ft. Wayne, Indiana, went to court when WADM (FM), Decatur, Indiana, a station whose signal overlapped with that of WMEE, changed its call letters to WMCZ. A federal court concluded that listeners likely would be confused by the similar call letters and ordered that use of WMCZ be discontinued.

In a second case, the call letters WBOT-TV were found to be confusingly similar to WBOC-TV. On the other hand, a court refused to grant an injunction against WVFT-TV after a public radio station WVTF-FM claimed infringement.

Cases have expanded beyond call letter conflicts to include disputes over other identifiers, but the outcomes have varied.

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KABC (AM), Los Angeles cried foul when KFI (AM) began using their slogan "talk radio." KABC had used the slogan for 17 years, and the court ruled in favor of KABC, saying that Los Angeles AM listeners associated "talk radio" with KABC.

In two other cases, courts ruled that even though stations used slogans that were identical, injunctions would not be granted because the public was unlikely to be confused.

One case arose when two Chicago FM stations used the identifier, "FM 107." A district court granted an injunction against the allegedly offending station, but an appeals court ruled that "FM 107" referred to a utilitarian description of a dial position, one that was too generic to

Because broadcast signals cross state lines, federal registration provides protection in all states.

be trademarked. In the second case, a New York court held that the public would not confuse two radio stations when both used the slogan "Music Marathon."

Station identifiers

Taken together, the cases decided up to now point to the following as being important in deciding station marketing slogan disputes:

- the degree of similarity of the symbols;
- the similarity of program services presented by the stations;
- the degree of care listeners likely will exercise in responding to similar symbols;
- the area and manner of concurrent use;
- the strength of the primary symbol as determined by advertising and promotion of it;
- the degree of actual confusion among listeners;
- the intent of the infringer to "palm off" his mark as that of another.

If, in adopting an identifier, an infringer is aware of a similar symbol already in use in the area, and proceeds despite objections, intent can be a major factor.

Trademarking a symbol

Stations should register their symbols with the U.S. Patent and Trademark

Office. Because broadcast signals cross state lines, federal registration provides protection in all states, and prevents another station from obtaining superior rights by starting to use the mark after the date a station first registered it.

Symbols can also be registered in individual states, but the protection is inferior to federal registration. Federal registration has the added advantage of permitting a would-be applicant to register a symbol six months prior to beginning use of the mark.

Broadcasters choosing new calls or slogans should study the identifiers of competing stations to avoid the possibility of infringing on another station's trade-

mark. In addition, broadcasters need to be alert to changes in identifying symbols used by a competing station, and should be prepared to challenge use of a symbol similar to their own.

Call letters and associated identifiers are the most prominent and unique feature of a station in achieving ratings and audience loyalty. As a result, care should be taken to prevent the public from being confused by similar symbols.

□ □ □

Mike Meeske is a professor and Head of the Radio/TV Division at the University of Central Florida. He is also the co-author of a textbook titled Copywriting For The Electronic Media.

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EDITORIAL CALENDARS

Each month, **Radio World** examines a different category of radio equipment. Articles are solicited from users and manufacturers.

BUYERS GUIDE

January	February	March	April	May	June
Test & Monitoring Equipment	Digital Workstations	Automation Equipment & Software	AM Transmitters & Exciters	Antennas, Towers & Cables	Program & Studio Audio Processing
July	August	September	October	November	December
Microphones & Monitors	Consoles & Studio Furniture	Production & Broadcast Services	STL, Remote & Telco Equipment	FM Transmitters Exciters & SCAs	Studio Source Equipment

RUNNING RADIO

January	February	March	April	May	June
Sales Strategies	Research, Sales & Programming	Engineering Primer for Management	Networks	Ad Agencies & Radio Reps	Station Promotions Sports & Event Marketing
July	August	September	October	November	December
News Services/Delivery Systems	Program Syndication	Brokering & Financing Station Transactions	Format Trends	Business Outlook & Stations Operations	Incentive Selling, Merchandising

Running Radio is a special monthly section for radio station owners and managers. From plain-language explanations of technical issues, to applications-oriented stories about station services, Running Radio is a manager's educational forum. The newly established Running Radio editorial calendar also takes special aim at more narrowly focused points of interest: station promotions, incentive selling, making best use of networks, and more. Historical perspectives on radio, programming trend analysis, and Charles Taylor's USAirplay round out the section.

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Radio Chronicled at the Pavek Museum

by James T. Wold

A visit to the Pavek Museum of Broadcasting is always fascinating. The museum houses a collection of rare items from the early world of communications.

The institution was created by the late Joseph R. Pavek, an ardent collector and amateur radio operator. Wireless communication always fascinated Pavek who received his first call letters, WOEP (Old Empty Pockets) in 1933.

The Pavek Museum of Broadcasting is one of a kind, according to volunteer Executive Director James Wychor of the Minnesota Broadcasters Association. "This museum has one of the largest collections of broadcast equipment in the country."

How it started

The beginnings of the museum can be traced to 1919 when, at the age of 12, Joseph Pavek built his first crystal set and a Model T Ford spark coil transmitter. Pavek was born Feb. 18, 1908, the day the deForest Audion was patented. He passed away in June 1989, but if he were still alive he would still be adding to his vast collection of communication items.

Pavek began collecting broadcasting artifacts while traveling about the

Midwest on business in the 1940s. It was not until the 1970s—when people realized the value of vintage radio equipment and artifacts became more difficult to come by—that Pavek slowed the pace of his collecting.

Joseph Pavek turned his early interest in radios into a business repairing automobile radios in 1933, all the time continuing his hobby of amateur radio.

During World War II, when Joseph Pavek taught radio training for the Army Signal Corps, he often felt it was a waste to salvage radios for metal. With the need for metal during the war people were encouraged to scrap their old wireless radios for the metal. "They were destroyed," said Pavek in a 1988 interview. "It was a shame to destroy them, but it was a necessity, of course."

Pavek promised himself that after the war he would continue to collect vintage radios and other equipment. In 1945 he founded the Twin City Bolt and Supply Company, later Pavek Paint Products, an automobile parts and refinishing business. He retired in 1975 to concentrate on his radio collection.

A unique legacy

The Pavek Museum of Broadcasting is a testimony to the fulfillment of Pavek's aspirations, dreams and efforts. Joe devoted much of his lifetime to collecting, preserving and documenting the history of wireless technology and broadcasting. It was his dream that by sharing his collection with others they would learn and work for the advancement of electronics and broadcasting.

In 1985, after failing to find someone who would take over his collection with the conditions of preserving the equipment and creating a viable institution where children can learn about the history of radio broadcasting, Pavek put the collection up for auction.

Earl Bakken, inventor of the implantable pacemaker and founder Medtronic, Inc. came across the ad in the Old Timers Bulletin, a publication of the Antique Wireless Association. Interested in preserving the collection, Bakken and the Minnesota Broadcasters Association (MBA) joined Pavek in forming a non-profit organization that serves as an umbrella for the museum.

The museum houses radio sets, components, vacuum tubes, transmitters and receivers, broadcasting station equip-

ment, ham amateur equipment, telegraph equipment, microphones, speakers, antennas and television sets. All these items filled Pavek's first museum which was housed in the basement of his Minneapolis auto parts business.

After decades of categorizing, arranging, cataloging, and labeling his prized possessions, Pavek opened the museum in October 1988, on the fiftieth anniversary of the original "War of the Worlds" broadcast.

More than one collection

Pavek named his museum "The Wonderful World of Wireless Museum." In 1989 the museum's name was changed to the Pavek Museum of Broadcasting, in honor of its founder.

Steve Raymer, museum director and present curator, is always ready to give someone a tour of the museum. He came to the Pavek Museum in 1988. He is a long-time collector of vintage radios and related equipment.

The museum holdings consists primarily of three collections. The bulk of the museum's contents is the "Pavek Collection," which documents the history of radio and television broadcasting. "This is one of the most extensive collections of communications equipment from the period of 1900-1950; along with memorabilia and books," says Steve Raymer. One interesting room reconstructs an actual broadcasting control room of a vintage 1940s-1950s radio station.

The "Jack Mullin Collection" documents a "Century of Sound Recording." From the original Edison tin foil machine to talking pictures to the technical revolution of magnetic recording, the collection preserves many of the cultural achievements in entertainment technology of the past 100 years.

The third collection at the museum, and perhaps the most important to the Minnesota region, was put together during a 20-year period by area resident Charles Bradley. It is simply called the Minnesota collection and contains radios built by every one of the radio manufacturers that operated out of Minnesota in the early 1920s.

Today the Pavek museum has become a tourist attraction, a meeting place for communications classes and seminars, a focus of nostalgia, and a resource for students, scholars, business and industry and the general public.

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World Radio History

FCC Rewrote Political Rules in 1992

by Harry Cole

To paraphrase Mr. Zimmerman, the Bard of Hibbing, the political rules they are a-changin'. With the election year just behind us, the whole issue of political advertising, lowest unit rate charges and so on have been on the minds of most broadcasters recently, and for good reason.

The importance of complying with the political rules cannot be overstated. As you may be aware, candidates in a number of states have initiated lawsuits against significant numbers of stations based on the claim that the stations failed to comply with the lowest unit rate rules.

After doing some investigating of its own, the FCC apparently concluded that industry compliance with those rules, as a general matter, left much to be desired.

What's in a use?

At any rate, here is a recap of some of the major changes recently effected in the political rules:

- *Redefinition of "use."* The political rules don't come into play unless the spot to be aired constitutes a "use" of the station's facilities by the candidate. Under the old rules, a "use" was an appearance in which the candidate was actually recognizable.

Under the new rules, a "use" occurs when a program or commercial message (a) contains an actual appearance by the candidate and (b) "is controlled, approved or sponsored by the can-

didate or the candidate's authorized committee after the candidate becomes legally qualified."

This change in the definition of "use" has several obvious implications. First, it eliminates the need to worry about the airing of old musical recordings, movies, television appearances, etc. which were produced long before the candidate ever thought of running, and which the performer had little or no



The Bush FCC rewrote the rules on political advertising.

control over, in terms of content.

Second, a spot put together by a political group supporting a political candidate, and which contains an appearance by the candidate, will only be a "use" if the candidate "controls, approves or sponsors" the spot.

Appropriate provision for this consideration should be made in the station's political time contracts, and the station's staff should be prepared to undertake additional investigation in order to be sure of the candidate's position with respect to the spots.

Bear in mind that the definition of "use" entails more than just the lowest unit rate question. The law prohibits stations from censoring a "use" in any way. Because the station cannot modify the content of a "use," the law also immunizes the station from any defamation liability in the event that a "use" contains libel or slander.

- *Application of Lowest Unit Rate.* In addition to redefining "use," the Commission has also tinkered in a number of ways with the calculation and application of a station's "lowest unit rate" (LUR).

Let's start with the basics. LUR is the price political advertisers are to be charged for uses during election periods. "Election periods," of course, include the periods within 45 days of a primary and 60 days of a general election. The simple, rule-of-thumb definition of LUR is the lowest rate the station charges a conventional commercial advertiser for the purchase of an equivalent class of commercial time.

Even in the past, however, that rule-of-thumb really only skimmed the surface. As you might expect, there were a fairly wide variety of "gotchas" that came into play. Whether through ignorance of those gotchas, or for some other reason (one possible reason being intentional flouting of the LUR requirement by some licensees), the Commission determined that a sizable number of licensees were not actually giving candidates the lowest

continued on page 36 ►



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The Aphex Audiophile Air Chain allows maximum loudness and modulation while maintaining the natural dynamic feel of the program. Quick and easy to set up, it maintains the same high quality regardless of the type of programming or who is controlling the board. By contrast, other processors need to be tuned for almost every song, and achieve loudness by homogenizing or crunching to the point of pain.

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CANADA—Erikson Pro Audio; CZECHOSLOVAKIA—Audiopolis Studio Systems;
DENMARK—SC Sound; EGYPT—Alpha Audio; FINLAND—Nores; FRANCE—Cineco;
GERMANY—AKG Acoustics; GREECE—Omikron.; HOLLAND—TM Audio;
HONG KONG—Ace; HUNGARY—ATEC; INDIA—Pro Sound;
INDONESIA—PT Multi Audio Perkasa; ISRAEL—Sontronics;
ITALY—Audio Equipment; JAPAN—Otaritec; KOREA—Young Nak So Ri Sa;
MEXICO—Audioacustica y Electronica; NEW ZEALAND—Maser Broadcast Systems;
NORWAY—Audiotron; PERU—ABBA Trading; POLAND—Europe Sound System;
RUSSIA—MS-MAX; SAUDI ARABIA—Halwani Audio; SINGAPORE—Auvi Private;
SOUTH AFRICA—Tru-Fi Electronics; SPAIN—Lexon; SWEDEN—LEAB;
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A Global Demand for American Radio

by Marjory Roberts Gray

Each week, a dozen radio stations in Nigeria air a little piece of America, thanks to the local Pepsi truck drivers.

Along with soda, the drivers drop off compact discs that feature programs such as American Top 40. The stations air the Pepsi-sponsored programming services of Radio Express, a Los Angeles-based syndicator, distributor and producer of American music programming.

Though unusual in the delivery, arrangement through barter-

ing illustrates the breadth of international interest in American programming and the eagerness of U.S. companies to meet the growing demand.

"Whatever it takes, we deliver," says Tom Rounds, president of Radio Express. "All of the countries we deal with are at different points in the evolution of radio." Radio Express not only provided the programming in the Nigerian deal; it also donated 12 CD players.

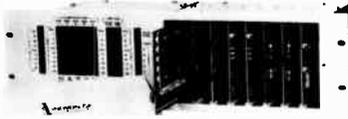
American-style radio owes its worldwide popularity largely to deregulation in the nations of the European Community and in

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Company	Address	Programming Offered	Delivery System	Contact	Circle Reader Service No.
ABC Radio International (Satellite Music Network)	125 West End Ave. New York, NY 10023 U.S.A.	Music News Entertainment	Reel to Reel Cassette Digital Audio Tape, CD	Larry Green Phone: +1-212-456-5152 FAX: +1-212-456-5705	104
Business Radio Network	888 Garden of the Gods Rd. Colorado Springs, CO 80907 U.S.A.	Interviews on business topics daily market wrap-ups, business specials	Satellite	Skip Joeckel Phone: +1-719-528-7040 FAX: +1-719-528-5170	61
CBS Hispanic Radio Network	51 W. 52nd St. New York, NY 10019 U.S.A.	Sporting events, holiday entertainment specials, political analysis	Satellite	Jerry Villacres Phone: +1-212-975-5367 FAX: +1-212-975-5384	180
CRN International	One Circular Ave. Hamden, CT 06514 U.S.A.	travel, ski and tennis reports	Variable	Patrick Kane Phone: +1-203-288-2002 FAX: +1-203-281-3291	48
Halland Broadcast Service	1289 E. Alosta Ave. Glendorara, CA 91740 U.S.A.	Music of the 50s, 60s, 70s and 80s	CD libraries	Steve Steinberg Phone: +1-818-963-6300 FAX: +1-818-963-2070	90
MediaAmerica, Inc.	11 W. 42nd St., 27th floor New York, NY 10036 U.S.A.	CHR; AOR (King Biscuit Flower Hour); Jazz/New Age; Urban; News/Info	Mostly CD, some Reel-to-Reel	Jeanne DeSanctis Phone: +1-212-302-1100 FAX: +1-212-302-6024	74
Pollack Media Group	984 Monument Street, #105 Pacific Palisades, CA 90272 U.S.A.	Consults client stations on programming, marketing and promotion	N/A	Carol Holt Phone: +1-310-459-8556 FAX: +1-310-454-5046	183
Premiere Radio Networks	15260 Ventura Blvd. # 500 Sherman Oaks, CA 91403 U.S.A.	"Plain Wrap Countdown" (entertainment), "Reflections" (Motown), specials	Tape, CD Satellite	Ed Mann Phone: +1-818-377-5335 FAX: +1-818-377-5333	19
Pro Audio USA	2020 Pennsylvania Ave. # 420 Washington, D.C. 20006 U.S.A.	"Top Hits USA"; 17-19 songs per disc; Adult contemporary, CHR or country format	CD	Eric Hompe Phone: +1-202-625-0804 FAX: +1-202-625-0878	119
Radio Express	3575 Cahuenga Blvd. W., # 390 Los Angeles, CA 90068 U.S.A.	Custom designed "networks"	Variable CD, Satellite, etc.	Tom Rounds Phone: +1-213-850-1003 FAX: +1-213-874-7753	91
Radio Vision International	7060 Hollywood Blvd. Ste. 525 Los Angeles, CA 90028 U.S.A.	Long-form music programming; concert format	Satellite, Tape	David Wylar Phone: +1-213-469-5750 FAX: +1-213-469-5599	47
Superadio Networks	225 Tumpike Rd. Southborough, MA 01772 U.S.A.	Programs form "Super Country" to top-10 "City- FM"	Satellite	Kristen Carlson Phone: +1-508-480-9000 FAX: +1-508-0344	33
Valentino	500 Executive Blvd. Elmsford, NY 10523-0534 U.S.A.	Production Music and Sound Effects	CD libraries	Thomas Valentino Phone: +1-914-347-7878 FAX: +1-914-347-4764	170
Westwood One International	8965 Lindblade St. Culver City, CA 90232 U.S.A.	CHR, adult contemporary, retrospectives, rock, country, urban, humor, concerts	Mostly CD	William Stoller Phone: +1-310-204-5000 FAX: +1-310-840-4054	171

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706 Digital Synthesis Stereo Generator \$3120

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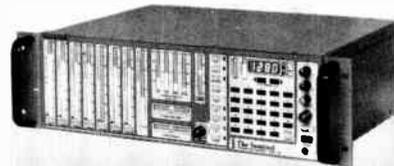
705 Basic FM Stereo Generator \$1375

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FCC Rewrote Political Rules

► continued from page 32
unit rate to which they were entitled.

New rules for LURs

Accordingly, in order to be perfectly clear about how that rate is to be calculated, the Commission has adopted a new rule dedicated exclusively to that topic.

The new rule—Section 73.1942—should be required reading by anyone who has anything to do with the sale of broadcast time. Here are some of the highlights:

- *Classes of time.* Historically, a station's lowest unit rate has been allowed by the Commission to vary according to the class of time involved. That is, a station could charge a higher rate for some classes (say, fixed position spots) than for others (say, run-of-schedule).

However, the FCC's precise view of what constituted a "class of time" was not formally written down anywhere. Now it is. The new rule specifies that "the Commission recognizes non-preemptible, preemptible with notice, immediately preemptible and run-of-schedule as distinct classes of time."

Additionally, stations may define their own reasonable classes of immediately preemptible time "so long as the differences between such classes are based on one or more demonstrable benefits associated with each class and are not based solely upon price or identity of the advertiser."

Valid rationales for such distinct classes of immediately preemptible include varying levels of preemption protection, scheduling flexibility, or associated privileges (e.g., guaranteed time-sensitive make-goods).

- *Fire-sale charges.* If a station sells any of its inventory for reduced prices at the last minute, such charges must be included in the calculation of lowest unit rate for all time sold to candidates during the period or daypart or program (regardless of when the candidates originally bought or ordered their spots). However, such calculation establishes the lowest unit charge only for the period, daypart or program in which such fire-sale spots were actually broadcast.

This means that if a station finds itself with some unsold time at the last minute

and, in order to salvage some payment for that time, sells it at a fire-sale price, a candidate is entitled to that same price for any class of availability in the time period/program/daypart in which the first fire-sale spot aired.

- *Treatment of "packages."* Under the old rules, when a station offered commercial advertisers special rates for the purchase of a "package" of different classes of availabilities, a candidate seeking to qualify for the package rate had to buy at least one unit of each class of availability in the package.

That has now been changed. The new rule is that package sales to commercial advertisers must be broken down with allocations of prices for the various components of the package, and the candidate is entitled to buy any of the components at the allocated price. If the station does not come up with a per-component allocation, the price of any particular component for lowest unit rate purposes is calculated by taking the average price for all items in the package as a whole.

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these rules operate as they are intended to. The FCC is now requiring all stations to make extensive and specific disclosures to political advertisers, concerning the station's commercial practices.

The disclosure must include, as a minimum, the following information:

- 1) A description and definition of each class of time available to commercial advertisers sufficient to permit candidates to "identify and understand what specific attributes differentiate each class";
- 2) A description of the lowest unit charge and related privileges (such as priorities against preemption and make-goods prior to specific deadlines) for each class of time offered;
- 3) A description of the station's method of selling preemptible time based upon advertiser demand (commonly known as the "current selling level"), with the express stipulation that candidates will be able to purchase at these demand-generated rates in the same manner as commercial advertisers;
- 4) An approximation of the likelihood of preemption for each kind of preemptible time; and
- 5) An explanation of the station's sales practices, if any, that are based on audience delivery, with the express stipulation that candidates will be able to purchase this kind of time, if available to commercial advertisers.

Write it down

Because the new rule requires that this disclosure be made, it would probably be a good idea to have it prepared in writing, so that it can be provided with a minimum possibility of misunderstanding or misstatement. Even so, if the policy is provided to a potential political advertiser in person, it would probably be wise to have the advertiser sign a receipt indicating that they were, in fact, given a copy of the disclosure.

One alternative approach to LUR calculation not set forth specifically in the rule, but mentioned by the Commission in a footnote in its decision adopting the new rule, would permit each station to develop its own special discount rate for a non-preemptible, candidate-only class of time.

Other intricacies

You should be aware that there are other intricacies in the rules that you must pay attention to—the political-advertising materials which must be placed in your local public inspection file, for example, or your obligation with regard to the availability of make-goods,

or the on-going obligation to review your advertising records "periodically throughout the election period" to determine whether rebates or credits to candidates may be necessary.

Here are some miscellaneous other items related to political advertising which you should know:

- You can refuse to sell availabilities in the body of news programs if that is your station's policy. This refusal can apply to both federal and non-federal candidates.
- You cannot reject a spot for failure to have the required sponsorship identification announcement in the required form. However, because you also are legally obligated to be sure that some such announcement is included in the spot, you may, on your own initiative, override or tag the ad to comply with the rule. Note that this is a very narrow exception to the general rule that stations may not censor in any way the content of political announcements.
- If, during the one-year period prior to the campaign, the station ever provided staff and services over the weekend to accommodate a last-minute request for regular, non-political advertisers, you must provide this same level of service

to political candidates for federal office, upon their request, on the last weekend prior to the election.

In light of some initial apparent successes in some on-going litigation, candidates (and lawyers who seem intent on assisting candidates in such litigation) are likely to be exceedingly vigilant in their efforts to assure such compliance. The best defense for a broadcaster is a continuing good faith effort to know the rules and obey them.

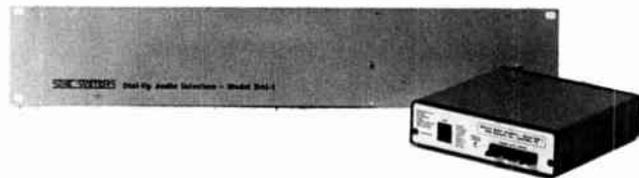
If you have not yet received—from your communications counsel, from the FCC or from any other source—copies of the Commission's several recent decisions on political advertising, you should get your hands on them immediately and study them carefully.

Summaries such as this column, while perhaps helpful, are by necessity only summaries. If you have any questions about any of these matters, you should contact your communications counsel right away.

□ □ □

Harry Cole is a partner in the Washington-based law firm of Bechtel & Cole, Chartered. He can be reached at 202-833-4190.

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Global Demand for American Radio

► continued from page 34

the former Eastern Bloc. One after another, governments have turned over the airwaves and paved the way for commercial FM radio to take hold.

"There's a competitive, global marketplace in radio now," says David Wyler, senior vice president of sales for Radio Vision International, which licenses, markets and distributes long-form music programming for television and radio. "Deregulation has created a competitive atmosphere, more like in the U.S."

In turn, foreign programming needs have changed dramatically. "Until now, entrenched broadcasters could afford to program very broadly, because there was very little choice to the left or right on the dial," explains Larry Green, managing director of ABC Radio International.

The global clamor for new programming—particularly American formats—has captured the attention of at least a dozen U.S. companies, including media conglomerate Capital Cities/ABC Radio. ABC Radio productions, most notably American Top 40, have aired around the world for more than 20 years through syndication by Radio Express. But in 1992, ABC created an international division, dedicating its resources to the cultivation of new international markets.

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ABC Radio International "handles all of the music and information programs produced by Satellite Music Network in Dallas and all of the news and information products created by...ABC Radio News," says Green. "We can offer foreign stations and networks everything from a 15-second soundbite of Saddam Hussein or George Bush to 24-hour music formats, such as 'Z-Rock'."

With a similar desire to expand, companies such as Premiere Radio Networks, MediaAmerica Inc. and Pro Audio USA have formed either an international division or begun to market services abroad, all within the last two years.

To date, the ventures have generally proved profitable. Radio Express, which struck its first international barter deal in 1986—with Pepsi in Spain—has experienced a steady 20 percent annual growth rate since then. The company, long known for its international syndication services, also exports, and sometimes co-produces, advertiser-supported "networks" that include a variety of formats.

All told, "we're now in 85 countries," says Rounds, with a third of the business in the Americas, a third in the Pacific Rim and Asia and the rest in Europe. About 60 percent of the programming is adapted to the client station's native language.

Pro Audio USA reports a "gratifying" response in the nine months since it launched a weekly music service called "Top Hits U.S.A." The service, which comes to subscribers on compact disc in either an adult contemporary, top 40 or country format, has already attracted 800 stations.

As an increasing number of companies ply their trade internationally, the selection for foreign programming directors continues to expand. (See chart) Music formats run the gamut from rock and pop to jazz and new age. Some companies specialize in one brand of programming for international markets.

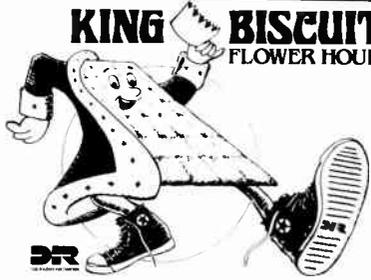
CBS Hispanic Radio Network, for example, does satellite broadcasts of major sports events, mostly to Latin America.

Looking to the future, purveyors of American programming see a potential gold mine in the countries of the former Eastern Bloc.

Radio Vision is already doing business in Hungary, the Commonwealth of

Independent States (CIS), Czechoslovakia and Poland and produced a Michael Jackson concert out of Romania at the end of September. Premiere Radio Networks, too, currently has a contract pending in Poland.

"We see the Eastern Bloc as a place for tremendous growth, particularly Poland and Hungary," says Ed Mann, vice president of international sales for Premiere.



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RADIO VISION

AMERICAN
★ TOP40 ★
WITH SHADOE STEVENS

Music syndicators offer a variety of programs on the international market.

MediaAmerica Inc. and Pro Audio USA also are making contacts and seeking business in the region. "We feel that advertisers will scramble to reach these countries," says Jeanne DeSanctis, managing director of MediaAmerica's international division. "And they're going to need vehicles."

Following the ad dollar clearly makes good business sense. But equally important in promoting competitive programming strategies overseas is to study and preserve the culture of each market, says radio consultant Tommy Hedges, president of the Pollack Media Group.

AM FREQUENCY vs. AM TOWER HEIGHT

For medium wave broadcast frequencies, the most used one-quarter wave tower height is shown as related to the operating frequency. For $\frac{3}{8}$ wave length, multiply height shown by $1\frac{1}{2}$ and for $\frac{1}{2}$ wave length, multiply height shown by 2. For insulated towers, the height is above the base insulated.

Frequency in Kilohertz	Tower Height in Feet	Tower Height in Meters	Frequency in Kilohertz	Tower Height in Feet	Tower Height in Meters
550	446.8	136.2	1080	227.7	69.4
560	439.5	133.9	1090	225.6	68.7
570	431.3	131.4			
580	423.9	129.2	1100	223.6	68.1
590	417.3	127.2	1110	221.6	67.5
			1120	219.7	66.9
600	410.0	125.0	1130	217.7	66.3
610	403.1	122.8	1140	215.6	65.7
620	396.8	120.9	1150	213.9	65.2
630	390.3	118.9	1160	211.9	64.6
640	386.5	117.8	1170	210.2	64.0
650	378.8	115.4	1180	208.6	63.5
660	373.1	113.7	1190	206.7	63.0
670	367.3	111.9			
680	361.1	110.0	1200	205.0	62.5
690	356.2	108.5	1210	203.2	61.9
			1220	201.5	61.4
700	351.2	107.0	1230	199.7	60.8
710	346.8	105.7	1240	198.4	60.4
720	341.9	104.2	1250	196.8	60.0
730	337.0	102.7	1260	195.2	59.4
740	332.1	101.2	1270	193.6	59.0
750	328.0	100.0	1280	192.2	58.5
760	323.4	98.5	1290	190.7	58.1
770	319.8	97.5			
780	315.7	96.2	1300	189.2	57.6
790	311.6	95.0	1310	187.7	57.2
			1320	186.5	56.8
800	307.5	93.7	1330	184.9	56.3
810	303.4	92.5	1340	183.6	55.9
820	300.1	91.4	1350	182.2	55.5
830	296.0	90.2	1360	180.5	55.0
840	292.7	89.2	1370	179.5	54.7
850	289.4	88.2	1380	178.1	54.2
860	286.1	87.2	1390	176.5	53.8
870	282.9	86.2			
880	279.6	85.2	1400	175.6	53.5
890	276.3	84.2	1410	174.2	53.1
			1420	173.4	52.8
900	273.0	83.2	1430	172.0	52.4
910	270.6	82.5	1440	170.9	52.1
920	267.3	81.4	1450	169.6	51.7
930	264.8	80.7	1460	168.5	51.3
940	261.5	79.7	1470	167.3	51.0
950	259.1	78.9	1480	166.5	50.7
960	256.6	78.2	1490	165.0	50.3
970	253.3	77.2			
980	250.9	76.4	1500	164.0	50.0
990	248.4	75.7	1510	162.9	49.6
			1520	161.7	49.2
1000	246.0	75.0	1530	160.9	48.0
1010	243.7	74.2	1540	159.9	48.7
1020	241.1	73.5	1550	158.6	48.3
1030	238.8	72.8	1560	157.8	48.1
1040	236.5	72.1	1570	156.7	47.7
1050	234.2	71.4	1580	155.8	47.5
1060	232.0	70.7	1590	154.7	47.1
1070	229.9	70.0	1600	153.7	46.8

Approximate distances to the radio horizon vs. various tower heights (for FM and TV)

Tower height in meters (M)							
Distance to radio horizon in kilometers (KM)							
M	KM	M	KM	M	KM	M	KM
6	10.1	162	52.5	318	73.5	474	89.8
12	14.3	168	53.4	324	74.2	480	90.3
18	17.5	174	54.4	330	74.9	486	90.9
24	20.2	180	55.3	336	75.6	492	91.4
30	22.6	186	56.2	342	76.2	498	92.0
36	24.7	192	57.1	348	76.9	504	92.5
42	26.7	198	58.0	354	77.6	510	93.1
48	28.6	204	58.9	360	78.2	516	93.6
54	30.3	210	59.7	366	78.9	522	94.2
60	31.9	216	60.6	372	79.5	528	94.7
66	33.5	222	61.4	378	80.2	534	95.3
72	35.0	228	62.2	384	80.8	540	95.8
78	36.4	234	63.1	390	81.4	546	96.3
84	37.8	240	63.9	396	82.0	552	96.9
90	39.1	246	64.7	402	82.7	558	97.4
96	40.4	252	65.4	408	83.3	564	97.9
102	41.6	258	66.2	414	83.9	570	98.4
108	42.8	264	67.0	420	84.5	576	98.9
114	44.0	270	67.7	426	85.1	582	99.5
120	45.2	276	68.5	432	85.7	588	100.0
126	46.3	282	69.2	438	86.3	594	100.5
132	47.4	288	70.0	444	86.9	600	101.0
138	48.4	294	70.7	450	87.5	606	101.5
144	49.5	300	71.4	456	88.0	612	102.0
150	50.5	306	72.1	462	88.6	618	102.5
156	51.5	312	72.8	468	89.2	624	103.0

Tower height in feet (FT)							
Distance to radio horizon in miles (MI)							
FT	MI	FT	MI	FT	MI	FT	MI
20	6.3	520	32.2	1020	45.2	1520	55.1
40	8.9	540	32.9	1040	45.6	1540	55.5
60	11.0	560	33.5	1060	46.0	1560	55.9
80	12.6	580	34.1	1080	46.5	1580	56.2
100	14.1	600	34.6	1100	46.9	1600	56.6
120	15.5	620	35.2	1120	47.3	1620	56.9
140	16.7	640	35.8	1140	47.7	1640	57.3
160	17.9	660	36.3	1160	48.2	1660	57.6
180	19.0	680	36.9	1180	48.6	1680	58.0
200	20.0	700	37.4	1200	49.0	1700	58.3
220	21.0	720	37.9	1220	49.4	1720	58.7
240	21.9	740	38.5	1240	49.8	1740	59.0
260	22.8	760	39.0	1260	50.2	1760	59.3
280	23.7	780	39.5	1280	50.6	1780	59.7
300	24.5	800	40.0	1300	51.0	1800	60.0
320	25.3	820	40.5	1320	51.4	1820	60.3
340	26.1	840	41.0	1340	51.8	1840	60.7
360	26.8	860	41.5	1360	52.2	1860	61.0
380	27.6	880	42.0	1380	52.5	1880	61.3
400	28.3	900	42.4	1400	52.9	1900	61.6
420	29.0	920	42.9	1420	53.3	1920	62.0
440	29.7	940	43.4	1440	53.7	1940	62.3
460	30.3	960	43.8	1460	54.0	1960	62.6
480	31.0	980	44.3	1480	54.4	1980	62.9
500	31.6	1000	44.7	1500	54.8	2000	63.2

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ENGINEERING TIPS

REACTANCE FORMULAS

$$C = \frac{1}{2\pi f X_C} \quad X_C = \frac{1}{2\pi f C}$$

$$L = \frac{X_L}{2\pi f} \quad X_L = 2\pi f L$$

RESONANT FREQUENCY FORMULAS

$$F = \frac{1}{2\pi\sqrt{LC}} \quad f_{kHz} = \frac{159.2}{\sqrt{LC}}$$

$$L = \frac{1}{4\pi^2 f^2 C} \quad L_{\mu HY} = \frac{25,330}{f^2 C}$$

$$C = \frac{1}{4\pi^2 f^2 L} \quad C_{\mu FD} = \frac{25,330}{f^2 L}$$

Where f is in kHz
L is in microhenries
C is in microfarads

CONVERSION FACTORS

$$\pi = 3.14 \quad 2\pi = 6.28$$

$$\pi^2 = 9.87 \quad \log \pi = 0.497$$

1 meter = 3.28 feet
1 inch = 2.54 centimeters
1 radian = 57.3°

FREQUENCY AND WAVELENGTH FORMULAS

$$f_{kHz} = \frac{3 \times 10^5}{\lambda_{METERS}} \quad \lambda_{METERS} = \frac{3 \times 10^5}{f_{kHz}}$$

$$f_{MHz} = \frac{984}{\lambda_{FEET}} \quad \lambda_{FEET} = \frac{984}{f_{MHz}}$$

0.625λ = 225° = 5/8 WAVE
0.5λ = 180° = HALF WAVE
0.311λ = 112°
0.25λ = 90° = QUARTER WAVE

RESISTORS IN SERIES

$$R_{TOTAL} = R_1 + R_2 + R_3 + \dots$$

RESISTORS IN PARALLEL

EQUAL RESISTORS

$$R_{TOTAL} = \frac{R}{n} \quad \text{Where n is the total number of resistors}$$

UNEQUAL RESISTORS

$$R_{TOTAL} = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots}$$

$$R_{TOTAL} = \frac{R_1 R_2}{R_1 + R_2} \quad R_1 = \frac{R_T R_2}{R_2 - R_T}$$

If the current through a resistor doubles, the power dissipated quadruples

IMPEDANCE FORMULAS

SERIES CIRCUITS — R & X IN SERIES

$$Z = \sqrt{R^2 + (X_L - X_C)^2}$$

PARALLEL CIRCUITS — R & X IN PARALLEL

$$Z = \frac{RX}{\sqrt{R^2 + X^2}}$$

DIRECT POWER FORMULA

$$P = I^2 R$$

Where I is the common point or base current in amperes, and R is the common point or base resistance in ohms

INDIRECT POWER FORMULA

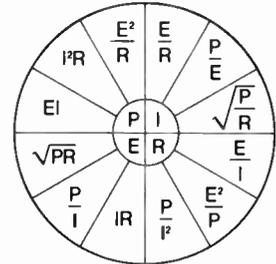
$$P = IE(\text{effy})$$

Where I is the final P.A. current in amperes, E is the final P.A. voltage in volts, and effy is the transmitter efficiency expressed in decimal form (79% = 0.79)

SINE WAVE CONVERSION

$$\begin{aligned} \text{Effective Value} &= 0.707 \times \text{Peak Value} \\ \text{Average Value} &= 0.637 \times \text{Peak Value} \\ \text{Peak Value} &= 1.414 \times \text{Effective Value (RMS)} \\ \text{Effective Value} &= 1.11 \times \text{Average Value} \\ \text{Peak Value} &= 1.57 \times \text{Average Value} \\ \text{Average Value} &= 0.9 \times \text{Effective Value (RMS)} \end{aligned}$$

OHM'S LAW FORMULAS FOR DC CIRCUITS



ONE CYCLE TIME DURATION

10kHz = 100μsec
20kHz = 50μsec
100kHz = 10μsec
200kHz = 5μsec
250kHz = 4μsec
1MHz = 1μsec
4MHz = 0.25μsec
10MHz = 0.1μsec

BINARY TO BASE 10 CONVERSION

1 (2 ³) = 8
0 (2 ²) = 0
1 (2 ¹) = 2
1 (2 ⁰) = + 1
11

DECIBEL FORMULAS

Where impedances are equal

$$dB = 10 \log \frac{P_1}{P_2} = 20 \log \frac{E_1}{E_2} = 20 \log \frac{I_1}{I_2}$$

Where impedances are unequal

$$dB = 10 \log \frac{P_1}{P_2} = 20 \log \frac{E_1 \sqrt{Z_2}}{E_2 \sqrt{Z_1}} = 20 \log \frac{I_1 \sqrt{Z_1}}{I_2 \sqrt{Z_2}}$$

$$\begin{aligned} 0dBm (1mW) &= 0.774 \text{ volts across } 600 \text{ ohms} \\ &= 0.387 \text{ volts across } 150 \text{ ohms} \\ &= 0.224 \text{ volts across } 50 \text{ ohms} \end{aligned}$$

TRANSFORMER TURNS RATIOS

Primary Power = Secondary Power

$$\frac{N_P}{N_S} = \frac{E_P}{E_S} = \frac{I_S}{I_P} = \sqrt{\frac{Z_P}{Z_S}}$$



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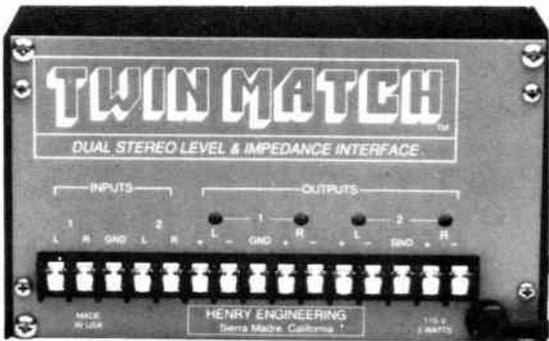
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- Chief, Barbara Kreisman 632-6993
- Assistant Chief, James Brown 632-6993
- Assistant Chief, Stephen Sewell 632-6993

Television Branch

- Chief, Clay Pendarvis 632-6357

Low Power Television Branch

- Chief, Keith Larson 632-3894
- Supervisor Engineer, Hossein Hashemzadeh 632-7698
- Supervisor Attorney, Mary Fitzgerald 632-3894

Distribution Services Branch

- Acting Chief, Clay Pendarvis 632-9356

Cable Television Branch

- Chief, Ronald Parver 632-7480

Ownership Section

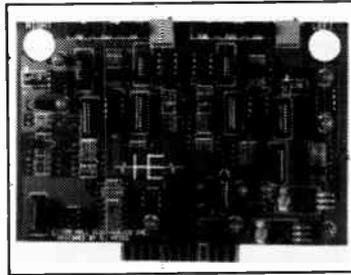
- Chief, LeAudrey Alexander 632-7258

Common Carrier Bureau

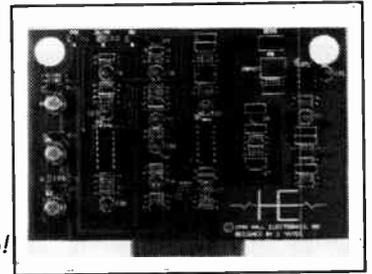
- Chief, Cheryl Tritt 632-6910
- Deputy Bureau Chief (Operations)
Gerald Vaughan 632-6910
- Deputy Bureau Chief (Policy)
Kathleen Levitz 632-6910
- Associate Bureau Chief
Jill Ross-Meltzer 632-6910
- Special Assistant to the Bureau Chief
James Spurlock 632-6910
- Legal Assistant to the Bureau Chief
Geraldine Matise 632-6910
- Legal Assistant to the Bureau Chief
Thomas Beers 632-6910
- Assistant Chief Economics
Thomas Spavins 632-6910

- Assistant Chief, Management
Elle Mulcare 632-6934
- Enforcement Division**
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- Deputy Chief, (Operations) Gregory Weiss 632-4887
- Deputy Chief, (Policy) Robert Spangler 632-4887
- Formal Complaints and Investigations Branch**
- Chief, Thomas Wyatt 632-1331
- Informal Complaints and Public Inquiries Branch**
- Chief, Kathie Kneff 632-7553
- Domestic Facilities Division**
- Chief, James Keegan 634-1860
- Deputy Chief, Thomas Tycz 634-1860
- Engineering Assistant James Meredith 634-4860
- Legal Assistant, Cassandra Thomas 634-1860
- Public Reference, Room 634-1512
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- Chief, Robert James 634-1706
- Domestic Services Branch**
- Chief, Abraham Leib 634-1800
- Satellite Radio Branch**
- Chief, Cecily Holiday 634-1624
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- Deputy Chief, Mary Brown 632-6387
- Associate Chief, Colleen Boothby 632-6387
- Tariff Review Branch**
- Chief, Judith Nitsche 632-5550
- Legal Branch**
- Chief, Ann Stevens 632-6917
- Mobile Services Division**
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- Deputy Chief, Myron Peck 632-6400
- Legal Branch**
- Chief, James Talens 632-6450
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- Deputy Chief, Alan Feldman.....632-1364

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- Deputy Chief, Ruth Milkman.....632-9342

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- Chief, Wendell Harris.....632-3214
- Deputy Assistant Chief /International, William Kirsch.....632-3214

International Facilities Division

- Chief, George Li.....632-7834

International Policy Division

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- Deputy Chief, Arlan van Doorn.....632-7200
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- Attorney Advisor, Lawrence Clance.....632-7591
- International Advisor, William Luther.....632-7591
- Assistant Bureau Chief, for Technology Michael Marcus.....634-1550
- Acting Chief for Emergency Broadcast Systems, Helena Mitchell.....632-3906

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- Assistant Chief, Roy Kolly.....632-7090

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- Chief, Kenneth Nichols.....632-7593

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Antenna Survey Branch

- Chief, Charles Engle.....632-7521

Radio Operator Branch

- Chief, Leonard Langley.....632-7240

Public Contact Branch

- Chief.....634-1940

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- Deputy Chief, Beverly Baker.....632-6942
- Legal Counsel, Kent Nakamura.....632-6940
- Engineering Assistant, F. Netro.....632-6940
- Assistant Bureau Chief for Management, Jennifer Bush.....632-6930

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- Chief, Richard Shiben.....632-7597
- Deputy Chief, Edward Jacobs.....632-7597

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- Chief, Rosalind Allen.....634-2443
- Deputy Chief, Martin Liebman.....634-2443

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- Chief, Carol Foelak.....632-7125

Policy and Planning Branch

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- Deputy Chief, W. Hollingsworth.....717-337-1212
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- Chief.....717-337-1321

Data Operations Section, Data Services Branch

- Chief, Kathy Fowler.....717-337-3268

Support Services Branch

- Chief, Lisa Stover.....717-337-3268

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- Chief, Betty Wright.....717-337-3268

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Fee and Mail Branch

- Chief, Laurel Sentz.....717-337-1531

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- Deputy Chief, Herbert Zeiler.....632-7197

Personal Radio Branch

- Chief, John Johnston.....632-4964

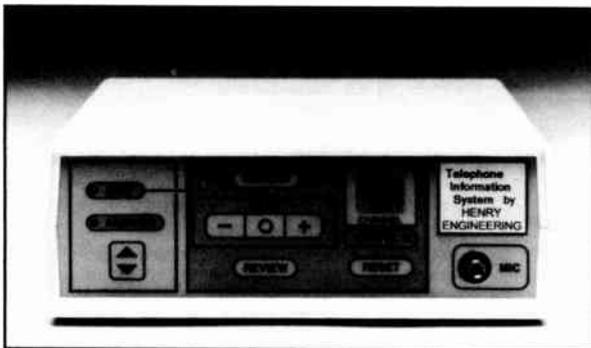
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The TELEPHONE INFORMATION SYSTEM makes it easy to provide multiple "listener information services" using only *one* phone line! The TIS stores up to 10 messages in digital memory. Just call the TIS, then use the buttons on your phone to select any message(s) for instant playback. It's quick and easy..and listeners love it!

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- | | |
|-----------------------|---------------------------|
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004	026	048	070	092	114	136	158	180
005	027	049	071	093	115	137	159	181
006	028	050	072	094	116	138	160	182
007	029	051	073	095	117	139	161	183
008	030	052	074	096	118	140	162	184
009	031	053	075	097	119	141	163	185
010	032	054	076	098	120	142	164	186
011	033	055	077	099	121	143	165	187
012	034	056	078	100	122	144	166	188
013	035	057	079	101	123	145	167	189
014	036	058	080	102	124	146	168	190
015	037	059	081	103	125	147	169	191
016	038	060	082	104	126	148	170	192
017	039	061	083	105	127	149	171	193
018	040	062	084	106	128	150	172	194
019	041	063	085	107	129	151	173	195
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| E. Network/Group owner | J. Other (specify) _____ |

II. Job Function

- | | |
|-----------------------|---------------------------|
| A. Ownership | D. Programming/production |
| B. General management | G. Sales Manager |
| C. Engineering | E. News operations |
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014	036	058	080	102	124	146	168	190
015	037	059	081	103	125	147	169	191
016	038	060	082	104	126	148	170	192
017	039	061	083	105	127	149	171	193
018	040	062	084	106	128	150	172	194
019	041	063	085	107	129	151	173	195
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Affordable
Custom
Broadcast
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Delivered and installed by

**STUDIO
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For additional information contact Vince Fiola at:

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FAX: (215) 640-5880

4 Pennsylvania Avenue, Malvern PA 19355

READER SERVICE NO. 73

NEW!

Composite Audio DA and Switcher!



APPLICATIONS

- Switching Between Composite STL's
- Main/Alternate Processing Switching
- Feed Up to 3 Transmitters with Identical Audio
- SCA or SAP Generator Switching
- Non-Intrusive Composite Testing/Monitoring

FEATURES

- 2 Input Switcher
- 3 Isolated Outputs
- Individual Level Control for Each Output
- Front Panel and Remote Control with Full Status
- Power Fall Memory with Bypass Mode
- Inputs Selectable for Balanced or Unbalanced Operation

SPECIAL INTRODUCTORY PRICE (LIMITED TIME ONLY) **\$ 695**

bdi

Broadcast Devices, Inc.

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Peekskill, NY 10566

(914) 737-5032

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TOWER AND OBSTRUCTION LIGHTING PRODUCTS

FLASHER
FS155-30T



ALARM RELAY
SCR430T



SHORTED FLASHER ALARM
SFA430T

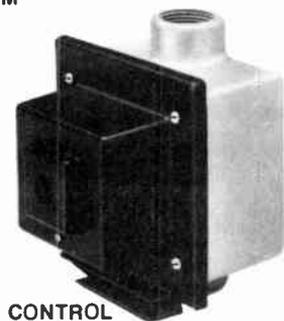
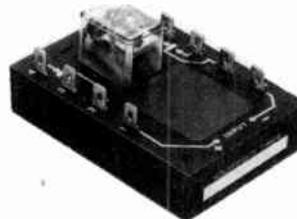


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PCR11

SSAC offers a complete line of solid state products to control and monitor the lights on communication towers and other tall structures. SSAC solid state products have proven performance and reliability with years of infield use. Flash single or multiple beacons. Sense lamp failure in the beacon, side lamps, or other obstruction lighting with an alarm output. The PCR11 Photo Control with its all plastic housing is ideal for turning on complete tower lighting at dusk (factory calibrated).

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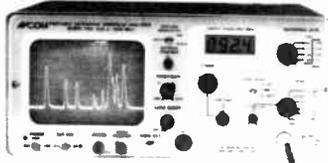
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Flashers
Alarm Relays
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Shorted Flasher Alarms
3 Phase Voltage Monitors

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PRODUCT & SERVICES SHOWCASE

NEW!!! from AVCOM
**PSA-65A Portable Spectrum Analyzer &
 SCPC-2000E Single Channel Per Carrier Receiver**



PSA-65A Portable Spectrum Analyzer - \$2855

AVCOM's PSA-65A Portable Microwave Spectrum Analyzer covers a frequency range from less than 2 MHz to 1000 MHz. The broad frequency coverage and high sensitivity of the PSA-65A make it ideal wherever a low cost, compact spectrum analyzer is needed. The light weight, battery or line operated PSA-65A Portable Spectrum Analyzer from AVCOM is the perfect instrument for field testing of RF systems, classroom instruction, satellite system alignment, electronic countermeasures, cable TV maintenance, cellular and production use.



SCPC-2000E SCPC Satellite Receiver - \$1875

AVCOM's Single Channel Per Carrier Receiver, model SCPC-2000E, has been developed for the reception of FM SCPC signals from satellites operating in the 3.7 to 4.2 GHz band. The SCPC-2000E is a complete receiver that can tune up to 4 specific crystal controlled audio or data channels from a given transponder and adapt to a variety of de-emphasis requirements. The SCPC-2000E is available in either wide or narrow band models and may be used with the SS-1000 (\$1027) Slave for simultaneous reception of additional channels.

AVCOM OF VIRGINIA 500 Southlake Blvd., Richmond, Va. 23236
 Bringing High Technology Down to Earth Phone 804-794-2500 / Fax 804-794-8284

READER SERVICE NO. 159

**BEFORE
 YOU PURCHASE
 ANY SYSTEM FOR**

- Remote Control
- Monitoring
- Site Supervision

From tower lights to transmitters

Be sure to call

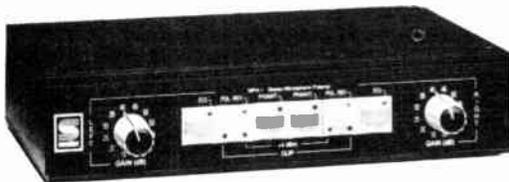
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 SOFTWARE, LTD.**

First!!!

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**If you haven't tried this pre-amp,
 you don't know how good your
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If you read ads for microphone pre-amps you'll find they all, regardless of price, promise the same things: low distortion, low noise, and great noise rejection.

PROMISES... PROMISES

Sontec promises you something better. Install our MPA-1 pre-amp. If it's not cleaner and more transparent than what you're now using, just return it for credit. Now that is a promise!

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READER SERVICE NO. 115

Radio World

**Your Source
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 Radio &
 Audio News,
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 Updates**

PRODUCT & SERVICES SHOWCASE



Excalibur Electronics

CDA-1

Composite Distribution Amplifier



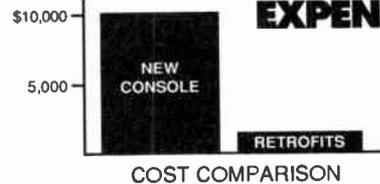
This 1 in, 3 out distribution amplifier allows you to distribute stereo composite and/or subcarrier signals as easily as audio.

- ◆ DC-100 kHz frequency response
- ◆ 90 dB signal/noise ratio
- ◆ +6 dB to -20 dB gain range
- ◆ Individual 20-turn output trimmers
- ◆ 1 3/4" rack mount enclosure

EXCALIBUR ELECTRONICS, INC., CHANTILLY, VIRGINIA
Please circle our bingo number for a data sheet and a dealer list.

READER SERVICE NO. 139

CONSOLE UPGRADE WITHOUT THE BIG EXPENSE



Approach digital quality with your yesteryear audio console by using BDI plug-in retrofit electronics. If the cost of a new console is depriving you of a competitive air sound then BDI electronics are the answer. Better headroom,

lower noise, lower distortion, dynamic range approaching 90dB and improved reliability are just some of the advantages of our easy to install upgrades. Call us today direct for a competitive air sound tomorrow!

Our retrofit electronics currently support most:

*Gates/Harris Consoles
RCA Consoles
McMartin Consoles
McCurdy Consoles*

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READER SERVICE NO. 96

Obstruction Lighting That's Not Sky High

ElectroFlash™ Aviation Lighting Systems

- Medium and High Intensity Obstruction Strobe Lighting
- ETL Certified. FAA, Transport Canada and ICAO Approved
- Compatible with Dual Installations—Auto Restart
- Available with AC, DC, or AC/DC Combo Input Voltage
- Installation and Service Maintenance Available
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Nashua, NH 03060
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READER SERVICE NO. 163

CORNELL-DUBILIER MICA CAPACITORS

FROM STOCK

JENNINGS VACUUM CAPACITORS

FROM STOCK

JENNINGS VACUUM RELAYS

SURCOM ASSOCIATES

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READER SERVICE NO. 187

PRODUCT & SERVICES SHOWCASE



E-Z UP INSTANT SHELTERS

- Sets up in 60 seconds
- Compact size that stores easily
- Durable reinforced all-steel double truss design



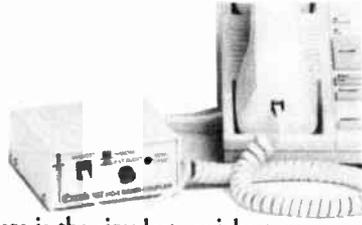
E-Z UP SHELTERS ARE PERFECT FOR

- Boating • Picnics • Camping • Sales Booths
- Race Pits • Backyard Barbecues • Ball Games

International E-Z UP, Inc.
 Corporate & Manufacturing Headquarters
 5525 East Gibraltar Street
 Ontario, California 91764-5121
 909/466-8333 Outside Calif. 800/45 SHADE
 READER SERVICE NO. 97



Excalibur Electronics
HC-1 Handi-Coupler



Here is the simplest, quickest, most convenient way to connect audio to a telephone. The HC-1 connects in series with the handset of any phone using modular connectors. *No* connection to the phone line is needed. Press the front panel button and external audio is available on separate send and receive 1/4" TRS jacks on the rear panel. Release the button and the handset is once more connected for normal use of the phone. Nothing could be simpler!

You can find many uses for the HC-1 around your station: on-air studio, production room, newsroom, sales office, field news kits, sports remotes, etc.

EXCALIBUR ELECTRONICS, INC., CHANTILLY, VIRGINIA
Please circle our bingo number for a data sheet and a dealer list
 READER SERVICE NO. 127

Technet Systems Group
A Division of Steve Vanni Associates, Inc.

**Broadcast Equipment
 Turn-keyed Systems
 Tower Erection & Service
 Consulting**

**Your Single Source for
 Technical Needs**

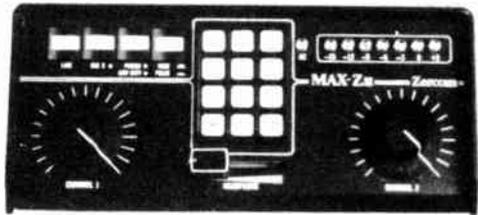
Steve Vanni

Bob Smith *Kim Meisinger*

P.O. Box 422 Auburn NH 03032
 Tel. 603-483-5365 Fax 603-483-0512

READER SERVICE NO. 148

MAX-Z II



The Zercom MAX-Z II is an abbreviated version of the famous Zercom MAX-Z Remote Broadcasting Telephone System. High quality audio handling is maintained in the two channels of audio input. Headroom, noise performance and distortion are comparable in quality to studio consoles.

Features of the 6 lb, 8"×9.5" unit include frequency response of 200Hz to 7KHz ± 0.5 db, 90Hz to 12KHz ± 1.5 db; noise floor of -70 dbm with 0 dbm line level input, -61 dbm (mic level input); and harmonic distortion of 0.35% or less and intermodulation distortion of 0.2% or less. Head room is 16 db above 0 VU.

ZERCOM
 Box 84, Merrifield, MN 56465 • 218-765-3151
 READER SERVICE NO. 161

PRODUCT & SERVICES SHOWCASE

This Forecast Calls For More Listeners



Rain or shine, here's a custom-formatted, personalized, and localized weather forecasting service your audience will stay tuned for every day.

- Frequent Updates, Live Or Tape
- Experienced Radio Voices
- Quality Sound
- Special Help For Automation
- Multi-Station & AM/FM Discounts



For details and a free demo tape, call 1-800-SKYWATCH, or 412-221-6000.



347 Prestley Rd., Bridgeville, PA 15017

READER SERVICE NO. 133

Remote\$ + MARTI = Revenue



RPT-30 RPU Transmitter

Marti has been bringing back live remote broadcasts for over 34 years. Put Marti's proven reliability to work for you.

Contact your broadcast products dealer for more details.



MARTI Electronics

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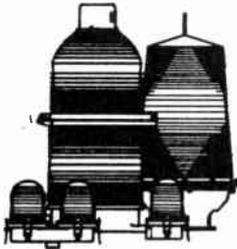
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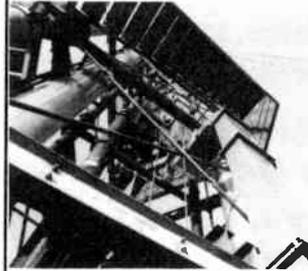


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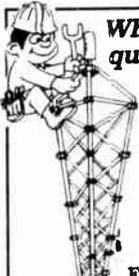
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- I. Mfg. distributor or dealer
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II. Job Function

- A. Ownership
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017	039	061	083	105	127	149	171	193
018	040	062	084	106	128	150	172	194
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II. Job Function

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In the following pages, you will find three tools for keeping track of vendors and their products.

We hope these listings will save you time and help you find the products you want to buy.

Product Source Book	64
The Product Source Book is an index which lists companies according to type of equipment they make or distribute. The product information was provided by the vendors themselves, in response to a questionnaire sent by Radio World in 1992.	
Supplier Source Book	86
Our Supplier Source Book lists names and addresses of the companies found in the Product Source Book.	
Company Profiles	113
Those of you looking for more information on the companies listed can turn to Company Profiles, in which firms have provided details about their businesses and products.	
Audio Broadcast Group Inc.	114
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PRODUCT SOURCE BOOK



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 UAR Professional Systems
 Versatech Industries, Inc.
 Videoquip Research Limited
 Ward-Beck Systems Ltd.
 Wavnet, Inc.
 West Starr International
 Wheatstone Corporation
 Wide Range Electronics Corporation

Antennas, Anti-icing devices

Broadcast Comm Systems Inc
 Broadcast Services/EME
 Continental Electronics
 Crouse-Kimzey Company
 Dielectric Communications
 Electronics Research, Inc.
 Environmental Technology Inc
 GBS-Giesler Broadcasting Supply
 Harris Allied
 Jampro Antennas
 Marcom
 Northeast Broadcast Lab Inc
 Professional Audio Supply
 Radiation Systems
 RF Specialties of Florida
 Radio Resources & Services
 Stellar Distributing Inc.

Antennas, Dehydrators

AVR Communications Limited East
 AVR Communications Limited West
 Audio Broadcast Group, Inc.
 Audiomedia
 Broadcast Supply West
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Bradley Broadcast Sales
 Broadcast Equipment Sales &
 Engineering
 Broadcast Services/EME
 Broadcasters General Store
 Cablewave Systems, Div of RFS
 Cancomm
 Capital Electronics Inc
 Cirrus Technologies Inc
 Comad Communications Limited
 Comark Communications
 Continental Electronics
 Control Technology Inc.
 Crouse-Kimzey Company
 Dielectric Communications
 Electronic Industries, Inc.
 Electronics Research, Inc.
 Giesler Broadcasting Supply, Inc.
 Guarantee Radio Supply Corporation
 Hall Electronics
 Mart Haller Co.-Exporters
 Harmon's Tower Service
 Harris Allied
 Holzberg Inc.
 Hy James, Inc.
 IBSS
 IER (Industrial Equip. Reps.)
 Jampro Antennas
 John E. Hillman Associates
 John Nix
 LDL Communications
 LPB Inc
 Lita Broadcasting Distributors
 Litronix Corporation
 Marcom
 Micro Communications Inc
 Northeast Broadcast Lab, Inc.
 Old Dominion Broadcast Eng. Serv
 Professional Audio Supply
 Paramount Communications Systems
 Parcom Inc.

Payne Engineering
 PMA Marketing
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Research Associates, Inc.
 Richard Hirschmann of America
 Roscom General
 S.W.R. Inc.
 Scala Electronic Corporation
 Shively Labs
 Stellar Distributing Inc.
 Suministros Gonzalez
 Tennaplex Systems, Ltd.
 Tobias & Company Ltd
 Transcom Corporation

Antennas, Shortwave

Kintronic Laboratories Inc
 Nott, Ltd

Antennas, Translators and Boosters

Broadcast Comm Systems Inc
 Broadcast Services/EME
 Cancomm
 Comad Communications Ltd
 Comex Worldwide Corporation
 Communications Technologies, Inc.
 Continental Electronics
 Control Technology Inc
 Crouse-Kimzey Company
 Electronic Industries
 Electronics Research, Inc.
 FM Technology Assoc Inc
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 Jampro Antennas
 Marcom
 QEI Corporation
 RF Specialties of Florida
 Radio Resources & Services
 Roscom General
 Shively Labs
 Stellar Distributing Inc.
 Television Technology Corp
 T.Z. Sawyer Technical Consultants
 Technet Systems Group

Antennas, Tuning & Multiplexing

Antenna Concepts
 Broadcast Comm Systems Inc
 Caveco
 Central Tower Inc
 Comad Communications Ltd
 Continental Electronics
 Control Technology Inc
 Consulting Radio Engineer
 Electronics Research, Inc.
 Frederick L. Spaulding, P.E.
 Hammett & Edison Inc
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 IER, Industrial Equip Reps
 Jampro Antennas
 Kintronic Laboratories Inc
 Marcom
 Phasetek
 RF Specialties of Florida
 Roscom General
 S.W.R. Inc.
 Shively Labs
 Stellar Distributing Inc.
 T.Z. Sawyer Technical Consultants
 Technet Systems Group

Automation, Station Business

Automated Business Concepts
 Barrett Associates, Inc.

CBSI
 CEA Newsroom System
 Caveco
 Columbine Systems Inc
 Computer Concepts Corp. Intl Division
 Continental Electronics Corp
 Control Technology Inc
 Custom Business Systems, Inc.
 Datacount
 Decision Inc
 Enterprise Systems Group Inc
 IBSS
 IGM Communications
 Harris Allied Broadcast Equip
 The Management
 Master Software Systems
 Professional Management Serv.
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 Radio Resources & Services
 Register Data Systems
 Roscom General
 Summit Software Systems

Automation, Newsroom

Barrett Associates, Inc.
 Broadcasters General Store
 CEA Newsroom System
 Caveco
 Cirrus Technologies Inc
 Columbine Systems Inc.
 Comprompter Inc
 Control Technology Inc
 DHK Group
 IBSS
 IGM Communications
 Media Computing, Inc.
 RF Specialties of California
 RF Specialties of Missouri
 Radio Resources & Services
 Schafer Digital
 Sierra Automated Systems & Eng Corp
 Sine Systems, Inc.
 Videoquip Research Limited
 Wireready Newswire Systems Inc

Automation, Radio Program

AVR Communications Limited East
 AVR Communications Limited West
 Absolute Broadcast Automation
 Audio Broadcast Group, Inc.
 Broadcast Supply West
 Barrett Associates, Inc.
 Bill Elliott Bdct Consultants
 Bradley Broadcast Sales
 Broadcast Automation, Inc.
 Broadcast Electronics
 Broadcast Equipment Sales &
 Engineering
 Broadcast Programming
 Broadcast Services/EME
 Broadcasters General Store
 Caveco
 Chrontral Corporation
 Cirrus Technologies Inc
 Computer Concepts Corp. Intl Division
 Concept Productions
 Conex Electro-Systems, Inc.
 Continental Electronics Corp
 Control Technology Inc.
 Crouse-Kimzey Company
 DHK Group
 Dick Summer Communications
 Drake-Chenault
 ESE
 Enterprise Systems Group Inc
 Giesler Broadcasting Supply, Inc.
 Graysonics
 Guarantee Radio Supply Corporation
 Harris Allied
 Harris Allied Broadcast Equip
 Hy James, Inc.
 IBSS
 IGM Communications

Innovative Automation
Kingdom Technology
The Management
McCurdy Radio Industries
Music Director Programming
Northeast Broadcast Lab, Inc.
Old Dominion Broadcast Eng. Serv.
Parcom Inc.
POA/ Products Group
Pristine Systems, Inc.
Professional Management Serv.
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Ram Broadcast Systems
Register Data Systems
Roscom General
Schafer Digital
Schafer World Communications
Sentry Systems
Sono-Mag Corporation
Studer Revox America, Inc.
Systemation
TM Communications
Technet Systems Group
Time Logic, Inc.
Versatech Industries, Inc.

b

Batteries

AVC Systems
AVR Communications Limited East
AVR Communications Limited West
American Media Services
Audio Labs
Audio Services Corporation
BJM Electronics Ltd.
Beyerdynamic Inc.
Capital Electronics Inc
Control Technology Inc
Electronic Industries, Inc.
Full Compass Systems, Ltd.
Fusion Electronics, Inc.
Guarantee Radio Supply Corporation
Holzberg Inc.
Landy Associates Inc
Lines Video Systems
Omega Communications Company
Professional Audio Supply
Parcom Inc.
Peirce-Phelps, Inc
Periphex, Inc.
Photocomm (Solar Signage)
Ritz Audio-Visual Associates, Inc
Spectra Sonics

Brokers, Station Appraisers

Building, Prefabricated
ACII
Adelphon
Andrew Corporation
Broadcast Services/EME
Canadian Portable Structures
E-Z Up International
Fort Worth Tower Inc
Harris Allied
Harris Allied Broadcast Equip
LDL Communications
Payne Engineering
Ray H. Rosenblum
RF Specialties of Missouri
RF Specialties of Washington, Inc.
ROHN Inc
Skyline Antenna Management
Tower Structures, Inc
Tower Structures Inc.

c

Cabinets, Cases and Racks

+4 Audio
AVC Systems
AVR Communications Limited East
AVR Communications Limited West
Advance Products
Amco Engineering Co.
American Media Services
Anvil Cases
Anything Audio
Arrakis Systems
Atlas/Soundolier
Audio Broadcast Group, Inc.
Audio Services Corporation
AudioLine, Inc.
BJM Electronics Ltd.
Barrett Associates, Inc.
Grant Becker Enterprises
Bradley Broadcast Sales
Broadcast Automation, Inc.
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Broadcasters General Store
Bud Industries, Inc.
Calzone Case Co.
Cancomm
Continental Electronics
Control Technology Inc.
Crouse-Kimzey Company
Electronic Industries, Inc.
Emcor Products/Crenlo Inc
The Express Group
Fiberbilt Cases Inc.
Fidelipac Corporation
Full Compass Systems, Ltd.
GKM Mfg. Corp.
Giesler Broadcasting Supply, Inc.
Graysonics
Guarantee Radio Supply Corporation
Hall Electronics
C.B. Hannay & Son, Inc.
Harris Allied
Harris Allied Broadcast Equip
Holzberg Inc.
Hy James, Inc.
J.N.S. Electronics, Inc.
Kintron Laboratories Inc
LPB, Inc.
Landy Associates Inc
Lasalle Music and Pro Audio
Lines Video Systems
Martin Audio/Video Corp
Milam Audio Co.
Murphy Studio Furniture
Nalpak Video Sales Inc.
Netcom
New World Music & Sound
Northeast Broadcast Lab, Inc.
Numark Electronics
Old Dominion Broadcast Eng. Serv.
Omega Communications Company
Professional Audio Supply
Parsons Audio
Peavey Electronics Corporation
Pierce-Phelps, Inc. - AVSD
Peirce-Phelps, Inc
Pro Media
Pyramid Audio, Inc.
Quintessence Audio
RF Specialties of California
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Ram Broadcast Systems
Research Technology International
Ritz Audio-Visual Associates, Inc
Roscom General
Ruslang Corp
Sono-Mag Corporation

Spectra Sonics
Star Case Manufacturing Co Inc
J Storeel Corp.
Studio Technology
Suministros Gonzalez
Technet Systems Group
Tek Media Supply Company
Thermodyne Intl Ltd
Thermodyne International Ltd.
Tobias & Company Ltd
Wheatstone Corporation
Wide Range Electronics Corporation
Winsted Corp
Zero Stantron

Cart Machines, NAB

AV Technology International, Inc.
AVC Systems
AVR Communications Limited East
AVR Communications Limited West
Audi-Cord Corporation
Audio Broadcast Group, Inc.
Audio Dynamics, Inc.
AudioLine, Inc.
Audiomedia
Audironics
Broadcast Supply West
Barrett Associates, Inc.
Grant Becker Enterprises
Bradley Broadcast Sales
Broadcast Automation, Inc.
Broadcast Electronics
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Broadcasters General Store
Cancomm
Caveco
Cirrus Technologies Inc
Continental Electronics
Control Technology Inc.
Crouse-Kimzey Company
Electronic Industries, Inc.
Fidelipac Corporation
Full Compass Systems, Ltd.
Giesler Broadcasting Supply, Inc.
Graysonics
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Hartmann Associates
Holzberg Inc.
Hy James, Inc.
IER (Industrial Equip. Reps.)
IGM Communications
International Tapetronics
Jim Walters Co.
John E. Hillman Associates
LPB Inc
Landy Associates Inc
Lasalle Music and Pro Audio
Lindahl Sales Corp
Lita Broadcasting Distributors
Manger Eng-Beau Motors Div.
Martin Audio/Video Corp
Milam Audio Co.
New World Music & Sound
Northeast Broadcast Lab, Inc.
Oakwood Audio Labs Ltd.
Old Dominion Broadcast Eng. Serv.
Otari Corporation
Professional Audio Supply
Pacific Recorders & Engineering Corp.
Parcom Inc.
Parsons Audio
Pierce-Phelps, Inc. - AVSD
Peirce-Phelps, Inc
PMA Marketing
Pro Media
QEI Corporation
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.

RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Radio Systems
Research Associates, Inc.
Riggins Electronic Sales
Roscom General
Sequoia Electronics
Sono-Mag Corporation
Star Systems
Suministros Gonzalez
Tapecaster
Technet Systems Group
Transcom Corporation

Cart Machines, Digital

AV Technology International, Inc.
AVC Systems
AVR Communications Limited East
AVR Communications Limited West
Arrakis Systems
Audio Broadcast Group, Inc.
Audio Services Corporation
AudioLine, Inc.
Audiomedia
Audironics
Broadcast Supply West
BARCO-EMT GmbH
Barrett Associates, Inc.
BASYS Automation Systems
Grant Becker Enterprises
Bradley Broadcast Sales
Broadcast Automation, Inc.
Broadcast Electronics
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Broadcasters General Store
Cancomm
Caveco
Cirrus Technologies Inc
Continental Electronics
Control Technology Inc.
Crouse-Kimzey Company
Digital Broadcast Associates
Electronic Industries, Inc.
Fidelipac Corporation
Full Compass Systems, Ltd.
Giesler Broadcasting Supply, Inc.
Graysonics
Hall Electronics
Harris Allied
Hartmann Associates
Harris Allied Broadcast Equip
Henry Engineering
Hy James, Inc.
International Music Company
Jim Walters Co.
John E. Hillman Associates
LPB Inc
Lasalle Music and Pro Audio
Lita Broadcasting Distributors
The Management
Martin Audio/Video Corp
Milam Audio Co.
New World Music & Sound
Northeast Broadcast Lab, Inc.
Oakwood Audio Labs Ltd.
Old Dominion Broadcast Eng. Serv.
Otari Corporation
Professional Audio Supply
Pacific Recorders & Engineering Corp.
Parcom Inc.
Parsons Audio
POA/ Products Group
Pierce-Phelps, Inc. - AVSD
Peirce-Phelps, Inc
PMA Marketing
Pro Media
QEI Corporation
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.

RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Racom Products
 Radio Resources & Services
 Radio Systems
 Register Data Systems
 Research Associates, Inc.
 Riggins Electronic Sales
 Roscom General
 Sequoia Electronics
 Sono-Mag Corporation
 Star Systems
 Studer Revox America, Inc.
 Suministros Gonzalez
 TM Century, Inc.
 Technet Systems Group
 360 Systems
 Tobias & Company Ltd
 Transcom Corporation
 Wireready Newswire Systems Inc

Cassette Recorders

+4 Audio
 AVC Systems
 AVR Communications Limited East
 AVR Communications Limited West
 Accurate Sound Corporation
 Anything Audio
 Audio Broadcast Group, Inc.
 Audio Labs
 Audio Services Corporation
 AudioLine, Inc.
 Audiomedia
 Broadcast Supply West
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Bradley Broadcast Sales
 Broadcast Automation, Inc.
 Broadcast Electronics
 Broadcast Equipment Sales & Engineering
 Broadcast Services/EME
 Broadcasters General Store
 Cancomm
 Caveco
 Continental Electronics
 Control Technology Inc.
 Crouse-Kimzey Company
 Electronic Industries, Inc.
 Fidelipac Corporation
 Giesler Broadcasting Supply, Inc.
 Graysonics
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Hartmann Associates
 Holzberg Inc.
 Hy James, Inc.
 Intl Electro-Magnetics
 Jim Walters Co.
 John E. Hillman Associates
 LPB Inc
 Landy Associates Inc
 Lasalle Music and Pro Audio
 Marantz Professional Products
 Milam Audio Co.
 Nakamichi America Corp
 New World Music & Sound
 Northeast Broadcast Lab, Inc.
 Oakwood Audio Labs Ltd.
 Old Dominion Broadcast Eng. Serv.
 Omega Communications Company
 Professional Audio Supply
 Parcom Inc.
 Parsons Audio
 Pierce-Phelps, Inc. - AVSD
 Peirce-Phelps, Inc
 Pro Media
 Pyramid Audio, Inc.
 QEI Corporation
 RE America
 RF Specialties of California
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Research Associates, Inc.
 Riggins Electronic Sales
 Ritz Audio-Visual Associates, Inc
 Singularity Corporation
 Sony Business & Professional Group
 Studer Revox America, Inc.
 Suministros Gonzalez
 TFT Inc
 Telectro Systems Corporation
 Tobias & Company Ltd
 UAR Professional Systems

RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Research Associates, Inc.
 Riggins Electronic Sales
 Roscom General
 Sono-Mag Corporation
 Sound America Inc.
 Star Systems
 Studer Revox America, Inc.
 Tandberg Educational, Inc.
 TASCAM
 Technet Systems Group
 Tobias & Company Ltd
 Transcom Corporation
 Uher of America
 Wide Range Electronics Corporation

Chemicals, Cleaning

Caig Laboratories, Inc
 Pacific Rcds & Engineering

Cassette Recorders

AVC Systems
 AVR Communications Limited East
 AVR Communications Limited West

Codecs, analog and Digital

Audio Services Corporation
 AudioLine, Inc.
 Broadcast Supply West
 BARCO-EMT GmbH
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Broadcast Equipment Sales & Engineering
 Broadcast Services/EME
 Broadcasters General Store
 California Digital
 Comrex Corp
 Control Technology Inc.
 Dolby Laboratories Inc.
 Full Compass Systems, Ltd.
 Giesler Broadcasting Supply, Inc.
 Guarantee Radio Supply Corporation
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Hy James, Inc.
 Intraplex Inc
 J.N.S. Electronics Inc
 Jim Walters Co.
 Lasalle Music and Pro Audio
 Martin Audio/Video Corp
 Milam Audio Co.
 New World Music & Sound
 Northeast Broadcast Lab, Inc.
 Oakwood Audio Labs Ltd.
 Professional Audio Supply
 Parcom Inc.
 Parsons Audio
 Peavey Electronics Corporation
 Pierce-Phelps, Inc. - AVSD
 Peirce-Phelps, Inc
 Pro Media
 Pyramid Audio, Inc.
 QEI Corporation
 RE America
 RF Specialties of California
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Research Associates, Inc.
 Riggins Electronic Sales
 Ritz Audio-Visual Associates, Inc
 Singularity Corporation
 Sony Business & Professional Group
 Studer Revox America, Inc.
 Suministros Gonzalez
 TFT Inc
 Telectro Systems Corporation
 Tobias & Company Ltd
 UAR Professional Systems

Wavnet, Inc.
 Yamaha Music Corp. of America

Compact Disc (CD) Players

+4 Audio
 AVC Systems
 AVR Communications Limited East
 AVR Communications Limited West
 Anything Audio
 Audio Broadcast Group, Inc.
 Audio Labs
 Audio Services Corporation
 AudioLine, Inc.
 Audiotechniques
 Broadcast Supply West
 BARCO-EMT GmbH
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Bradley Broadcast Sales
 Broadcast Automation, Inc.
 Broadcast Electronics Inc
 Broadcast Equipment Sales & Engineering
 Broadcast Services/EME
 Broadcasters General Store
 Cancomm
 Caveco
 Concept Productions
 Continental Electronics
 Control Technology Inc.
 Crouse-Kimzey Company
 Denon America Inc.
 Electronic Industries, Inc.
 Full Compass Systems, Ltd.
 Gefen Systems
 Giesler Broadcasting Supply, Inc.
 Gotham Audio Corp
 Graysonics
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 Hy James, Inc.
 ICB Audio
 IER, Industrial Equip Reps
 Jim Walters Co.
 John E. Hillman Associates
 LPB Inc
 Landy Associates Inc
 Lasalle Music and Pro Audio
 Lita Broadcasting Distributors
 The Management
 Martin Audio/Video Corp
 Milam Audio Co.
 Nakamichi America Corp
 New World Music & Sound
 Northeast Broadcast Lab, Inc.
 Numark Electronics
 Oakwood Audio Labs Ltd.
 Old Dominion Broadcast Eng. Serv.
 Professional Audio Supply
 Parcom Inc.
 Parsons Audio
 Pierce-Phelps, Inc. - AVSD
 Peirce-Phelps, Inc
 Pro Media
 Professional Management Serv.
 Pyramid Audio, Inc.
 Quintessence Audio
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Research Associates, Inc.
 Riggins Electronic Sales
 Ritz Audio-Visual Associates, Inc
 Roscom General
 RRADCO Group
 Sono-Mag Corporation
 Sony Business & Professional Group
 Star Systems

Studer Revox America, Inc.
 Suministros Gonzalez
 TM Communications
 Tandberg Educational, Inc.
 TASCAM
 Technet Systems Group
 Tobias & Company Ltd
 Transcom Corporation
 UAR Professional Systems

Compact Disc (CD) Recorders

+4 Audio
 Audio Broadcast Group Inc
 Audio Labs
 Broadcast Services/EME
 Cancomm
 Caveco
 Control Technology Inc
 Crouse-Kimzey Company
 Denon America Inc
 Dic Digital
 Fuller Sound
 GBS-Giesler Broadcasting Supply
 Gotham Audio Corp
 Graysonics
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 John E. Hillman Associates
 LPB Inc
 Old Dominion Broadcast Engr Service
 Professional Audio Supply
 Pierce-Phelps, Inc. - AVSD
 Pyramid Audio Inc
 Quintessence Audio
 RF Specialties of Florida
 Riggins Electronic Sales
 Roscom General
 RRADCO Group
 Star Systems
 Stellavox
 Studer Revox America, Inc.
 Technet Systems Group

Components, Transistors

Audiotechniques
 BJM Electronics Ltd.
 Barrett Associates, Inc.
 Capital Electronics Inc
 Caveco
 Electronic Industries, Inc.
 Fusion Electronics, Inc.
 IER, Industrial Equip Reps
 Lasalle Music and Pro Audio
 Lita Broadcasting Distributors
 Martin Audio/Video Corp
 Omega Communications Company
 Parcom Inc.
 Philips Components
 Richardson Electronics/RF Gain
 RF Specialties of Missouri
 Riggins Electronic Sales
 Suministros Gonzalez
 Tandberg Educational, Inc.
 That Corporation
 Thor Electronics Corp.
 Wide Range Electronics Corporation

Components, Lamps

Lamp Technology Inc

Components, Capacitors

American Media Services
 BJM Electronics Ltd.
 Barrett Associates, Inc.
 Capital Electronics Inc
 Caveco
 Commercial Radio Company
 Electronic Industries, Inc.
 Fusion Electronics, Inc.
 Hall Electronics
 IER (Industrial Equip. Reps.)
 ITT Jennings

Kintronic Laboratories Inc
LSI Jennings
Lita Broadcasting Distributors
Martin Audio/Video Corp
Omega Communications Company
Parcom Inc.
Philips Components
Plastic Capacitors Inc
Richardson Electronics/RF Gain
RF Specialties of Missouri
Riggins Electronic Sales
Suministros Gonzalez
Surcom Associates, Inc.
Tandberg Educational, Inc.
Wide Range Electronics Corporation

Components, Resistors

Altronic Research
BJM Electronics Ltd.
Barrett Associates, Inc.
Capital Electronics Inc
Caveco
Commercial Radio Company
Electronic Industries, Inc.
Guarantee Radio Supply Corporation
Lita Broadcasting Distributors
Martin Audio/Video Corp
Omega Communications Company
Parcom Inc.
Philips Components
Power Film Systems, Inc.
RF Specialties of Missouri
Riggins Electronic Sales
Shallco
Suministros Gonzalez
Tandberg Educational, Inc.
Tech Laboratories, Inc.
Wide Range Electronics Corporation

Components, RF

Broadcast Electronics
CCA Electronics, Inc
Continental Electronics Corp
Harris Allied Broadcasting Equipment
Kintronic Laboratories Inc
Phasetek
QEI Corporation
Television Technology Corp

Computer Hardware

AVR Communications Limited East
AVR Communications Limited West
Alpha Products
Altair communications Inc
Audio Labs
BGW Systems Inc
BJM Electronics Ltd.
CBSI (Custom Business Systems)
CEA Newsroom System
Caveco
Columbine Systems Inc.
Computer Concepts Corporation
Concept Productions
Custom Business Systems, Inc.
DigiDesign Inc
Enterprise Systems Group Inc
Gefen Systems
Generation Technologies Corp
Guarantee Radio Supply Corporation
Harris Allied Broadcast Equip
Lasalle Music and Pro Audio
The Management
Media Computing, Inc.
Media Touch Systems
Nordic Software, Inc.
Parcom Inc.
Parsons Audio
Professional Management Serv.
Quintessence Audio
Register Data Systems
Schafer Digital
TM Communications
Tandberg Educational, Inc.
Time & Temperature Company of S.D.

Turtle Beach Systems
WSI Corporation

Computer Software and Peripherals

Alpha Products
Altair communications Inc
Associated Press Bdct Service
Audiological Engineering Corp
Automated Business Concepts
BJM Electronics Ltd
CBSI (Custom Business Systems)
CEA Newsroom System
Caveco
Cirrus Technologies Inc
Columbine Systems Inc.
Communications Data Services
Computer Concepts Corporation
Concept Productions
Critical Mass Media
Custom Business Systems, Inc.
Datacount
Datel Corporation
Decision Inc
DigiDesign Inc
Doug Vernier Broadcast Consulting
Enterprise Systems Group Inc
First Light Video Publishing
Gefen Systems
Generation Technologies Corp
Harris Allied Broadcast Equip
IGM Communications
Jensen Transformers Inc.
Lasalle Music and Pro Audio
Litronix Corporation
The Management
Master Software Systems
Media Computing, Inc.
Media Touch Systems
Nordic Software, Inc.
Parcom Inc.
Parsons Audio
PC Boards
Plastic Reel Corp. of America
Pristine Systems, Inc.
Professional Management Serv.
Quintessence Audio
Radio Computing Services, Inc.
Ramko Research
Register Data Systems
Schafer Digital
Sentry Systems
SoftWright
Star Case Manufacturing Co Inc
Summit Software Systems Inc
TM Communications
Tandberg Educational, Inc.
Text Technologies, Inc.
Time & Temperature Company of S.D.
The Radio Mall
Turtle Beach Systems
Videoquip Research Limited
Wireready Newswire Systems Inc

Consoles, On-Air

A/V Technology International, Inc.
ATI (Audio Technologies Inc)
Allen & Heath
Amco Engineering Co.
AMEK/TAC U.S. Operations
Anything Audio
Arrakis Systems
Audio Broadcast Group, Inc.
Audioarts Engineering
AudioLine, Inc.
Audiomedia
Auditronics
Autogram Corp
Broadcast Supply West
Barrett Associates, Inc.
Beck Associates, Inc.
Grant Becker Enterprises
Bradley Broadcast Sales
Broadcast Audio Corp
Broadcast Automation Inc

Broadcast Electronics
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Broadcasters General Store
Cancomm
Caveco
Cirrus Technologies Inc
Continental Electronics
Control Technology Inc.
Crouse-Kimzey Company
D&R Electronics USA
Electronic Industries, Inc.
Full Compass Systems, Ltd.
Giesler Broadcasting Supply, Inc.
Graysonics
Guarantee Radio Supply Corporation
Hall Electronics
Hallikainen & Friends, Inc.
Harris Allied
Harris Allied Broadcast Equip
Harrison by GLW
Holzberg Inc.
Howe Technologies Corporation
Hy James, Inc.
IER (Industrial Equip. Reps.)
Jim Walters Co.
LPB, Inc.
Landy Associates Inc
Lasalle Music and Pro Audio
Lindahl Sales Corp
Lines Video Systems
Logitek Electronic Systems Inc.
The Management
Martin Audio/Video Corp
McCurdy Radio Industries
Milam Audio Co.
Neotek Corporation
New World Music & Sound
Northeast Broadcast Lab, Inc.
Oakwood Audio Labs Ltd.
Old Dominion Broadcast Eng. Serv.
Douglas Ordon & Company, Inc.
Professional Audio Supply
Pacific Recorders & Engineering Corp.
Parcom Inc.
Parsons Audio
Pierce-Phelps, Inc. - AVSD
Peirce-Phelps, Inc
Penny & Giles Inc.
PMA Marketing
Pro Media
Professional Management Serv.
QEI Corporation
QEI Corporation
Quintessence Audio
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Radio Systems
Ram Broadcast Systems
Ramko Research
Research Associates, Inc.
Riggins Electronic Sales
Roscom General
RRADCO Group
Russco Electronics Mfg. Inc.
Schafer World Communications
Sequoia Electronics
Sony Business & Professional Group
Soundcraft
Star Systems
Studer Revox America, Inc.
Suministros Gonzalez
TASCAM
Technet Systems Group
Telo Technology
Tobias & Company Ltd
Transcom Corporation
UAR Professional Systems

Ward-Beck Systems Ltd.
Wavnet, Inc.
Wheatstone Corporation
Yamaha Music Corp. of America

Consoles, Production

+4 Audio
A/V Technology International, Inc.
ART, Applied Research & Tech
AVC Systems
AVR Communications Limited East
AVR Communications Limited West
Dan Alexander Audio
Allen & Heath
Amco Engineering Co.
AMEK/TAC U.S. Operations
Anything Audio
Arrakis Systems
Audio Broadcast Group, Inc.
AudioLogic
Audio Services Corporation
Audioarts Engineering
AudioLine, Inc.
Audiotechniques
Auditronics
Autogram Corp
Broadcast Supply West
BARCO-EMT GmbH
Barrett Associates, Inc.
Beck Associates, Inc.
Grant Becker Enterprises
Bradley Broadcast Sales
Broadcast Audio Corp
Broadcast Electronics
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Broadcasters General Store
Cancomm
Caveco
Continental Electronics
Control Technology Inc.
Crouse-Kimzey Company
D&R Electronics USA
DDA
Electronic Industries, Inc.
Full Compass Systems, Ltd.
GML, Inc.
Giesler Broadcasting Supply, Inc.
Grass Valley Group Inc
Graysonics
Group One Ltd.
Guarantee Radio Supply Corporation
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Harrison by GLW
Henry Engineering
Holzberg Inc.
Howe Technologies Corporation
Hy James, Inc.
IER (Industrial Equip. Reps.)
Jim Walters Co.
Landy Associates Inc
Lasalle Music and Pro Audio
Lindahl Sales Corp
Lines Video Systems
Logitek Electronic Systems Inc.
Mackie Designs
The Management
Martin Audio/Video Corp
McCurdy Radio Industries
Milam Audio Co.
Neotek Corporation
New World Music & Sound
Northeast Broadcast Lab, Inc.
Numark Electronics
Oakwood Audio Labs Ltd.
Old Dominion Broadcast Eng. Serv.
Douglas Ordon & Company, Inc.
Otari Corporation
Professional Audio Supply
Pacific Recorders & Engineering Corp.

Panasonic/Prof Audio Systems (Ramsa)
 Parcom Inc.
 Parsons Audio
 Peavey Electronics Corporation
 Pierce-Phelps, Inc. - AVSD
 Peirce-Phelps, Inc.
 Penny & Giles Inc.
 PMA Marketing
 Pro Media
 Professional Management Serv.
 QEI Corporation
 Quintessence Audio
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Radio Systems
 Ram Broadcast Systems
 Ramko Research
 Research Associates, Inc.
 Riggins Electronic Sales
 Roscom General
 RRADCO Group
 Russco Electronics Mfg. Inc.
 Schafer World Communications
 Schoeps/Posthorn Recordings
 SECK
 Sequoia Electronics
 Sony Business & Professional Group
 Soundcraft
 Spectra Sonics
 Star Systems
 Studer Revox America, Inc.
 Suministros Gonzalez
 TASCAM
 Technet Systems Group
 Telo Technology
 Tobias & Company Ltd
 Transcom Corporation
 UAR Professional Systems
 Ward-Beck Systems Ltd.
 Wavnet, Inc.
 Wheatstone Corporation
 Wide Range Electronics Corporation
 Yamaha Music Corp. of America

Consoles, Remote

+4 Audio
 ART, Applied Research & Tech
 AVR Communications Limited East
 AVR Communications Limited West
 Dan Alexander Audio
 AMEK/TAC U.S. Operations
 Arrakis Systems
 Audio Broadcast Group, Inc.
 Audiologic
 Audioarts Engineering
 AudioLine, Inc.
 Broadcast Supply West
 Barrett Associates, Inc.
 Beck Associates, Inc.
 Grant Becker Enterprises
 Bradley Broadcast Sales
 Broadcast Audio Corp
 Broadcast Electronics
 Broadcast Equipment Sales & Engineering
 Broadcast Services/EME
 Broadcasters General Store
 Caveco
 Comrex Corporation
 Continental Electronics Corp
 Control Technology Inc.
 Crouse-Kimzey Company
 D&R Electronics USA
 DDA
 Dynacord
 Electronic Industries, Inc.
 Excalibur Electronics
 Full Compass Systems, Ltd.

Furman Sound, Inc.
 Giesler Broadcasting Supply, Inc.
 Grass Valley Group Inc
 Graysonics
 Guarantee Radio Supply Corporation
 Hall Electronics
 Hallikainen & Friends, Inc.
 Harris Allied
 Harris Allied Broadcast Equip
 Harrison by GLW
 Holzberg Inc.
 Hy James, Inc.
 IER (Industrial Equip. Reps.)
 Jim Walters Co.
 Lasalle Music and Pro Audio
 Lines Video Systems
 Logitek Electronic Systems Inc.
 Mackie Designs
 The Management
 Martin Audio/Video Corp
 Midas
 Milam Audio Co.
 Neotek Corp
 Northeast Broadcast Lab, Inc.
 Old Dominion Broadcast Eng. Serv.
 Douglas Ordon & Company, Inc.
 Professional Audio Supply
 Panasonic/Prof Audio Systems (Ramsa)
 Parcom Inc.
 Parsons Audio
 Pierce-Phelps, Inc. - AVSD
 Peirce-Phelps, Inc.
 Posthorn Recordings
 Professional Management Serv.
 Pyramid Audio, Inc.
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Ram Broadcast Systems
 Research Associates, Inc.
 Riggins Electronic Sales
 Roscom General
 RP Communications
 Russco Electronics Mfg. Inc.
 Schafer World Communications
 Schoeps/Posthorn Recordings
 SECK
 Sequoia Electronics
 Soundcraft
 Spectra Sonics
 Star Systems
 Studer Revox America, Inc.
 Suministros Gonzalez
 Technet Systems Group
 Telfax Communications
 Tobias & Company Ltd
 Tri-Tech, Inc.
 UAR Professional Systems
 Ward-Beck Systems Ltd.
 Wavnet, Inc.
 Wheatstone Corporation
 Wide Range Electronics Corporation
 Yamaha Music Corp. of America
 Zercom Corporation

Consulting, Engineering and Design Services

+4 Audio
 ASC - Tube Traps
 AVC Systems
 Acoustic Technology Inc.
 Acoustilog, Inc.
 Adelphon, Inc.
 Alacronics
 Alpine Marketing Communications Ltd.
 American Digital Radio
 Anything Audio
 Audio Concepts and Engineering Services

Audio Dynamics, Inc.
 Audio Services Corporation
 AudioLine, Inc.
 Audiomedia
 Audisar
 BIA Consulting
 BP Consulting Group
 Barrett Associates, Inc.
 Beck Associates, Inc.
 Bill Elliott Bdct. Consultants
 Broadcast Comm Systems Inc
 Broadcast Consultants
 Bdct. Design & Construction
 Broadcast Equipment Sales & Engineering
 Broadcast Services of Colorado
 Broadcast Services/EME
 Broadcasting and Electronic Svrs Lab
 CSI Telecommunications
 CTI Installations, Inc.
 California Digital
 Carl T. Jones Corporation
 Carolina Global Maps, Inc.
 Central Tower, Inc.
 Chan & Associates
 Chip Morgan Broadcast Eng
 Circuit Doctors Inc
 Cliff Gill Enterprises, Inc
 Cohen, Dippell and Everist, P.C.
 Comex Worldwide Corporation
 Commercial Radio Company
 Communications Data Services
 Communications Technologies, Inc
 Communications General Corp.
 Control Technology Inc
 Consulting Radio Engineer
 Critical Mass Media
 Cutting Edge Technologies
 D.L. Markley & Associates
 Dataworld
 Datel Corporation
 Digital Recorders
 Diversified Communications Systems
 Doug Vernier Broadcast Consulting
 duTreil, Lundin & Rackley, Inc.
 E Harold Munn, Jr & Associates
 Electronics Research, Inc.
 The Express Group
 FM Technology Assoc Inc
 First Atlantic Group, Inc.
 Frederick L. Spaulding, P.E.
 Full Compass Systems, Ltd.
 GKM Mfg. Corp.
 Ronald J. Grandmaison, P.E.
 Consultant
 Hammett & Edison Inc
 Harris Allied
 Harris Allied Broadcast Equip
 Harry Nelson & Associates
 Charles A. Hecht & Associates
 Hatfield & Dawson Consult Engr
 Charles A. Hecht & Associates, Inc.
 Holzberg Inc.
 Hy James, Inc.
 IBSS
 IDB Communications Group, Inc
 Innovative Automation
 Intraplex, Inc.
 John Furr and Associates
 Jorgenson Broadcast Brokerage
 Jules Cohen & Associates P.C.
 Keating Technical Services
 Kenneth R Meades
 Kintronic Laboratories Inc
 Lakeside Associates Inc
 Lasalle Music and Pro Audio
 Lawrence Behr & Associates
 Lawrence L. Morton Associates
 International Sales Manager
 Lines Video Systems
 Litronix Corporation
 Lohnes & Culver
 Magrill Engineering
 Marcom

McClanathan & Associates
 Micro Communications Inc
 MidAmerica Electronics Service, Inc.
 Milam Audio Co.
 Moffet, Larson & Johnson, Inc.
 Mullaney Engineering, Inc.
 Multiphase Consulting
 National Supervisory Network
 Netcom
 Nick Anthony & Associates
 Normex Electronic Co. Ltd.
 Northeast Broadcast Lab, Inc.
 Nott Ltd.
 Fred A. Nudd Corporation
 Rick Nudd, Ltd.
 Oakwood Audio Labs Ltd.
 Old Dominion Broadcast Eng. Serv.
 Owl Engineering, Inc.
 Pacific Recorders & Engineering Corp.
 Parsons Audio
 Paul Dean Ford, P.E.
 Payne Engineering
 Pierce-Phelps, Inc. - AVSD
 Peirce-Phelps, Inc.
 PMA Marketing
 Professional Management Serv.
 Quintessence Audio
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RPG Diffuser Systems Inc
 RPS Communications
 Radio Systems Engineering
 Radiotechniques Engineering Corp
 Raines Electromagnetics
 Research Associates, Inc.
 Ron Krob
 Rose Engineering
 Ray H. Rosenblum
 RP Communications
 RRADCO Group
 SCA Data Systems Inc.
 Sellmeyer Engineering
 SG Communications
 Shafer Communications Group
 Silliman and Silliman
 Sine Systems, Inc.
 W Lee Simmons & Associates Inc
 Skyline Antenna Management
 Skywatch Weather Center
 SoftWright
 Sound Maintenance
 Spectra Sonics
 Spencer Broadcast
 Stephens Communications
 Steven L DeLay Co
 Steve Vanni Assoc Inc.
 Stram Electronics Corp
 Studio Technology
 T.Z. Sawyer Technical Consultants
 Target Tuning, Inc.
 Technet Systems Group
 Teletech Inc
 Telsat
 Tennaplex Systems Ltd
 Transtector Systems Inc.
 UAR Professional Systems
 U.S. Tower Services
 Videoquip Research Limited
 VIR James Engineers
 Walter Wulff & Associates
 Walters-Storyk Design Group
 Warren Electronic Systems
 Wavnet, Inc.
 Wide Range Electronics Corporation

Consulting, Programming & Marketing

C.R.N. Media
 Creeradio
 Don Kelly & Associates
 KBE "Broadcasting By Design"
 Lee Bayley & Associates
 Media Perspectives

C Casey Radio Programming Cslt
Stadlen Radio Associates
Todd Wallace Associates
Zarecki Radio Consulting

Contract Engineering Services

AVC Systems
Audio Concepts and Engineering Services
Beck Associates, Inc.
Bill Elliott Bdct. Consultants
Broadcast Automation Inc
Bdct. Design & Construction
Broadcast Equipment Sales & Engineering
Broadcasting and Electronic Svrs Lab
Chan & Associates
Chip Morgan Broadcast Eng
Circuit Doctors Inc
Electronic Research
Executive Broadcast Services
Full Compass Systems, Ltd.
Funke & Associates
Holzberg Inc.
Innovative Automation
John Nix
Jules Cohen & Associates P.C.
Keating Technical Services
Lasalle Music and Pro Audio
Lines Video Systems
Magrill Engineering
MidAmerica Electronics Service, Inc.
Multiphase Consulting
National Supervisory Network
Netcom
Normex Electronics Co Ltd
Old Dominion Broadcast Eng. Serv.
Parsons Audio
Payne Engineering
Pierce-Phelps, Inc. - AVSD
PMA Marketing
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
Radio Systems Engineering
Redco Audio Products
Research Associates, Inc.
RRADCO Group
SG Communications
Shaffer Communications Group
Skyline Antenna Management
Sound Maintenance
Stephens Communications
Steven L DeLay Co
Stram Electronics Corp
Target Tuning, Inc.
Tech Laboratories Inc
Teletech Inc
U.S. Tower Services
Versatech Industries, Inc.
Walter Wulff & Associates
Warren Electronic Systems
Wavnet, Inc.

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Data Vendors

American Digital Radio
Communications Data Services
CTR For Radio Information
Custom Publishing & Mktg Grp
Dataworld
The Radio Mail

Digital Audio Loggers

Radio Computing Service, Inc.

Delay, Audio Censoring

A/Z Associates
Audio/Digital Inc
Eventide Inc

Digital Audio Tape (DAT) Machines

+4 Audio

AVC Systems
AVR Communications Limited East
AVR Communications Limited West
Anything Audio
Audio Broadcast Group, Inc.
Audio Services Corporation
AudioLine, Inc.
Audiotechniques
Broadcast Supply West
Barrett Associates, Inc.
Grant Becker Enterprises
Bradley Broadcast Sales
Broadcast Automation, Inc.
Broadcast Equipment Sales
Broadcast Services/EME
Broadcasters General Store
Cancomm
Caveco
Concept Productions
Continental Electronics
Control Technology Inc.
Crouse-Kimzey Company
Electronic Industries, Inc.
Eventide Inc
Fostex Corp. of America
Full Compass Systems, Ltd.
Giesler Broadcasting Supply, Inc.
Gotham Audio Corp
Graysonics
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Holzberg Inc.
Hy James, Inc.
ICB Audio
IER, Industrial Equip Reps
International Music Company
Jim Walters Co.
John E. Hillman Associates
LPB Inc
Landy Associates Inc
Lasalle Music and Pro Audio
The Management
Marantz Professional Products
Martin Audio/Video Corp
Milam Audio Co.
The Music Director Programming
Nakamichi America Corp
New World Music & Sound
Northeast Broadcast Lab, Inc.
Oakwood Audio Labs Ltd.
Old Dominion Broadcast Eng. Serv.
Professional Audio Supply
Panasonic/Prof Audio Systems
(Ramsa)
Parcom Inc.
Parsons Audio
Pierce-Phelps, Inc. - AVSD
Peirce-Phelps, Inc
Pro Media
Professional Management Serv.
Pyramid Audio, Inc.
Quintessence Audio
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Radio Systems
Research Associates, Inc.
Ritz Audio-Visual Associates, Inc
Roscom General
RRADCO Group
Sono-Mag Corporation
Sony Business & Professional Group
Star Systems
Stellavox
Studer Revox America, Inc.
Suministros Gonzalez
TASCAM
Technet Systems Group
Tobias & Company Ltd

UAR Professional Systems

Digital Audio Accessories & Converters

Apogee Electronics
CANARE
Stellavox

Digital Audio Work Stations

+4 Audio
AKAI
AKG Acoustics
A/Z Associates
AVC Systems
AVR Communications Limited East
AVR Communications Limited West
BSS. A Div. of AKG Acoustics
Anything Audio
Audio Broadcast Group Inc
AudioLine, Inc.
Broadcast Supply West
BARCO-EMT GmbH
BASYS Automation Systems
Bradley Broadcast Sales
Broadcast Electronics Inc
Broadcast Services/EME
Broadcasters General Store
Caveco
Cirrus Technologies Inc
Computer Concepts Corporation
Computer Concepts Corp. Intl Division
Continental Electronics Corp
Control Technology Inc.
Crouse-Kimzey Company
D&R Electronics USA
DigiDesign Inc
Full Compass Systems, Ltd.
Gentner Electronics Corporation
Harris Allied
Harris Allied Broadcast Equip
Hy James, Inc.
IBSS
ICB Audio
Kingdom Technology
Lasalle Music and Pro Audio
Lexicon Inc.
The Management
Martin Audio/Video Corp
Milam Audio Co.
New England Digital
New World Music & Sound
Northeast Broadcast Lab Inc
Oakwood Audio Labs Ltd.
Douglas Ordon & Company, Inc.
Otari Corporation
Parsons Audio
POA/ Products Group
Pierce-Phelps, Inc. - AVSD
Pristine Systems, Inc.
Pro Media
Professional Management Serv.
Pyramid Audio, Inc.
RF Specialties of Missouri
Register Data Systems
Research Associates Inc
Schafer Digital
Star Systems
Studer Revox America, Inc.
TM Century, Inc.
TM Communications
Time Logic, Inc.
Turtle Beach Systems
UAR Professional Systems
Videoquip Research Limited
Waveframe Corporation

Digital Message Repeaters
Henry Engineering
Racom Products

Digital Hard Disk Recorders/Reproducers
+4 Audio
AKAI

Altair communications Inc
Antex Electronics
Anything Audio
Audio Broadcast Group Inc
Broadcast Supply West
BARCO-EMT GmbH
Bradley Broadcast Sales
Broadcast Electronics Inc
Broadcast Services/EME
Caveco
Cirrus Technologies Inc
Computer Concepts Corp. Intl Division
Concept Productions
Continental Electronics Corp
Control Technology Inc
Crouse-Kimzey Company
Digital Broadcast Systems Inc
Gentner Electronics Corporation
Graysonics
Harris Allied
Harris Allied Broadcast Equip
IER, Industrial Equip Reps
IGM Communications
International Taptronic Corp
J & I Audio-Video
The Management
Media Touch Systems
Northeast Broadcast Lab Inc
Old Dominion Broadcast Engr Service
POA/ Products Group
Pierce-Phelps, Inc. - AVSD
Professional Management Serv.
Pyramid Audio Inc
Quintessence Audio
Register Data Systems
Roscom General
Schafer Digital
Schafer World Communications
Sentry Systems
Star Systems
Studer Revox America, Inc.
Time Logic, Inc.
Videoquip Research Limited
Waveframe Corporation
Wheatstone Corporation

Direct Broadcast Satellites
Control Technology Inc

Distributor, Regional
+4 Audio
AVC Systems
American Loop Systems
Audiomedia
Bradley Broadcast Sales
Broadcast Equipment Sales & Engineering
Burlington Audio/Video Tapes
Cancomm
Capital Electronics Inc
Clements Company
Connector Distribution
Continental Electronics Corp
Control Technology Inc
Crouse-Kimzey of Annapolis
Electrex Company
Electronic Industries, Inc.
Full Compass Systems, Ltd.
Giesler Broadcasting Supply, Inc.
Guarantee Radio Supply Corporation
Hall Electronics
Harris Allied Broadcast Equip
Jim Walters Co.
International Sales Manager
Marcom
Martin Audio/Video Corp
Northeast Broadcast Lab, Inc.
Ocean Audio Inc.
Parcom Inc.
Parsons Audio
Pierce-Phelps, Inc. - AVSD
Peirce-Phelps, Inc
Posthorn Recordings
Professional Audio Marketing

Professional Management Serv.
Pyramid Audio Inc
RF Specialties of California
RF Specialties of Florida
RF Specialties of Texas
RF Specialties of Washington, Inc.
Riggins Electronic Sales
Roscom General
Schoeps/Posthorn Recordings
Sequoia Electronics
Tobias & Company Ltd
UAR Professional Systems
Wavnet, Inc.

Distributor, National

A/V Technology International, Inc.
A/Z Associates
AVR Communications Limited East
AVR Communications Limited West
American Broadcast Financial
American Loop Systems
Audio Broadcast Group, Inc.
Audiotechniques
BJM Electronics Ltd.
Boynton Studio, Inc.
Bradley Broadcast Sales
Broadcast Cartridge Service Inc.
Broadcast Comm Systems Inc
Broadcast Services/EME
Burlington Audio/Video Tapes
Cancomm
Cartridge Express
Cirrus Technologies Inc
Commercial Radio Company
Continental Electronics Corp
Control Technology Inc.
Crouse-Kimzey Company
Crouse-Kimzey of Annapolis
Electrex Company
Focal Press Broadcasting Pubs.
Full Compass Systems, Ltd.
Funke & Associates
Giesler Broadcasting Supply, Inc.
Graysonics
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Holzberg Inc.
ITP-Paulist Communications
Marcom
Mark IV Audio
Mastertone-Tapex Co., Inc.
Northeast Broadcast Lab, Inc.
Oakwood Audio Labs Ltd.
Old Dominion Broadcast Eng. Serv.
Professional Audio Supply
Pierce-Phelps, Inc. - AVSD
Peirce-Phelps, Inc.
Penny & Giles Inc.
Posthorn Recordings
Professional Management Serv.
Pyramid Audio Inc
QEI Corporation
Richardson Electronics/RF Gain
RF Specialties of Missouri
Radio Resources & Services
Redwood Marketing
S C M S Inc.
Schoeps/Posthorn Recordings
Sequoia Electronics
Skyline Antenna Management
Spencer Broadcast
Tandberg Educational, Inc.
Technet Systems Group
Thor Electronics Corp.
Videoquip Research Limited
Warren Electronic Systems
Wide Range Electronics Corporation
WFMT Fine Arts/Beethoven Sat

Distributor, International

A/V Technology International, Inc.
A/Z Associates
Acoustic Technology Inc.

American Loop Systems
American Media Services
AR Import/Export Inc.
Audio Services Corporation
BEE Sound, Inc.
BARCO-EMT GmbH
Barrett Associates, Inc.
Bradley Broadcast Sales
Broadcasters General Store
Burlington Audio/Video Tapes
Cirrus Technologies Inc
Comex Worldwide Corporation
Commercial Radio Company
Continental Electronics Corp
Control Technology Inc.
Crouse-Kimzey of Annapolis
Electrex Company
Enterprise Systems Group Inc
Full Compass Systems, Ltd.
Guarantee Radio Supply Corporation
Harris Allied
Harris Allied Broadcast Equip
IBSS
IER (Industrial Equip. Reps.)
J & F Trading
John E. Hillman Associates
Lita Broadcasting Distributors
Marcom
Professional Audio Supply
Pierce-Phelps, Inc. - AVSD
Peirce-Phelps, Inc.
Pomar Electronics
Pro Audio USA
Professional Management Serv.
Pyramid Audio Inc
QEI Corporation
QEI Corporation
Raks Corporation of America, Inc.
Redwood Marketing
Roscom General
Schafer International
Sequoia Electronics
Suministros Gonzalez
Thor Electronics Corp.
Tobias & Company Ltd
VIF International
Warren Electronic Systems
WFMT Fine Arts/Beethoven Sat

Dummy Loads

AVR Communications Limited East
AVR Communications Limited West
Altronic Research
Audio Broadcast Group, Inc.
Broadcast Supply West
Barrett Associates, Inc.
Bird Electronics Corporation
Bradley Broadcast Sales
Broadcast Comm Systems Inc
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Broadcasters General Store
Cancomm
Caveco
Coaxial Dynamics Inc
Commercial Radio Company
Continental Electronics
Control Technology Inc
Crouse-Kimzey Company
Dielectric Communications
Electro Impulse Laboratory, Inc.
Giesler Broadcasting Supply, Inc.
Guarantee Radio Supply Corporation
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Holzberg Inc.
Hy James, Inc.
Kintronic Laboratories Inc
Marcom
Loral Microwave-Narda
Northeast Broadcast Lab, Inc.
Old Dominion Broadcast Eng. Serv.

Omega Communications Company
Professional Audio Supply
Parcom Inc.
Phasetek
QEI Corporation
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
RF Systems
Radio Resources & Services
Roscom General
Suministros Gonzalez
Tech Laboratories Inc
Technet Systems Group
Tennaplex Systems Ltd
Tobias & Company Ltd
Trompeter Electronics



Encoders/Decoders, Tone and EBS Equipment

AVR Communications Limited East
AVR Communications Limited West
ASACA/Shibasoku Corp. of America
Audio Broadcast Group, Inc.
Broadcast Supply West
BARCO-EMT GmbH
Barrett Associates, Inc.
Bext Inc.
Bradley Broadcast Sales
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Broadcasters General Store
Cancomm
Caveco
Conex Electro-Systems Inc
Continental Electronics Corp
Control Technology Inc.
Crouse-Kimzey Company
Di-Tech Inc.
Electronic Industries, Inc.
Emergency Alert Receiver Inc
Giesler Broadcasting Supply, Inc.
Gorman Redlich Mfg. Co.
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Hartmann Associates
Hedco
Holzberg Inc.
Hy James, Inc.
IGM Communications
Intralex, Inc.
J-Squared Technical Service
Landy Associates Inc
Marcom
Martin Audio/Video Corp
Monroe Electronics, Inc.
Northeast Broadcast Lab, Inc.
Old Dominion Broadcast Eng. Serv.
Professional Audio Supply
Parcom Inc.
RE America
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Riggins Electronic Sales
Roscom General
TFT Inc.
Technet Systems Group
Tobias & Company Ltd
Vega, a Mark IV company
Videoquip Research Limited
Zercom Corporation

Exciters, AM Stereo

AVR Communications Limited East
AVR Communications Limited West
Audio Broadcast Group, Inc.
Audiologic
Broadcast Supply West
Barrett Associates, Inc.
Bradley Broadcast Sales
Broadcast Electronics
Broadcast Services/EME
Broadcasters General Store
Caveco
Cirrus Technologies Inc
Continental Electronics
Control Technology Inc.
Crouse-Kimzey Company
Delta Electronics Inc.
Electronic Industries, Inc.
Giesler Broadcasting Supply, Inc.
Graysonics
Guarantee Radio Supply Corporation
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Holzberg Inc.
Hy James, Inc.
IBSS
Jim Walters Co.
Marcom
Martin Audio/Video Corp
Micro Controls, Inc.
MidAmerica Electronics Service, Inc.
Motorola Inc./AM Stereo
Northeast Broadcast Lab, Inc.
Old Dominion Broadcast Eng. Serv.
Orban Associates, Div of AKG
Professional Audio Supply
Parcom Inc.
Pomar Electronics
Pyramid Audio Inc
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Roscom General
RRADCO Group
Suministros Gonzalez
Technet Systems Group
Tobias & Company Ltd
Transcom Corporation

Exciters, FM

AVR Communications Limited East
AVR Communications Limited West
Roscom General
Audio Broadcast Group, Inc.
Audiologic
Broadcast Supply West
Barrett Associates, Inc.
Grant Becker Enterprises
Bext Inc.
Bradley Broadcast Sales
Broadcast Electronics
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Broadcasters General Store
Broadcasting Systems
CCA Electronics
Cancomm
Caveco
Cirrus Technologies Inc
Comad Communications Limited
Continental Electronics
Control Technology Inc.
Crouse-Kimzey Company
Elcom Bauer
Electronic Industries
Energy-Onix Broadcast Equipment Co.
F M Systems Inc.

Giesler Broadcasting Supply, Inc.
 Graysonics
 Guarantee Radio Supply Corporation
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 Hy James, Inc.
 IER, Industrial Equip Reps
 Inovonics Inc
 J-Squared Technical Service
 Jim Walters Co.
 Landy Associates Inc
 Lasalle Music and Pro Audio
 Lita Broadcasting Distributors
 Litronix Corporation
 Marcom
 Martin Audio/Video Corp
 McMartin Incorporated
 Micro Controls, Inc.
 Northeast Broadcast Lab, Inc.
 Old Dominion Broadcast Eng. Serv.
 Orban Associates, Div of AKG
 Professional Audio Supply
 Parcom Inc.
 PMA Marketing
 Pomar Electronics
 Pyramid Audio Inc
 QEI Corporation
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Research Associates, Inc.
 Roscom General
 RRADCO Group
 Suministros Gonzalez
 TFT Inc
 Television Technology Corp.
 Technet Systems Group
 Tepco Corporation
 Tobias & Company Ltd
 Transcom Corporation

f

Fiber-Optic Products

ADC Telecommunications, Inc.
 ANT Telecommunications, Inc.
 Artel Communications Corp
 Barrett Associates, Inc.
 Broadcast Services/EME
 Broadcasters General Store
 Control Technology Inc
 Cooper Industries/Belden Division
 Dynair Electronics
 Electronic Industries
 Gepco International Inc
 Grass Valley Group Inc
 Harris Allied Broadcast Equip
 IDB Communications Group, Inc
 Intraplex, Inc.
 J.N.S. Electronics Inc
 Jensen Tools Inc
 Martin Audio/Video Corp
 Parcom Inc.
 Parsons Audio
 Pittsburgh Int'l Teleport
 RM&E, Inc.
 Rockwell International
 Roscom General
 Selco Products
 Wavnet, Inc.

Format Providers

Berkowitz Broadcast Consulting
 Broadcast Programming
 Concept Productions
 Control Technology Inc
 Critical Mass Media

Dick Summer Communications
 Don Kelly & Associates
 Far West Communications
 Gorman Media
 Music Director Programming
 Radio Programming Consultant
 Sonic Broadcasting Inc

Frequency Measures Services

Bald Mountain Lab
 Communications General Corp

h

Headphones, Headsets

+4 Audio
 AKG Acoustics
 AVC Systems
 AVR Communications Limited East
 AVR Communications Limited West
 BSS, A Div. of AKG Acoustics
 American Media Services
 Anything Audio
 Audio Broadcast Group, Inc.
 Audio Labs
 Audio Services Corporation
 Audio-Technica U.S., Inc.
 AudioLine, Inc.
 Audiological Engineering Corp
 Broadcast Supply West
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Beyerdynamic Inc.
 Bradley Broadcast Sales
 Broadcast Equipment Sales &
 Engineering
 Broadcast Services/EME
 Broadcasters General Store
 Caveco
 Clear-Com Systems
 Continental Electronics
 Control Technology Inc.
 Crouse-Kimzey Company
 Electronic Industries, Inc.
 Fostex Corp. of America
 Full Compass Systems, Ltd.
 Giesler Broadcasting Supply, Inc.
 Graysonics
 Guarantee Radio Supply Corporation
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 Hy James, Inc.
 ICB Audio
 IER, Industrial Equip Reps
 Jim Walters Co.
 John E. Hillman Associates
 LPB Inc
 Landy Associates Inc
 Lasalle Music and Pro Audio
 Martin Audio/Video Corp
 Milam Audio Co.
 Nady Systems
 Nakamichi America Corp
 New World Music & Sound
 Northeast Broadcast Lab, Inc.
 Numark Electronics
 Oakwood Audio Labs Ltd.
 Old Dominion Broadcast Eng. Serv.
 Omega Communications Company
 Professional Audio Supply
 Parcom Inc.
 Parsons Audio
 Pierce-Phelps, Inc. - AVSD
 Peirce-Phelps, Inc
 Pro Media
 Pyramid Audio, Inc.
 Quintessence Audio
 R-Columbia Productions
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri

RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Research Associates, Inc.
 Riggins Electronic Sales
 Roscom General
 RRADCO Group
 Sennheiser Electronic Corporation
 Sony Business & Professional Group
 Sound America Inc.
 Stanton Magnetics Inc.
 Star Systems
 Suministros Gonzalez
 Systems Wireless Ltd.
 TOA Electronics Inc
 Tandberg Educational, Inc.
 Technet Systems Group
 Telex Communications Inc
 TV Equipment Assoc Inc
 UAR Professional Systems
 Yamaha Music Corp. of America

Heads and Refurbishing Services

AVR Communications Limited East
 AVR Communications Limited West
 American Media Services
 Amp Services
 R.B. Annis Co Inc.
 Barrett Associates, Inc.
 Broadcast Services/EME
 Control Technology Inc
 Crouse-Kimzey Company
 Electronic Industries, Inc.
 Giesler Broadcasting Supply, Inc.
 Hall Electronics
 Harris Allied Broadcast Equip
 IER, Industrial Equip Reps
 Intl Electro-Magnetics
 JRF Magnetic Sciences
 Manger Eng-Beau Motors Div.
 Milam Audio Co.
 Nortronics Company, Inc.
 Parcom Inc.
 Parsons Audio
 Research Associates Inc
 Riggins Electronic Sales
 Saki Magnetics Inc.
 Sequoia Electronics
 Sprague Magnetics
 Tandberg Educational, Inc.
 Tapecaster
 VIF International

Hearing, Assisting Systems

American Loop Systems
 Audiological Engineering Corp
 LPB Inc

Traffic

Columbine Systems Inc.
 Computer Concepts Corporation
 Continental Electronics Corp
 Control Technology Inc
 Custom Business Systems, Inc.
 Datacount
 Harris Allied Broadcast Equip
 Master Software Systems
 Register Data Systems
 Register Data Systems
 Professional Management Serv.
 Summit Software Systems Inc

Intercoms

+4 Audio
 AVC Systems
 AVR Communications Limited East
 AVR Communications Limited West
 Aiphone Intercom Systems
 Atlas/Soundolier
 Audio Services Corporation

Auditronics
 Grant Becker Enterprises
 Best Audio
 Bogen Communications, Inc.
 Bradley Broadcast Sales
 Broadcast Services/EME
 Broadcasters General Store
 Cancomm
 Caveco
 Clear-Com Systems
 Control Technology Inc
 Crouse-Kimzey Company
 Electronic Industries, Inc.
 Full Compass Systems, Ltd.
 Guarantee Radio Supply Corporation
 HM Electronics Inc
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 Hy James, Inc.
 J.N.S. Electronics Inc
 Jim Walters Co.
 John E. Hillman Associates
 Landy Associates Inc
 Lasalle Music and Pro Audio
 Lines Video Systems
 McMartin Incorporated
 New World Music & Sound
 Northeast Broadcast Lab, Inc.
 Old Dominion Broadcast Eng. Serv.
 Omega Communications Company
 Professional Audio Supply
 Parcom Inc.
 Parsons Audio
 POA/ Products Group
 Pierce-Phelps, Inc. - AVSD
 Peirce-Phelps, Inc
 Portland Instruments/ROH
 Pro Media
 Pyramid Audio, Inc.
 R-Columbia Productions
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 Ram Broadcast Systems
 Sierra Automated Systems & Eng Corp
 Studio Technologies
 Swintek Enterprises, Inc.
 Systems Wireless Ltd.
 TOA Electronics Inc
 Telectro Systems Corporation
 Telex Communications Inc
 Vega, a Mark IV company
 Vega, Wireless
 Ward-Beck Systems Ltd.

Lightning Protection and Power Conditioning

AVR Communications Limited East
 AVR Communications Limited West
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Best Power Technology, Inc.
 Bradley Broadcast Sales
 Broadcast Comm Systems Inc
 Broadcast Equipment Sales &
 Engineering
 Broadcast Services/EME
 Broadcasters General Store
 Broadcasting and Electronic Svrs Lab
 Cancomm
 Capital Electronics Inc
 Caveco
 Circuit Doctors Inc
 Comad Communications Limited
 Commercial Radio Company
 Control Technology Inc
 Cortana Corporation
 Current Technology, Inc.
 Eagle Hill Electronics Inc
 Electronic Industries, Inc.

Energy Control Systems
 FM Technology Assoc Inc
 Full Compass Systems, Ltd.
 Furman Sound, Inc.
 Giesler Broadcasting Supply, Inc.
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 Hy James, Inc.
 IER, Industrial Equip Reps
 John E. Hillman Associates
 John Nix
 Lightning Eliminators
 Lita Broadcasting Distributors
 Litronix Corporation
 MCG Electronics Inc.
 Marcom
 Mid-State Comm & Electronics
 Northeast Broadcast Lab, Inc.
 Professional Audio Supply
 Paramount Communications Systems
 Parcom Inc.
 Payne Engineering
 Peter W. Dahl Co.
 QEI Corporation
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Roscom General
 Suministros Gonzalez
 Superior Electric
 Tenco Tower
 Transtector Systems Inc.
 VIR James Engineers



Machine Synchronizers for ATRs

+4 Audio
 AVC Systems
 Audio Broadcast Group, Inc.
 AudioLine, Inc.
 Audiotechniques
 Bradley Broadcast Sales
 Broadcast Services/EME
 Chronrol Corporation
 Control Technology Inc.
 Harris Allied
 Harris Allied Broadcast Equip
 Hy James, Inc.
 Jim Walters Co.
 Lasalle Music and Pro Audio
 Milam Audio Co.
 New World Music & Sound
 Northeast Broadcast Lab, Inc.
 Douglas Ordon & Company, Inc.
 Professional Audio Supply
 Parcom Inc.
 Parsons Audio
 Peavey Electronics Corporation
 Peirce-Phelps, Inc
 Pro Media
 Pyramid Audio, Inc.
 RF Specialties of Missouri
 Star Systems
 UAR Professional Systems

Microphones and accessories

+4 Audio
 AKG Acoustics
 AVC Systems
 AVR Communications Limited East
 AVR Communications Limited West
 BSS, A Div. of AKG Acoustics
 Dan Alexander Audio
 American Media Services
 Anything Audio
 Atlas/Soundolier
 Audio Broadcast Group, Inc.

Audio Eng Assoc
 Audio Eng Assoc
 Audio Labs
 Audio Services Corporation
 Audio-Technica U.S., Inc.
 AudioLine, Inc.
 Audiological Engineering Corp
 Audiomeida
 Audiotechniques
 Audix Corp
 BJM Electronics Ltd.
 Broadcast Supply West
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Best Audio
 Beyerdynamic Inc.
 Beyerdynamic Inc.
 Bogen Communications, Inc.
 Bradley Broadcast Sales
 Broadcast Equipment Sales &
 Engineering
 Broadcast Services/EME
 Broadcasters General Store
 Bruel & Kjaer Instruments, Inc.
 CRL
 Cancomm
 Capital Electronics Inc
 Caveco
 Continental Electronics
 Control Technology Inc.
 Crouse-Kimzey Company
 Electro-Voice Inc
 Electronic Industries, Inc.
 Fostex Corp. of America
 Full Compass Systems, Ltd.
 Fusion Electronics, Inc.
 Future Primitive
 Giesler Broadcasting Supply, Inc.
 Gotham Audio Corp
 Graysonics
 Group One Ltd.
 Guarantee Radio Supply Corporation
 HM Electronics Inc
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Karl Heitz, Inc.
 Holzberg Inc.
 Hy James, Inc.
 IER (Industrial Equip. Reps.)
 Jim Walters Co.
 John E. Hillman Associates
 Landy Associates Inc
 Lasalle Music and Pro Audio
 Lines Video Systems
 Martin Audio/Video Corp
 Milam Audio Co.
 Nady Systems
 Neumann
 New World Music & Sound
 Northeast Broadcast Lab, Inc.
 Numark Electronics
 Old Dominion Broadcast Eng. Serv.
 Omega Communications Company
 Douglas Ordon & Company, Inc.
 Professional Audio Supply
 Panasonic/Prof Audio Systems
 (Ramsa)
 Parcom Inc.
 Parsons Audio
 Peavey Electronics Corporation
 Peirce-Phelps, Inc. - AVSD
 Peirce-Phelps, Inc
 PMA Marketing
 Posthorn Recordings
 Pro Media
 Pyramid Audio, Inc.
 Quintessence Audio
 R-Columbia Productions
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas

RF Specialties of Washington, Inc.
 Radio Design Labs
 Radio Resources & Services
 Research Associates, Inc.
 Richardson Electronics
 Riggins Electronic Sales
 Ritz Audio-Visual Associates, Inc
 Roscom General
 Schoeps/Posthorn Recordings
 Sennheiser Electronic Corporation
 Shure Brothers Inc
 Sontec Electronics
 Sony Business & Professional Group
 Sound America Inc.
 Stram Electronics Corp
 Studio Technologies
 Suministros Gonzalez
 Swintek Enterprises, Inc.
 Systems Wireless Ltd.
 TOA Electronics Inc
 Tandberg Educational, Inc.
 Tannoy-Tgi North America Inc
 Technet Systems Group
 Telex Communications Inc
 Tobias & Company Ltd
 Trompeter Electronics
 Vega, a Mark IV company
 Vega, Wireless
 Yamaha Music Corp. of America

Microwave Equipment

ANT Telecommunications, Inc.
 AVCOM of Virginia Inc
 AVR Communications Limited East
 AVR Communications Limited West
 Antennas For Communications
 Audio Broadcast Group, Inc.
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Bradley Broadcast Sales
 Broadcast Comm Systems Inc
 Broadcast Services/EME
 Broadcasters General Store
 Cablewave Systems, Div of RFS
 Cancomm
 Comex Worldwide Corporation
 Continental Electronics
 Control Technology Inc.
 Crouse-Kimzey Company
 Dolby Laboratories Inc.
 Electronic Industries, Inc.
 Environmental Technology, Inc.
 Giesler Broadcasting Supply, Inc.
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 Hy James, Inc.
 IBSS
 IER, Industrial Equip Reps
 ITS Corporation
 J.N.S. Electronics Inc
 John E. Hillman Associates
 Kandell Electronics
 Lines Video Systems
 Marcom
 Marti Electronics, Inc.
 Micro Controls, Inc.
 Loral Microwave-Narda
 Northeast Broadcast Lab, Inc.
 Old Dominion Broadcast Eng. Serv.
 Parcom Inc.
 Payne Engineering
 PMA Marketing
 QEI Corporation
 Radiation Systems
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Richard Hirschmann of America
 Rockwell International

RRADCO Group
 TFT Inc.
 Technet Systems Group
 Tobias & Company Ltd
 Verda Corp
 Will-Burt Company
 Wood & Douglas Inc

Microwave Services

Adelphon, Inc.
 Harris Allied Broadcast Equip
 Broadcast Comm Systems Inc
 Communications General Corp.
 Control Technology Inc
 Payne Engineering
 Tower Structures Inc.

MIDI Equipment

AKAI
 ART, Applied Research & Tech
 AVC Systems
 Antenna Concepts
 Anything Audio
 Apex Systems, Ltd.
 Audiologic
 Audio Services Corporation
 Audiotechniques
 Barrett Associates, Inc.
 Bradley Broadcast Sales
 Broadcast Services/EME
 Broadcasters General Store
 Caveco
 Comtech Antenna Systems
 Control Technology Inc
 Control Technology Inc
 Full Compass Systems, Ltd.
 Harris Allied Broadcast Equip
 ICB Audio
 IER, Industrial Equip Reps
 Ice Crackers
 Lasalle Music and Pro Audio
 Mackie Designs
 The Management
 Martin Audio/Video Corp
 Mid-State Comm & Electronics
 Milam Audio Co.
 New World Music & Sound
 Northeast Broadcast Lab, Inc.
 Professional Audio Supply
 Parsons Audio
 Peavey Electronics Corporation
 Pierce-Phelps, Inc. - AVSD
 Pro Media
 Pyramid Audio, Inc.
 Quintessence Audio
 RF Specialties of Missouri
 RANE Corporation
 Roscom General
 Sony Business & Professional Group
 Star Systems
 TASCAM
 360 Systems
 Turtle Beach Systems
 UAR Professional Systems
 Wavnet, Inc.
 Yamaha Music Corp. of America

Mobile Production Vans

Control Technology Inc
 Harris Allied
 Harris Allied Broadcast Equip
 IDB Communications Group, Inc
 Landy Associates Inc
 Lines Video Systems
 Peirce-Phelps, Inc. - AVSD
 Peirce-Phelps, Inc
 Pyramid Audio, Inc.
 RF Specialties of Missouri

Mobile Remote Broadcast Studios

Broadcast Services/EME
 California Digital
 Control Technology Inc
 Harris Allied

Harris Allied Broadcast Equip
Lines Video Systems
Zercom Corporation

Monitors, AM

AVR Communications Limited East
AVR Communications Limited West
American Media Services
Audio Broadcast Group, Inc.
Broadcast Supply West
Barrett Associates, Inc.
Grant Becker Enterprises
Belar Electronics Laboratory, Inc.
Bradley Broadcast Sales
Broadcast Electronics
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Broadcasters General Store
Cancomm
Caveco
Comad Communications Ltd
Commercial Radio Company
Continental Electronics
Control Technology Inc.
Crouse-Kimzey Company
Delta Electronics Inc.
Electronic Industries, Inc.
Funke & Associates
Giesler Broadcasting Supply, Inc.
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Hartmann Associates
Holzberg Inc.
Hy James, Inc.
IER, Industrial Equip Reps
Inovonics, Inc.
J.N.S. Electronics, Inc.
J-Squared Technical Service
Jim Walters Co.
John E. Hillman Associates
Landy Associates Inc
Marcom
Motorola Inc./AM Stereo
Northeast Broadcast Lab, Inc.
Old Dominion Broadcast Eng. Serv.
Professional Audio Supply
Parcom Inc.
Potomac Instruments, Inc.
Pro Media
Pyramid Audio Inc
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Research Associates, Inc.
Roscom General
RRADCO Group
Suministros Gonzalez
TFT Inc.
Technet Systems Group
Tobias & Company Ltd
Transcom Corporation

Monitors, FM

AVR Communications Limited East
AVR Communications Limited West
American Media Services
Audio Broadcast Group, Inc.
Broadcast Supply West
Barrett Associates, Inc.
Grant Becker Enterprises
Belar Electronics Laboratory, Inc.
Bradley Broadcast Sales
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Broadcasters General Store
Cancomm
Caveco

Comad Communications Ltd
Continental Electronics
Control Technology Inc.
Crouse-Kimzey Company
Electronic Industries, Inc.
Funke & Associates
Giesler Broadcasting Supply, Inc.
Gotham Audio Corp
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Hartmann Associates
Holzberg Inc.
Hy James, Inc.
IER, Industrial Equip Reps
Inovonics, Inc.
J.N.S. Electronics, Inc.
J-Squared Technical Service
Jim Walters Co.
Landy Associates Inc
Marcom
McMartin Incorporated
Modulation Sciences, Inc.
Northeast Broadcast Lab, Inc.
Old Dominion Broadcast Eng. Serv.
Professional Audio Supply
Parcom Inc.
PMA Marketing
Pro Media
Pyramid Audio Inc
QEI Corporation
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Design Labs
Radio Resources & Services
Research Associates, Inc.
Roscom General
RRADCO Group
Studer Revox America, Inc.
Suministros Gonzalez
TFT Inc.
Technet Systems Group
Titus Technologies Lab
Tobias & Company Ltd
Transcom Corporation

Music and Sound Effects Libraries

+4 Audio
AVR Communications Limited East
AVR Communications Limited West
The Aircraft Music Library
Airforce Broadcast Services Inc.
Anything Audio
Associated Production Music
AudioLine, Inc.
BP Consulting Group
Barrett Associates, Inc.
Broadcast Programming
Brown Bag Productions
Capitol Production Music
Classical Music Syndication
Control Technology Inc.
Creative Support Services
Dave Dworkin's Ghostwriters
Drake-Chenault
Far West Communications
First Light Video Publishing
Gefen Systems
Halland Broadcast Services Inc.
Harris Allied Broadcast Equip
Hy James, Inc.
IER, Industrial Equip Reps
Manhattan Production Music
Jay Mitchell Assoc
The Music Director Programming
Omnimusic
Philadelphia Music Works
PMA Marketing
Promusic, Inc.

Pyramid Audio, Inc.
River City Sound Productions
Sopersound Music Library
Sound Ideas
Suministros Gonzalez
Summit Software Systems Inc
TM Communications
UAR Professional Systems
Valentino Production Music & Sound

**NRSC Equipment**

AVR Communications Limited East
AVR Communications Limited West
Audio Broadcast Group, Inc.
Broadcast Supply West
Barrett Associates, Inc.
Grant Becker Enterprises
Bradley Broadcast Sales
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Broadcasters General Store
Circuit Research Labs
Cancomm
Caveco
Continental Electronics
Control Technology Inc
Crouse-Kimzey Company
Delta Electronics Inc.
Electronic Industries, Inc.
Funke & Associates
Gentner Electronics Corporation
Giesler Broadcasting Supply, Inc.
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Hnat Hindes
Holzberg Inc.
IBSS
IER, Industrial Equip Reps
Inovonics
Jim Walters Co.
Marcom
Northeast Broadcast Lab, Inc.
Old Dominion Broadcast Eng. Serv.
Professional Audio Supply
Parcom Inc.
Pro Media
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Design Labs
Radio Resources & Services
Research Associates Inc
Roscom General
Sequoia Electronics
Suministros Gonzalez
TFT Inc.
Technet Systems Group
Tobias & Company Ltd

News Services

American Leisure Network
Associated Press Bdct Service
British Information Services
Critical Mass Media
Generation Technologies Corp
USA Radio Network

Noise Reduction Equipment

+4 Audio
ART, Applied Research & Tech
AVC Systems
AVR Communications Limited East
AVR Communications Limited West
Acoustic Technology Inc.

Dan Alexander Audio
Antenna Concepts
Anything Audio
Audio Broadcast Group, Inc.
Audio Dynamics, Inc.
Audio Services Corporation
AudioLine, Inc.
Audiotechniques
Auditratics
Broadcast Supply West
BARCO-EMT GmbH
Barrett Associates, Inc.
Grant Becker Enterprises
Bradley Broadcast Sales
Broadcast Comm Systems Inc
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Broadcasters General Store
Broadcasting Systems
CRL
Caveco
Caveco
Central Tower Inc
Communications General Corp.
Continental Electronics
Control Technology Inc.
Crouse-Kimzey Company
D&R Electronics USA
DBX Professional Products
Dayton Industrial Corp
Dolby Laboratories Inc.
Electronic Industries, Inc.
FM Technology Assoc Inc
Full Compass Systems, Ltd.
Funke & Associates
Giesler Broadcasting Supply, Inc.
Gotham Audio Corp
Guarantee Radio Supply Corporation
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Hy James, Inc.
IER, Industrial Equip Reps
Jim Walters Co.
Lasalle Music and Pro Audio
Marti Electronics, Inc.
Mid-State Comm & Electronics
Milam Audio Co.
New World Music & Sound
Northeast Broadcast Lab, Inc.
Old Dominion Broadcast Eng. Serv.
OPAMP Inc.
Douglas Ordon & Co Inc
Professional Audio Supply
Parsons Audio
Peavey Electronics Corporation
Pierce-Phelps, Inc. - AVSD
Peirce-Phelps, Inc
Pro Media
Pyramid Audio, Inc.
QEI Corporation
Quintessence Audio
RF Specialties of California
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Radio Systems Inc
Ram Broadcast Systems
Research Associates, Inc.
Roscom General
Sequoia Electronics
Stephens Communications
Studer Revox America, Inc.
Suministros Gonzalez
Symetrix, Inc
Technet Systems Group
Tectan Inc
That Corporation
UAR Professional Systems
Valley International
Wavnet, Inc.

O
Optical Recording and Media
 Sony Business & Prof Group

P
Patch Panels, Jacks, Plugs, Connectors

+4 Audio
 ADC Telecommunications, Inc.
 ANT Telecommunications, Inc.
 AVC Systems
 AVR Communications Limited East
 AVR Communications Limited West
 American Media Services
 Anything Audio
 Roscom General
 Audio Accessories
 Audio Broadcast Group Inc
 AudioLine, Inc.
 Audiotechniques
 Auditorics
 BJM Electronics Ltd.
 Broadcast Supply West
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Bradley Broadcast Sales
 Broadcast Equipment Sales & Engineering
 Broadcast Services/EME
 Broadcasters General Store
 Canare Cable Inc.
 Caveco
 Commercial Radio Company
 Connector Distribution
 Connectronics Corporation
 Continental Electronics
 Control Technology Inc.
 Crouse-Kimzey Company
 Dielectric Communications
 Electronic Industries, Inc.
 Fostex Corp. of America
 Full Compass Systems, Ltd.
 Furman Sound, Inc.
 Fusion Electronics, Inc.
 Gaines Audio
 Gentner Electronics Corporation
 Gepco International Inc
 Giesler Broadcasting Supply, Inc.
 Graysonics
 Guarantee Radio Supply Corporation
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 Hy James, Inc.
 IBSS
 IER, Industrial Equip Reps
 Jim Walters Co.
 Kings Electronics Co., Inc.
 Kintronic Laboratories Inc
 Landy Associates Inc
 Lasalle Music and Pro Audio
 Lines Video Systems
 Martin Audio/Video Corp
 McCurdy Radio Industries
 Micro Communications, Inc.
 Milam Audio Co.
 New World Music & Sound
 Northeast Broadcast Lab, Inc.
 Oakwood Audio Labs Ltd.
 Old Dominion Broadcast Eng. Serv.
 Omega Communications Company
 Professional Audio Supply
 Parcom Inc.
 Parsons Audio
 Pierce-Phelps, Inc. - AVSD
 Peirce-Phelps, Inc
 Penny & Giles Inc.
 Pro Media
 Pyramid Audio, Inc.

Quintessence Audio
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Ram Broadcast Systems
 Redco Audio Products
 Research Associates, Inc.
 Riggins Electronic Sales
 Ritz Audio-Visual Associates, Inc
 Roscom General
 Shively Labs
 Suministros Gonzalez
 Switchcraft, Inc.
 Technet Systems Group
 Tennaplex Systems Ltd
 Trimm Inc.
 Trompeter Electronics
 UAR Professional Systems
 Videoquip Research Limited
 Wireworks Corp
 Zercorn Corporation

Phasors
 AVR Communications Limited East
 AVR Communications Limited West
 Dan Alexander Audio
 Audio Broadcast Group, Inc.
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Broadcast Equipment Sales & Engineering
 Broadcasters General Store
 Commercial Radio Company
 Continental Electronics
 Control Technology Inc
 Consulting Radio Engineer
 Elcom Bauer
 Giesler Broadcasting Supply, Inc.
 Guarantee Radio Supply Corporation
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 IER (Industrial Equip. Reps.)
 Kintronic Laboratories Inc
 Northeast Broadcast Lab, Inc.
 Old Dominion Broadcast Eng. Serv.
 Professional Audio Supply
 Parcom Inc.
 Phasetek
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 RF Systems
 Roscom General
 Spaulding & Assoc.,consult eng
 Suministros Gonzalez
 T.Z. Sawyer Technical Consultants
 Technet Systems Group
 Tobias & Company Ltd

Phono Cartridges
 +4 Audio
 AVC Systems
 AVR Communications Limited East
 AVR Communications Limited West
 American Media Services
 Audio Broadcast Group, Inc.
 Audio Labs
 Audio-Technica U.S., Inc.
 AudioLine, Inc.
 Audiotechniques
 Broadcast Supply West
 BARCO-EMT GmbH
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Bradley Broadcast Sales
 Broadcast Equipment Sales &

Engineering
 Broadcast Services/EME
 Broadcasters General Store
 Capital Electronics Inc
 Caveco
 Continental Electronics
 Control Technology Inc.
 Crouse-Kimzey Company
 Electronic Industries, Inc.
 Full Compass Systems, Ltd.
 Giesler Broadcasting Supply, Inc.
 Guarantee Radio Supply Corporation
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 Hy James, Inc.
 ICB Audio
 IER, Industrial Equip Reps
 Jim Walters Co.
 John E. Hillman Associates
 LPB Inc
 Landy Associates Inc
 Lasalle Music and Pro Audio
 Martin Audio/Video Corp
 Milam Audio Co.
 New World Music & Sound
 Northeast Broadcast Lab, Inc.
 Oakwood Audio Labs Ltd.
 Old Dominion Broadcast Eng. Serv.
 Omega Communications Company
 Professional Audio Supply
 Parsons Audio
 Pierce-Phelps, Inc. - AVSD
 Peirce-Phelps, Inc
 Pro Media
 Pyramid Audio, Inc.
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Research Associates, Inc.
 Riggins Electronic Sales
 Roscom General
 Shure Brothers Inc
 Stanton Magnetics Inc.
 Suministros Gonzalez
 Technet Systems Group
 UAR Professional Systems

Phono Turntables and Tone Arms
 +4 Audio
 AVR Communications Limited East
 AVR Communications Limited West
 American Media Services
 Audio Broadcast Group, Inc.
 AudioLine, Inc.
 Audiotechniques
 Broadcast Supply West
 BARCO-EMT GmbH
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Bradley Broadcast Sales
 Broadcast Electronics
 Broadcast Equipment Sales & Engineering
 Broadcast Services/EME
 Broadcasters General Store
 Cancomm
 Caveco
 Cirrus Technologies Inc
 Continental Electronics
 Control Technology Inc.
 Crouse-Kimzey Company
 Electronic Industries, Inc.
 Full Compass Systems, Ltd.
 Giesler Broadcasting Supply, Inc.
 Graysonics
 Guarantee Radio Supply Corporation
 Hall Electronics
 Harris Allied

Harris Allied Broadcast Equip
 Henry Engineering
 Holzberg Inc.
 Hy James, Inc.
 IER (Industrial Equip. Reps.)
 Jim Walters Co.
 John E. Hillman Associates
 LPB Inc
 Landy Associates Inc
 Lasalle Music and Pro Audio
 Lindahl Sales Corp
 Martin Audio/Video Corp
 Milam Audio Co.
 New World Music & Sound
 Northeast Broadcast Lab, Inc.
 Numark Electronics
 Oakwood Audio Labs Ltd.
 Old Dominion Broadcast Eng. Serv.
 Professional Audio Supply
 Parsons Audio
 Pierce-Phelps, Inc. - AVSD
 Peirce-Phelps, Inc
 Pro Media
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Research Associates, Inc.
 Riggins Electronic Sales
 Roscom General
 Russco Electronics Mfg. Inc.
 Sequoia Electronics
 Suministros Gonzalez
 Technet Systems Group
 UAR Professional Systems

Power Supplies and Generators
 AVC Systems
 AVR Communications Limited East
 AVR Communications Limited West
 ADAPT
 Anything Audio
 Audio Services Corporation
 Barrett Associates, Inc.
 Best Power Technology, Inc.
 Broadcast Comm Systems Inc
 Broadcasters General Store
 Cancomm
 Caveco
 Control Technology Inc
 Current Technology, Inc.
 Deremer Radio
 Eagle Hill Electronics Inc
 Full Compass Systems, Ltd.
 Guarantee Radio Supply Corporation
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Hipotronics
 Holzberg Inc.
 IER, Industrial Equip Reps
 J.N.S. Electronics, Inc.
 Jim Walters Co.
 Kandel Electronics
 Kay Industries
 Lasalle Music and Pro Audio
 Leader Instruments Corporation
 McMartin Incorporated
 Norac Industrial Services Inc.
 OPAMP Inc.
 Professional Audio Supply
 Photocomm, Inc.
 PhotoComm (Solar Signage)
 Plastic Capacitors Inc
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Spectra Sonics
 Transtector Systems Inc.
 Vanner Inc

Wide Range Electronics Corporation

Processing, Audio EQ and Limiting

+4 Audio
 ART, Applied Research & Tech
 ATI (Audio Technologies Inc)
 AVC Systems
 AVR Communications Limited East
 AVR Communications Limited West
 Acoustic Technology Inc.
 Dan Alexander Audio
 Altec Lansing Bdct/Prod. Pdcts
 Anything Audio
 Aphex Systems, Ltd.
 Ashly Audio, Inc.
 Audio Animation
 Audio Broadcast Group, Inc.
 Audio Concepts and Engineering Services
 Audiologic
 Audio/Digital Inc
 Audioarts Engineering
 AudioLine, Inc.
 Audiomeia
 Audiotechniques
 Auditronics
 BSS, A Div. of AKG Acoustics
 Broadcast Supply West
 BEE Sound, Inc.
 BARCO-EMT GmbH
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Bradley Broadcast Sales
 Broadcast Equipment Sales & Engineering
 Broadcast Services/EME
 Broadcasters General Store
 Circuit Research Labs
 Caveco
 Chip Morgan Broadcast Eng
 Continental Electronics
 Control Technology Inc.
 Crouse-Kimzey Company
 Cutting Edge Technologies
 D&R Electronics USA
 DBX Professional Products
 Delta Electronics Inc.
 Dolby Laboratories Inc
 Dorrough Electronics
 DYNACORD
 Electro-Voice Inc.
 Electronic Industries, Inc.
 Eventide Inc.
 Full Compass Systems, Ltd.
 Furman Sound, Inc.
 GML, Inc.
 Gentner Electronics Corporation
 Giesler Broadcasting Supply, Inc.
 Graysonics
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Hnat Hindes
 Holzberg Inc.
 Hy James, Inc.
 IBSS
 IER, Industrial Equip Reps
 Inovonics
 Ivie
 JBL Professional
 J.N.S. Electronics, Inc.
 Jim Walters Co.
 John E. Hillman Associates
 Klark-Teknik
 LPB Inc
 Landy Associates Inc
 Lasalle Music and Pro Audio
 Leitch Incorporated
 Lita Broadcasting Distributors
 Logitek Electronic Systems Inc.
 Martin Audio/Video Corp
 Milam Audio Co.
 Modulation Sciences, Inc.
 New World Music & Sound

Northeast Broadcast Lab, Inc.
 Oakwood Audio Labs Ltd.
 Old Dominion Broadcast Eng. Serv.
 Omega Communications Company
 OPAMP Inc.
 Orban Associates, Div of AKG
 Douglas Ordon & Co Inc
 Professional Audio Supply
 Parcom Inc.
 Parsons Audio
 Peavey Electronics Corporation
 Pierce-Phelps, Inc. - AVSD
 Peirce-Phelps, Inc
 PMA Marketing
 Posthorn Recordings
 Pro Media
 Pyramid Audio, Inc.
 QEI Corporation
 Quintessence Audio
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Ram Broadcast Systems
 RANE Corporation
 Research Associates, Inc.
 Riggins Electronic Sales
 Ritz Audio-Visual Associates, Inc
 Roscom General
 RRADCO Group
 Schoeps/Posthorn Recordings
 Sequoia Electronics
 Sescom Inc.
 Somich Engineering
 Sontec Electronics
 Sony Business & Professional Group
 Star Systems
 Suministros Gonzalez
 Summit Audio Inc
 Symetrix Inc.
 TOA Electronics Inc
 Technet Systems Group
 Tobias & Company Ltd
 UAR Professional Systems
 Urei
 Valley Audio Products
 Valley International
 Ward-Beck Systems Ltd.
 Wavnet, Inc.
 Wheatstone Corporation
 White Instruments, Div C VAN R
 Yamaha Music Corp. of America

Processing, Studio Effects

+4 Audio
 ART, Applied Research & Tech
 AVC Systems
 AVR Communications Limited East
 AVR Communications Limited West
 BSS, A Div. of AKG Acoustics
 Dan Alexander Audio
 Anything Audio
 Aphex Systems, Ltd.
 Ashly Audio, Inc.
 Audio Broadcast Group, Inc.
 Audio Concepts and Engineering Services
 Audiologic
 Audio/Digital, Inc.
 AudioLine, Inc.
 Audiotechniques
 BSS, A Div. of AKG Acoustics
 Broadcast Supply West
 BEE Sound, Inc.
 BARCO-EMT GmbH
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Bradley Broadcast Sales
 Broadcast Equipment Sales & Engineering
 Broadcast Services/EME

Broadcasters General Store
 Circuit Research Labs
 Control Technology Inc.
 Crouse-Kimzey Company
 D&R Electronics USA
 DBX Professional Products
 Digitech, div. of DOD Elect.
 Dynacord
 DYNACORD
 Electronic Industries, Inc.
 Eventide Inc.
 Full Compass Systems, Ltd.
 Furman Sound, Inc.
 Giesler Broadcasting Supply, Inc.
 Graysonics
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Hy James, Inc.
 IER (Industrial Equip. Reps.)
 Jim Walters Co.
 John E. Hillman Associates
 Klark-Teknik
 Lasalle Music and Pro Audio
 International Sales Manager
 Lexicon Inc.
 Martin Audio/Video Corp
 Milam Audio Co.
 New World Music & Sound
 Northeast Broadcast Lab, Inc.
 Numark Electronics
 Oakwood Audio Labs Ltd.
 Old Dominion Broadcast Engr Service
 Orban Associates, Div of AKG
 Douglas Ordon & Company, Inc.
 Professional Audio Supply
 Parcom Inc.
 Parsons Audio
 Peavey Electronics Corporation
 Pierce-Phelps, Inc. - AVSD
 Peirce-Phelps, Inc
 Pro Media
 Pyramid Audio, Inc.
 QEI Corporation
 Quintessence Audio
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Research Associates, Inc.
 Roscom General
 RRADCO Group
 Sequoia Electronics
 Spectra Sonics
 Star Systems
 Studio Technologies
 Suministros Gonzalez
 Technet Systems Group
 Titus Technologies Lab
 Tobias & Company Ltd
 UAR Professional Systems
 Valley Audio Products
 Valley International
 Videoquip Research Limited
 Waveframe Corporation
 Wavnet, Inc.
 Yamaha Music Corp. of America

Professional Services

BIA Consulting
 Botik Broadcast Services
 BTMI
 CNET Media Payment Systems
 Cahn Capital Corp
 Carpenter & Associates Inc
 Critical Mass Media
 Gordon Rice Associates
 Kozacko-Horton Co
 Media/ Communications Partners
 Omnia Group Inc
 Prismcomm, Inc
 R.E. Meador & Associates

Program Distributors and Services

Alpine Marketing Communications Ltd.
 American Leisure Network
 Associated Press Bdct Service
 BP Consulting Group
 Berkowitz Broadcast Consulting
 British Information Services
 Broadcast Programming
 C.R.N. Media
 Classical Music Syndication
 Clayton-Davis & Associates
 Concept Productions
 Control Technology Inc
 Critical Mass Media
 Dave Dworkin's Ghostwriters
 Drake-Chenault
 Harris Allied
 Harris Allied Broadcast Equip
 Harry Nelson & Associates
 Health News Feed
 IDB Communications Group, Inc
 ITP-Paulist Communications
 Kenneth R. Meades
 Jay Mitchell Assoc
 The Music Director Programming
 Nick Anthony & Associates
 Pro Audio USA
 R.M. Lowry & Company
 Radio Programming & Mgmt
 Satellite Production Network
 Shane Media Services
 Stadlen Radio Associates
 USA Radio Network
 Zephyr Weather Information Service

Promotional Merchandise

Altair Communications Inc
 Contemporary Group
 Future Primitive Design
 Promotional Ventures
 Reef Industries, Inc
 The Radioguide People Inc

Programming, Creative Services

Brown Spots
 Clayton-Davis & Associates
 GMI Broadcast Services
 Hot Spots Creative Service
 Pam's Jingles
 Thompson Creative

Public Address (PA) Systems

+4 Audio
 AVC Systems
 AVR Communications Limited East
 AVR Communications Limited West
 Altec Lansing Corp
 American Loop Systems
 American Loop Systems
 Anything Audio
 Ashly Audio, Inc.
 Atlas/Soundolier
 Audio Labs
 Audio Services Corporation
 Audisar
 BEE Sound, Inc.
 Grant Becker Enterprises
 Best Audio
 Bogen Communications, Inc.
 Bradley Broadcast Sales
 Broadcast Equipment Sales & Engineering
 Broadcast Services/EME
 Capital Electronics Inc
 Caveco
 Control Technology Inc.
 Crouse-Kimzey Company
 Digital Recorders
 Electro-Voice Inc.
 Electronic Industries, Inc.
 Full Compass Systems, Ltd.
 Furman Sound, Inc.
 Guarantee Radio Supply Corporation
 Hall Electronics

Harris Allied
 Harris Allied Broadcast Equip
 Hy James, Inc.
 JBL Professional
 John E. Hillman Associates
 Lasalle Music and Pro Audio
 Lines Video Systems
 McMartin Incorporated
 Milam Audio Co.
 New World Music & Sound
 Old Dominion Broadcast Eng. Serv.
 Omega Communications Company
 Professional Audio Supply
 Panasonic/Prof Audio Systems
 (Ramsa)
 Parsons Audio
 Peavey Electronics Corporation
 Pierce-Phelps, Inc. - AVSD
 Peirce-Phelps, Inc
 Pro Media
 Pyramid Audio, Inc.
 RF Specialties of Missouri
 RF Specialties of Texas
 Research Associates, Inc.
 Ritz Audio-Visual Associates, Inc
 Star Systems
 TOA Electronics Inc
 Telectro Systems Corporation



RF Filters & Combiners

AVR Communications Limited East
 AVR Communications Limited West
 Antennas For Communications
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Bird Electronics Corporation
 Broadcast Comm Systems Inc
 Broadcast Electronics Inc
 Broadcast Equipment Sales &
 Engineering
 Cancomm
 Caveco
 Coaxial Dynamics Inc
 Comark Communications
 Commercial Radio Company
 Continental Electronics
 Continental Electronics Corp
 Control Technology Inc
 Dielectric Communications
 ERI Installations
 Electronic Industries, Inc.
 Electronics Research, Inc.
 Giesler Broadcasting Supply, Inc.
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Jampro Antennas
 Jampro Antennas Inc
 Kintron Laboratories Inc
 LDL Communications
 Lasalle Music and Pro Audio
 Marcom
 Micro Communications Inc
 Microwave Filter
 Old Dominion Broadcast Eng. Serv.
 Professional Audio Supply
 Parcom Inc.
 Rascom General
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 RF Systems
 Shively Labs
 Spectra Sonics
 T.Z. Sawyer Technical Consultants
 Tennaplex Systems Ltd
 Tepco Corporation
 Tobias & Company Ltd

Radio Broadcast Data Systems

(RBDS)
 Inovonics, Inc
 Modulation Sciences Inc
 RE America
 Rohde & Schwarz
 Sage Alerting Systems

RF Detuning Systems

Nott, Ltd

Radio Networks

Associated Press Bdct Service
 C.R.N. Media
 Control Technology Inc
 CRN International
 Executive Broadcast Services
 GMI Broadcast Services
 ITP-Paulist Communications
 MRN Radio
 Phasetek
 Radio Today Entertainment
 USA Radio Network
 WFMT Fine Arts/Beethoven Sat

Receivers, Radio

AVR Communications Limited East
 AVR Communications Limited West
 American Media Services
 Audio Services Corporation
 Audiological Engineering Corp
 Broadcast Supply West
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Bext Inc.
 Bogen Communications, Inc.
 Broadcast Equipment Sales &
 Engineering
 Broadcast Services/EME
 Control Technology Inc.
 Crouse-Kimzey Company
 Dayton Industrial Corp
 Deremer Radio
 Electronic Industries
 Erko Technologies
 Full Compass Systems, Ltd.
 Gorman Redlich Mfg. Co.
 Hall Electronics
 Hamtronics, Inc.
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 J.N.S. Electronics, Inc.
 Jim Walters Co.
 Lasalle Music and Pro Audio
 Lindahl Sales Corp
 Marti Electronics, Inc.
 McMartin Incorporated
 Motorola Inc./AM Stereo
 Nady Systems
 Northeast Broadcast Lab, Inc.
 Old Dominion Broadcast Eng. Serv.
 Omega Communications Company
 Professional Audio Supply
 Parcom Inc.
 Pro Media
 RF Specialties of California
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Washington, Inc.
 Research Associates, Inc.
 Riggins Electronic Sales
 Roscom General
 RRADCO Group
 TFT Inc.
 Tandberg, Inc.
 Target Tuning, Inc.
 Technet Systems Group
 Universal Electronics, Inc.

Receivers, Satellite

AVCOM of Virginia, Inc.
 AVR Communications Limited East
 AVR Communications Limited West

Antenna Technology Corporation
 Grant Becker Enterprises
 Broadcast Services/EME
 Broadcasting and Electronic Svrs Lab
 California Digital
 Circuit Doctors Inc
 ComStream Corp
 Continental Electronics Corp
 Control Technology Inc.
 Erko Technologies
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 IDB Communications Group, Inc
 IER, Industrial Equip Reps
 Intraplex, Inc.
 Marcom
 McMartin Incorporated
 Micro Phase Communications Inc
 Parcom Inc.
 RF Specialties of Pennsylvania, Inc.
 Satellite Systems Corp
 Tennaplex Systems Ltd
 Universal Electronics, Inc.
 Wegener Communications, Inc.

Receivers, SCA

AVR Communications Limited East
 AVR Communications Limited West
 Antenna Technology Corporation
 Applied Micro Technology, Inc.
 Avocet Instruments
 Broadcast Supply West
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Broadcast Equipment Sales &
 Engineering
 Broadcast Services/EME
 Cancomm
 Continental Electronics
 Control Technology Inc.
 Dayton Industrial Corp
 Electronic Industries, Inc.
 Erko Technologies
 Funke & Associates
 Giesler Broadcasting Supply, Inc.
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 IER, Industrial Equip Reps
 J.N.S. Electronics Inc
 J Squared Technical Service
 Lita Broadcasting Distributors
 Marti Electronics, Inc.
 McMartin Incorporated
 Micro Controls, Inc.
 Modulation Sciences, Inc.
 Northeast Broadcast Lab, Inc.
 Old Dominion Broadcast Eng. Serv.
 Professional Audio Supply
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Roscom General
 SCA Data Systems Inc.
 Target Tuning, Inc.
 Technet Systems Group
 Tennaplex Systems Ltd

Reel-to-Reel Recorders

+4 Audio
 AVC Systems
 AVR Communications Limited East
 AVR Communications Limited West
 Accurate Sound Corporation
 Dan Alexander Audio
 Anything Audio
 Audio Broadcast Group, Inc.
 Audio Labs
 Audio Services Corporation

AudioLine, Inc.
 Audiomedia
 Audiotechniques
 Broadcast Supply West
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Bradley Broadcast Sales
 Broadcast Automation, Inc.
 Broadcast Equipment Sales &
 Engineering
 Broadcast Services/EME
 Broadcasters General Store
 Cancomm
 Caveco
 Continental Electronics Corp
 Control Technology Inc.
 Crouse-Kimzey Company
 Electronic Industries, Inc.
 Fostex Corp. of America
 Full Compass Systems, Ltd.
 Giesler Broadcasting Supply, Inc.
 Guarantee Radio Supply Corporation
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 Hy James, Inc.
 IER, Industrial Equip Reps
 Jim Walters Co.
 John E. Hillman Associates
 Landy Associates Inc
 Lasalle Music and Pro Audio
 Lindahl Sales Corp
 Manger Eng-Beau Motors Div.
 Martin Audio/Video Corp
 Milam Audio Co.
 New World Music & Sound
 Northeast Broadcast Lab, Inc.
 Oakwood Audio Labs Ltd.
 Old Dominion Broadcast Engr Service
 Otari Corporation
 Professional Audio Supply
 Parcom Inc.
 Parsons Audio
 Pierce-Phelps, Inc. - AVSD
 Peirce-Phelps, Inc
 Pro Media
 Pyramid Audio, Inc.
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Redco Audio Products
 Research Associates, Inc.
 Riggins Electronic Sales
 Roscom General
 RRADCO Group
 Sequoia Electronics
 Sono-Mag Corporation
 Star Systems
 Stellavox
 Studer Revox America, Inc.
 Suministros Gonzalez
 Tandberg Educational, Inc.
 TASCAM
 Technet Systems Group
 Telectro Systems Corporation
 Tobias & Company Ltd
 UAR Professional Systems
 Uher of America
 VIF International
 Wide Range Electronics Corporation

Remote Control and Telemetry

AVR Communications Limited East
 AVR Communications Limited West
 Audio Broadcast Group, Inc.
 Audiomedia
 Broadcast Supply West
 Barrett Associates, Inc.
 Grant Becker Enterprises

Bradley Broadcast Sales
Broadcast Comm Systems Inc
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Broadcast Software Ltd.
Broadcasters General Store
Burk Technology, Inc.
Cancomm
Caveco
Chronrol Corporation
Commercial Radio Company
Continental Electronics
Control Technology Inc.
Crouse-Kimzey Company
Delta Electronics Inc.
Electronic Industries, Inc.
Full Compass Systems, Ltd.
Gentner Electronics Corporation
Giesler Broadcasting Supply, Inc.
Graysonics
Hall Electronics
Hallikainen & Friends, Inc.
Harris Allied
Harris Allied Broadcast Equip
Holzberg Inc.
Hy James, Inc.
IER, Industrial Equip Reps
J-Squared Technical Service
John E. Hillman Associates
Marcom
Marti Electronics, Inc.
Micro Controls, Inc.
Monroe Electronics, Inc.
Moseley Associates
National Supervisory Network
Northeast Broadcast Lab, Inc.
Old Dominion Broadcast Eng. Serv.
Professional Audio Supply
Parcom Inc.
Parsons Audio
Photocomm (Solar Signage)
Potomac Instruments, Inc.
Pro Media
Professional Management Serv.
QEI Corporation
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Roscom General
Sine Systems, Inc.
Sony Business & Professional Group
Suministros Gonzalez
TFT Inc.
Technet Systems Group
Telo Technology
Telular, Inc.
Titus Technologies Lab
Tobias & Company Ltd
Vega, a Mark IV company
Versatech Industries, Inc.
Videoquip Research Limited
Wood & Douglas Inc

Rental Equipment

Multiphase Consulting
Silver Lake Audio

RPU Equipment

Deremer Radio
Marti Electronics
Moseley Associates Inc

**SCA Equipment**

AVR Communications Limited East
AVR Communications Limited West
Applied Micro Technology, Inc.

Audio Broadcast Group, Inc.
Avocet Instruments
Broadcast Supply West
Barrett Associates, Inc.
Grant Becker Enterprises
Bradley Broadcast Sales
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Broadcasters General Store
Burk Technology, Inc.
CRL
Cancomm
Caveco
Continental Electronics
Control Technology Inc.
Crouse-Kimzey Company
Cutting Edge Technologies
Electronic Industries, Inc.
Erko Technologies
F M Systems Inc.
Funke & Associates
Giesler Broadcasting Supply, Inc.
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Holzberg Inc.
Hy James, Inc.
IER, Industrial Equip Reps
ITS Corporation
J.N.S. Electronics Inc
J-Squared Technical Service
John E. Hillman Associates
Marti Electronics, Inc.
McMartin Incorporated
Micro Controls, Inc.
Modulation Sciences, Inc.
Northeast Broadcast Lab, Inc.
Old Dominion Broadcast Eng. Serv.
Professional Audio Supply
Parcom Inc.
PMA Marketing
Pro Media
QEI Corporation
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Research Associates, Inc.
Riggins Electronic Sales
Roscom General
SCA Data Systems Inc.
Suministros Gonzalez
TFT Inc.
TOA Electronics Inc
Technet Systems Group
Tennaplex Systems Ltd
Titus Technologies Lab
Tobias & Company Ltd

Satellite Equipment, Antennas

ANT Telecommunications, Inc.
AVR Communications Limited East
AVR Communications Limited West
Andrew Corporation
Antenna Technology Corporation
Antennas for Communications, Inc.
Broadcast Services/EME
Broadcasting and Electronic Svrs Lab
California Digital
Circuit Doctors Inc
Comex Worldwide Corporation
ComStream Corp
Comtech Antenna Systems, Inc.
Continental Electronics Corp
Control Technology Inc
Environmental Technology, Inc.
Harris Allied
Harris Allied Broadcast Equip
Holzberg Inc.

IDB Communications Group, Inc
IER, Industrial Equip Reps
John E. Hillman Associates
John Nix
Marcom
Microdyne Corporation
Old Dominion Broadcast Eng. Serv.
Pittsburgh Int'l Teleport
RF Specialties of Pennsylvania, Inc.
Satellite Systems Corp
Scientific Atlanta
Spaceage Electronics Corp
Tennaplex Systems Ltd

Satellite Equipment, Electronics

AVC Systems
AVCOM of Virginia, Inc.
AVR Communications Limited East
AVR Communications Limited West
Antenna Technology Corporation
Broadcast Supply West
Broadcast Automation Inc
Broadcast Services/EME
Broadcasting and Electronic Svrs Lab
California Digital
Circuit Doctors Inc
Comex Worldwide Corporation
ComStream Corp
Continental Electronics Corp
Control Technology Inc
Dolby Laboratories Inc.
Erko Technologies
F M Systems Inc.
FM Technology Assoc Inc
FM Technology Assoc Inc
Guarantee Radio Supply Corporation
Hall Electronics
Hallikainen & Friends, Inc.
Harris Allied
Harris Allied Broadcast Equip
Henry Engineering
Holzberg Inc.
IDB Communications Group, Inc
IER, Industrial Equip Reps
Intraplex, Inc.
John E. Hillman Associates
Kingdom Technology
Leitch Incorporated
MCL Inc.
Marcom
Microdyne Corporation
Pittsburgh Int'l Teleport
PMA Marketing
RF Specialties of Pennsylvania, Inc.
Satellite Systems Corp
Scientific Atlanta
Sierra Automated Systems & Eng Corp
Spaceage Electronics Corp
Tectan Inc
Tennaplex Systems Ltd
Universal Electronics, Inc.
Wegener Communications, Inc.

Satellite Owners & Operators

Control Technology Inc

Satellite Resale & Common Carrier

Control Technology Inc
Space Com Systems Inc

Speakers and Enclosures

+4 Audio
AVC Systems
AVR Communications Limited East
AVR Communications Limited West
Aiphone Intercom Systems
Altec Lansing Corp
American Media Services
Anything Audio
Roscom General
Atlas/Soundolier
Audio Broadcast Group, Inc.
Audio Labs

Audio Services Corporation
AudioLine, Inc.
Audiomedia
Audisar
Audix Corp
Auernheimer Labs and Co.
Auratone Corporation
BJM Electronics Ltd.
Broadcast Supply West
Barrett Associates, Inc.
Grant Becker Enterprises
Best Audio
Bogen Communications, Inc.
Bradley Broadcast Sales
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Broadcasters General Store
Caveco
Continental Electronics
Control Technology Inc.
Crouse-Kimzey Company
Dyna-cord
Electro-Voice Inc.
Electronic Industries, Inc.
Full Compass Systems, Ltd.
Giesler Broadcasting Supply, Inc.
Graysonics
Group One Ltd.
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Holzberg Inc.
Hy James, Inc.
IER (Industrial Equip. Reps.)
JBL Professional
Jim Walters Co.
Landy Associates Inc
Lasalle Music and Pro Audio
Lindahl Sales Corp
Lines Video Systems
Martin Audio/Video Corp
Milam Audio Co.
New World Music & Sound
Northeast Broadcast Lab, Inc.
Numark Electronics
Oakwood Audio Labs Ltd.
Old Dominion Broadcast Eng. Serv.
Omega Communications Company
Douglas Ordon & Company, Inc.
Professional Audio Supply
Panasonic/Prof Audio Systems
(Ramsa)
Peavey Electronics Corporation
Pierce-Phelps, Inc. - AVSD
Pierce-Phelps, Inc.
Pneumatron
Pro Media
Pyramid Audio, Inc.
Quintessence Audio
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Renkus-Heinz, Inc.
Research Associates, Inc.
Riggins Electronic Sales
Ritz Audio-Visual Associates, Inc
Roscom General
Spectra Sonics
Star Systems
Studer Revox America, Inc.
Suministros Gonzalez
TOA Electronics Inc
Tannoy-Tgi North America Inc
Technet Systems Group
Telectro Systems Corporation
Urei
Wavnet, Inc.
Wohler Technologies
Yamaha Music Corp. of America

STL Equipment

AVR Communications Limited East
 AVR Communications Limited West
 Artel Communications Corp
 Audio Broadcast Group, Inc.
 Audiomedia
 Broadcast Supply West
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Bext Inc.
 Bradley Broadcast Sales
 Broadcast Comm Systems Inc
 Broadcast Equipment Sales & Engineering
 Broadcast Services/EME
 Broadcasters General Store
 Broadcasting Systems
 CRL
 Cancomm
 Caveco
 Cirrus Technologies Inc
 Continental Electronics
 Control Technology Inc.
 Corporate Computer Systems
 Crouse-Kimzey Company
 Dolby Laboratories Inc.
 Dynair Electronics
 Electronic Industries, Inc.
 F M Systems Inc.
 Funke & Associates
 Giesler Broadcasting Supply, Inc.
 Graham-Patten Systems
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 Hy James, Inc.
 IER (Industrial Equip. Reps.)
 Intraplex, Inc.
 J.N.S. Electronics Inc
 J-Squared Technical Service
 Landy Associates Inc
 Learning Industries
 Lita Broadcasting Distributors
 Litronix Corporation
 Marcom
 Marti Electronics, Inc.
 McMartin Incorporated
 Micro Controls, Inc.
 Moseley Associates
 Northeast Broadcast Lab, Inc.
 Oakwood Audio Labs Ltd.
 Old Dominion Broadcast Eng. Serv.
 Professional Audio Supply
 Parcom Inc.
 Parsons Audio
 Payne Engineering
 PMA Marketing
 Pomar Electronics
 Pro Media
 QEI Corporation
 Radiation Systems
 RE America
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 RF Systems
 Radio Resources & Services
 Roscom General
 Suministros Gonzalez
 Systems Wireless Ltd.
 TFT Inc.
 Technet Systems Group
 Tectan Inc
 Telular, Inc.
 Tobias & Company Ltd
 Transcom Corporation
 Wavnet, Inc.
 Wegener Communications, Inc.

Studio Furniture & Storage

Alatronics
 Arrakis Systems
 Audio Broadcast Group Inc
 Audioarts Engineering
 Bradley Broadcast Sales
 Broadcast Services/EME
 Cancomm
 Caveco
 Continental Electronics
 Control Technology Inc
 Crouse-Kimzey Company
 Enberg Electronics
 The Express Group
 GBS-Giesler Broadcasting Supply
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 Landy Associates Inc
 Murphy Studio Furniture
 Old Dominion Broadcast Engr Service
 Professional Audio Supply
 Quintessence Audio
 RF Specialties of Florida
 Radio Resources & Services
 Roscom General
 Riggins Electronic Sales
 Sequoia Electronics
 Star Systems
 Studio Technology
 Technet Systems Group
 Titus Technologies Lab
 Inventure Inc
 Wheatstone Corporation
 Winsted Corp

Switchers, Audio Routing

AVC Systems
 AVR Communications Limited East
 AVR Communications Limited West
 ASACA/Shibasoku Corp. of America
 Audio Broadcast Group Inc
 BJM Electronics Ltd.
 Broadcast Supply West
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Benchmark Media Systems Inc
 Best Audio
 Bradley Broadcast Sales
 Broadcast Devices Inc.
 Broadcast Services/EME
 Broadcasters General Store
 Broadcasting and Electronic Svrs Lab
 Burk Technology
 Caveco
 Chronrol Corporation
 Cirrus Technologies Inc
 Computer Concepts Corporation
 Conex Electro-Systems, Inc.
 Control Technology Inc.
 Crouse-Kimzey Company
 Datatek Corp
 DHK Group
 Di-Tech Inc.
 Dynair Electronics
 Electronic Industries, Inc.
 Full Compass Systems, Ltd.
 Gentner Electronics Corporation
 Giesler Broadcasting Supply, Inc.
 Grass Valley Group Inc
 Graysonics
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Harrison by GLW
 Hedco
 Henry Engineering
 Holzberg Inc.
 Hy James, Inc.
 IER, Industrial Equip Reps
 International Tapetronics
 J.N.S. Electronics, Inc.
 Jim Walters Co.
 Landy Associates Inc
 International Sales Manager

Logitek Electronic Systems Inc.
 Martin Audio/Video Corp
 McCurdy Radio Industries
 Micro Controls, Inc.
 Milam Audio Co.
 Northeast Broadcast Lab, Inc.
 Oakwood Audio Labs Ltd.
 Old Dominion Broadcast Eng. Serv.
 OPAMP Inc.
 Professional Audio Supply
 Pacific Recorders & Engineering Corp.
 Parcom Inc.
 Parsons Audio
 Peavey Electronics Corporation
 Pierce-Phelps, Inc. - AVSD
 Peirce-Phelps, Inc
 Pro-Bel
 Pyramid Audio, Inc.
 RE Instruments Corp
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Ram Broadcast Systems
 Ramko Research
 Research Associates, Inc.
 Roscom General
 Sierra Automated Systems
 Sony Business & Professional Group
 Studer Revox America, Inc.
 360 Systems
 Titus Technologies Lab
 Versatech Industries, Inc.
 Videoquip Research Limited
 Wavnet, Inc.
 West Starr International
 Wheatstone Corporation
 Wide Range Electronics Corporation
 Yamaha Music Corp. of America



Tape, Cartridge Rebuilding
 A & D Cartridge Rebuilding

Tape, Cartridge
 A/V Technology International, Inc.
 A & D Cartridge Rebuilding
 AVR Communications Limited East
 AVR Communications Limited West
 American Media Services
 Audio Broadcast Group, Inc.
 Audio Labs
 Audiodyne Bdct Cartridge
 AudioLine, Inc.
 Audiomedia
 Audiopak, Inc.
 Broadcast Supply West
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Bradley Broadcast Sales
 Broadcast Cartridge Service Inc.
 Broadcast Cart Rewinding Service
 Broadcast Electronics Inc
 Broadcast Equipment Sales & Engineering
 Broadcast Services/EME
 Broadcasters General Store
 Burlington Audio/Video Tapes
 Cartridge Express
 Caveco
 Continental Electronics
 Control Technology Inc.
 Crouse-Kimzey Company
 Dic Digital
 Dic Digital
 Electronic Industries, Inc.
 Fidelipac Corporation
 Full Compass Systems, Ltd.
 Giesler Broadcasting Supply, Inc.
 Graysonics
 Guarantee Radio Supply Corporation

Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 Hy James, Inc.
 IER, Industrial Equip Reps
 International Tapetronics
 J & I Audio/Video
 John E. Hillman Associates
 Landy Associates Inc
 Lasalle Music and Pro Audio
 Marathon Products
 Martin Audio/Video Corp
 Mastertone-Tapex Co., Inc.
 Milam Audio Co.
 National Audio Co. Inc.
 Northeast Broadcast Lab, Inc.
 Oakwood Audio Labs Ltd.
 Old Dominion Broadcast Eng. Serv.
 Professional Audio Supply
 Parcom Inc.
 Parsons Audio
 Pierce-Phelps, Inc. - AVSD
 Peirce-Phelps, Inc
 PMA Marketing
 Polyline Corp - Polyquick Division
 Pro Media
 Pyramid Audio, Inc.
 QEI Corporation
 R & A Broadcast Services
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Radio Systems
 Research Associates, Inc.
 Riggins Electronic Sales
 Roscom General
 RRADCO Group
 Suministros Gonzalez
 Tandberg Educational, Inc.
 UAR Professional Systems
 Western International

Tape, Cassette
 AKAI
 AVC Systems
 AVR Communications Limited East
 AVR Communications Limited West
 American Media Services
 Ampex Recording Media Corporation
 Audico Label Corp
 Audio Broadcast Group, Inc.
 Audio Labs
 Audio Services Corporation
 Audiodyne Bdct Cartridge
 AudioLine, Inc.
 Audiopak, Inc.
 Audiotechniques
 Broadcast Supply West
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Bradley Broadcast Sales
 Broadcast Cartridge Service Inc.
 Broadcast Equipment Sales & Engineering
 Broadcast Services/EME
 Broadcasters General Store
 Burlington Audio/Video Tapes
 Caveco
 Continental Electronics
 Control Technology Inc
 Crouse-Kimzey Company
 Dic Digital
 Electronic Industries, Inc.
 Full Compass Systems, Ltd.
 Giesler Broadcasting Supply, Inc.
 Guarantee Radio Supply Corporation
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip

Holzberg Inc.
Hy James, Inc.
IER, Industrial Equip Reps
J & I Audio/Video
Jim Walters Co.
John E. Hillman Associates
Landy Associates Inc
Lasalle Music and Pro Audio
Martin Audio/Video Corp
Milam Audio Co.
Music Director Programming
Nakamichi America Corp
National Audio Co. Inc.
New World Music & Sound
Northeast Broadcast Lab, Inc.
Oakwood Audio Labs Ltd.
Old Dominion Broadcast Eng. Serv.
Omega Communications Company
Professional Audio Supply
Parcom Inc.
Parsons Audio
Pierce-Phelps, Inc. - AVSD
Peirce-Phelps, Inc
Polyline Corp - Polyquick Division
Pro Media
Pyramid Audio, Inc.
Quintessence Audio
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Raks Corporation of America, Inc.
Research Associates, Inc.
Ritz Audio-Visual Associates, Inc
RRADCO Group
Sony Business & Professional Group
Sound America Inc.
Suministros Gonzalez
UAR Professional Systems

Tape, DAT

A/V Technology International, Inc.
AVC Systems
AVR Communications Limited East
AVR Communications Limited West
American Media Services
Ampex Recording Media Corporation
Anything Audio
Audio Broadcast Group, Inc.
Audio Services Corporation
AudioLine, Inc.
Audiotechniques
Broadcast Supply West
Barrett Associates, Inc.
Grant Becker Enterprises
Bradley Broadcast Sales
Broadcast Cartridge Service Inc.
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Broadcasters General Store
Burlington Audio/Video Tapes
Caveco
Concept Productions
Continental Electronics Corp
Control Technology Inc
Crouse-Kimzey Company
Dic Digital
Electronic Industries, Inc.
Full Compass Systems, Ltd.
Giesler Broadcasting Supply, Inc.
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Holzberg Inc.
Hy James, Inc.
ICB Audio
IER, Industrial Equip Reps
J & I Audio/Video
Jim Walters Co.
John E. Hillman Associates

Lasalle Music and Pro Audio
Martin Audio/Video Corp
Milam Audio Co.
The Music Director Programming
Nakamichi America Corp
National Audio Co. Inc.
New World Music & Sound
Northeast Broadcast Lab, Inc.
Oakwood Audio Labs Ltd.
Professional Audio Supply
Panasonic/Prof Audio Systems (Ramsa)
Parcom Inc.
Parsons Audio
Pierce-Phelps, Inc. - AVSD
Peirce-Phelps, Inc
Polyline Corp - Polyquick Division
Posthorn Recordings
Pro Media
Pyramid Audio, Inc.
Quintessence Audio
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Radio Systems
Raks Corporation of America, Inc.
Research Associates, Inc.
Ritz Audio-Visual Associates, Inc
RRADCO Group
Sony Business & Professional Group
Suministros Gonzalez
Tape World
UAR Professional Systems

Tape, Reel-to-Reel

AVC Systems
AVR Communications Limited East
AVR Communications Limited West
American Media Services
Ampex Recording Media Corporation
Audio Broadcast Group, Inc.
Audio Labs
Audio Services Corporation
AudioLine, Inc.
Audiotechniques
Broadcast Supply West
Barrett Associates, Inc.
Grant Becker Enterprises
Bradley Broadcast Sales
Broadcast Cartridge Service Inc.
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Broadcasters General Store
Burlington Audio/Video Tapes
Caveco
Continental Electronics Corp
Control Technology Inc
Crouse-Kimzey Company
Drake-Chenault
Electronic Industries, Inc.
Full Compass Systems, Ltd.
Giesler Broadcasting Supply, Inc.
Guarantee Radio Supply Corporation
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Holzberg Inc.
Hy James, Inc.
ICB Audio
IER, Industrial Equip Reps
J & I Audio/Video
Jim Walters Co.
Landy Associates Inc
Lasalle Music and Pro Audio
Martin Audio/Video Corp
Milam Audio Co.
The Music Director Programming
National Audio Co. Inc.
New World Music & Sound

Northeast Broadcast Lab, Inc.
Oakwood Audio Labs Ltd.
Professional Audio Supply
Parcom Inc.
Parsons Audio
Pierce-Phelps, Inc. - AVSD
Peirce-Phelps, Inc
Polyline Corp - Polyquick Division
Posthorn Recordings
Pro Media
Pyramid Audio, Inc.
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Research Associates, Inc.
Riggins Electronic Sales
Roscom General
RRADCO Group
Sony Business & Professional Group
Sprague Magnetics Inc
Suministros Gonzalez
Tek Media Supply Company
UAR Professional Systems
VIF International
Wide Range Electronics Corporation

Tape Cleaners, Erasers, Evaluators and Supplies

AVC Systems
Accurate Sound Corporation
American Media Services
R.B. Annis Co Inc.
ASACA/Shibasoku Corp. of America
Audio Broadcast Group, Inc.
Audio Concepts and Engineering Services
Audio Labs
Audiolab Electronics, Inc.
AudioLine, Inc.
Audiotechniques
Broadcast Supply West
Barrett Associates, Inc.
Grant Becker Enterprises
Bradley Broadcast Sales
Broadcast Electronics
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Broadcasters General Store
Burlington Audio/Video Tapes
Caveco
Comad Communications Limited
Continental Electronics
Control Technology Inc
Crouse-Kimzey Company
Electronic Industries, Inc.
Fidelipac Corporation
Full Compass Systems, Ltd.
Garner Industries
Giesler Broadcasting Supply, Inc.
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Hy James, Inc.
International Tapetronics
Landy Associates Inc
Lasalle Music and Pro Audio
Lipsner-Smith Company
Magnefax International, Inc.
Marathon Products
Martin Audio/Video Corp
Microtran Company
Milam Audio Co.
National Audio Co. Inc.
New World Music & Sound
Northeast Broadcast Lab, Inc.
Oakwood Audio Labs Ltd.
Old Dominion Broadcast Eng. Serv.
Professional Audio Supply
Parcom Inc.

Parsons Audio
Peirce-Phelps, Inc
Pro Media
RF Specialties of California
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Research Associates Inc
Research Technology International
Riggins Electronic Sales
Sequoia Electronics
Suministros Gonzalez
Tek Media Supply Company
UAR Professional Systems
VIF International
Videoquip Research Limited
Wide Range Electronics Corporation

Tape Duplicators

AVC Systems
AVR Communications Limited East
AVR Communications Limited West
Accurate Sound Corporation
Audio Broadcast Group, Inc.
AudioLine, Inc.
Barrett Associates, Inc.
Grant Becker Enterprises
Bradley Broadcast Sales
Broadcast Equipment Sales
Broadcast Services/EME
Caveco
Control Technology Inc.
Crouse-Kimzey Company
Electronic Industries, Inc.
Full Compass Systems, Ltd.
Giesler Broadcasting Supply, Inc.
Guarantee Radio Supply Corporation
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Holzberg Inc.
Hy James, Inc.
IER, Industrial Equip Reps
ITP-Paulist Communications
Jim Walters Co.
Landy Associates Inc
Lasalle Music and Pro Audio
Lindahl Sales Corp
Lita Broadcasting Distributors
Magnefax International, Inc.
Milam Audio Co.
The Music Director Programming
Nakamichi America Corp
National Audio Co. Inc.
New World Music & Sound
Northeast Broadcast Lab, Inc.
Oakwood Audio Labs Ltd.
Otari Corporation
Professional Audio Supply
Parsons Audio
Pierce-Phelps, Inc. - AVSD
Peirce-Phelps, Inc
Pro Media
Pyramid Audio, Inc.
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Raks Corporation of America, Inc.
Research Associates, Inc.
Roscom General
Ritz Audio-Visual Associates, Inc
Suministros Gonzalez
Telectro Systems Corporation
Telex Communications Inc
UAR Professional Systems
VIF International
Valentino Production Music & Sound
Wide Range Electronics Corporation

Telephone Equipment, Hybrids

+4 Audio
 AVR Communications Limited East
 AVR Communications Limited West
 Audio Broadcast Group, Inc.
 Audio Labs
 AudioLine, Inc.
 Audiomedia
 BJM Electronics Ltd
 Broadcast Supply West
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Bradley Broadcast Sales
 Broadcast Equipment Sales & Engineering
 Broadcast Services/EME
 Broadcasters General Store
 Cavoco
 Comrex Corporation
 Control Technology Inc.
 Crouse-Kimzey Company
 D&R Electronics USA
 ESE
 Electronic Industries, Inc.
 Excalibur Electronics
 Full Compass Systems, Ltd.
 Gentner Electronics Corporation
 Giesler Broadcasting Supply, Inc.
 Graham-Patten Systems
 Graysonics
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Henry Engineering
 Hy James, Inc.
 IBSS
 IER, Industrial Equip Reps
 Intraplex, Inc.
 Jim Walters Co.
 John E. Hillman Associates
 Lasalle Music and Pro Audio
 Lita Broadcasting Distributors
 Martin Audio/Video Corp
 Microtran Company
 Milam Audio Co.
 Monroe Electronics, Inc.
 Moseley Associates
 Northeast Broadcast Lab, Inc.
 Oakwood Audio Labs Ltd.
 Old Dominion Broadcast Eng. Serv.
 Omega Communications Company
 Professional Audio Supply
 Parcom Inc.
 Parsons Audio
 Pierce-Phelps, Inc. - AVSD
 Peirce-Phelps, Inc
 Pro Media
 Professional Management Serv.
 Pyramid Audio, Inc.
 RF Specialties of California
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Racom Products
 Roscom General
 Sound America Inc.
 Star Systems
 Studer Revox America, Inc.
 Suministros Gonzalez
 Technet Systems Group
 Telfax Communications
 Telos Systems
 Time & Temperature Company of S.D.
 Tri-Tech, Inc.
 Zercom Corporation

Telephone Equipment, Bandwidth Extenders

AVR Communications Limited East
 AVR Communications Limited West
 Audio Broadcast Group, Inc.
 AudioLine, Inc.
 Broadcast Supply West

Barrett Associates, Inc.
 Grant Becker Enterprises
 Bradley Broadcast Sales
 Broadcast Equipment Sales
 Broadcast Services/EME
 Broadcasters General Store
 Cavoco
 Comrex Corporation
 Control Technology Inc
 Corporate Computer Systems
 Crouse-Kimzey Company
 Electronic Industries, Inc.
 Full Compass Systems, Ltd.
 Gentner Electronics Corporation
 Giesler Broadcasting Supply, Inc.
 Graham-Patten Systems
 Graysonics
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Hy James, Inc.
 IBSS
 IER, Industrial Equip Reps
 Jim Walters Co.
 John E. Hillman Associates
 Lasalle Music and Pro Audio
 Marcom
 Moseley Associates
 Northeast Broadcast Lab, Inc.
 Old Dominion Broadcast Eng. Serv.
 Professional Audio Supply
 Parcom Inc.
 Parsons Audio
 Pierce-Phelps, Inc. - AVSD
 Pro Media
 Pyramid Audio, Inc.
 QEI Corporation
 RE America
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Roscom General
 Suministros Gonzalez
 Technet Systems Group
 Telfax Communications
 Telular, Inc.

Teleports

Harris Allied Broadcast Equip
 Control Technology Inc
 D&R Electronics USA
 Racom Products

Test Equipment, Distortion Analyzers

AVC Systems
 AVR Communications Limited East
 AVR Communications Limited West
 Amber Electro Design Inc.
 ASACA/SHIBASOKU CORP. of AMERICA
 Audio Precision
 Broadcast Supply West
 BARCO-EMT GmbH
 Barrett Associates, Inc.
 Boonton Electronics Corp
 Bruel & Kjaer Instruments, Inc.
 Cavoco
 Commercial Radio Company
 Continental Electronics
 Control Technology Inc
 ESE
 Electronic Industries, Inc.
 Full Compass Systems, Ltd.
 Funke & Associates
 Guarantee Radio Supply Corporation
 Harris Allied
 Harris Allied Broadcast Equip
 Hartmann Associates
 Holzberg Inc.
 Hy James, Inc.
 IER, Industrial Equip Reps
 John E. Hillman Associates

Kandel Electronics
 Landy Associates Inc
 Leader Instruments Corporation
 Leitch Incorporated
 Northeast Broadcast Lab, Inc.
 Douglas Ordon & Company, Inc.
 Professional Audio Supply
 Parcom Inc.
 Parsons Audio
 Peirce-Phelps, Inc
 Posthorn Recordings
 Potomac Instruments, Inc.
 Potomac Instruments, Inc.
 RE America
 RE Instruments Corp
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Sound Technology
 Suministros Gonzalez
 TFT Inc.
 Technet Systems Group
 Tektronix Inc
 Wavnet, Inc.

Test Equipment, Oscilloscopes

A/V Technology International, Inc.
 AVC Systems
 AVR Communications Limited East
 AVR Communications Limited West
 A. W. Sperry Instruments
 BJM Electronics Ltd.
 Barrett Associates, Inc.
 Broadcast Services/EME
 Cavoco
 Continental Electronics Corp
 Control Technology Inc
 Electronic Industries, Inc.
 Full Compass Systems, Ltd.
 Gold Line Connector Inc.
 James Grunder & Assoc Inc.
 Guarantee Radio Supply Corporation
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Hartmann Associates
 Holzberg Inc.
 IER, Industrial Equip Reps
 Jensen Tools Inc
 John E. Hillman Associates
 Kandel Electronics
 Landy Associates Inc
 Leader Instruments Corporation
 Lindahl Sales Corp
 Northeast Broadcast Lab, Inc.
 Professional Audio Supply
 Parsons Audio
 Peirce-Phelps, Inc
 RE America
 RF Specialties of Missouri
 Ram Broadcast Systems
 A W Sperry Instruments
 Suministros Gonzalez
 Tektronix Inc

Test Equipment, Other Audio

Bald Mountain Lab
 Dorrough Electronics
 Summit Audio, Inc
 VIF International

Test Equipment, Other RF

Broadcast Comm Systems Inc
 Broadcast Comm Systems Inc
 Potomac Instruments

Test Equipment, RF Radiation Test Gear

AVR Communications Limited East
 AVR Communications Limited West
 Anritsu America Inc
 Barrett Associates, Inc.

Bird Electronics Corporation
 Broadcast Comm Systems Inc
 Cavoco
 Commercial Radio Company
 Communications General Corp.
 Continental Electronics Corp
 Harris Allied Broadcast Equip
 Holaday Industries Inc.
 John E. Hillman Associates
 Kandel Electronics
 Loral Microwave-Narda
 Professional Audio Supply
 Potomac Instruments, Inc.
 RE America
 RF Specialties of Missouri
 Stephens Communications
 Technet Systems Group
 Verda Corp

Test Equipment, Spectrum Analyzers

AVC Systems
 AVCOM of Virginia, Inc.
 Amber Electro Design Inc.
 Anritsu America Inc
 Antenna Concepts
 Antenna Technology Corporation
 AudioControl Industrial
 Audio Precision
 Audiotechniques
 Barrett Associates, Inc.
 Broadcast Comm Systems Inc
 Broadcasters General Store
 Bruel & Kjaer Instruments, Inc.
 Cavoco
 Continental Electronics Corp
 Crouse-Kimzey Company
 Delta Electronics Inc.
 Full Compass Systems, Ltd.
 Funke & Associates
 Gold Line Connector Inc.
 Gotham Audio Corp
 Group One Ltd.
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Hartmann Associates
 Holzberg Inc.
 IER, Industrial Equip Reps
 IFR Systems Inc.
 IVIE

John E. Hillman Associates
 Kandel Electronics
 Klark-Teknik
 Martin Audio/Video Corp
 Milam Audio Co.
 New World Music & Sound
 Numark Electronics
 Douglas Ordon & Co Inc
 Professional Audio Supply
 Parsons Audio
 Peirce-Phelps, Inc
 Posthorn Recordings
 Pyramid Audio, Inc.
 RE America
 RF Specialties of Missouri
 Radio Resources & Services
 Sound Technology
 Tektronix Inc
 Wavnet, Inc.
 White Instruments, Div C VAN R

Test Equipment, Test Systems

AVC Systems
 AVR Communications Limited East
 AVR Communications Limited West
 Acoustic Technology Inc.
 Acustilog, Inc.
 Amber Electro Design Inc.
 R.B. Annis Co Inc.
 Antenna Concepts
 Audio Precision
 Audisar
 Beckman Industrial Corporation

Belar Electronics Laboratory, Inc.
 Bird Electronics Corporation
 Bruel & Kjaer Instruments, Inc.
 Caveco
 Commercial Radio Company
 Delta Electronics Inc.
 Dorough Electronics
 Full Compass Systems, Ltd.
 Funke & Associates
 Gaines Audio
 Gold Line Connector Inc.
 Harris Allied Broadcast Equip
 James Grunder & Assoc Inc.
 Hall Electronics
 Harris Allied
 Hartmann Associates
 Holzberg Inc.
 IER, Industrial Equip Reps
 J.N.S. Electronics, Inc.
 John E. Hillman Associates
 Kandel Electronics
 Landy Associates Inc
 Leitch Incorporated
 Magnetic reference Lab
 Magni Systems
 Multiphase Consulting
 Northeast Broadcast Lab, Inc.
 Douglas Ordon & Company, Inc.
 Professional Audio Supply
 Parcom Inc.
 Parsons Audio
 Potomac Instruments, Inc.
 Pro-Bel
 QEI Corporation
 RE America
 RE Instruments Corp
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 Radio Design Labs
 Radio Resources & Services
 RTI Research Technology Intl
 Schmid Telecomm. America Inc
 Sescom Inc.
 Sound Technology
 Stephens Communications
 TFT Inc.
 Technet Systems Group
 Tennaplex Systems Ltd
 Tentel Corporation
 Valley Audio Products
 Wavnet, Inc.
 Wohler Technologies

Time Code Equipment

+4 Audio
 A/Z Associates
 AVC Systems
 AVR Communications Limited East
 AVR Communications Limited West
 Anything Audio
 Audio Broadcast Group, Inc.
 Audio Services Corporation
 Audiotechniques
 Bradley Broadcast Sales
 Broadcast Services/EME
 Broadcasters General Store
 Crouse-Kimzey Company
 ESE
 FM Technology Assoc Inc
 Fostex Corp. of America
 Full Compass Systems, Ltd.
 Hall Electronics
 Harris Allied Broadcast Equip
 Holzberg Inc.
 Hy James, Inc.
 International Sales Manager
 JRF Magnetic Sciences
 Jim Walters Co.
 Landy Associates Inc
 Lasalle Music and Pro Audio
 Leitch Incorporated
 Martin Audio/Video Corp

Milam Audio Co.
 Northeast Broadcast Lab, Inc.
 Douglas Ordon & Company, Inc.
 Otari Corporation
 Professional Audio Supply
 Parcom Inc.
 Parsons Audio
 Peavey Electronics Corporation
 Posthorn Recordings
 Pyramid Audio, Inc.
 RE America
 RF Specialties of Missouri
 Research Associates, Inc.
 Schoeps/Posthorn Recordings
 Sequoia Electronics
 Sony Business & Professional Group
 Star Systems
 Turtle Beach Systems
 UAR Professional Systems
 Wavnet, Inc.
 Wide Range Electronics Corporation

Timers and Clocks

AVR Communications Limited East
 AVR Communications Limited West
 American Media Services
 Audio Broadcast Group, Inc.
 Auditronics
 Autogram Corp
 Broadcast Supply West
 Barrett Associates, Inc.
 Grant Becker Enterprises
 Bradley Broadcast Sales
 Broadcast Equipment Sales &
 Engineering
 Broadcast Services/EME
 Broadcasters General Store
 CRL
 Caveco
 Chronrol Corporation
 Cirrus Technologies Inc
 Continental Electronics Corp
 Crouse-Kimzey Company
 ESE
 Electronic Industries, Inc.
 Enberg Electronics
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Harrison by GLW
 Holzberg Inc.
 Hy James, Inc.
 IER, Industrial Equip Reps
 Jim Walters Co.
 Landy Associates Inc
 Leitch Incorporated
 International Sales Manager
 Martin Audio/Video Corp
 Monroe Electronics, Inc.
 Northeast Broadcast Lab, Inc.
 Oakwood Audio Labs Ltd.
 Old Dominion Broadcast Eng. Serv.
 Professional Audio Supply
 Pacific Recorders & Engineering Corp.
 Parcom Inc.
 Parsons Audio
 Peirce-Phelps, Inc
 Pro-Bel
 Pro Media
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Radio Systems
 Research Associates, Inc.
 Roscom General
 Sequoia Electronics
 Suministros Gonzalez
 Technet Systems Group
 Time & Temperature Company of S.D.

Tools and Gauges

Audiotechniques
 BJM Electronics Ltd.
 Broadcast Supply West
 Barrett Associates, Inc.
 Broadcast Comm Systems Inc
 Canare Cable Inc.
 Capital Electronics Inc
 Caveco
 Electronic Industries, Inc.
 Full Compass Systems, Ltd.
 Guarantee Radio Supply Corporation
 Harris Allied Broadcast Equip
 IER, Industrial Equip Reps
 Martin Audio/Video Corp
 Professional Audio Supply
 Paladin Corporation
 Sequoia Electronics
 Suministros Gonzalez
 Tentel Corp
 Vertigo
 Brian R. White Co., Inc.

Towers

Adelphon, Inc.
 Aluma Tower Company, Inc.
 American Media Services
 Andrew Corporation
 Barrett Associates, Inc.
 Broadcast Comm Systems Inc
 CTI Installations, Inc.
 Capital Electronics Inc
 Central Tower, Inc.
 Continental Electronics
 ERI Installations
 Electronic Industries, Inc.
 Electronic Research
 Express Tower Co. Inc.
 Fort Worth Tower Inc
 Guarantee Radio Supply Corporation
 Hall Electronics
 Mart Haller Co.-Exporters
 Harmon's Tower Service
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 IER (Industrial Equip. Reps.)
 Ice Krackers
 Jampro Antennas
 John E. Hillman Associates
 John Nix
 Kintronic Laboratories Inc
 LDL Communications
 L & R Communications Ltd.
 Lines Video Systems
 Lita Broadcasting Distributors
 Magnum Towers, Inc.
 Mid-State Comm & Electronics
 Miller Tower Company
 North Star Tower
 Fred A. Nudd Corporation
 Paramount Communications Systems
 Parcom Inc.
 Payne Engineering
 Pirod Inc
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 ROHN Inc
 Radio Resources & Services
 Research Associates, Inc.
 Roscom General
 SG Communications
 Shaffer Communications Group
 Skyhawk Communications
 Skyline Antenna Management
 Southern Tower Service Co., Inc.
 Stellar Communications Inc.
 Stephens Communications
 Steven L DeLay Co
 Suministros Gonzalez

Technet Systems Group
 Telex Communications Inc
 Tenco Tower
 Tower Structures, Inc
 Tower Structures Inc.
 Transmission Structures Ltd.
 U.S. Tower Services
 Utility Tower Company
 Will-Burt Company
 World Tower Co Inc

Towers, Guys & Lights

Adelphon, Inc.
 Aluma Tower Company, Inc.
 American Media Services
 Andrew Corporation
 Barrett Associates, Inc.
 Broadcast Comm Systems Inc
 Broadcast Services/EME
 Central Tower, Inc.
 Continental Electronics
 Cortland Cable Company
 Crouse-Kimzey Company
 ERI Installations
 Electronic Industries
 Electronics Research, Inc.
 Express Tower Co. Inc.
 Flash Technology
 Fort Worth Tower Inc
 Guarantee Radio Supply Corporation
 Mart Haller Co.-Exporters
 Harmon's Tower Service
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 Hughey & Phillips Inc.
 IER, Industrial Equip Reps
 John E. Hillman Associates
 John Nix
 LDL Communications
 Lita Broadcasting Distributors
 Magnum Towers, Inc.
 Mid-State Comm & Electronics
 North Star Tower
 Fred A. Nudd Corporation
 Rick Nudd, Ltd.
 Professional Audio Supply
 Paramount Communications Systems
 Payne Engineering
 Pirod Inc
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 ROHN Inc
 Radio Resources & Services
 Research Associates, Inc.
 Roscom General
 Shaffer Communications Group
 Skyhawk Communications
 Southern Tower Service Co., Inc.
 SSAC Co.
 Stellar Communications Inc.
 Stellar Distributing Inc.
 Suministros Gonzalez
 Technet Systems Group
 Tenco Tower
 Tower Structures Inc.
 Transmission Structures Ltd.
 U.S. Tower Services
 United Ropeworks
 Utility Tower Company
 World Tower Co Inc

Tower Services

Adelphon, Inc.
 Andrew Corporation
 Broadcast Communications Systems, Inc.
 CTI Installations, Inc.
 Central Tower, Inc.
 ERI Installations
 Electronics Research, Inc.

Express Tower Co. Inc.
Flash Technology Corp of America
Fort Worth Tower Inc
Guarantee Radio Supply Corporation
Harmon's Tower Service
Harris Allied Broadcast Equip
IER, Industrial Equip Reps
John E. Hillman Associates
John Nix
LDL Communications
L & R Communications Ltd.
Mid-State Comm & Electronics
North Star Tower
Fred A. Nudd Corporation
Old Dominion Broadcast Eng. Serv.
Paramount Communications Systems
Payne Engineering
RF Specialties of California
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Research Associates Inc
Rose Engineering
SG Communications
Shaffer Communications Group
Skyhawk Communications
Sky Tower Service
Southern Tower Service Co., Inc.
Stellar Communications Inc.
Stellar Distributing Inc.
Stephens Communications
Steven L DeLay Co
Technet Systems Group
Teletech Inc
Tenco Tower
Tower Structures Inc.
Transmission Structures Ltd.
U.S. Tower Services
Utility Tower Company
World Tower Co Inc

Transformers, Audio

+4 Audio
AVR Communications Limited East
AVR Communications Limited West
Acoustic Technology Inc.
Altec Lansing Corp
Roscom General
Audio Services Corporation
Audisair
BJM Electronics Ltd.
Barrett Associates, Inc.
Grant Becker Enterprises
Bogen Communications, Inc.
Broadcasters General Store
Caveco
Commercial Radio Company
Electronic Industries, Inc.
Full Compass Systems, Ltd.
Fusion Electronics, Inc.
Guarantee Radio Supply Corporation
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
IER, Industrial Equip Reps
Jensen Transformers Inc.
McMartin Incorporated
Microtran Company
Milam Audio Co.
Old Dominion Broadcast Eng. Serv.
Omega Communications Company
OPAMP Inc.
Professional Audio Supply
Parcom Inc.
Peavey Electronics Corporation
Pierce-Phelps, Inc. - AVSD
Peirce-Phelps, Inc
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
Radio Design Labs
Research Associates, Inc.
Riggins Electronic Sales
Russco Electronics Mfg. Inc.

Sescom Inc.
Shure Brothers Inc
Spectra Sonics
Suministros Gonzalez
Tandberg Educational, Inc.
Tapecaster
White Instruments, Div C VAN R

Transformers, RF

AVR Communications Limited East
AVR Communications Limited West
Barrett Associates, Inc.
Broadcasters General Store
Caveco
Commercial Radio Company
Control Technology Inc.
Delta Electronics Inc.
Fusion Electronics, Inc.
Guarantee Radio Supply Corporation
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Hy James, Inc.
IER, Industrial Equip Reps
Jampro Antennas
Lita Broadcasting Distributors
Marcom
Old Dominion Broadcast Eng. Serv.
Professional Audio Supply
Parcom Inc.
Peter W. Dahl Co.
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Systems
Shively Labs

**Transmission Line,
Flexible Cable, Waveguide**

ANT Telecommunications, Inc.
AVR Communications Limited East
AVR Communications Limited West
American Media Services
Andrew Corporation
Antennas for Communications, Inc.
Audio Broadcast Group Inc
Broadcast Supply West
Barrett Associates, Inc.
Bradley Broadcast Sales
Broadcast Comm Systems Inc
Broadcast Equipment Sales &
Engineering
Broadcast Services/EME
Broadcasters General Store
Cablewave Systems, Div of RFS
Cancomm
Caveco
Comark Communications
Comex Worldwide Corporation
Continental Electronics
Crouse-Kimzey Company
Dielectric Communications
Electronic Industries, Inc.
Electronics Research, Inc.
FM Technology Assoc Inc
Giesler Broadcasting Supply, Inc.
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Hy James, Inc.
IER, Industrial Equip Reps
Jampro Antennas
John E. Hillman Associates
John Nix
LDL Communications
Landy Associates Inc
Lines Video Systems
Lita Broadcasting Distributors
Marcom
Marti Electronics
Micro Communications Inc
Myat, Inc.
Loral Microwave-Narda
Northeast Broadcast Lab, Inc.
Old Dominion Broadcast Eng. Serv.

Professional Audio Supply
Parcom Inc.
Payne Engineering
Phasetek
QEI Corporation
QEI Corporation
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Research Associates Inc
Roscom General
S.W.R. Inc.
Scala Electronic Corporation
Shively Labs
Stellar Distributing Inc.
Steven L DeLay Co
Suministros Gonzalez
Technet Systems Group
Tenco Tower
Tennaplex Systems Ltd
Transcom Corporation

Transmitters, AM, 0-100 watts

AVR Communications Limited East
AVR Communications Limited West
Audio Broadcast Group, Inc.
Audiomedia
Beck Associates, Inc.
Besco International
Caveco
Cirrus Technologies Inc
Continental Electronics
Digital Recorders
Energy-Onix Broadcast Equipment Co.
GE Support Services
GBS-Giesler Broadcasting Supply
Guarantee Radio Supply Corporation
Harris Allied Broadcast Equip
Holzberg Inc.
IBSS
IER (Industrial Equip. Reps.)
John E. Hillman Associates
LPB, Inc.
Northeast Broadcast Lab, Inc.
Old Dominion Broadcast Eng. Serv.
Professional Audio Supply
PMA Marketing
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Washington, Inc.
Radio Resources & Services
Radio Systems
Roscom General
RRADCO Group
Technet Systems Group
Tobias & Company Ltd
Transcom Corporation

Transmitters, AM, 100-1kW

AVR Communications Limited East
AVR Communications Limited West
Audio Broadcast Group, Inc.
Audiomedia
Barrett Associates, Inc.
Beck Associates, Inc.
Besco International
Broadcast Electronics Inc
Caveco
Cirrus Technologies Inc
Commercial Radio Company
Continental Electronics
Elcom Bauer
Energy-Onix Broadcast Equipment Co.
GE Support Services
GBS-Giesler Broadcasting Supply
Guarantee Radio Supply Corporation
Harris Allied

Harris Allied Broadcast Equip
Holzberg Inc.
Hy James, Inc.
IER (Industrial Equip. Reps.)
John E. Hillman Associates
Lita Broadcasting Distributors
MidAmerica Electronics Service, Inc.
Nautel Electronic Laboratories
Nautel Maine Inc
Northeast Broadcast Lab, Inc.
Old Dominion Broadcast Eng. Serv.
Omnitronix, Inc.
Professional Audio Supply
PMA Marketing
Pomar Electronics
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Roscom General
RRADCO Group
Suministros Gonzalez
Technet Systems Group
Tobias & Company Ltd
Transcom Corporation

Transmitters, AM, 1kW-50kW

AVR Communications Limited East
AVR Communications Limited West
Audio Broadcast Group, Inc.
Audiomedia
Barrett Associates, Inc.
Beck Associates, Inc.
Besco International
Broadcast Electronics Inc
Broadcasting Systems
CCA Electronics
Caveco
Cirrus Technologies Inc
Commercial Radio Company
Continental Electronics
Crouse-Kimzey Company
Elcom Bauer
Energy-Onix Broadcast Equipment Co.
Fusion Electronics, Inc.
Fusion Electronics, Inc.
GE Support Services
Graysonics
Guarantee Radio Supply Corporation
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Holzberg Inc.
Hy James, Inc.
IER (Industrial Equip. Reps.)
John E. Hillman Associates
Lita Broadcasting Distributors
Litronix Corporation
McMartin Incorporated
MidAmerica Electronics Service, Inc.
Nautel Electronic Laboratories
Nautel Maine Inc
Northeast Broadcast Lab, Inc.
Old Dominion Broadcast Eng. Serv.
Omnitronix, Inc.
Professional Audio Supply
PMA Marketing
Pomar Electronics
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Roscom General
RRADCO Group
Steven L DeLay Co
Suministros Gonzalez
Tobias & Company Ltd
Transcom Corporation

Transmitters, AM, 50kW +

AVR Communications Limited East
 AVR Communications Limited West
 Audiomedia
 Barrett Associates, Inc.
 Beck Associates, Inc.
 Besco International
 CCA Electronics
 Caveco
 Cirrus Technologies Inc
 Continental Electronics
 Energy-Onix Broadcast Equipment Co.
 Fusion Electronics, Inc.
 GE Support Services
 Guarantee Radio Supply Corporation
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 IER (Industrial Equip. Reps.)
 MidAmerica Electronics Service, Inc.
 Nautel Electronic Laboratories
 Nautel Maine Inc
 Old Dominion Broadcast Eng. Serv.
 Professional Audio Supply
 PMA Marketing
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Roscom General
 RRADCO Group
 Steven L DeLay Co
 Suministros Gonzalez
 Tobias & Company Ltd
 Transcom Corporation

Transmitters, FM, 0-100 watts

AVR Communications Limited East
 AVR Communications Limited West
 Audio Broadcast Group, Inc.
 Audiological Engineering Corp
 Audiomedia
 Broadcast Supply West
 Barrett Associates, Inc.
 Beck Associates, Inc.
 Grant Becker Enterprises
 Besco International
 Bext Inc.
 Bradley Broadcast Sales
 Broadcast Electronics
 Broadcast Equipment Sales &
 Engineering
 Broadcast Services/EME
 Broadcasters General Store
 CCA Electronics
 Cancomm
 Caveco
 Cirrus Technologies Inc
 Comad Communications Limited
 Continental Electronics
 Crouse-Kimzey Company
 Elcom Bauer
 Energy-Onix Broadcast Equipment Co.
 FM Technology Assoc Inc
 FM Technology Assoc Inc
 Fusion Electronics, Inc.
 GE Support Services
 Giesler Broadcasting Supply, Inc.
 Guarantee Radio Supply Corporation
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 Hoberg Comm Consultant
 IBSS
 IER (Industrial Equip. Reps.)
 John E. Hillman Associates
 LPB Inc
 Landy Associates Inc
 Lita Broadcasting Distributors
 Litronix Corporation

Marcom
 McMartin Incorporated
 Northeast Broadcast Lab, Inc.
 Old Dominion Broadcast Eng. Serv.
 Professional Audio Supply
 Parcom Inc.
 PMA Marketing
 QEI Corporation
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Roscom General
 RRADCO Group
 Suministros Gonzalez
 TFT Inc.
 Television Technology Corp.
 Technet Systems Group
 Tobias & Company Ltd
 Transcom Corporation

Transmitters, FM, 100-1kW

AVR Communications Limited East
 AVR Communications Limited West
 Audio Broadcast Group, Inc.
 Audiomedia
 Broadcast Supply West
 Barrett Associates, Inc.
 Beck Associates, Inc.
 Grant Becker Enterprises
 Besco International
 Bext Inc.
 Bradley Broadcast Sales
 Broadcast Electronics
 Broadcast Equipment Sales &
 Engineering
 Broadcast Services/EME
 Broadcasters General Store
 Broadcasting Systems
 CCA Electronics
 Cancomm
 Caveco
 Cirrus Technologies Inc
 Comad Communications Limited
 Continental Electronics
 Crouse-Kimzey Company
 Elcom Bauer
 Energy-Onix Broadcast Equipment Co.
 FM Technology Assoc Inc
 FM Technology Assoc Inc
 GE Support Services
 Giesler Broadcasting Supply, Inc.
 Guarantee Radio Supply Corporation
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 IER, Industrial Equip Reps
 John E. Hillman Associates
 Landy Associates Inc
 Lita Broadcasting Distributors
 Litronix Corporation
 Marcom
 Northeast Broadcast Lab, Inc.
 Old Dominion Broadcast Eng. Serv.
 Professional Audio Supply
 Parcom Inc.
 PMA Marketing
 QEI Corporation
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Roscom General
 RRADCO Group
 Suministros Gonzalez
 Television Technology Corp.
 Technet Systems Group

Tobias & Company Ltd
 Transcom Corporation

Transmitters, FM, 1kW-10kW

AVR Communications Limited East
 AVR Communications Limited West
 Audio Broadcast Group, Inc.
 Audiomedia
 Broadcast Supply West
 Barrett Associates, Inc.
 Beck Associates, Inc.
 Grant Becker Enterprises
 Besco International
 Bext Inc.
 Bradley Broadcast Sales
 Broadcast Electronics
 Broadcast Equipment Sales &
 Engineering
 Broadcast Services/EME
 Broadcasters General Store
 Broadcasting Systems
 CCA Electronics
 Cancomm
 Caveco
 Cirrus Technologies Inc
 Comad Communications Limited
 Continental Electronics
 Crouse-Kimzey Company
 Elcom Bauer
 Energy-Onix Broadcast Equipment Co.
 GE Support Services
 Giesler Broadcasting Supply, Inc.
 Guarantee Radio Supply Corporation
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 IER, Industrial Equip Reps
 John E. Hillman Associates
 Landy Associates Inc
 Lita Broadcasting Distributors
 Litronix Corporation
 Marcom
 MidAmerica Electronics Service, Inc.
 Nautel Electronic Laboratories
 Nautel Maine Inc.
 Northeast Broadcast Lab, Inc.
 Old Dominion Broadcast Eng. Serv.
 Professional Audio Supply
 Parcom Inc.
 PMA Marketing
 Pomar Electronics
 QEI Corporation
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Roscom General
 RRADCO Group
 Suministros Gonzalez
 Television Technology Corp.
 Technet Systems Group
 Telo Technology
 Tobias & Company Ltd
 Transcom Corporation

Transmitters, FM, 10kW +

AVR Communications Limited East
 AVR Communications Limited West
 Audio Broadcast Group, Inc.
 Audiomedia
 Broadcast Supply West
 Barrett Associates, Inc.
 Beck Associates, Inc.
 Grant Becker Enterprises
 Besco International
 Bext Inc.
 Bradley Broadcast Sales
 Broadcast Electronics
 Broadcast Equipment Sales &
 Engineering

Broadcast Services/EME
 Broadcasters General Store
 Broadcasting Systems
 CCA Electronics
 Cancomm
 Caveco
 Cirrus Technologies Inc
 Continental Electronics
 Crouse-Kimzey Company
 Elcom Bauer
 Energy-Onix Broadcast Equipment Co.
 Fusion Electronics, Inc.
 Fusion Electronics, Inc.
 GE Support Services
 Giesler Broadcasting Supply, Inc.
 Graysonics
 Guarantee Radio Supply Corporation
 Hall Electronics
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 IER (Industrial Equip. Reps.)
 John E. Hillman Associates
 Landy Associates Inc
 Lita Broadcasting Distributors
 Litronix Corporation
 Marcom
 McMartin Incorporated
 Nautel Electronic Laboratories
 Nautel Maine Inc
 Northeast Broadcast Lab, Inc.
 Old Dominion Broadcast Eng. Serv.
 Professional Audio Supply
 Parcom Inc.
 PMA Marketing
 QEI Corporation
 RF Specialties of California
 RF Specialties of Florida
 RF Specialties of Missouri
 RF Specialties of Pennsylvania, Inc.
 RF Specialties of Texas
 RF Specialties of Washington, Inc.
 Radio Resources & Services
 Roscom General
 RRADCO Group
 Steven L DeLay Co
 Suministros Gonzalez
 Television Technology Corp.
 Technet Systems Group
 Telo Technology
 Tobias & Company Ltd
 Transcom Corporation

Transmitters, Shortwave, 0-1kW

Beck Associates, Inc.
 Besco International
 Caveco
 Cirrus Technologies Inc
 Elcom Bauer
 Energy-Onix Broadcast Equipment Co.
 Guarantee Radio Supply Corporation
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 IER, Industrial Equip Reps
 Lita Broadcasting Distributors
 Old Dominion Broadcast Eng. Serv.
 PMA Marketing
 RRADCO Group
 Tobias & Company Ltd
 Transcom Corporation

Transmitters, Shortwave, 1kW-50kW

Besco International
 Broadcasting Systems
 CCA Electronics
 Caveco
 Continental Electronics
 Elcom Bauer
 Energy-Onix Broadcast Equipment Co.
 Harris Allied
 Harris Allied Broadcast Equip
 Holzberg Inc.
 IER, Industrial Equip Reps

Lita Broadcasting Distributors
Old Dominion Broadcast Eng. Serv.
PMA Marketing
RRADCO Group
Steven L DeLay Co
Tobias & Company Ltd
Transcom Corporation

Transmitters, Shortwave, 50kW +
Beck Associates, Inc.
Besco International
CCA Electronics
Caveco
Continental Electronics
Energy-Onix Broadcast Equipment Co.
Harris Allied
Harris Allied Broadcast Equip
Holzberg Inc.
Old Dominion Broadcast Eng. Serv.
PMA Marketing
Tobias & Company Ltd
Transcom Corporation

Tubes, Transmitting
AVR Communications Limited East
AVR Communications Limited West
American Media Services
BJM Electronics Ltd.
Broadcast Supply West
Barrett Associates, Inc.
Bethpage Associates Inc
Broadcasting Systems
Caveco
Cirrus Technologies Inc
Commercial Radio Company
Continental Electronics
EEV
Econco

Electronic Industries, Inc.
Freeland Products, Inc.
Giesler Broadcasting Supply, Inc.
Guarantee Radio Supply Corporation
Hall Electronics
Mart Haller Co.-Exporters
Harris Allied
Harris Allied Broadcast Equip
Holzberg Inc.
IER, Industrial Equip Reps
John E. Hillman Associates
Jolida Tube Factory
Lita Broadcasting Distributors
Litronix Corporation
Marcom
Old Dominion Broadcast Eng. Serv.
Professional Audio Supply
Parcom Inc.
PMA Marketing
Pomar Electronics
QEI Corporation
Richardson Electronics/RF Gain
RF Specialties of California
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Richardson Electronics
Suministros Gonzalez
Thor Electronics Corp.
Vacuum Tube Industries, Inc.

Tubes, Receiving
AVR Communications Limited East
AVR Communications Limited West
American Media Services
Audio Labs
BJM Electronics Ltd.
Barrett Associates, Inc.
Bethpage Associates Inc
Capital Electronics Inc
Caveco
Commercial Radio Company
EEV
Electronic Industries, Inc.

Guarantee Radio Supply Corporation
Mart Haller Co.-Exporters
IER, Industrial Equip Reps
John E. Hillman Associates
Jolida Tube Factory
Lindahl Sales Corp
Lita Broadcasting Distributors
Old Dominion Broadcast Eng. Serv.
Professional Audio Supply
Pomar Electronics
Richardson Electronics/RF Gain
RF Specialties of Missouri
RF Specialties of Texas
Richardson Electronics
Thor Electronics Corp.
Vacuum Tube Industries, Inc.

U

Used Equipment
Graysonics
Hall Electronics
Harris Allied Broadcast Equip

W

Warning/On-Air Lights

Enberg Electronics
Fidelipac Corp
Titus Technologies Labs

Weather Radar Systems

Control Technology Inc
Erko Technologies
Harris Allied Broadcast Equip
WSI Corporation

Weather Radios, NOAA

Control Technology Inc
Emergency Alert Receiver Inc
Hall Electronics
Hamtronics, Inc.
Harris Allied
Harris Allied Broadcast Equip
RF Specialties of Florida
Universal Electronics, Inc.
Wireready Newswire Systems Inc

Wire, Audio

+4 Audio
AVC Systems
AVR Communications Limited East
AVR Communications Limited West
American Media Services
Anything Audio
AudioLine, Inc.
Audiotechniques
BJM Electronics Ltd.
Broadcast Supply West
Barrett Associates, Inc.
Grant Becker Enterprises
Beyerdynamic Inc.
Bradley Broadcast Sales
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Broadcasters General Store
Canare Cable Inc.
Capital Electronics Inc
Caveco
Commercial Radio Company
Connectronics Corporation
Continental Electronics
Control Technology Inc.
Cooper Industries/Belden Division
Crouse-Kimzey Company
Electronic Industries, Inc.
Full Compass Systems, Ltd.
Gepco International Inc
Giesler Broadcasting Supply, Inc.
Graysonics
Guarantee Radio Supply Corporation

Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Holzberg Inc.
Hy James, Inc.
IBSS
IER, Industrial Equip Reps
John E. Hillman Associates
Landy Associates Inc
Lasalle Music and Pro Audio
Lita Broadcasting Distributors
Martin Audio/Video Corp
Milam Audio Co.
New World Music & Sound
Northeast Broadcast Lab, Inc.
Numark Electronics
Old Dominion Broadcast Eng. Serv.
Omega Communications Company
Professional Audio Supply
Parcom Inc.
Parsons Audio
Peavey Electronics Corporation
Pierce-Phelps, Inc. - AVSD
Peirce-Phelps, Inc
Posthorn Recordings
Pro Media
Pyramid Audio, Inc.
Quintessence Audio
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Redco Audio Products
Riggins Electronic Sales
Ritz Audio-Visual Associates, Inc
Roscom General
Spectra Sonics
Star Systems
Stram Electronics Corp
Suministros Gonzalez
Technet Systems Group
Thor Electronics Corp.
Wireworks Corp

Wire, Coax

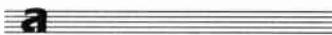
AVC Systems
AVR Communications Limited East
AVR Communications Limited West
American Media Services
BJM Electronics Ltd.
Broadcast Supply West
Barrett Associates, Inc.
Grant Becker Enterprises
Bradley Broadcast Sales
Broadcast Comm Systems Inc
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Broadcasters General Store
Cablewave Systems, Div of RFS
Canare Cable Inc.
Capital Electronics Inc
Caveco
Commercial Radio Company
Connectronics Corporation
Continental Electronics
Control Technology Inc
Cooper Industries/Belden Division
Crouse-Kimzey Company
Electronic Industries, Inc.
Full Compass Systems, Ltd.
Fusion Electronics, Inc.
Gepco International Inc
Giesler Broadcasting Supply, Inc.
Graysonics
Guarantee Radio Supply Corporation
Hall Electronics
Harris Allied
Harris Allied Broadcast Equip
Holzberg Inc.
Hy James, Inc.

IBSS
IER (Industrial Equip. Reps.)
John E. Hillman Associates
Landy Associates Inc
Lasalle Music and Pro Audio
Lita Broadcasting Distributors
Martin Audio/Video Corp
Milam Audio Co.
Northeast Broadcast Lab Inc
Old Dominion Broadcast Eng. Serv.
Omega Communications Company
Professional Audio Supply
Parcom Inc.
Parsons Audio
Pierce-Phelps, Inc. - AVSD
Peirce-Phelps, Inc
PMA Marketing
Pro Media
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
RF Specialties of Washington, Inc.
Radio Resources & Services
Redco Audio Products
RF Industries/ Connector Div
Riggins Electronic Sales
Roscom General
Scala Electronic Corporation
Suministros Gonzalez
Technet Systems Group
Thor Electronics Corp.
Trompeter Electronics
Wireworks Corp

Wire, Other

AVR Communications Limited East
AVR Communications Limited West
American Media Services
Audiotechniques
BJM Electronics Ltd.
Broadcast Equipment Sales & Engineering
Broadcast Services/EME
Canare Cable Inc.
Caveco
Commercial Radio Company
Connectronics Corporation
Control Technology Inc.
Cooper Industries/Belden Division
Cortland Cable Co
Crouse-Kimzey Company
Electronic Industries, Inc.
Full Compass Systems, Ltd.
Gepco International Inc
Guarantee Radio Supply Corporation
Hall Electronics
C.B. Hannay & Son, Inc.
Harris Allied
Harris Allied Broadcast Equip
Holzberg Inc.
IER, Industrial Equip Reps
John E. Hillman Associates
Landy Associates Inc
Lasalle Music and Pro Audio
Martin Audio/Video Corp
Old Dominion Broadcast Eng. Serv.
Omega Communications Company
Professional Audio Supply
Parcom Inc.
Parsons Audio
Pierce-Phelps, Inc. - AVSD
Pro Media
RF Specialties of California
RF Specialties of Florida
RF Specialties of Missouri
RF Specialties of Pennsylvania, Inc.
RF Specialties of Texas
Redco Audio Products
Roscom General
Thor Electronics Corp.
Wireworks Corp

SUPPLIER SOURCE BOOK



+4 Audio
P.O. Box 566
Salem, MA 01970
Contact: Peter Engel, President
508-745-8522

A/V Technology Intl
PO Box 97
West Newton, MA 02165
Contact: Gerard Abeles, Pres
617-965-3866 FAX: 617-965-1865

A & D Cartridge Rebuilding
3706 Vold Court
Eau Claire, WI 54701
Contact: Amy Casey/Diane Jump, Partners
715-835-8676 FAX: 715-835-1151

ABC Radio
125 West End Avenue
New York, NY 10023
Contact: Pat Kresner

ADC Telecommunications, Inc.
4900 West 78th Street
Minneapolis, MN 55435
Contact: Suzette LaFrance-Burley,
Customer Service
612-938-8080 FAX: 612-946-3292

ACII
4701 Milton Avenue
Syracuse, NY 13219
Contact: Jack Allen, Marketing Manager
315-488-5959 FAX: 315-488-4724

ACP-ABACUS
7402 Setting Sun Way
Columbia, MD 21046
Contact: Gene Bidun, President

AEG Bayly Inc
167 Hunt St
Ajax, Ontario, L1S 1P6 Canada
Contact: Allan P Proctor
416-683-8200 FAX: 416-683-8186

AHB USA Ltd
5 Connair Road
Orange, CT 06477
Advertising Manager

Air System Technologies, Inc.
14232 Marsh Lane, Suite 339
Dallas, TX 75234
Contact: Tom Becker, Pres.
214-402-9660

AKAI
1316 E Lancaster
Fort Worth, TX 76102
Contact: James Martin,
Product Specialist
817-336-5114 FAX: 817-870-1271

AKG Acoustics
1525 Alvarado Street
San Leandro, CA 94577
Contact: David Roudebush, Marketing
Manager
510-351-3500 FAX: 510-351-0500

ANT Telecommunications Inc
205 Perry Pkwy
Gaithersburg, MD 20877
Contact: Denise Beckett, Marketing
Specialist
301-670-9777 FAX: 301-670-3992

ART, Applied Research Tech
215 Tremont St
Rochester, NY 14608
Contact: Angelo Biasi, Advertising - Media
Relations
716-436-2720 FAX: 716-436-3942

ASC - Tube Traps
P.O. Box 1189
Eugene, OR 97440
Contact: Art Noxon,
President
800-272-8823 FAX: 503-343-9245

A/Z Associates
P.O. Box 357
Needham, MA 02192
Contact: Harry Adams, President
617-444-0191 FAX: 617-444-0757

ATI (Audio Technologies Inc)
328 W Maple Ave
Horsham, PA 19044
Contact: Sam Wenzel/Ed Mullin,
President/Vice President
215-443-0330 FAX: 215-443-0394

AVAB America Inc
967 Howard St
San Francisco, CA 94103
415-421-3562

AVC Systems Division of Vaughn
6253 Bury Drive
Eden Prairie, MN 55346-1720
Contact: Jack Dailey
612-832-3232 FAX: 612-831-0791

AVCOM of Virginia Inc
500 Southlake Blvd
Richmond, VA 23236
Contact: Charlie Odom,
Sales & Marketing
804-794-2500 FAX: 804-794-8284

AVR Communications, Ltd. East
8-595 Middlefield Road
Scarborough, ON M1V 3S2 CANADA
Contact: Paul Lico/Ian Schmidt
416-297-9377 FAX: 416-297-4757

AVR Communications, Ltd. West
2615 126 Ave., S.W.
Calgary, AB T2W 3V5 Canada
Contact: Wilf Rice, Sales Manager
403-251-0707 FAX: 403-281-2695

AVR Grp/Audio Video Research
65 Main Street, 4th Floor
Watertown, MA 02172

A Steeple Jack Co
3722 Roma
Houston, TX 77080
Contact: Don Highley, President

A W Sperry Instruments
245 Marcus Blvd
Hauppauge, NY 11788
Contact: Dennis Carroll, VP Sales
516-231-7050 FAX: 516-434-3128

A-ware
22600 Arcadian Ave, 3rd Floor
Waukesha, WI 53186
Contact: Joseph Knapp

Absolute Broadcast Automation
82 Main St
Westertport, MD 21562
Contact: Jack Mullen, Jr
301-786-4661

Access Communications
404 N. Main Street
Deforest, WI 53532-1143
Contact: Jim Miller, President

Accu-Weather Inc
619 W College Ave
State College, PA 16801
Contact: Sheldon Levine,
Director of Sales
814-237-0309 FAX: 814-238-1339

Accurate Sound Corp
3475A Edison Way
Menlo Park, CA 94062
Contact: Ronald M. Newdell,
President
415-365-2843 FAX: 415-365-3057

Acoustic Sciences Corporation
245 Jackson Street
Eugene, OR 97402-4939
Contact: Doug Tucker,
Sales & Marketing

Acoustic Systems
415 East St Elmo Rd
Austin, TX 78745
Contact: Tim Jarvis, Sales Mgr
800-531-5412 FAX: 512-444-2282

Acoustic Technology Inc
4445 College Park Drive
Dallas, TX 75229-2929
Contact: Alan Groh, General Manager
817-540-5544 FAX: 817-540-5544

Acoustilog, Inc.
19 Mercer St
New York, NY 10013
Contact: Alan Fierstein, President
212-925-1365

Acoustionics Sound/Shelex
637 East Fairmont Road
Burbank, CA 91501
Contact: Shelly A Herman, Owner

Adams-Smith
34 Tower St
Hudson, MA 01749
617-562-3801

ADAPT
2213 Mount Vernon Avenue
Alexandria, VA 22301
Contact: Tina Behnke,
Marketing Manager

Adelphon
100 Covello Ave
Ft Worth, TX 76111-5813
Contact: Henry McGinnis,
President
817-335-8666 FAX: 817-335-2171

Adcom Inc
3408 Tullmore Road
Cleveland Heights, OH 44118
Contact: John Bancroft

Advanced Broadcast Comm. Serv.
241 N.E. 10th Avenue
Cape Coral, FL 33909
Contact: Paul Wolf, President

Advanced Receiver Research
P.O. Box 1242
Burlington, CT 06013
Contact: Jay Rusgrove, Owner

Advance Products
Box 2178
Wichita, KS 67201
Contact: Annette Schoenthaler,
Regional Sales Manager
316-263-4231 FAX: 316-263-4245

Agfa-Gevaert Inc Magnetic Tape
275 North St
Teterboro, NJ 07608
201-288-4100

Alphone Corporation
1700 130th Ave NE
Bellevue, WA 98005
Contact: Robin Anderson,
Marketing Coordinator
206-455-0510 FAX: 206-455-0071

The Aircraft Music Library
162 Columbus Avenue
Boston, MA 02116-5222
Contact: Mark Cuddy, Producer
800-343-2514 FAX: 617-542-7222

Airforce Broadcast Services
216 Carlton Street
Toronto, ON M5A 2L1 Canada
Contact: Richard Loth,
Director of Mktg & Sales
416-961-2541 FAX: 416-961-7754

Air Services
844 South Robertson Blvd
Los Angeles, CA 90035-1601

Alcatel Wire & Cable
10376 Battleview Parkway
Manassas, VA 22110
Contact: Fred Galle, Marketing Manager

Alcronics
192 Worcester St
Wellesley, MA 02181
617-239-0000 FAX: 617-431-8710

Alan Burns & Associates
11705 Sumacs Street
Oakton, VA 22124
Contact: Alan Burns

Alamar USA
471 Division Street
Campbell, CA 95008
Contact: Jesside Blount, Marketing
Manager

Alan Dick & Company
9 Clinton Drive
Hollis, NH 03049
Contact: S.A. Matthews, General Manager

Alden Electronics Inc
40 Washington St
Westboro, MA 01581
617-366-8851

Alderfer & Associates
298 Town Mountain Road
Asheville, NC 28804
Contact: G.M. Alderfer, President

Alesis Corporation
3630 Holdrege Avenue
Los Angeles, CA 91006
Contact: Allen Wald

Dan Alexander Audio
5935 Market Street
Oakland, CA 94608
Contact: Dan Alexander
415-601-1146 FAX: 415-652-4022

Allen & Heath
5639 Riley Lane
Salt Lake City, UT 84107-5899
Contact: Lynn P. Martin, Sales Manager
801-268-8400 FAX: 801-262-4966

Allen Marketing
P.O. Box 19765
Raleigh, NC 27619
Contact: Cliff Allen, Owner

Allied Broadcast Equipment
4405 Mall Blvd Ste 125
Union City, GA 30291
Contact: John Timm, Judy Spell, Mark
Drummond
800-622-0022 FAX: 404-964-2820

Allied Broadcast Equip Canada
10 Pearce St Unit 6
Richmond Hill, ON Canada
Contact: Jon Young, VP
416-731-3697 FAX: 416-764-0729

Allied Broadcast Equipment

P.O. Box 1487
Richmond, IN 47375-1487
Contact: John Grayson, Tom Harle
800-622-0022 FAX: 312-470-9017

Allied Bulletin Board

3712 National Rd West
Richmond, IN 47374
317-935-0531

Allied Emergency Services

3712 National Rd West
Richmond, IN 47374
Contact: Glenn Rawlings
317-935-0455

Allied International

3712 National Road West
Richmond, IN 47374
Contact: Joe Ziemer
317-935-1704 FAX: 317-962-8961

Allied Tower Co

12450 Old Glaveston
Webster, TX 77598
Contact: Doug Moore, Sales Manager

Alpha Audio Acoustics

P.O. Box 5403
Richmond, VA 23220
Contact: Michael Binns, President
800-782-5742 FAX: 804-358-9496

Alpha Lyracom Radio Services

One Pickwick Plaza, #270
Greenwich, CT 06830
Contact: Elizabeth Dickins

Alpha Products

303 Linwood Ave
Fairfield, CT 06430
Contact: Robert Maffei, Director of
Marketing Research
203-656-1806 FAX: 203-656-0756

Alpha Recording Corp

2049 W Broad Street
Richmond, VA 23220-2075
Contact: C Nicholas Collieran Jr, President

Alpine Marketing Comm Ltd

3300 Edinborough Way, Suite 306
Edina, MN 55435
Contact: James Preste, President/CEO
612-830-8242 FAX: 612-830-8245

Altair Communications Inc

1914 Maple Leaf Drive Ste 100
Windermere, FL 34786
Contact: John Newman, President
407-298-4000 FAX: 407-297-4077

Altec Lansing Corp

P.O. Box 26105
Oklahoma City, OK 73126
Contact: Jerry D. Spriggs, National Sales
Manager
405-324-5311 FAX: 405-324-7601

Altronic Research Inc

P.O. Box 249
Yellville, AR 72687
Contact: Doug Starkey, Marketing Director
800-482-5623 FAX: 501-449-6000

Aluma Tower Co Inc

P.O. Box 2806
Vero Beach, FL 32961-2806
Contact: T.E. Gottry, VP/General Manager
407-567-3423 FAX: 407-567-3432

Amber Electro Design

6969 Trans-Canada Highway Ste. 113
St Laurent PQ, H4T 1V8 CANADA
Contact: Dora Marena, Marketing
Coordinator
514-333-8748 FAX: 514-333-1388

Amco Engineering

3801 N Rose St
Schiller Park, IL 60176
Contact: Jim Walenda, Marketing Manager
708-671-6670 FAX: 708-671-9469

AMFM/Adv. Marketing for Media

4410 Harding Place
Nashville, TN 37205
Contact: Vic Rumore, President

Amek/Tac US Operations

10815 Burbank Blvd
N Hollywood, CA 91601
Contact: Steve Harvey,
National Sales Manager
818-508-9788 FAX: 818-508-8619

American Broadcast Financial

4359 S. Howell Avenue, Suite 106
Milwaukee, WI 53207-5056
Contact: Pat Martin, President
414-482-2638 FAX: 414-483-1980

American Comedy Network

10 Middle Street
Bridgeport, CT 06604
Contact: Douglas Mola, AE

American Digital Radio

402 Tenth Avenue
Haddon Heights, NJ 08035
Contact: Edward A. Schober,
President
609-546-8008 FAX: 609-546-1841

American Leisure Network

139 Fulton Street, #917
New York, NY 10038
Contact: Morrie Trumble,
President

American Loop Systems

43 Davis Road, Suite 2
Belmont, MA 02178
Contact: Robert Gilmore, President
617-776-5667 FAX: 617-666-5228

American Media Services

1836 Barnett
Weatherford, TX 76087
Contact: Genie Sims, Owner
800-345-1953 FAX: 800-356-1953

American Radio Brokers

1255 Post Street, #625
San Francisco, CA 94109
Contact: Chester Coleman,
President

American Radio Networks

P.O. Box 732
Clifton Park, NY 12065-0732
Contact: Donald Andrew Emanuel,
President

American Security Bank

1501 Pennsylvania Avenue NW
Washington, DC 20013
Contact: Gregg Johnson

American Telesource Inc

6121 Hollis Street
Emeryville, CA 94608
Contact: Dennis Winingier, Dir. of Sales
510-428-1111 FAX: 510-428-2460

American Urban Radio Networks

463 Seventh Avenue 6th Floor
New York, NY 10018
Contact: E.J. Williams Jr,
Co-President

Ameritrust

900 Euclid Avenue
Cleveland, OH 44101
Contact: Dan Leuken

Amp Services

224 Datura Street, Ste 614
W Palm Beach, FL 33401
Contact: Tom Rappolt,
Vice President Sales & Marketing
800-826-0601 FAX: 407-655-1808

Amperex Electronics Corp

100 Providence Pike
Slatersville, RI 02876
Contact: Greg J Murphy
401-762-3800

Ampex Recording Media Corp

401 Broadway M/S 22-02
Redwood City, CA 94063
Contact: Richard A. Antonio, VP US Sales
& Customer Service
415-367-3809 FAX: 415-367-4132

Ampex Equipment Co.

401 Broadway
Redwood City, CA 94063
Contact: Al Fisher, Director of Marketing
415-367-3888 FAX: 312-593-6000

Amtel Systems Inc

310 Judson St
Toronto, ON, Canada M8Z 5T6
603-880-9011

Analog Digital Synergy, Inc.

3600 Hacienda Blvd #F
Fort Lauderdale, FL 33314
Contact: Lutz Meyer, President
305-791-1501 FAX: 305-791-8986

Anderson Consulting

3801 Fifth Avenue South
Great Falls, MT 59405
Contact: Frank Anderson, Owner

Andrew Corp

10500 W 153rd St
Orland Park, IL 60462
Contact: J.D. Tuttle, Marketing
Communications Manager
708-349-3300 FAX: 708-349-5442

Anlinter Brothers, Inc

4711 Golf Road
Skokie, IL 60076
Contact: Vince Buckman

R B Annis Co Inc.

1101 N Delaware St
Indianapolis, IN 46202
Contact: R.B. Annis, President
317-637-9282 FAX: 317-637-9282

Anritsu America Inc

15 Thornton Rd
Oakland, NJ 07436
Contact: Hugh Felger, Marketing Manager
201-337-1111 FAX: 201-337-1033

Antenna Concepts

3234 Saddlehill Court
Placerville, CA 95667
Contact: Ms. Jeryl Schooler, Office Manager
916-621-2015 FAX: 916-622-3274

Antenna Technology

1140 East Greenway St.
Mesa, AZ 85203
Contact: Gary Hatch, Dir of Intl Sales &
Marketing
602-264-7275 FAX: 602-898-7667

Antennas For Communications

350 Cypress Road
Ocala, FL 34472
Contact: Ronald S. Posner, Chairman
904-687-4121 FAX: 904-687-1203

Antex Electronics

16100 S Figueroa
Gardena, CA 90248
Contact: Richard Gross, VP Sales
310-532-3092 FAX: 310-532-8509

Anvil Cases

15650 Salt Lake Avenue
City of Industry, CA 91745
Contact: Gabe Nakash, Marketing Manager
818-968-4100 FAX: 818-968-1703

Anthony Wayne Investments

1202 Nueces
Austin, TX 78701
Contact: Adrienne Morgan

Anything Audio

63 Melcher St
Boston, MA 02210
Contact: Dave Malekpour, President
617-426-2875 FAX: 617-426-2763

AP Broadcast Services

1825 K Street NW
Washington, DC 20006-1253
Contact: Jim Williams, VP/Director

Aphex Systems Ltd

11068 Randall St
Sun Valley, CA 91352
Contact: Paul Freudenberg, Sales Manager
818-767-2929 FAX: 818-767-2641

Apogee Electronics Corp

3145 Donald Douglas Loop South
Santa Monica, CA 90405
Contact: Jon Wesslen,
Marketing/P.R. Manager
310-915-1000 FAX: 310-391-6262

Applied Micro Technology

3116 Merriam Lane
Kansas City, KS 66106
Contact: Steve Hathaway, Engineer
913-362-9422 FAX: 913-362-9477

Appollo Radio Ltd

350 Park Avenue, 10th Floor
New York, NY 10022
Contact: William Stakelin, President/CEO

Arben Design

600 W Roosevelt Rd
W Chicago, IL 60185
312-231-5077

AR Import/Export Inc.

3100 NW 72 Ave #127
Miami, FL 33122-1335
Contact: Amalio Rodriguez, President
305-471-1180 FAX: 305-471-1182

Armstrong Transmitters

5046 Smoral Road
Camillus, NY 13031
Contact: Bob White, President

Arrakis Systems Inc

2619 Midpoint Dr
Ft Collins, CO 80525
Contact: Michael Palmer, President
303-224-2248 FAX: 303-493-1076

Art Good's Jazz Trax

9842 Hibert Street, #128
San Diego, CA 92131-1020
Contact: Art Good

The Art Studio

1300 Timberline Office Park
Austin, TX 78746
Contact: Jack Wilson

Artel Communications Corp

22 Kane Industrial Dr
Hudson, MA 01749
Contact: Judith Flynn,
Marketing/Communication Manager
508-562-2100 FAX: 508-562-6942

ASACA/SHIBASOKU CORP OF AMER.

12509 Beatrice St
Los Angeles, CA 90066
Contact: Teresa Baker, Nat'l Sales/ Mktg. Mgr.
310-827-7144 FAX: 310-306-1382

ASCAP

One Lincoln Plaza
New York, NY 10017
Contact: Julie Harris

ASM

2536 Pulgas Avenue
East Palo Alto, CA 94303
Contact: Mark Berthiaume, Sales Manager

Ashly Audio, Inc

100 Fernwood Ave
Rochester, NY 14621
Contact: Robert French, Sr VP Mktg
716-544-5191 FAX: 716-266-4589

Asian Control Technologies

12 Sarah Lane
Hopewell Junction, NY 12533
Contact: Mike Hale, President

Assistance In Broadcast Mktg

11890 Montgomery Road
Cincinnati, OH 45249

Associated Press Bdct Service

1825 K Street, NW
Washington, DC 20006
Contact: Daryl Staehle, Director Sales & Mktg.
800-821-4747 FAX: 202-736-1107

Associated Production Music

6255 Sunset Blvd, Ste. 820
Hollywood, CA 90028
Contact: Connie Red, Broadcast Sales
Director
800-543-4276 FAX: 213-461-9102

Atlantic Research Corp

5390 Cherokee Ave
Alexandria, VA 22312
703-642-4000

Atlas/Soundolier

1859 Intertech Drive
Fenton, MO 63026
Contact: Bud Waters, National Sales
Manager
314-349-3110 FAX: 314-349-1251

AT & T Network Systems

111 Madison Avenue
Morristown, NJ 07962-1970
Contact: Jim Garbowski, Marketing Mgr.

Audlco Label Corp

8343 West Grand Avenue
River Grove, IL 60171-1434
Contact: Barbara Deletzke, President
708-456-0003 FAX: 708-456-0416

Audi-Cord Corporation

1845 West Hovey Avenue
Normal, IL 61761-4315
Contact: Andrew M. Rector, Jr.,
President/Marketing Manager
309-452-9461 FAX: 309-452-0893

Audient Marketing Services

POB 7217
Mission Hills, CA 91346
Contact: Erika Lopez

Audio & Recording Systems

3986 Edidin Drive
Jacksonville, FL 32211-2172
Contact: Robert Woolf, Owner

Audio Accessories Inc

Mill St/P.O. Box 174
Marlow, NH 03456
Contact: Timothy J Symonds, Operations
Manager
603-446-3335 FAX: 603-446-7543

Audio Animation Inc.

6632 Central Avenue Pike
Knoxville, TN 37912
Contact: James M. Ruse, Product
Development & Mktg Mgr
615-689-2500 FAX: 615-689-7815

Audio Broadcast Group Inc

2342 S Division Ave
Grand Rapids, MI 49507
Contact: Dave Howland, Sales & Mktg. Mgr.
800-999-9281 FAX: 616-452-1652

AudioControl Industrial

22410 70th Avenue West
Mountlake Terrace, WA 98043
Contact: Tom Walker, President
206-775-8461 FAX: 206-778-3161

Audio Concepts & Engineering

P.O. Box 25652
Richmond, VA 23260
Contact: Jeff Loughridge, President
804-550-3337 FAX: 804-550-3291

Audio Dynamics, Inc.

3029 Copper Knoll Road
Charlottesville, VA 22901-7222
Contact: Steve Yates, President
804-296-4111 FAX: 804-296-4111

Audio Eng Assoc

1029 N Allen Ave
Pasadena, CA 91104
Contact: Wes Dooley,
President
818-798-9128 FAX: 818-798-2378

Audio Innovators

5001 Baum Blvd
Pittsburgh, PA 15213
Contact: Martha Wilson

Audio Labs

9 Roxbury
Keene, NH 03431
Contact: C Keith, Manager
603-352-8460 FAX: 603-352-8461

Audio Logic

5639 South Riley Lane
Salt Lake City, UT 84107
Contact: Dean Stubbs
801-268-8400 FAX: 603-672-4246

Audio Precision

PO Box 2209
Beaverton, OR 97075
Contact: Tom Mintner,
Director of Sales & Marketing
503-627-0832 FAX: 503-641-8906

Audio Service Corp

10639 Riverside Dr
N Hollywood, CA 91602
Contact: Gwen Madrid,
Director of Marketing
818-980-9891 FAX: 818-980-9911

Audio-Technica U S, Inc

1221 Commerce Road
Stow, OH 44224
Contact: Garry Elliott,
National Sales Manager
216-686-2600 FAX: 216-686-0719

Audio-Video Engineering Co

65 Nancy Blvd
Merrick, NY 11566
516-546-4239

Audio Village of Orlando

333 W Cabrillo Rd
Palm Springs, CA 92262
Contact: Chuck Jones

Audio/Digital Inc

8500 Balboa Blvd.
Northridge, CA 91329
Contact: Gary Hardesty,
Director of JBL Systems Group
818-893-8411 FAX: 818-893-6369

Audiodyne Bdct Cartridge Rebid

725 N Bush Avenue
Fresno, CA 93727
Contact: Allan Tatarian, President
209-252-2787

Audioarts Engineering

6720 V.I.P. Parkway
Syracuse, NY 13211
Contact: Mark L. Kaltman,
Sales Manager
315-455-7740 FAX: 315-454-8104

Audiolab Electronics Inc

5631 Rosebud Lane, Bldg C
Sacramento, CA 95841
Contact: Ron Stefan, VP Marketing
916-348-0200 FAX: 916-348-1512

Audioline Inc

2323J Bluemound Rd
Waukesha, WI 53186
Contact: Barbara Gutknecht,
Marketing Director
414-785-9166 FAX: 414-785-0789

Audiological Engineering Corp

35 Medford St
Somerville, MA 02143
Contact: M. Michael Reynolds,
Vice President
617-623-5562 FAX: 617-666-5228

Audiomedia Associates

PO Box 29264
New Orleans, LA 70189
Contact: Corey Meyer, Pres
504-586-0140

Audiopak Inc

255-1 Tyson Drive, P.O. Box 3100
Winchester, VA 22603
Contact: Gordon Stafford, VP Sales
703-667-8125 FAX: 703-667-6379

Audiotechniques Inc

1600 Broadway, 8th floor
New York, NY 10019
Contact: Doug Cook, VP/GM
212-586-5989 FAX: 212-489-4936

Audio World Technology

34 SE 2nd Avenue, #314
Miami, FL 33131
Contact: Scott Goldman

Audisar

Box 1561
Bellevue, WA 98009
Contact: Robert Munger, Owner
206-454-2040

Auditronics Inc

3750 Old Getwell Rd
Memphis, TN 38118
Contact: Murray Shields, Dir of Sales &
Marketing
901-362-1350 FAX: 901-365-8629

Audix Corp

19439 SW 90th Court
Tualatin, OR 97062
Contact: Cliff Castle, VP Sales
510-463-1112 FAX: 510-463-2149

Auernheimer Labs & Co

4561 E Florence Ave
Fresno, CA 93725
Contact: Curly Auernheimer, Owner
209-442-1048

Auratone Corp

PO Box 180698
Coronado, CA 92178-0698
Contact: Jack Wilson, President
619-297-2820 FAX: 619-296-8734

Automated Business Concepts

10650 Treena St, #103
San Diego, CA 92131
Contact: John Caso, President/CEO
619-566-8920 FAX: 619-566-1039

Automated Call Processing Corp

220 Jackson St, #300
San Francisco, CA 94111
Marketing Manager

Autogram Corp

1500 Capital Ave
Plano, TX 75074
Contact: Ernie T Ankele Jr, President
214-424-8585 FAX: 214-423-6334

Avocet Instruments

1249 Virginia Ave
Campbell, CA 95008-6808
Contact: Eric Lane, President
408-376-3700 FAX: 408-376-0777

b**B & K Precision**

6460 W Cortland
Chicago, IL 60635
Contact: Martin Plude, Adv Mgr
312-889-9087

B&B Systems

28111 North Avenue Stanford
Valencia, CA 91355
Contact: B Burnsed, Pres

BEC Technologies Inc

9460 Delegates Drive #108
Orlando, FL 32837-6346
Contact: John Totten

BGW Systems Inc

13130 South Yukon
Hawthorne, CA 90251
Contact: Joe Demeo, Sales Manager
800-468-AMPS FAX: 310-676-6713

BIA Consulting

P.O. Box 17307
Washington, DC 20041
Contact: David Cole, Senior Vice President
703-818-2425 FAX: 703-803-3299

BJM Electronics Ltd

2589 Richmond Terrace
Staten Island, NY 10303
Contact: Robert Manzo, President
718-442-0223 FAX: 718-442-1451

BP Consulting Group

2211 Fifth Avenue
Seattle, WA 98121
Contact: Jay Albright, General Manager
800-426-9082 FAX: 206-441-6582

Broadcast Equipment Sales

PO Box 20331
Jackson, MS 39289-1331
Contact: Jeffery Corkren
601-857-8573 FAX: 601-857-2346

BSS, A Div. of AKG Acoustics

1525 Alvarado Street
San Leandro, CA 94577
Contact: David Roudebush, Corporate
Marketing Manager
510-351-3500 FAX: 510-351-0500

BSM/ West Starr International

W. 7106 W.D. Alton Drive, Ste 106
Spokane, WA 99204
Contact: Dick Jones, Vice President of
Marketing
509-838-0110 FAX: 509-624-2941

BSW (Broadcast Supply West)

7012 27th St West
Tacoma, WA 98406
Contact: Patrick Medved, VP Sales
800-426-8434 FAX: 800-231-7055

Balboa Motivation Strategies

909 W Laurel Street
San Diego, CA 92101
Contact: Tom Wick

Bald Mountain Lab

230 Bellevue Rd
Troy, NY 12180
Contact: Robert Henry, Owner
518-279-9753

Bank of America NT & SA

555 S Flower Street, 49th Floor
Los Angeles, CA 90071
Contact: Gary Matus,
Senior Vice President

Bank of New England

28 State Street
Boston, MA 02109
Contact: Judy Martin, Assistant Vice
President

Bank of Boston Media Ent

100 Federal Street
Boston, MA 02110
Contact: Elizabeth Ferrée, Division
Executive Vice President

Bankers Reporting Group

1815 W Diehl Road
Naperville, IL 60540
Contact: Bob Pachaly

Banner Radio

1 Dag Hammarskjold Plaza, 26th Flr
New York, NY 10017
Contact: Charlie Columbo, President

BBE Sound, Inc.

5500 Bolsa Ave Ste 245
Huntington Beach, CA 92649
Contact: Helen R. Eun, Office Manager
714-897-6766 FAX: 714-895-6728

Barber Tower Service
2363 Norwood Avenue
Norwood, OH 45212
Contact: Charlie Barber, Owner

Barkin Communications
Box 610924
Dallas, TX 75261
Contact: Kay Barkin

BARCO-EMT GmbH
Postfach 2 00
W-7634 Kippenheim GERMANY
Contact: Dipl Ing Gerhard Moeller,
Prod & Mktg Manager Audio
78-25-90-60 FAX: 78-25-22-85

Barrett Associates Inc
3205 Production Ave
Oceanside, CA 92054
Contact: Denny Nelson, President
619-433-5600 FAX: 619-433-1590

Barron Associates
831 Washington St
Wilmington, DE 19801
Contact: William Wohl, Sr Account Executive

Barry Skidelsky, Esquire
757 Third Avenue, 28th Floor
New York, NY 10017
Contact: Barry Skidelsky, President

BASE
P.O. Box 801450
Santa Clarita, CA 91380-1450
Contact: Edie Gelardi, Vice President of
Marketing

Basys Automation Systems
5 Odell Plaza
Yonkers, NY 10701
Contact: Frank De Mayo, Senior Vice
President
914-376-4800 FAX: 914-376-0865

Baybank Boston, N.A.
175 Federal Street
Boston, MA 02110
Contact: William Rogers, Vice President

B.C.L.
222 S. Central, #808
Clayton, MO 63105
Contact: Michael Parolka, Vice President
314-863-2449 FAX: 314-863-8278

BCRS
5501-B Richland St
Greensboro, NC 27409
Contact: Paul Allen, Product Manager

Beck Associates, Inc.
2403 Howard
Austin, TX 78728
Contact: Jeff Morris, Marketing VP
512-388-9777 FAX: 512-388-1833

Beecher-Scott Inc
1128 Granada Way
St Paul, MN 55128
Contact: Jane Scott

Beekman Labs
455 Central Park Ave
Scarsdale, NY 10583
Contact: Stewart Popiol, Export Manager

Becker Enterprises
4110 West Bank Avenue
Tampa, FL 33624
Contact: Grant Becker, Owner
813-960-8153

Beckman Industrial Corp
3883 Ruffin Rd
San Diego, CA 92123-1898
Contact: Carol Dorsey, Marcom Manager
619-495-3200 FAX: 619-268-0172

Beck-Ross Communications
11514 Victoria Drive
Boynton Beach, FL 33436
Contact: Martin Beck, Chairman/CEO

Belar Electronics Laboratory
119 Lancaster Ave
Devon, PA 19333
Contact: Arno Meyer, President
215-687-5550 FAX: 215-687-2686

Dick Bellow Sales Inc
13405 Floyd Cir Ste 102
Dallas, TX 75243
Contact: Sales Mgr

Benchmark Company
1705 Capitol Texas Highway #305
Austin, TX 78746
Contact: Robert Balon, President
512-327-7010 FAX: 512-328-1464

Benchmark Media Systems Inc
5925 Court Street Road
Syracuse, NY 13206-1707
Contact: R. Rory Rall, Sales Manager
315-437-6300 FAX: 315-437-8119

Bender, Goldman & Helper
11500 W Olympic Blvd
Los Angeles, CA 90049
Contact: Lissy Peace,
Account Executive

M A Benington Inc
2459 Cuchura Dr
Birmingham, AL 35244
Contact: Mike Benington, Pres

Berkowitz Broadcast Consulting
4901 Champlain Circle
West Bloomfield, MI 48323
Contact: Gary Berkowitz, President
313-737-3727 FAX: 313-737-0243

Besco International
5946 Club Oaks Dr
Dallas, TX 75248
Contact: Rob Malany, Sales Manager
214-630-3600 FAX: 214-226-9416

Best Audio
9745 Independence Ave
Chatsworth, CA 91311 91311
Contact: Laurence Estrin, President
818-763-2378 FAX: 818-505-9211

Best Power Technology, Inc
POB 280
Necedah, WI 54646
Contact: Kenneth E. Urban, Mgr of
Marketing Communications
608-565-7200 FAX: 608-565-2221

Bethpage Associates Inc
1590 Monrovia Ave
Newport Beach, CA 92663
Contact: Jerry Page, Vice President
714-722-6733 FAX: 714-722-6508

Bext Inc
739 Fifth Ave, Suite 7A
San Diego, CA 92101
Contact: Dennis Pieri,
Marketing Director
619-239-8462 FAX: 619-239-8474

Beyerdynamic Inc
56 Central Avenue
Farmingdale, NY 11735
Contact: Mike Solomon,
Marketing Manager
516-293-3200 FAX: 516-293-3288

Big Tuna Radio Services
4626 Sunnyslope Avenue
Sherman Oaks, CA 91423
Contact: John Antoon, President

Bill Brazzil Associates
13520 SW 61st Court
Miami, FL 33156
Contact: Bill Brazzil, President

Bill Elliott Bdct Consultants
6709 Ridge Road, Suite 300B
Port Richey, FL 34668
Contact: Bill Elliott, President
813-849-3477

Binary Keyboard
607 Ashland Road
Middlesex, NJ 08846
Contact: Paul Rosberger, Owner

Birch Scarborough Research
12350 NW 39th Street
Coral Springs, FL 33065-2404
Contact: Merle Hope Lambert, Director of
Corporate Comm.

Bird Electronic Corp
30303 Aurora Rd
Cleveland, OH 44139
Contact: William F. Kail, Dir Domestic Sales
216-248-1200 FAX: 216-248-5426

Blackburn & Company
201 N Union Street, #340
Alexandria, VA 22314-2642
Contact: Richard Blackburn, President

Blanton Tower Leasing
118 Magothy Bridge Road
Severna Park, MD 21146
Contact: Charles Blanton, President

Bogen Communications, Inc.
50 Spring Street
Ramsey, NJ 07446
Contact: David A. Chambers, Dir of
National Sales
201-934-8500 FAX: 201-934-9832

Bogner Broadcast Equipment
P.O. Box 67
Valley Stream, NY 11582-0067
Contact: Leonard King
516-997-7800

Bolton Research Corporation
250 W Lancaster Avenue #100
Paoli, PA 19301
Contact: Ted Bolton, President

Bonneville Broadcasting System
4080 Commercial Avenue
Northbrook, IL 60062-1829
Contact: John Patton, President/CEO

Bonneville Products
130 Social Hall Ave
Salt Lake City, UT 84111
Contact: Douglas Borba, Mktg Dir
801-237-2400

Boom Media
7812 Midlothian Trnkp Ste 679
Richmond, VA 23235
Contact: Martin Snead, President
804-276-5811

Boonton Electronics Corp
791 Route 10
Randolph, NJ 07869
Contact: David Jenkins, Marketing Manager
201-584-1077 FAX: 201-584-3037

Botik Broadcast Services
12204 Highway 1826
Austin, TX 78737
Contact: Bob Botik, President
512-288-0625 FAX: 512-288-1808

BP Consulting Group
2211 Fifth Avenue
Seattle, WA 98121
Contact: Jay Albright, General Manager

Boynton Studio Inc
Melody Pines Farm
Morris, NY 13808
607-263-5695 FAX: 607-263-2373

Bradley Broadcast Sales
8101 Cessna Ave
Gaithersburg, MD 20879
Contact: Art Reed, General Manager
301-948-0650 FAX: 301-330-7198

Brentlinger Bdct Engineering
4310 Nabal Drive
LaMesa, CA 91941-7152
Contact: Charles Brentlinger

Bretford/Knox
9715 Soreng Ave
Schiller Park, IL 60176
312-678-2545

Brite Voice System
7309 E 21st North
Wichita, KS 67206
Contact: Stan Brannan, President

British Information Services
845 3rd Avenue
New York, NY 10022
Contact: Mark Hopkinson,
Head, Radio & Television Division

Broadcast Audio Corp
11306 Sunco Dr
Rancho Cordova, CA 95742
Contact: John Fernandez
916-635-1048 FAX: 916-638-0512

Broadcast Automation Inc
4125 Keller Springs, Suite 122
Dallas, TX 75244
Contact: Earl Bullock, President
214-380-6800 FAX: 214-380-0823

Broadcast Cartridge Service
15131 Triton Ln Ste 108
Huntington Beach, CA 92649
Contact: Lora L. Crafton, Pres
714-898-7224 FAX: 714-891-6977

Broadcast Cart Rewinding Svcs
5501-B Richland Street
Greensboro, NC 27409
Contact: Paul Allen, Owner
919-855-6726 FAX: 919-230-0006

Broadcast Circuit Systems
420 Grapevine Ln
Fort Wayne, IN 46825-3632
Contact: J Didier

Broadcast Communications Group
7737 W Chestnut Pk #110
Littleton, CO 80123
Contact: Thomas Dudley,
President

Broadcast Comm Systems Inc
98 Highway 69 N/ PO Box 730
New Glarus, WI 53574-0733
Contact: Todd Klassy,
Marketing/ Sales
608-527-5670 FAX: 608-527-5674

Broadcast Components Corp
470 Mamaroneck Ave, Suite 205
White Plains, NY 10605
Marketing Manager

Broadcast Consultants
34 Lorna Drive
Auburn, MA 01501
Contact: Robert Lund,
Proprietor
508-832-2611

Broadcast Data Systems
1515 Broadway, 37th Floor
New York, NY 10036
Contact: Joanne Smith

Bdct Design & Construction
317 Howard
Mt. Clemens, MI 48043
Contact: Frank Raymo,
Owner
313-465-3226 FAX: 313-465-2560

Broadcast Devices Inc
5 Crestview Ave
Peekskill, NY 10566
Contact: Bob Tarsio,
Product Manager
914-737-5032

Broadcast Direct Marketing
6851 Yumuri Street, #11
Coral Gables, FL 33146
Contact: Courtney Thompson,
President/CEO

Broadcast Electronics Inc

4100 N 24th Street, P.O. Box 3606
Quincy, IL 62305
Contact: David Whit/ Dave Buck,
Mgr RF Sales/Mgr Studio Sales
217-224-9600 FAX: 217-224-9607

Broadcast Equipment Sales

PO Box 20331
Jackson, MS 39289-1331
Contact: Jeffery Corkren, Pres
601-857-8573 FAX: 601-857-2346

Broadcast Equities Standard

1000 Centerville Trpk #411
Virginia Beach, VA 23463
Contact: Darby Lawhorne

Broadcast Marketing Group

3100 Broadway, #318
Kansas City, MO 64111
Contact: Aubrey Potter Jr, Partner

Broadcast Microwave Services

5795 Kearny Villa Road
San Diego, CA 92123
619-560-8601

Broadcast Print Marketing

403 York Street, #405
Newport, KY 41071-1639
Contact: Frank Kockjritz, President

Broadcast Programming

2211 Fifth Ave
Seattle, WA 98121
Contact: John Carlile, VP/ Manager
800-426-9082 FAX: 206-441-6582

Broadcast Products Inc

P.O. Box 2500
Elkhart, IN 46515
Contact: Doug Clark

Broadcast Services of Colorado

12211 West Alameda Parkway, #101
Lakewood, CO 80228
Contact: Paul Montoya,
Owner/Manager
303-988-4733 FAX: 303-987-2735

Broadcast Services/EME

Reedy Creek Road
Four Oaks, NC 27524
Contact: Neal Davis, President
800-525-1037 FAX: 919-934-1537

Broadcast Services/EME

P.O. Box 309
Front Royal, VA 22630
Contact: Keith Arnett, Vice
President/Marketing
800-345-7112 FAX: 703-635-9762

Broadcast Services/EME

4110 N. Main Street
High Point, NC 27265
Contact: Dennis Ford/Bill Gordon, Field
Sales Reps
800-942-6005

Broadcast Services/EME

1605 E. Palmdale, Suite G
Palmdale, CA 93550
Contact: Tony Mezey,
Field Sales Rep
800-523-1037

Broadcast Systems Inc

8601 Sixforks Road, #403
Raleigh, NC 27615
800-531-5232

Broadcast Software Ltd.

1076 Sixth Avenue North
Naples, FL 33940
Contact: Gary Schmidt,
President
813-649-5978 FAX: 813-649-1933

Broadcast Tech Partners

525 Woodward Ave #200
Bloomfield Hills, MI 48013
Contact: Mr Eugene Cooper

Broadcasters General Store

746 Cypress Lane
Carol Stream, IL 60188
Contact: Dave Kerstin, President

Broadcasting

7650 SW 132nd Court
Miami, FL 33183-3306
Contact: M.D. Baccinelli, Owner

Broadcasting & Elect. Srvs Lab

P.O. Box 178
Newton, UT 84327
Contact: John Griffin, Owner
801-563-3088

Broadcasting Systems

One West Lone Cactus Drive
Phoenix, AZ 85027
Contact: Kenneth Casey, Owner
603-582-6550 FAX: 602-582-8229

Broadcasting Unlimited Inc

35 Main Street
Wayland, MA 01778
Contact: Jay Williams, President

Broadmark Capital Corporation

1420 Fifth Avenue #3030
Seattle, WA 98101-2333
Contact: Gerald Dennon,
Vice President

Browning Labs

8151 NW 74th Ave
Miami, FL 33166
Contact: Robert Brown, Pres

Brown Bag Productions

4134 S Eudora Street
Englewood, CO 80110
Contact: Mike Lee, Managing Partner
303-756-9949 FAX: 303-759-8213

Brown Spots, Inc.

1703 N Main
N Little Rock, AR 72114
Contact: Bob Brown, President
800-880-8808 FAX: 501-791-2329

Bruel & Kjaer Instruments

185 Forrest St
Marlboro, MA 01752
Contact: J A Pelz, Adv Mgr
508-481-7000 FAX: 508-485-0519

Bryston/Bryston Vermont Ltd

979 Franklin Ln
Maple Glen, PA 19002
Contact: Martin Bartelstone, VP
800-673-7899 FAX: 215-668-2970

BTMI

1090 Vermont Ave NW #800
Washington, DC 20005-4905
Contact: Paul Robinson, President
202-408-7036 FAX: 202-408-1590

Bud Industries Inc

4605 East 355th St
Willoughby, OH 44094
Contact: Blair K. Haas, VP, Marketing
216-946-3200 FAX: 216-951-4015

BTC Test & Measurement

7500 Six Forks Road
Raleigh, NC 27615
Contact: G J Thursby, President

Buckley Broadcasting

166 W Putnam Avenue
Greenwich, CT 06830
Contact: Richard Buckley Jr, President

Burkhart/Douglas & Associates

6500 River Chase Circle East
Atlanta, GA 30328
Contact: Dwight Douglas, President

Burk Technology

7 Lomar Dr
Pepperell, MA 01463
Contact: Phil Halter, Sales Manager
508-433-8877 FAX: 508-433-8981

Burlington Audio/Video Tapes

106 Mott St
Oceanside, NY 11572
Contact: Rudy Schwartz, Vice President
800-331-3191 FAX: 516-678-8959

Burr, Egan, Deleage & Co.

1 Post Office Square #3800
Boston, MA 02109
Contact: Bill Egan, Partner

Business Broker Associates

5555 Hixson Pike #203
Hixson, TN 37343-3201
Contact: C Alfred Dick, Owner

Business Radio Network

888 Garden of the Gods Road
Colorado Springs, CO 80907
Contact: Jeff Behan, ViP of Advertising

**CBN Radio**

1000 Centerville Pike
Virginia Beach, VA 23463
Contact: Michael Stephen Miller, Manager
of Station Services

CBSI (Custom Business Systems)

PO Box 67
Reedsport, OR 97467
Contact: Steve Kenagy, VP Mktg
800-547-3930 FAX: 503-271-5721

CBS Radio Representatives

51 W 52nd Street
New York, NY 10019
Contact: Anthony Miraglia, VP/General
Manager

CCA Electronics, Inc.

Box 426 360 Bohannon Rd
Fairburn, GA 30213
Contact: Steve McElroy, VP Sales
404-964-3530 FAX: 404-964-2222

CCI

2001 Hickory Valley Rd
Chattanooga, TN 37421
Contact: John Brady, Pres

CEA Newsroom System

3922 Vero Road
Baltimore, MD 21227
Contact: Pete Ballard, Director - Sales
410-247-5244 FAX: 410-247-5407

C.D. Electronics

P.O. Box 7326
Klamath Fall, OR 97602
Contact: Alan Fonseca, Owner

C.F. Ellis Consulting

1103 La Neuville
Lafayette, LA 70508
Contact: Charles Ellis

CD Media

6255 W Sunset Blvd #2020
Los Angeles, CA 90028
Contact: Wally Clark

CED

2500 NW 39th Street
Miami, FL 33142
Contact: Augusto Arevalo, Vice President of
Engineering

C M Baker Electronics

P.O. Box 500
Richland, PA 17087
Contact: Craig Baker, Owner

C.P. Crossno & Associates

P.O. Box 18312
Dallas, TX 75218
, Marketing Manager

CNET Media Payment Systems

971 Stuyvesant Avenue
Union, NJ 07083-6906
Contact: Henry Kavett, President
908-964-7111 FAX: 908-964-5046

CRL (Circuit Research Labs)

2522 W Geneva
Tempe, AZ 85282
Contact: William Ammons, Radio & TV
Product Sales
800-535-7648 FAX: 602-438-8227

C.R.N. Media

124 West 60th Street #33F
New York, NY 10023
Contact: Tom Shovan, President
212-765-2587 FAX: 212-586-8797

C.S.I. Telecommunications

P.O. Box 29002
San Francisco, CA 94129-0002
Contact: Michael S. Newman, Vice
President of Engineering
415-751-8845 FAX: 415-387-7201

CTI Installations Inc

5688 Prospect Dr
Newburgh, IN 47630
Contact: Steve Rhinerson, President
812-853-6374 FAX: 812-853-6652

Cal Switch

13717 S Normandie Avenue
Gardena, CA 90249
Contact: Gayle Danielson

Bob Callahan Incorporated

489 Hastings Street
Boca Raton, FL 33487
Contact: Bob Callahan, President

Cablewave Systems

60 Dodge Ave
North Haven, CT 06473
Contact: Krista Esposito, Marketing &
Advertising Admin.
203-239-3311 FAX: 203-234-7718

Cabrera Broadcast

1000 S Harbour Island Blvd, #2612
Tampa, FL 33602
Contact: Hilda Cabrera, President

Cahn Capital Corp

230 Park Avenue #1910
New York, NY 10023
Contact: W. Stewart Cahn, President
212-922-0015

Calg Laboratories, Inc.

16744 W. Bernardo Drive
San Diego, CA 92127-1904
Contact: Mark Tyler, Advertising Manager
619-451-1799 FAX: 619-451-2799

Calaway Engineering

165 E Sierra Madre
Sierra Madre, CA 91024
Contact: J L Calaway, Owner

California aircheck

P.O. Box 4408
San Diego, CA 92164
Contact: George Junak

California Antenna

4495 Conrad Avenue
San Diego, CA 92117
Contact: Richard Greco

California Digital

530 New Los Angeles 114-96
Moorpark, CA 93021
Contact: Caryn Beemer, Operations
Manager
805-523-2310 FAX: 805-523-0480

Caliper Corp

741 Mount Lucas Road
princeton, NJ 08540-2050
Contact: Roberta Drago,
Account Manager
609-924-3800 FAX: 609-683-8560

Calzone Case Co

225 Black Rock Ave
Bridgeport, CT 06605-1204
Contact: Joseph Calzone, III, President
203-367-5766 FAX: 203-336-4406

- Cal Switch**
13717 S. Normandie Avenue
Gardena, CA 90249
Contact: Gayle Danielson
- Canadian Portable Structures**
3091 Harrison Court
Burlington, Ont M1H 2X1 CANADA
Contact: Tony Clift, VP Sales
416-335-5500 FAX: 416-335-1492
- CANARE**
511 5th St, #G
San Fernando, CA 91340
Contact: Barry Brenner, General Manager
818-365-2446 FAX: 818-365-0479
- Canary Productions**
PO Box 202
Bryn Mawr, PA 19010
Contact: Andy Mark
215-825-1254 FAX: 215-825-1254
- Cancomm**
1249 Virginia Ave
Campbell, CA 95008-6808
Contact: Eric Lane, President
408-376-3700 FAX: 408-376-0777
- Cannon Pictures**
8200 Wilshire Blvd
Beverly Hills, CA 90212
Contact: Jack Fiman, Exec VP/Mktg
- Capitol**
1750 N Vine Street
Hollywood, CA 90028
Contact: John Fagot Sr, VP/Promotion
- Capital Electronics Inc**
425 Glenwood Avenue
Raleigh, NC 27603-1287
Contact: David Marlette, President
919-832-2811 FAX: 919-856-0421
- Capitol Media**
700-H Heather Ridge Drive
Frederick, MD 21702
Contact: Jeannie Mantel
- Capitol Production Music**
6922 Hollywood Blvd, Ste 718
Hollywood, CA 90028
Contact: Ole Georg, Managing Director
800-421-4163 FAX: 213-461-1543
- Capster Communications**
600 Congress Avenue #1270
Austin, TX 78701
Contact: R Steven Hicks, President/CEO
- Capstone Communications**
P.O. Box 331
Saddle River, NJ 07458
Contact: Josh Mayberry, President
- Carl T. Jones Corporation**
7901 Yarnwood Court
Springfield, VA 22153-2899
Contact: Donna Fabian, Facility Admin.
703-569-7704 FAX: 703-569-6417
- Carl E Smith Consulting Engrs**
P.O. Box 807
Bath, OH 44210
Marketing Manager
- Carle Associates Inc**
1425 Chartwell Drive
W Vancouver BC V7S 2R7 CANADA
Contact: Don Carle, President
604-926-6128 FAX: 604-926-8768
- Carolina Global Maps, Inc.**
PO Box 8026
Greenville, NC 27835
Contact: Melinda Wall, General Manager
800-248-6277 FAX: 919-752-9155
- Carpenter & Associates Inc**
4 Oakley Drive
Destrehan, LA 70047
Contact: Jack Carpenter, President
504-764-6610 FAX: 504-764-7170
- Carroll Enterprises**
P.O. Box 593
Cordova, TN 38018-0593
Contact: C R Carroll, President
- Cartridge Express**
12814 Somerset Place
Chino, CA 91710
Contact: John Jackson, Owner
714-591-0944
- Carvin Corp**
1155 Industrial Ave
Escondido, CA 92025
619-747-1710
- Catel Telecommunications Inc**
4050 Technology Blvd
Fremont, CA 94537
Contact: Julie Latchford, Customer Svc
415-659-8988
- Caveco**
1121 Bellamy Rd N Unit 10
Scarborough ON, M1H 3B9 CANADA
Contact: Bob Burger, Technical Sales Mgr.
416-438-6230 FAX: 416-438-1065
- Cats 'N' Jemmer**
979 South 5th Street
Coas Bay, OR 97420
Contact: Tim Coney
- Cecil L Richards Inc**
P.O. Box 9037
McLean, VA 22102
Contact: Cecil Richards, President
- CeCo Communications Broadcast**
2115 Ave X
Brooklyn, NY 11235
Contact: Tony Ianna, Ad Mgr
718-646-6300
- Cellcast Communication Product**
110 South Main
Owasso, OK 74055
Contact: Gloria Staib
- Celwave**
Route 79
Marlboro, NJ 07746
Contact: Steve Oldinger, Ad Mgr
201-462-1880 FAX: 201-462-6919
- Central Tower Inc**
2855 Highway 261
Newburgh, IN 47630
Contact: Terrence A. Becht,
VP Marketing
812-853-0595 FAX: 812-853-6852
- Chen & Associates**
2217 Loma Verde Drive
Fullerton, CA 92633
Contact: Curtis Chan, President
714-447-4993 FAX: 714-578-0284
- Charles J Givens**
242 N Westmonte Dr #210
Altamonte Springs, FL 32714-3310
Contact: Shane Hackett,
Vice President
- Charles Michelson & Sons**
9350 Wilshire Blvd
Beverly Hills, CA 90212
Contact: Charles Michelson, President
- Charles S Wright**
414 Star Hill Dr
Swansboro, NC 28584
Contact: Charles Wright,
Professional Engineer
- Champion Motor Coeoch Inc**
2701 University Drive #300
Auburn Hills, MI 48326-2566
Contact: Paul Degriek, Mktg Mgr
- Checkmete Company**
P.O. Box 1672
Vienna, VA 22183-1672
Contact: Joe Novak, President
- Chesapeake Computer Group**
3903 17th Street
Chesapeake Beach, MD 20732
Contact: Becky Wahl, Corporate Secretary
- Chesley Maddox & Associates**
1818 Ohio Savings Plaza
Cleveland, OH 44114
Contact: Chesley Maddox, President
- Chester Cable Div Celwave Syst**
PO Drawer D
Chester, NY 10918
914-469-2141
- Chicago Radio Syndicate**
1134 N LaBrea
Los Angeles, CA 90038
Contact: Sandy Orkin, President
- Chip Morgan Broadcast Eng**
2340 Dartmouth
El Dorado Hills, CA 95762-5801
Contact: Chip Morgan, President
916-933-9330 FAX: 916-933-3903
- Chris Beck Communications**
6333 Canoga Avenue #234
Woodland Hills, CA 91367-2505
Contact: Chris Beck, President
- Chrysalis**
645 Madison Avenue
New York, NY 10022
Contact: Tom Gorman Sr,
Vice President Promotions
- Chrysler Capital Corporation**
1100 Abernathy NE, #1400
Atlanta, GA 30328
Contact: Michael Butterly,
Natl Mgr of Bdcig Investments
- Chuck Blore & Don Richman**
1606 N Argyle Avenue
Los Angeles, CA 90028
Contact: Chuck Blore, CEO
- Chuck Rancilio Assoc Inc**
P.O. box 28869
St Louis, MO 63123
Contact: Chuck Rancilio, Owner
- Circuit Doctors Inc**
Box 358, 689 Ten Mile Dr
Frisco, CO 80443
Contact: R Michael King, President
303-390-3252 FAX: 303-468-0087
- Chronrol Corp**
9675 Business Park Ave
San Diego, CA 92131
Contact: Jim Durham,
Vice President of Engineering
619-566-5656 FAX: 619-566-0140
- Cirrus Technologies Inc**
37 Main Street, Suite 4
Concord, MA 01742
Contact: Howard M. Crow, Jr.,
President
508-371-0483 FAX: 508-371-7360
- CKW & Associates**
4769 Elmer Avenue
North Hollywood, CA 91602
Contact: Charles Whaley
- Clarcum Computers**
PO Box 131
Vandalia, IL 62471
Contact: Neil Clark
- Clark & Associates**
P.O. Box 24266
Denver, CO 80224
Contact: John Clark, Proudct Marketing
Consultant
- Classical Music Syndication**
478 North Main Street
Wallingford, CT 06492
Contact: Hastings Baker, CEO
203-269-1823
- Clausen Communications**
23 Phillips Road
Nahant, MA 01908
Contact: Chris Clausen,
Vice President
- Clayton-Davis & Associates**
8229 Maryland Avenue
St Louis, MO 63105
Contact: Irvin Davis, Partner
- Clear Channel Communications**
7710 Jones-Maltsberger/600
San Antonio, TX 78216
Contact: L Lowry Mays, President/CEO
- Cleer-Com Intercoms**
945 Camelia Street
Berkeley, CA 94710
Contact: Michael Goddard,
National Sales Manager
510-527-6668 FAX: 510-527-6899
- Clements Co**
PO Box 1286
Carpinteria Beach, CA 93013
Contact: Jerry Clements, Pres
805-684-5415 FAX: 805-684-9316
- Cliff Gill Enterprises**
2884 Woodridge Circle
Carlsbad, CA 90292
Contact: Giff Gill, President
714-927-8397 FAX: 714-927-1083
- Clifton Gardiner & Associates**
P.O. Box 5559
Avon, CO 81620-5559
Contact: Clifton Gardiner, President
- Cloud Nine BBS**
13328 Firebrick Drive
Houston, TX 77041
Contact: David Armstrong
- CMi**
612 Hampton Drive
Venice, CA 90291
Contact: Bob Benderson, President
- CNM Electronics**
P.O. Box 10
Summerland Key, FL 33042
Contact: C Gossard
- Coastcom Inc**
2312 Stanwell Dr
Concord, CA 94520
Contact: E M Buttnr
- Coaxial Dynamics Inc**
15210 Industrial Pkwy
Cleveland, OH 44135
Contact: Bob Scott,
Vice President
216-267-2233 FAX: 216-267-3142
- Cody/Leach Broadcast Architect**
17 Hulfish Street
Princeton, NJ 08542
Contact: Owen Leach, Partner
- Cohen, Dippell & Everist, P.C.**
1300 L St, NW, Suite 1100
Washington, DC 20005
Contact: Julius Cohen, President
202-898-0111 FAX: 202-898-0895
- Coherent Communications**
13756 Glenoaks Blvd
Sylmar, CA 91342
Contact: Ivan Kruglak
818-362-9393
- Coleman Research**
P.O. Box 13829
Research Tri Park, NC 27709
Contact: Jon Coleman, President
- Columbia Pictures**
10202 W Washington Blvd
Culver City, CA 90232
Contact: Melanie Steele,
Radio Publicity & Promotions

Columbine Systems Inc

1707 Cole Blvd
Golden, CO 80401
Contact: Mike Oldham, Director, Sales & Marketing
303-237-4000 FAX: 303-237-0085

Comad Communications Ltd

875 Kenyon Crescent
Cornwall, ONT K6H 6Z1 Canada
Contact: Emil Adamyk, President
613-937-0041 FAX: 613-937-0089

Comark

Rte 57 Feeding Hills Rd
Southwick, MA 01077
Contact: K. R. Barkerney, RF SALES Manager
413-569-5939 FAX: 413-569-0679

Comark Communications

Rt. 57, Feeding Hills Road
Southwick, MA 01077
Contact: Ken Barker, RF Components Manager
413-569-5939 FAX: 413-569-0679

Comex Worldwide Corporation

1645 NW 79th Avenue
Miami, FL 33126
Contact: Jack Rickel, President and CEO
305-594-0850 FAX: 305-591-7298

Commercial Radio Co

Duttonsville School Dr
Cavendish, VT 05142
Contact: Dan Churchill, GM
802-226-7582 FAX: 802-226-7738

Communication Resource Network

4 Copper Beech Place
Merrick, NY 11566-3225
Contact: Alec Shapiro, President

Communications Data Services

6105-E Arlington Blvd
Falls Church, VA 22044
Contact: Rich Biby, President
703-534-0034 FAX: 703-534-7884

Communications Technologies

P.O. Box 1130
Marlton, NJ 08053
Contact: Clarence Beverage, President
609-985-0077 FAX: 609-985-8124

Communications General Corp.

2685 Alta Vista Drive
Fallbrook, CA 92028-9683
Contact: Robert Gonselt, President
619-723-2700 FAX: 619-723-4000

Comm Equity Associates

101 E Kennedy Blvd #3300
Tampa, FL 33602
Contact: Ken O'Rouke

Communication Graphics

313 North Redbud
Broken Arrow, OK 74012
Contact: Rick Lawrence, President

Competition Specialties

723 E. Fesler Street
Santa Maria, CA 93454-4515
Contact: Jim Mussell

Comprompter Inc

141 South 6th St
La Crosse, WI 54601
Contact: Ralph King, Pres
608-785-7766 FAX: 608-782-4674

Compucan

251 West Renner Road
Richardson, TX 75080
Contact: Michele Geopferick

Compu Systems

103 Boyd Drive
Brunswick, GA 31520
Contact: Larry Hickerson

Computer Concepts Corp

8375 Melrose Dr
Lenexa, KS 66216
Contact: Mark Bailey, President
913-541-0900 FAX: 913-541-0169

Computer Concepts - Intl Div.

P.O. Box 2826
College Station, TX 77841
Contact: Stephen S. Sampson, Director
409-268-7441 FAX: 409-268-7751

Comrex Corp

65 Nonset Path
Acton, MA 01720
Contact: Lynn Distler, VP Sales
508-263-1800 FAX: 508-635-0401

Comsat World Systems

950 L'Enfant Plaza, SW
Washington, DC 20024
Contact: Kay Norton, Service Development

Comsearch Inc

11720 Sunrise Valley Dr
Reston, VA 22091
Contact: Jerry Schulman, Mktg Mgr
703-620-6300

ComSpec, P.C.

218 York Rd
Greenville, NC 27858
Contact: Rick Hollowell, Vice President
919-355-1456 FAX: 919-355-1456

ComStream Corporation

10180 Barnes Canyon Road
San Diego, CA 92121
Contact: Andy Paul, Vice President Sales
619-458-1800 FAX: 619-453-8953

Comtech Antenna Systems

3100 Communications Rd
St Cloud, FL 34769
Contact: Thomas C. Christy, VP of Marketing
407-892-6111 FAX: 407-957-3402

Comtech Data

350 N Hayden Rd
Scottsdale, AZ 85257
Contact: Ray Kelsey, Dir Mky

Concept Productions

120 Main Street
Roseville, CA 95678-2232
Contact: Dick Wagner, President
916-782-7754 FAX: 916-786-8304

Concept Unlimited

9311 San Pedro, Suite 1060
San Antonio, TX 78216
Contact: Dave Rettinger

Concord

P.O. Box 845
Concord, CA 94522
Contact: Merrilee Trost, VP/Dir Promotion

Conex Electro-Systems Inc

PO Box 1342
Bellingham, WA 98227
Contact: Bill Hamelin, Sales Engineer
800-645-1061 FAX: 206-676-4822

Connector Distribution

2985 East Harcourt St
Rancho Dominguez, CA 90221
Contact: Judith E. Vallette, Sales Manager
310-632-2466 FAX: 310-632-5413

Contemporary Group

1401 S Brentwood Blvd
St Louis, MO 63144
Contact: Gregory Haglund, Vice President
314-962-4000 FAX: 314-962-0445

Continental Electronics Corp.

POB 270879, 4212 S. Buckner Blvd
Dallas, TX 75227
Contact: Steve Claterbaugh, Advertising/Sales Promotion
214-381-7161 FAX: 214-381-4949

Control Concepts Corp

PO Box 1380
Birmingham, NY 13902-1380
607-724-2484

Control Technology Inc

2950 SW 2nd Ave
Ft Lauderdale, FL 33315
Contact: James C. Woodworth, President
800-327-4121 FAX: 305-764-3298

Cooper Industries/Belden Div

PO Box 1980
Richmond, IN 47375
Contact: Kip Coates, Product Specialist
800-BELDEN-1 FAX: 317-983-5294

Co-Opportunities

324 Campus Lane, #B
Suisun, CA 94585
Contact: Elaine Clark, Marketing/Operations Manager

Cool-Amp Conducto-Lube Co

15834 Upper Boones Ferry Road
Lake Oswego, OR 97035
Contact: Jeanne McKinney, Secretary
503-624-6426 FAX: 503-624-6436

Copley Radio Network

Box 190
San Diego, CA 92112
Contact: Pat Glynn

Corporate Computer Systems

33 West Main Street
Holmdel, NJ 07733
Contact: David Lin, Product Manager
908-946-3800 FAX: 908-946-7167

Cortana Corporation

5412 Hwy. 64 E, POB 2548
Farmington, NM 87499-2548
Contact: David Stockmar, Vice President
505-325-5336 FAX: 505-326-2337

Cortland Cable Co

PO Box 330, 177 Port Watson St
Cortland, NY 13045-0330
Contact: John J. Dower, President
607-753-8276 FAX: 607-753-3183

Consulting Radio Engineer

P.O. Box 1888
Carson City, NV 89702
Contact: D.C. Williams, P.E.
702-885-2400 FAX: 702-885-8705

Consultronics

269 Portage Road
Lawiston, NY 14092-1710
Contact: Ron Evans

Countryman Associates Inc

417 Stanford Ave
Redwood City, CA 94063
415-364-9988

Cox Enterprises Inc

1400 Lake Hearn Drive NE
Atlanta, GA 30319
Contact: Michael Faherty, Exec.VP/Radio

Creative Radio Network

P.O. Box 7749
Thousand Oaks, CA 91359-7749
Contact: Darwin Lamm, President

Creative Services

83 Riverside Drive
New York, NY 10024
Contact: Amy Vitale

Creative Support Services

1950 Riverside Dr
Los Angeles, CA 90039
Contact: Mike Fuller, Owner
800-468-6874 FAX: 213-660-2070

Creedyadio/ One to One

Box 9787
Fresno, CA 93794
Contact: Jay Trachman, Publisher
209-226-0558 FAX: 209-226-7481

Cremlo Inc

1600 Fourth Avenue NW
Rochester, MN 55901
Contact: Dan Estes

Crisler Capital Company

600 Vine Stree #2710
Cincinnati, OH 45202
Contact: R Dean Melszer, Mng. Director

Critical Mass Media Inc

4242 Airport Road
Cincinnati, OH 45226-1646
Contact: John Martin, President
708-501-4644 FAX: 708-501-3969

CRN International

One Circular Avenue
Hamden, CT 06514
Contact: Lucille Fortunato, Dir/Affiliate
203-288-2002 FAX: 203-281-3291

Crouse-Kimzey Company

P.O. Box 155999
Fort Worth, TX 76155-0999
Contact: Mark Bradford, General Manager
817-283-7700 FAX: 817-283-8133

Crouse-Kimzey of Annapolis

P.O. Box 6300
Annapolis, MD 21401-0300
Contact: Kathleen Karas, Branch Manager
800-955-6800 FAX: 410-643-8888

Crown International Inc

1718 W Mishawaka Rd
Elkhart, IN 46517
219-294-8000

Crystal Semiconductor Corp

Box 17847
Austin, TX 78760-7847
Contact: Cheri Hood

CT Productions

6051 Morella Avenue
N Hollywood, CA 91606
Contact: Chris Taylor, President

Center For Radio Information

19 Market Street
Cold Springs, NY 10516
Contact: Maurie Webster, President
800-359-9898 FAX: 914-265-2715

Curpier Company

149 Main Street
Cooperstown, NY 13326-1224
Contact: Jim Johnson, Account Executive

Current Technology

101 West Buckingham
Richardson, TX 75081
Contact: Martin Sandy Sandberg,
Broadcast Sales Manager
214-238-5300 FAX: 214-238-0911

Custom Business Systems/CBSI

PO Box 67
Reedsport, OR 97467
Contact: Steve Kenagy, VP Mktg
800-547-3930 FAX: 503-271-5721

Custom Publishing & Mktg Group

PO Box 1150
Jupiter, FL 33468-1150
Contact: Dick Downes, President
407-743-0548 FAX: 407-743-7842

Cutting Edge Technologies

2101 Superior Av
Cleveland, OH 44114
Contact: Frank Foti, Senior Engineer
216-241-3343 FAX: 216-621-2801

Coyote Metalworks

529 Hillview Court NE
Albuquerque, NM 87123-2126
Contact: Bruce Cooley, Product Manager

Cybox

P.O. Box 790
Huntsville, AL 35804
Contact: Stuart Culbreth

**D&R Electronics USA**

Rt 3, Box 184-A
Montgomery, TX 77356
Contact: Paul Westbrook, President
409-588-3411 FAX: not listed

Dace

3890 Willow Crest Ave, #4
North Hollywood, CA 91604
Contact: William Paul, Engineer

dbx Professional Products

1525 Alvarado Street
San Leandro, CA 94577
Contact: David Roudebush, Mktg Mgr
510-351-3500 FAX: 510-351-0500

D.L. Markley & Associates

2104 West Moss Avenue
Peoria, IL 61604
Contact: D.L. Markley,
President/Consultant
309-673-7511 FAX: 309-673-8128

DDA

200 Sea Lane
Farmingdale, NY 11735
Contact: Allan Nichols,
Sales Manager
516-249-3660 FAX: 516-420-1863

D1 Products Inc

95 E Main St
Huntington, NY 11743
Contact: B Kutny
516-673-6866 FAX: 516-673-6893

DKW Systems Inc

#730, 9919-105 Street
Edmonton, AL, T5K 1B1 CANADA

DSI Communications Inc

627 Boulevard
Kenilworth, NJ 07033
201-746-9307 FAX: 201-744-9059

DYMA Engineering Inc

Box 1535
Los Lunas, NM 87031
Contact: Wally Cunningham, VP
505-865-6700

Da-Lite Screen Co Inc

PO Box 137
Warsaw, IN 46580
219-267-8101

Dameron Communications Service

1015 Main St
Charleston, SC 29407-6139
Contact: Griffin Dameron

Data Bank

264 N Oxford
San Angelo, TX 76901
Contact: Cary Fitch

Data Express

2822 Remington Green #204
Tallahassee, FL 32308
Contact: Julie Neal

Data For Small Systems

2020 Pennsylvania Ave
Washington, DC 20006
Contact: Rich Pomeroy
703-276-9442

Datacount

2207 Anderson Rd, PO Box 3078
Opelika, AL 36801
Contact: Debbie Hamby,
Sales Manager
205-749-5641 FAX: 205-749-5666

Datatek Corp

1121 Bristol Rd
Mountainside, NJ 07092
Contact: Rick Rainey,
Sales Manager
201-654-8100 FAX: 201-232-6381

Dataworld

P.O. Box 30730
Bethesda, MD 20824
Contact: John L. Neff, President
800-368-5754 FAX: 301-656-5341

Datel Corporation

1515 North Court House Road
Arlington, VA 22201
Contact: William Meintel,
Broadcast Consultant
703-276-9007 FAX: 703-276-9008

Datum Inc

1363 S State College Blvd
Anaheim, CA 92805
714-533-6333

Dave Dworkin's Ghostwriters

2412 Unity Avenue North
Minn., MN 55422-3450
Contact: Dave Dworkin, President
612-522-6256 FAX: 612-522-6256

Dave Gorman Consulting

P.O. Box 401
Dublin, PA 18917
Contact: Dave Gorman

David Rogers & Associates

P.O. Box 684
Highland Park, IL 60035
Contact: David Rogers

Davilyn Corp

13406 Saticox St
N Hollywood, CA 91605
Contact: Vince Digulio, Sales
818-787-3334 FAX: 818-787-4732

Davis Instruments

3465 Diablo Avenue
Hayward, CA 94545
Contact: Jackie Kidd,
Ad Manager

Dayton Industrial Corp

4411 Bee Ridge Road, #319
Sarasota, FL 34233
Contact: Don Roettele, President
813-378-5425 FAX: 813-378-3394

DDS SALES Training/Consultants

5904 West 35th Street
Sioux Falls, SD 57106
Contact: Darrell Solberg, President

Decision Inc

402 South Ragsdale #206
Jacksonville, TX 75766
Contact: Bill Keenan,
Vice President Marketing
903-586-0557 FAX: 903-586-6751

Delta Electronics Inc

5730 General Washington Dr
Alexandria, VA 22312
Contact: Joseph S. Novak,
Vice President Marketing
703-354-3350 FAX: 703-354-0216

Delta Lab Research Inc

1 Progress Way
Wilmington, MA 01887
Contact: Jim Camacho, Ad Mgr

Denny Somach Productions

812 W Darby Road
Havertown, PA 19083
Contact: Denny Somach,
President
215-446-7100 FAX: 215-446-7721

Denon America Inc

222 New Road
Parsippany, NJ 07054
Contact: Laura Tyson, Sales Manager
201-575-7810 FAX: 201-808-1608

DGBW

20 Executive Park #200
Irvine, CA 92714
Contact: Linda Sajbel,
Account Executive

Deremer Radio

33 Main Street
Seward, NE 68434
Contact: William Hohnstein,
Owner
402-643-3338 FAX: 402-643-3338

Dewolf Music Library

25 W 45th Street
New York, NY 10036
Contact: Andrew Jacobs

DHK Group

170 S. Dawson Drive
Camarillo, CA 93010
Contact: Larry Baley, Partner
805-484-8260 FAX: 805-482-3268

Diamong Broadcasting

4949 W Belmont Avenue
Chicago, IL 60641
Contact: Daniel Lee, President

Diary Experts

302 9th Avenue
Haddon Heights, NJ 08035
Contact: Todd Doren,
President

DI-Tech Inc

48 Jefryn Blvd
Deer Park, NY 11729
Contact: Anthony Bolletino,
Dir of Mktg
516-667-6300 FAX: 516-595-1012

Dic Digital

222 Bridge Plaza South
Fort Lee, NJ 07024
Contact: Kevin Kennedy,
Vice President Marketing
201-224-9344 FAX: 201-224-9363

Dick Brescia Associates

11 W 42nd St, 27th Floor
New York, NY 10036
Contact: Dick Brescia

Dick Summer Communications

5125 S Cullom Avenue
Chicago, IL 60641
Contact: Dick Summer, President
312-481-0825 FAX: 312-481-0825

Dictaphone Corp

3191 Broadbridge Avenue
Stratford, CT 06497
Contact: Lorna Guarascio

Dielectric Communications

Tower Hill Rd
Raymond, ME 04071
Contact: Colleen Mitchell,
Dir Marketing Services
207-655-4555 FAX: 207-655-4669

Digidesign

1350 Willow Road
Menlo Park, CA 94025
Contact: Eric Bonetti,
Marketing Administrator
415-688-0616 FAX: 415-327-0777

Digital Audio Labs

14505 21st Avenue N #202
Plymouth, MN 55447-5602
Contact: Jeff Wilson

Digital Audio Tape Store

2624 Wilshire Blvd
Santa Monica, CA 90403
Contact: Brad Schneider

Digital Broadcast Associates

826 N. Victory Blvd
Burbank, CA 91502
Contact: Ron DeBry, President
818-567-2873

Digital Broadcast Systems Inc

184 Mechanic St
Southbridge, MA 01550
Contact: Richard LaVallee, President
508-764-4386 FAX: 508-764-4387

Digital Domain

309 East 90th Street, Suite B
New York, NY 10128
Contact: Bob Katz, President

Digital I/O

2554 Lincoln Blvd #122
Marina Del Rey, CA 90291
Contact: Paul Wiffen, Managing Dir. Europe

Digital Management Systems

2714 Sapling Drive
Allison Park, PA 15101
Contact: Ed Deheart

Digital Recorders

P.O. Box 14068
Resrch Triangle Pk, NC 27709-4068
Contact: Joanne Alpiser, Senior Account Mgr.
800-222-9583 FAX: 919-361-2947

Digitel, div. of DOD Elect.

5639 South Riley Lane
Salt Lake City, UT 84107
Contact: Ferdinand Boyce, VP Marketing
801-268-8400 FAX: 801-262-4966

Direct Broadcasting Group

32 E 57th Street
New York, NY 10022
Contact: Robert Meyrowitz, President

Direct Mail Express

2441 Bellevue Avenue
Daytona Beach, FL 32114
Contact: Mark Edwards, National Sales Dir.

Discovery Systems

7001 Discovery Blvd
Dublin, OH 43017
Contact: Mike Ward

Diversified Comm Systems

9139 PA Rte 18
Cranesville, PA 16410
Contact: Richard Pogson, Owner
814-756-3053

Diversified Interests

900 E Birch Drive
Gulfport, MS 39503
Contact: Kim Campbell

Divisional Supply

124 Broadway, Suite #D
Costa Mesa, CA 92627
Contact: Dennis Barela

DMF

53 Park Ridge Lane
Pittsburgh, PA 15228
Contact: Mathew Barr

D.N.S.

125 Ruby/POB 11821
Eugene, OR 97440
Contact: John Dodson, Owner

DMR Bdct Consultants

POB 15039/Ctr City Plaza
Portland, ME 04101
Contact: Bruce Blette, President

Dolby Laboratories Inc

100 Potrero Ave
San Francisco, CA 94103
Contact: Kevin Tam, Dir. of Mkt. & Sales
415-558-0200 FAX: 415-863-1373

Domain Communications

289 Main Place
Carol Stream, IL 60188
Marketing Manager

Don Elliot Creative Services

25 San Rafael
Dana Point, CA 92629-4042
Contact: Don Elliot, Owner

Don Kelly & Associates

39 Mayberry Road
Chappaqua, NY 10514
Contact: Don Kelly, President
914-666-0175 FAX: 914-666-0286

Donald K. Clark Inc

P.O. Box 340617
Tampa, FL 33694
Contact: Donald Clark, President

Donald S. Smith Associates

P.O. Box 1545
Whittier, CA 90609
Contact: Donald S. Smith, President

Dorough Electronics

5221 Collier Pl
Woodland Hills, CA 91364
Contact: Kay Dorough, Partner
818-999-1132 FAX: 818-998-1507

Donna Halper & Associates

304 Newbury Street, #506
Boston, MA 02115
Contact: Donna Halper, President

Doug Vernier Broadcast Cstl

1600 Picturesque Dr
Cedar Falls, IA 50613
Contact: Doug Vernier, Pres
319-266-8402 FAX: 319-273-6402

Donohue Research & Marketing

8401 Patterson Avenue #G-101
Richmond, VA 23229-6401
Contact: Gary Donohue, President

Dow Jones Radio Network

200 Liberty Street
New York, NY 10281
Contact: Robert Rush, Dir/Bd't Services

Doyle Peterson & Associates

17304 N Preston Road #800
Dallas, TX 75252
Contact: Doyle Peterson, Owner

Drake-Chenault, div Bdct Prog.

2211 Fifth Avenue
Seattle, WA 98121
Contact: John Carlile, VP/ Manager
800-426-9082 FAX: 206-441-6582

Drawer/GMI

15 Strathmore Road
Natick, MA 01760
Contact: Scott Berdell

DGI Communications

627 Boulevard
Kenilworth, NJ 07033
Contact: Fred D'Alessandro

Duncan's American Radio

Box 90284
Indianapolis, IN 46290
Contact: James Duncan Jr., President

Durpelt & Associates

205 N Michigan Avenue #2015
Chicago, IL 60601
Contact: Tony Durpelt, President

duTreil, Lundin & Rackley, Inc

1019 19th St, NW, Suite 300
Washington, DC 20036
Contact: L. Robert duTreil, President
202-223-6700 FAX: 202-466-2042

Mark Durenburger

18147 Valley View Road
Eden Prairie, MN 55346-4128
Contact: Mark Durenburger, Consultant

Dyma Engineering

152 La Mirada
El Paso, TX 79932
Marketing Manager

Dynacom

4100 Industrial Avenue
Lincoln, NE 68504-1105
Marketing Manager

Dynacord

200 Sea Lane
Farmingdale, NY 11735
Contact: Allan Nichols, Sales Manager
516-249-3660 FAX: 516-420-1863

Dynair Electronics

5275 Market St
San Diego, CA 92114
Contact: Jesse Blount, Jr., VP, Sales & Marketing
619-263-7711 FAX: 619-264-4181

Dynatech Broadcast

6400 Enterprise Lane
Madison, WI 53719
Contact: Chuck Soholdt, Ad Mgr
FAX: 703-550-7560

**ECS International Inc**

P.O. Box 330607
Ft Worth, TX 76119
Contact: Dick Townsend

EEG Enterprises Inc

1 Rome St
Farmingdale, NY 11735
516-293-7472

EEV

4 Westchester Plaza
Elmsford, NY 10523
Contact: Greg Morton, Sales Manager
914-592-6050 FAX: 914-682-8922

EG & G Inc

35 Congress St
Salem, MA 01970
Contact: George Mandeville

E. Alvin Davis & Associates

9851 Forest Glen Drive
Cincinnati, OH 45242
Contact: E. Alvin Davis, President

E Harold Munn, Jr & Associates

P.O. Box 220
Coldwater, MI 49036
Contact: E Harold Munn Jr., President
517-278-7339 FAX: 517-278-6973

E. Karl Broadcast Consulting

2130 Sherwood Drive
Cambria, CA 93428
Contact: E. Karl, President

ERI Installations

108 Market Street
Newburgh, IN 47630
Contact: Max Brown, Director, Installations
818-853-3318 FAX: 818-858-5709

ESI

7249-B Browning Road
Pennsauken, NJ 08109
Contact: Thomas Newman, Sales Manager

EMCEE Broadcast Products

PO Box 68
White Haven, PA 18661
717-443-9575

ESE

142 Sierra St
El Segundo, CA 90245
Contact: Brian Way, Director of Marketing
310-322-2136 FAX: 310-322-8127

E-Z Up International

5525 East Gibraltar
Ontario, Ca 91764-5121
Contact: Faye Carter, Advertising Director

Eagle Hill Electronics Inc

21247 Chesapeake Rd
Chestertown, MD 21620
Contact: William H Johnson, President
410-778-3240

Eagle Marketing

223 Linden, #204
Fort Collins, CO 80524
Contact: Paul Meacham

EAP Services

123 Pennsylvania Avenue
Shenandoah, VA 22849
Contact: Tom Jones

Eastern Acoustics

1 Main Street
Whittensville, MA 01588
Contact: Kenneth Berger

Eastman Radio

1 Dag Hammarskhold Plaza, 22nd Flr
New York, NY 10017
Contact: Carl Butrum, President

Echosphere

6038 S Willow Way
Englewood, CO 80111
Contact: Bill Western

Econco

1318 Commerce Ave
Woodland, CA 95776
Contact: Debbie Storz, Sales
800-532-6626 FAX: 916-668-7760

Economy RF Construction

P.O. box 92251
Austin, TX 78709-2251
Contact: Joe McClish

Edge Technology Group Inc

1292 Acapulco Avenue
Simi Valley, CA 93065-4003
Contact: Lance Korhals, President

Edwin Tornberg & Co Inc

P.O. Box 55298
Washington, DC 20011
Contact: Edwin Tornberg, President

EFM Media Management

342 Madison Avenue #920
New York, NY 10173
Contact: Edward McLaughlin,
President

Eimac Div of Varian

48 Campbell Lane
Menlo Park, CA 94025
Contact: W Orr, Adv Mgr

Elcom Bauer

6199 Warehouse Way
Sacramento, CA 95826
Contact: Paul Gregg, Pres
916-381-3750 FAX: 916-381-4332

Electech Industries

P.O. Box 214
Port Monmouth, NJ 07758-0214
Contact: William Holden,
Executive Director

Electrex Co

18620 NE 2nd Ave
Miami, FL 33179
Contact: Ben Ostrovsky, Pres
305-651-5752 FAX: 305-654-1386

Electro Impulse Laboratory Inc

1805 Corlies Avenue, P.O. Box 278
Neptune, NJ 07754-0278
Contact: Mark Rubin, President
908-776-5800 FAX: 908-776-6793

Electro-Voice Bdct & Prod Pdct

600 Cecil St
Buchanan, MI 49107
Contact: Rick Sanchez,
Bdct & Prod. Marketing Manager
800-877-1771 FAX: 818-444-1342

Electrodanics

PO Bx 333
Cotack, NY 11725
Contact: Matt Kruger

Electronic Equipment Bank

323 Mill St., NE
Vienna, VA 22180
800-368-3270 FAX: 703-938-6911

Electronic Industries

19 E. Irving Avenue
Oshkosh, WI 54902
Contact: Gordon Dailey,
Broadcast Sales
414-235-8930 FAX: 414-235-4233

Electronic Research

108 Market St
Newburgh, IN 47630
Contact: Bill Elmer,
VP Sales
812-853-3318 FAX: 812-858-5706

Electronic Specialty

PO Box 7167
Springfield, IL 62791-7167
Contact: Ed Davison

Electronics Diversified Inc

1675 Northwest 216th Ave
Hillsboro, OR 97124
503-645-5533

Electrotechnics

POB 953
Seattle, WA 98111
Contact: David Ziskin, Pres

Elenos Inc

73 Oak Street
Plymouth, MA 02360
Contact: Renato Carpeggiani, Director

Elicon

417 S Associated Road, #A-313
Brea, CA 92621
714-870-6647

Ellason Weather Radar

747 Spirit of St. Louis Blvd
Chesterfield, MO 63005
Contact: Bill Ellason, President
314-532-3031 FAX: 314-532-3414

Emcor Products/Cranio Inc

1600 4th Ave, NW
Rochester, MN 55901
Contact: Tom Regnier,
Advertising Coordinator
507-289-3371 FAX: 507-287-3405

Emergency Alert Receiver Inc

PO Box 20629
New York, NY 10025-1515
Contact: Jack Bergman, President
212-695-4767

Emmis Broadcasting

950 N Meridian Street #1200
Indianapolis, IN 46204
Contact: Jeff Smulyan, CEO

Emphasys Software

9855 W 78th St, Suite 240
Prairie, MN 55344
Contact: Jeanneane R Swenson,
Marketing Secretary

Enberg Electronics

2121 Production Drive
Indianapolis, IN 46214
Contact: Mike Ringenberger, Pres
317-253-3866 FAX: 317-244-5128

Enco Systems, Inc

1866 Craigshire Drive
St Louis, MO 63146
Contact: Gene Novacek, President
314-453-0060 FAX: 314-453-0061

ECS International

PO Box 330607
Ft. Worth, TX 76163
Contact: Dick Townsend,
Manager, Broadcast Division
817-483-8497 FAX: 817-572-2242

Energy-Onix

752 Warren Street
Hudson, NY 12534
Contact: Ernest A. Belanger,
VP Marketing
518-828-1690 FAX: 518-828-8476

Enterprise Systems Group Inc.

5475 Tech Center Drive #300
Colorado Springs, CO 80919
Contact: George T. Beattie,
Senior Vice President
719-548-1800 FAX: 719-548-1818

Entrack Corp

80 1/2 Kinnaird Street
Cambridge, MA 02139-3153
Contact: Steve Krampf, President

Environmental Technology Inc

1302 High St
South Bend, IN 46601
Contact: Ron Witchie, Marketing Manager
219-233-1202 FAX: 219-233-2152

Equipment Mint

P.O. Box 309
Hobart, WA 98025
Contact: John Shell

Equipto Electronics Corp

351 Woodlawn Ave
Aurora, IL 60506-9988
312-897-4691

Eric Neil Angevine Consulting

420 E Rogers DrSt
Stillwater, OK 74075-1626
Contact: Eric Neil Angevine, P.E.

Erico Products

34600 Solon Road
Cleveland, OH 44139
Contact: Barry Gregg, Marketing Services

Erko Technologies

4541 South 88th St
Omaha, NE 68127
Contact: Larry Martin, Owner
402-331-2632 FAX: 402-592-5320

Estey-Hoover

3300 Irvine Avenue #225
Newport Beach, CA 92660
Contact: Myrna Horn, Media Planner

Ethereal Concepts

210 Golden Gate Dr
Dayton, OH 45459
Contact: Lonnie Domnitz, Owner

Euro Tech

273A Monmouth Street
Jersey City, NJ 07302
Contact: Fabrizio Pluchino,
Advertising Director

Evans Antenna Service

P.O. Box 29
Kimbolton, OH 43749
Contact: Ron Evans, Owner

Evans Sales & Marketing

509 A Ligon Drive
Nashville, TN 37204
Contact: Sales Manager

EventIde Inc

One Alsan Way
Little Ferry, NJ 07643
Contact: Gil Griffith, Sales Manager
201-641-1200 FAX: 201-641-1640

Event Marketing Inc.

9966 Alydar
Cincinnati, OH 45242
Contact: Jane Backman, President

Evergreen Media Corporation

433 E. Las Colinas #1130
Irving, TX 75039
Contact: Scott Ginsburg,
President/CEO

Excalibur Electronics

4604 Sand Rock Ln
Chantilly, VA 22021-2468
Contact: Bill Ashley, VP

Exchange National Funding

2425 N Central Expressway. #241
Richardson, TX 75080
Contact: Charles Shore

Execucoach

1229 Third Avenue
Chula Vista, CA 91911
Contact: Ed Diaz, Noventa FM 90 Inc

Executive Broadcast Services

Box 60327
Colorado Springs, CO 80960
Contact: Skip Joekel, President
719-579-6664 FAX: 719-579-6664

Executive Decision Systems

6421 W Weaver Drive
Littleton, CO 80123
Contact: Philip Lenoble

The Express Group

3518 3rd Ave
San Diego, CA 92103
Contact: Byron Andrus, President
619-298-2834 FAX: 619-298-4143

Express Tower Co Inc

PO Box 143
Big Cabin, OK 74332
Contact: Dyke A Dean, Mktg Dir
918-783-5129 FAX: 918-783-5590

**FM Construction Co**

421 S Second St, Suite 500
Elkhart, IN 46516
Contact: Carl Tiedemann

FMR Associates

6045 E Grant Road
Tucson, AZ 85712
Contact: Bruce Fohr, President

F M Systems Inc

3877 South Main St
Santa Ana, CA 92707
Contact: Frank McClatchie, President

FM Technology Assoc Inc

30925 Vista View
Mount Dora, FL 32757
Contact: Howard Enstrom, President

FMX Stereo/BTP

2017 Fox Glen Court
Bloomfield Hills, MI 48304-1007
Contact: Lou Raymo, Director

Fahnestock Co Inc

110 Wall Street, 10th Floor
New York, NY 10005
Contact: John Palmer,
Managing Director

Fairfax Media Inc

4002 University Drive
Fairfax, VA 22030
Contact: Ben Avery, Director Special
Projects

Fairwest Direct

6020 Cornerstone Court #100
San Diego, CA 92121
Contact: Reg Johns, CEO

Far West Communications

120 N Victory Blvd #106
Burbank, CA 91502
Contact: Paul Ward, President/CEO
818-566-7003 FAX: 818-566-7086

FDE Associates

21070 SW Tile Flat Raod
Beaverton, OR 97007
Contact: Bernard Vancil

FED Associates/Media Employees

137 W County Line Road #250
Littleton, CO 80126
Contact: Steven Gramzey, Executive Dir.

Fiberbilt Cases

601 West 26th St
New York, NY 10001
Contact: Paul Lowman, Sales Mgr
800-847-4176 FAX: 212-691-5935

Fidelipac Corp

97 Foster Road, PO Box 808
Moorestown, NJ 08057
Contact: Jack Ducart, Dir of Sales
609-235-3900 FAX: 609-235-7779

Film House Inc

230 Cumberland Bend
Nashville, TN 37228
Contact: Wayne Campbell,
VP of Marketing
615-255-4000 FAX: 615-256-3380

First Atlantic Group, Inc.

P.O. Box 941888
Maifland, FL 32794-1888
Contact: Don Scheib, President
407-578-2000 FAX: 407-290-1632

First Interstate Bank

633 17th stree 3N/007
Denver, CO 80270
Contact: Brian Erickson,
Vice President

Firstcom Broadcast Services

13747 Montfort Drive #220
Dallas, TX 75240
Contact: Jim Long, Chairman

First Light Video Publishing

8536 Venice Boulevard
Los Angeles, CA 90034
Contact: Rosemary Guthrie,
Vice President of Sales
310-558-7880 FAX: 310-558-7891

Fitzco Sound

2600 W Wall
Midland, TX 79701
Contact: Mike Fitzgerald, Owner

Fitzco Sound Inc

2600 W Wall St
Midland, TX 79701-6320
Contact: Mike Fitz-Gerald, Owner

Flash Technology Corp of Amer.

P.O. Box 1549
Brentwood, TN 37024
Contact: Bill Somers, VP Sales
603-883-6500 FAX: 603-883-0205

Fleet National Bank

111 Westminster Street
Providence, RI 02903
Contact: Greg Mulligan,
Vice President

John Fluke Mfg Co Inc

PO Box 9090
Everett, WA 98206-9090
Contact: Debby Coyne,
Product Publicity Admin
206-347-6100 FAX: 206-356-5116

Focal Press Broadcasting Pubs.

80 Montvale Ave
Stoneham, MA 02180
Contact: Bill Lahey, National Sales Mgr
800-366-BOOK FAX: 617-279-4851

For-A Corp of America

313 Speen Street
Natick, MA 01760
Contact: Nicola Kataldo

Force II Communications

750 B St Symphony Towers Ste #1910
San Diego, CA 92101
Contact: Norm Feuer,
President/CEO
619-239-4242 FAX: 619-239-4270

Formost Corporation

2025 Hamburg Turnpike
Wayne, NJ 07470
Contact: Bill Formosa, President

Fort Worth Tower Co Inc

P.O. Box 8597
Fort Worth, TX 76112
Contact: Roy Moore,
Vice President
800-433-1816 FAX: 817-429-6010

Mel Foster Tech Sales, Inc

7611 Washington Ave So
Edina, MN 55434
Contact: Sales Mgr

Fostex Corp of America

15431 Blackburn Ave
Norwalk, CA 90650
Contact: Rick Cannata, RDAT Product
Spec
310-921-1112 FAX: 310-802-1964

Frank Boyle & co

2001 West Main Street, #280
Stamford, CT 06902
Contact: Frank Boyle, President

Frank N Magid Associates

One Research Center
Marion, IA 52302
Contact: Bruce Northcott, President

Fran Dym Communications

114 E 32nd Street, #1700
New York, NY 10016-5506
Contact: Fran Dym, President

Frankford Wayne Mastering

1697 Broadway, Suite 1404
New York, NY 10019
Contact: Carol Steele, Sales Manager
212-582-5473 FAX: 212-245-2309

Freeland Products Inc

75412 Hwy 25
Covington, LA 70433
Contact: Joseph H. Freeland, President
504-893-1243 FAX: 504-892-7323

Frese Software

656 N Miller Avenue
Wenatchee, WA 98801-2044
Contact: Glen Frese

Full Compass Systems

5618 Odana Rd
Madison, WI 53719-1208
Contact: Jonathan Lipp, President
608-271-1100 FAX: 608-273-6336

Fuller-Jeffrey Broadcasting Co

8842 Quail Lane
Roseville, CA 95661-9602
Contact: Bob Fuller, President

Fuller Sound

1948 Riverside Dr
Los Angeles, CA 90039
Contact: Mike Fuller, Owner
800-468-6874 FAX: 213-660-2070

Funke & Associates

908 Marilyn Dr
Campbell, CA 95008
Contact: Sonny Funke, Applications Engineer
800-748-6308 FAX: 408-866-1975

Furman Sound Inc

30 Rich St
Greenbrae, CA 94904
Contact: Joe Desmond, National Sales
Manager
415-927-1225 FAX: 415-927-4548

Fusion Electronics Inc

15 Main St, PO Box 170
East Rockaway, NY 11518
Contact: Sid Sussman,
Executive Vice President
800-645-2300 FAX: 516-599-6495

Future Primitive

10850 Van Owen
N Hollywood, CA 91605
Contact: Susan Michelson, President
818-766-3700 FAX: 818-768-9669

**G & M Power Products Inc**

943 N Orange Dr
Los Angeles, CA 90038
213-850-6800

GBC Electronics

125 Birch Street
Blountville, TN 37617
Contact: Bruce Cooke, Owner
615-323-2976 FAX: 615-323-2976

GE American Communications

Four Research Way
Princeton, NJ 08540
Contact: Andreas Georghiou,
Dir. Bdct & Business Services

GE Support Services

158 Gaither Drive
Mt. Laurel, NJ 08054
Contact: Kathleen Cook
609-866-3103 FAX: 609-866-3140

GKM Mfg Corp

47 Bridgewater St
Brooklyn, NY 11222
Contact: John D'Augelli, General Manager
718-388-4114 FAX: 718-384-1325

GL Enterprises

P.O. Box 99
Plantsville, CT 06479-0099
Contact: Gregory Laporta, President
203-238-0370

GMI Broadcast Services

P.O. Box 6206
Kent, WA 98064
Contact: Leslie Erak, Vice President
206-656-8414

GML, Inc.

7821 Burnet Avenue
Van Nuys, CA 91405
Contact: Mr. Cary Fischer,
Vice President
818-781-1022 FAX: 818-781-3828

Gaines Audio

1237 E. Main Street
Rochester, NY 14609
Contact: Jon Gaines, Owner
800-442-0780

Gannett Radio

6255 Sunset Blvd 11th Floor
Los Angeles, CA 90028
Contact: Jay Cook,
President/Radio Division

Gannon Associates

210 W Front St
Redbank, NJ 07701
Contact: Jim Corridon

Gardner, Carton & Douglas

1301 K St NW, #900 East Tower
Washington, DC 20005
Contact: M Scott Johnson

Garner Industries

4200 N 48th St
Lincoln, NE 68504
Contact: Brad Osthus,
Product Sales
402-464-5911 FAX: 402-464-6960

Gary Kaplan & Associates

201 S Lake Avenue #600
Pasadena, CA 91101
Contact: Gary Kaplan, President

Gary Stevens & Co Inc

49 Locust Avenue #107
New Canaan, CT 06840
Contact: Gary Stevens,
Managing Director

Gefen Systems

6261 Variel Avenue, #C
Woodland Hills, CA 91367
Contact: Hagai Gefen,
President
800-545-6900 FAX: 818-884-3108

Geleco

2 Throncliffe Park Drive #28
Toronto, Ont, M4H 1H2 CANADA
Contact: Gerald Lee
416-421-5631 FAX: 416-421-3880

Gemini Electronic Marketing

1550 NW 195th #110
Seattle, WA 98177
Contact: Sales Mgr

General Broadcast Supply Inc.

HC 31 Box 128
Deer, AR 72628-9606
Contact: T.S. Butler, President
501-253-8127 FAX: 501-253-6151

Generation Technologies Corp

6420 West 110th St, #100
Overland Park, KS 66211
Contact: Bob Kirby, Dir. of Communications
913-345-1012 FAX: 913-345-0156

Generic Computer Systems

357 N Main St
Butler, PA 16001
412-283-1500

Genesis Broadcasting

5949 Sherry Lane #935
Dallas, TX 75225
Contact: Martin Greenberg, President

Gentner Communications Corp.

1825 Research Way
Salt Lake City, UT 84119
Contact: Elaine Jones, Business Unit
Manager-Broadcast
801-975-7200 FAX: 801-977-0087

George Moore & Associates

12900 Preston Road, #1040
Dallas, TX 75230
Contact: W. James Moore, President

George Williams Communications

5330 Bent Tree Forest, #912
Dallas, TX 75248
Contact: George Williams, President

Gepco International Inc

2225 West Hubbard
Chicago, IL 60612-1613
Contact: Larry Smith, Sr., VP Technical
Marketing
312-733-9555 FAX: 312-733-8416

Ghielmetti Inc

30961 Agoura Road, #309
Westlake Village, CA 91361-4618
Contact: Rick Ordofer, Sales Engineer

Gibraltar Digital Systems

4125 S W Martin Highway
Palm City, FL 33490
Contact: D.S. Dayton, President

GBS-Giesler Broadcasting Sply

5914 Maple
Houston, TX 77074
Contact: Bernie Giesler, President
713-774-3314 FAX: 713-774-1306

Global Satellite Network

14958 Ventura Blvd
Sherman Oaks, CA 91403-3455
Contact: Howard Gillman, President

Golden Home Star Snd/Light

1421 Eastern Avenue
Norgantown, WV 26505
Contact: Daniel Whittaker, Owner

Gold Line

Box 500
West Redding, CT 06896
Contact: Marj Miller, VP Sales
203-938-2588 FAX: 203-938-8740

Gordon Rice Associates

5 Palmetto Business Park, #101
Hilton Head Isl, SC 29928
Contact: Gordon Rice, President
803-842-8806 FAX: 803-785-6829

Gorman Media

19754 Tanbark
Strongsville, OH 44136
Contact: John Gorman, President

Gorman-Redlich Mfg Co

257 W Union St
Athens, OH 45701
Contact: Jim Gorman, Owner
614-593-3150 FAX: 614-592-3898

Gotham Audio Corp

1790 Broadway 8th Fl
New York, NY 10019
Contact: Russ Hamm, President
212-765-3410 FAX: 212-265-8459

Gotcher Tower Service

3728 S Elm Place, #541
Broken Arrow, OK 74011
Contact: Rex Gotcher, Owner

Gowdy Printcraft Press

22 N Sierra Madre
Colorado Springs, CO 80903
Contact: Michael Murt, Sales Manager

Graham-Patten Systems

13451 Colfax Hwy, PO Box 1960
Grass Valley, CA 95945
Contact: Jim Prouty
916-273-8412

Ronald J. Grandmaison, P.E.

11213 Split Rail Ln
Fairfax Station, VA 22039
Contact: Ronald J Grandmaison, President
703-764-0513

Granum Communications

666 Fifth Avenue 33rd Floor
New York, NY 10103
Contact: Herbert McCord, President

Grass Valley Group Inc

Box 1114
Grass Valley, CA 95945
Contact: Jay Cook, Advertising Manager
916-478-3000 FAX: 916-478-3187

Gray Audio

1451 E Farmington Avenue
Farmington, CT 06032
Contact: Bobby Gray

Gray Communications

8701 South Kimbark Street
Chicago, IL 60619
Contact: Tony Gray, President

Graysonics

P.O. Box 1338
Evanston, IL 60204-1338
Contact: John Grayson, Owner
708-869-0001 FAX: 708-869-0017

Great American Broadcasting

One E Fourth St, #600
Cincinnati, OH 45202-3713
Contact: Dave Crowl, President/Broadcast
Group

Greenwood Performance Systems

3010 S Harvard Avenue #210
Tulsa, OK 74114
Contact: Jim Rhea, President

R Griffin & Assoc

133 W 19th
New York, NY 10111
Contact: Robert Griffin, Pres

Group One Ltd.

80 Sea Lane
Farmingdale, NY 11735
Contact: Jack Kelly, President
516-249-1399 FAX: 516-753-1020

Group W Radio

888 Seventh Avenue
New York, NY 10106
Contact: Jim Thompson, President

James Grunder & Assoc Inc

5925 Beverly
Mission, KS 66202
Contact: Amy Flickinger, Advertising
Manager
913-831-0188 FAX: 913-831-3427

Guarantee Radio Supply

1314 Iturbide St
Laredo, TX 78040
Contact: M Flores/A Robledo, Pres
512-723-6913 FAX: 512-727-8458

h**H.L. Dalls Inc.**

35-35 24th Street
Long Island City, NY 11106
Contact: Joseph Palazzo, Sales Manager

Haicom

20253 NE 15th Street
Miami, FL 33179
Contact: R Chauvet, President

HM Electronics Inc

6675 Mesa Ridge Rd
San Diego, CA 92121
Contact: Bruce Siemmer, General Sales
Manager
619-535-6060 FAX: 619-552-0139

Hagen Media Research

P.O. Box 40542
Washington, DC 20016-0542
Contact: Don Hagen, President

Hal Communications

PO Box 365
Urbana, IL 61801
Contact: Ken Sartain, Mktg Mgr

Halland Broadcast Services Inc

1289 E. Alosta Avenue
Glendora, CA 91740
Contact: Steve Steinberg, General Manager
818-963-6300 FAX: 818-963-2070

Hall Electronics

1305-F Seminole Drive
Charlottesville, VA 22901
Contact: Jon Hall, President
804-974-8466 FAX: 804-974-8450

Mart Haller Inc

PO Box 140159
Coral Gables, FL 33114
Contact: Pat Haller, President
305-444-4617 FAX: 305-445-7551

Hallikainen & Friends Inc

141 Suburban Rd
San Luis Obispo, CA 93401
Contact: Harold Hallikainen, Pres
805-541-0200 FAX: 805-544-6715

Hamtronics, Inc.

65 Moul Rd
Hilton, NY 14468-9535
Contact: Jerry Vogt, President
716-392-9430 FAX: 716-392-9420

Hammett & Edison, Inc

P.O. Box 280068
San Francisco, CA 94128
Contact: William F. Hammett, P.E.,
Managing Director
415-342-5200 FAX: 415-342-6482

C.B. Hannay & Son, Inc.

600 East Main Street
Westerlo, NY 12193
Contact: Edward A. Rash, Advertising Mgr.
518-797-3791 FAX: 800-REELING

Harker Research

6131 Falls/Neuse Road, #112
Raleigh, NC 27609
Contact: Richard Harker, President

Harman International

8500 Balboa Blvd
Northridge, CA 91329
Contact: Mike Budd, VP Manufacturing

Bob Harper's Company

9449 Balboa Avenue #203
San Diego, CA 92123
Contact: Bob Harper, President

Harris Allied

PO Box 4290, 3200 Wismann Lane
Quincy, IL 62305-4290
Contact: Martha B. Rapp, Mgr, RF
Marketing Communications
217-222-8200 FAX: 217-224-1439

Harris Allied Broadcast Equip
3712 National Rd West
Richmond, IN 47375
Contact: Tom Harle, Studio Product Mgr.
800-622-0022 FAX: 317-962-8961

Harris Allied Broadcast Equip
3712 National Rd West
Richmond, IN 47375
Contact: Gene Schultz, Manager Worldwide Marketing
317-962-8596 FAX: 317-962-8961

Harris Allied Equipment Exchge
635 South E Street
Richmond, IN 47374
Contact: Jim Jones, Manager
317-962-1471 FAX: 317-966-6321

Harrison by GLW
437 Atlas Drive
Nashville, TN 37211
Contact: Tom Irby, VP/ Sales & Marketing
615-331-8800 FAX: 615-331-8883

Harry Nelson & Associates
2716 Gainesborough
Dallas, TX 75287
Contact: Harry Nelson, President
214-307-8773 FAX: 214-306-3961

Hartmann Associates
5 Nestlingwood Dr
Long Valley, NJ 07853
Contact: A David Hartmann, Pres
201-850-3750 FAX: 201-850-3751

Harvey Smith & Associates
1607 Palmer Ave
Pueblo, CO 81004
Contact: Harvey Smith, Owner
719-561-9535 FAX: 719-561-9555

Hatfield & Dawson Consult Engr
4226 Sixth Ave, NW
Seattle, WA 98107
Contact: Benjamin F. Dawson, Marketing Manager
206-783-9151 FAX: 206-789-9834

HME Inc
3161 Groton Way, #2
San Diego, CA 92110
Contact: Randy Opela, National Sales Manager

Health News Feed
550 N Broadway, 11th Floor
Baltimore, MD 21205
Contact: Amy Van Houten, Asst. to Director
410-955-2849 FAX: 410-955-4452

Charles A. Hecht & Assoc., Inc
164 Doe Run
Pittstown, NJ 08867
Contact: Charles A. Hecht, President
908-730-7959 FAX: 908-730-7408

HEDCO
920 Corporate Lane
Chesapeake, VA 23320
Contact: Steve Miller, Vice President Sales
804-548-2300 FAX: 804-548-4088

Karl Heitz Inc
34-11 62nd Street
Woodside, NY 11377
Contact: Esther Conde, Marketing Manager
718-565-0004 FAX: 718-565-2582

Bob Henabery Associates
136 E 55th Street
New York, NY 10022
Contact: Bob Henabery, President

Heller Financial
200 N LaSalle Street
Chicago, IL 60601
Contact: Doug Zylstra, Vice President

Henley & Lundquist
2717 Cottage Way, Ste 4
Sacramento, CA 95825
Contact: Bob Henley, Partner

Henry Ansbacher Inc
280 Park Avenue 20th Floor
New York, NY 10017
Contact: William McCluskey,
President/CEO

Henry Engineering
503 Key Vista Dr
Sierra Madre, CA 91024
Contact: Hank Landsberg, Owner
818-355-3656 FAX: 818-355-0077

Heritage Media Corp
1 Galleria Tower, #1500
Dallas, TX 75240
Contact: Paul Fiddick, Pres./Radio Group

Herron Media Group
40 Beach Street, #200
Manchester, MA 01944
Contact: Hilary Greene, Senior VP Sales & Marketing

Hickman Associates
29 Manor Drive/Drake Manor
Newton, NJ 07860
Contact: Ron Hickman, President

Hipotronics
Route 22, P.O. Drawer 414
Brewster, NY 10509
Contact: Jack McGuire, Product Manager
914-279-8091 FAX: 914-279-2467

Hispano U.S.A. Network
12655 N Central Expressway #423
Dallas, TX 75243
Contact: Janie Garza, Vice President
214-991-0399 FAX: 214-991-0387

Hnat Hinds Inc
42 Elaine St, RR 1
Thompson, CT 06277
Contact: Bonnie Hnat
203-935-9066

Holiday Industries Inc
14825 Martin Dr
Eden Prairie, MN 55344
Contact: Michael Leighton, Sales
612-934-4920 FAX: 612-934-3604

Holzberg Inc
PO Box 3323
Sea Bright, NJ 07760
Contact: Herb Holzberg, President
800-242-7298 FAX: 908-842-7552

Hoberg Comm Consultant
9301 Bryant Avenue S, #103
Bloomington, MN 55420-3436
Contact: Don Hoberg, President
612-884-4505 FAX: 612-888-5664

Hogan-Feldmann Inc
4463 Bergamo Drive
Encino, CA 91436
Contact: Arthur Hogan, Partner

Hooks Unlimited
200 Old 63 South #103
Columbia, MO 65201
Contact: Bernie Grice

Hot Spots Creative Service
510 Seventh Street
Sugarland, TX 77478

House & Company
9 East 53rd Street
New York, NY 10022
Contact: Gloria Kestenbaum

Houston International Teleport
3003 Moffitt Lane
Missouri City, TX 77489
Contact: Anna Sterling, Admin Assist

Howe Technologies Corp
2651 Grapewood Lane
Boulder, CO 80304-2481
Contact: Terry Sweeney,
VP Sales
303-444-4693 FAX: 303-444-8447

Hughey & Phillips Inc
P.O. Box 2167
Simi Valley, CA 93062
Contact: Peter H. Johnson, Vice President
805-581-5591 FAX: 805-581-5032

Hunter Communications
2521 1/2 S Vista Way #2
Carlsbad, CA 92008-1234
Contact: Bill Hunter, Owner

Huntsville Antenna Engineering
1301 Central Pkwy SW
Decatur, AL 35601
Contact: Ken Casey

Hy James Inc
24166 Haggerty Road
Farmington Hills, MI 48335
Contact: Henry J. Root, Pres
313-471-0027 FAX: 313-471-2611



IBSS Ltd.
Box 303
Binbrook Ontario, Canada
Contact: Rob Meuser, Technical Director
416-692-3330 FAX: 416-692-4033

Ian Communications Group
13 Ray Avenue
Burlington, MA 01803-4720
Marketing Manager

ICB Audio
2036 Reading Road
Cincinnati, OH 45202
Contact: John Baylis, Manager
513-651-0800 FAX: 513-651-0828

IDB Communications Group, Inc
10525 W. Washington Blvd
Culver City, CA 90232
Contact: Julie Spira, President, Audio Sales
213-870-9000 FAX: 213-838-6374

IER (Industrial Equip Reps.)
1685 Precision Park Lane, #E
San Diego, CA 92173
Contact: Alex Rodriguez, VP of Operations
619-428-2261 FAX: 619-428-3483

IFR Systems Inc
10200 West York St
Wichita, KS 67215
Contact: Thomas G. Dideum, Test & Msmt Mktg
316-522-4981 FAX: 316-522-2623

IGM Communications
4041 Home Road
Bellingham, WA 98226
Contact: Carl Peterson, Dir Bdct Sales/Mktg
206-733-4567 FAX: 206-734-7939

I Pollack In-Stat Sis/Trng
Four Chrysler Rd/Radio Plaza
Natick, MA 01760
Contact: Irwin Pollack, President

International Tapetronics Corp
2425 S Main St, P.O. Box 241
Bloomington, IL 61702-0241
Contact: Bruce Helling, Marketing Communications Manager
800-447-0414 FAX: 309-828-1386

ITP-Paulist Communications
818 Roeder Road, #600
Silver Spring, MD 20910
Contact: Lawrence Rice, Assoc. Dir.
301-588-0505 FAX: 301-565-2015

ITS Corporation
375 Valley Brook Rd
McMurray, PA 15317
Contact: Robert M. Unetich, President
412-941-1500 FAX: 412-941-4603

ITT Jennings
970 McLaughlin Avenue
San Jose, CA 95122
Contact: E.V. Valehrach, Dir. of Marketing
408-292-4025 FAX: 408-286-1789

ITW Switches/II Toolworks Co
6615 W Irving Pk Rd
Chicago, IL 60634
Contact: Rick Magnuson,
Mktg Mgr Swtrs/Sys

Ice Crackers
273 Circle Drive
Springfield, IL 62703
Contact: Jim Newbanks, President
217-786-6516

Ilumina
475 Starks Bldg
Louisville, KY 40202
Contact: Terry Holland

Image Devices Inc
1825 NE 149th St
Miami, FL 33181
Contact: Bill Reiter, Mktg Mgr

Image Point Productions
200 N Dearborn, #3606
Chicago, IL 60601
Contact: Jonathan Miller, President

Imagine Products
581 S Rangeline Rd, #B-3
Carmel, IN 46032
Contact: Dan Montgomery,
President

Impact Ratings
190 S Warner Raod #100
Stratford, PA 19087
Contact: Renate Harshaw, President

Impact Resources Co
125 Dillmont Drive
Columbus, OH 43235
Contact: Garry Drenik, President

Impact Target Marketing
419 Boylston St #7
Boston, MA 02116-3314
Contact: Eric Corwin,
President

Independent Broadcast Network
#2 Corporate Drive #530
Clearwater, FL 34622
Contact: Bob Hensler

Industrial Acoustics Co
1160 Commerce Ave
Bronx, NY 10462
212-931-8000

Industrial Components Corp
61 Birch Lane
Brewster, MA 02631-2114
Contact: Stephen Welch, Pres

In-Fisherman Radio
651 Edgewood Drive
Brainerd, MN 56401
Contact: Jim O'Rourke

Industrial Financial Services
3605 Potomac Avenue
Dallas, TX 75025
Contact: Keith Deville, President

Infinity Broadcasting
600 Madison Avenue
New York, NY 10022
Contact: Mel Karmazin,
President/CEO

Information
2715 Electronic Ln
Dallas, TX 75220
Contact: Woody Taylor, VP

Inmark Corp
38 Brushwood Rd
Stamford, CT 06903
Contact: Lars Giers

Innovative Audio Sales
4978 Oak Hill Drive
Waterford, MI 48329-1753
Contact: Andrew Combs, Owner

Innovative Automation

3316 19th Ave Se
Rio Rancho, NM 87124
Contact: Don Prentice, President
505-891-0501

Inovonics Inc

1305 Fair Ave
Santa Cruz, CA 95060
Contact: James B Wood, President
408-458-0552 FAX: 408-458-0554

Intergrated Media Systems

1370 Willow Road, Suite 201
Menlo Park, CA 94025
Contact: Theresa Smith

Interface Electronics

6710 Alder
Houston, TX 77081
Contact: Louis Stevenson

International Broadcast Supply

2450 N Powerline Rd K #12
Pompano Beach, FL 33069-1051
Contact: Jorge Bicocchi, President

International Cinema Eq Co

6750 NE 4th Ct
Miami, FL 33138
Contact: S Krams

International Demographics Inc

3000 Richmond, #175
Houston, TX 77098
Contact: Jim Higgenbotham,
Chairman

Intl Electro-Magnetics

350 North Eric Drive
Palatine, IL 60067
Contact: Tony Pretto, President
800-227-4323 FAX: 708-358-4623

International Magnetics

4411 Red Maple Ct
Cocord, CA 94521
Contact: Bob Kearns

International Map Service

12211 W Alameda Pky, #101
Lakewood, CO 80228
Contact: Lynn Montoya,
Director of Operations
303-987-2747 FAX: 303-987-2735

International Music Company

1316 E. Lancaster
Fort Worth, TX 76102
Contact: James Martin,
Akai Product Specialist
817-336-5114 FAX: 817-870-1271

International Teletronics Inc

PO Box 738
Williamstown, NJ 08094
Contact: John F Hayes, VP

Intraplex Inc

PO Box 2427
Littleton, MA 01460
Contact: Roger L Shaw,
Product Manager
508-486-3722 FAX: 508-486-0709

Ivie

1366 W Center St
Orem, UT 84057
Contact: Glen Meyer, Mktg Mgr
801-224-1800 FAX: 801-224-7526

**J & F Trading Inc**

10991 SW 72nd Terrace
Miami, FL 33171-2743
Contact: Jose Reis Terras, Manager
305-471-7961 FAX: 305-599-0688

J & I Audio/Video

20899 Kelvin Palce
Woodland Hills, CA 91367
Contact: Gilbert F. Grieger, Jr., Owner
818-992-4288

Jack Taddeo Comm Group

20 Wisner Street
Park Ridge, NJ 60068-3546
Contact: Jack Taddeo, President

Jacor Communications Inc

1300 Central Trust Center
Cincinnati, OH 45202
Contact: Terry Jacobs, Chairman/Pres./CEO

Jaffle Communications

3718 Riverdale Avenue
Bronx, NY 10463-1808
Contact: D Harewood

JAM Creative Productions

5454 Parkdale Drive
Dallas, TX 75227
Contact: Jonathan Wolfert, President
214-388-5454 FAX: 214-381-4647

JBL Professional

8500 Balboa Blvd
Northridge, CA 91329
Contact: Steve Armstrong, Director of Sales
818-893-8411 FAX: 818-893-3639

J.L. Ritter Productions

1280 38th Avenue NE
St Petersburg, FL 33704-1642
Contact: John Ritter, President

J.M. Flanagan Broadcast Serv

720 Thornhill
Colma, CA 94015
Contact: John Mack Flanagan

JMF Consulting

11306 Sunco Drive #3
Rancho Cordova, CA 95864
Contact: John Fernandez, President

JM Technical Arts

30 Music SQ W #5
Nashville, TN 37203
Contact: Jack Clark, Owner

J.N. Wells & Company

21 West O 75 Monticello Road
Lombard, IL 60148
Contact: Joseph Wells, President

J.N.S. Electronics Inc

PO Box 32550
San Jose, CA 95152
Contact: John E. Leonard Jr., President
408-729-3838 FAX: 408-926-1003

JRF Magnetic Sciences

249 Kennedy Road
Greendell, NJ 07839
Contact: John R. French, Pres
201-579-5773 FAX: 201-579-6021

JVC Corp

41 Slater Drive
Elmwood Park, NJ 07407
Contact: Roberts, Spec Prod Mgr

J Squared Technical Service

2198 Hubbard Lane
Grants Pass, OR 97527
Contact: Jim Jones, Owner
503-471-2262

J Boyd Ingram & Associates

P.O. Box 73
Batesville, MS 38606
Marketing Manager

J Lipman Marketing & Promo Svs

305 W 98th St #7E South
New York, NY 10025
Contact: Jayne Lipman, President

Jaffle Communications

122 E 42nd St
New York, NY 10168
Contact: D Harewood

Jameson Broadcast

1700 Connecticut Ave NS
Washington, DC 20009
Contact: Jamie Jameson, President

Jay Stevens Radio

269 W Alameda Avenue Suite D
Burbank, CA 91502-2520
Contact: Jay Stevens, President

Jampro Antennas Inc

6340 Sky Creek Drive
Sacramento, CA 95828
Contact: James E. Olver, President
916-383-1177 FAX: 916-383-1182

Jefferson Pilot Data Services

301 S McDowell St, #500
Charlotte, NC 28204
Contact: John O. McDonald,
Product Sales Manager

Jensen Tools Inc

7815 South 46th St
Phoenix, AZ 85044
Contact: Karen Richardson, Advertising
Coordinator
602-968-6241 FAX: 602-438-1690

Jensen Transformers Inc

10735 Burbank Blvd
N Hollywood, CA 91601
Contact: Dave Hill/Kris Ellis
213-876-0059 FAX: 818-763-4574

Jim Walters Co

5017 Kalaniana'ole Hwy
Honolulu, HI 96821
Contact: Jim Walters, Owner
808-373-2701 FAX: 808-373-4435

Jim West Company

6515 Laurel Valley
Dallas, TX 75248
Contact: Jim West, President

Jim Wood & Associates

1033 16th Avenue South
Nashville, TN 37212
Contact: Jim Wood, President

Joe Cipriano Promos

15237 Sunset Blvd #208
Pacific Palisades, CA 90272
Contact: Joe Cipriano

Joe Davis & Associates Inc

6900 E Camelback #410
Scottsdale, AZ 85251
Contact: Joe Davis

Joe Kelly, Inc.

1137 N Osborne Blvd
Racine, WI 53405-1717
Contact: Joe Kelly, President

Joel Raab Associates

5 Strong Place
Cobble Hill, NY 11231-3708
Contact: Joel S. Raab

John Furr & Associates

2700 NE Loop 410, Suite 325
San Antonio, TX 78217
Contact: John Furr, President
210-599-6511 FAX: 210-599-6635

John FX Browne & Associates

525 Woodward Avenue
Bloomfield Hills, MI 48013
, Marketing Manager

John E. Hillman Associates

P.O. Box 530335
Miami, FL 33153
Contact: Timothy J. Hillman,
Sales Manager
305-757-7661 FAX: 305-756-7749

John Nix

4215 Liberty Road South
Salem, OR 97302-5756
Contact: John Nix, President
800-321-4056

John Stapp & Co.

405 West Michigan #115
Kalamazoo, MI 49007
Contact: Beth Rood

Johnson Electronics

1000 Legion Place #1515
Orlando, FL 32801-1044
Contact: Robert W Peters
407-677-4030 FAX: 407-679-1288

Joint Communications Intl Corp

P.O. Box 70128
Marietta, GA 30007-0128
Contact: John Parikhal, CEO

Jolida Tube Factory

10820 Guilford Road, Suite 209
Annapolis Junction, MD 20701
Contact: John Bin, Advertising/Mkt. Manager
301-953-2014 FAX: 301-498-0554

Jorgenson Broadcast Brokerage

2700 W M. Luther King Blvd #400
Tampa, FL 33607-6377
Contact: Mark Jorgenson, Managing
Partner
813-877-3000 FAX: 813-877-4849

Joslyn Jennings Corp

970 McLaughlin Ave
San Jose, CA 95122
Contact: Dwane Gisi, Director of Marketing
408-292-4025 FAX: 408-286-1789

Jules Cohen & Associates P.C.

1725 Desales St NW, Ste 600
Washington, DC 20036
Contact: Robert W. Denny, Jr., President
202-659-3707 FAX: 202-659-0360

**Kallil & Co. Inc.**

3444 N country Club #200
Tucson, AZ 85716
Contact: Frank Kalil, President

Kathryn Schumacher & Assoc

1043 University Ave #142
San Diego, CA 92103
Contact: Kathryn Schumacher,
President/CEO

Kandel Electronics

P.O. Box 204
Oreland, PA 19075
Contact: Robert Kandel, President
215-233-6100 FAX: 215-886-7017

Katz Radio Group

One Dag Hammarskjold 28th Floor
New York, NY 10017
Contact: Darlene Fiscus,
Mgr/Publicity & Promo.

Kay Industries Inc

604 N Hill St
South Bend, IN 46617
Contact: Larry Katz, National Sales Mgr.
800-348-5257 FAX: 219-289-5932

Kayron

621 N Harvey Avenue
Oak Park, IL 60302
Contact: Hal Kaitchuck, President

KBE "Broadcasting By Design"

8116 San Francisco NE
Albuquerque, NM 87109
Contact: Karl Baehr, President
505-828-0488 FAX: 505-828-0488

Keating-Dahlin Technical Serv

PO Box 900283
San Diego, CA 92190
Contact: Steve Keating, Owner
619-277-0304 FAX: 619-277-6319

Kellner Electronics

Ferry Road
Charlotte, VT 05445
Contact: Charles Kellner

Kelper International Corp

25 W 43rd St
New York, NY 10036
Contact: Jacques Kellner,
President

R.L. Kennedy & Associates

PO Box 141
Waynesville, NC 28786
Contact: Richard L. Kennedy
704-648-3283

Kenneth R. Meades

PO Box 1469
Los Angeles, CA 90053
Contact: Kenneth R. Meades,
Owner
213-669-9670

Keymarket Group

2743 Perimeter Parkway #250
Augusta, GA 30909
Contact: Kerby Confer, CEO

Keystone Printed Specialties

1 Keystone Place
Jessup, PA 18434
Contact: John Lathrop,
Art Director

Kidder, Peabody & Co Inc.

10 Hanover Square
New York, NY 10005
Contact: Richard Intrator,
Senior Vice President

Killer Music

6532 Sunset Blvd
Los Angeles, CA 90028
Contact: Dain Eric Blair,
Executive Vice President

Kingdom Technology

P.O. Box 1145
Ft Walton Beach, FL 32549-1145
Contact: David R. Benoit, Owner
904-664-6492

Kings Electronics Co Inc

40 Marbledale Rd
Tuckahoe, NY 10707
Contact: Robert A. Dock, VP Sales &
Marketing
914-793-5000 FAX: 914-793-5092

Kintronic Laboratories Inc

Box 845, 144 Pleasant Grove Rd
Bristol, TN 37621-0845
Contact: Tom King, President
615-878-3141 FAX: 615-878-4224

Klark-Teknik

200 Sea Lane
Farmingdale, NY 11735
Contact: Allan Nichols,
Sales Manager
516-249-3660 FAX: 516-420-1863

Kline Towers

P.O. Box 1013
Columbia, SC 29202
Contact: Jerry Kline, President

KM Records Inc

2980 N Ontario Street
Burbank, CA 91504
Contact: Bill Riley,
Vice President of Sales

Kosmik Audio Products Inc

P.O. Box 1061
Longmont, CO 80502-1061
Contact: Bob Koss, President

Kozacko-Horton Company

P.O. Box 948
Elmira, NY 14902
Contact: Richard Kozacko, President
607-733-7138 FAX: 607-733-1212

Kris Stevens Enterprises

14241 Ventura Blvd #204
Sherman Oaks, CA 91423
Contact: Kris Erik Stevens, President
818-981-8255 FAX: 818-990-4350

Kronwall Communications

Rt 1 Box 1126
Lake Geneva, WI 53147
Contact: Dave Kronwall

LBS Radio

875 Third Avenue
New York, NY 10022
Contact: Mike Weiden, President

LCR Systems

149 Ockley Drive
Shreveport, LA 71105-3022
Contact: Larry Clifton

LDL Communications Inc

14440 Cherry Lane Ct, No. 201
Laurel, MD 20707
Contact: G J Wilson, President
301-498-2200 FAX: 301-498-7952

L. Edge & Associates

366 Wall Street
Princeton, NJ 08540
Contact: H Thomas Forbes,
Consultant

L.J. Consulting

1010 S 26th Street
Sound Bend, IN 46615
Contact: Larry Shank

L & R Communications Limited

3504 Robs Drive, P.O. Box 1387
Suffolk, VA 23434
Contact: Bob Nelson, Branch Manager
804-539-8365 FAX: 804-539-2047

LPB Inc

28 Bacton Hill Rd
Frazer, PA 19355
Contact: John E. Devecka, Sales
215-644-1123 FAX: 215-644-8651

LMI Promotions

4751 Best Road #180
Atlanta, GA 30307
Contact: Mark Steward

LNR

180 Marcus Blvd
Hauppauge, NY 11788
Contact: Karen Robinson, Manager
Advertising & Promotions

Lahm, Suffa & Cavell, Inc.

3975 University Dr, Suite 450
Fairfax, VA 22030
Contact: Gary Cavell

Laighton Consulting

4950 Agnes Avenue
Valley Village, CA 91607
Contact: Doug Laighton

Lakeside Associates Inc

9271 Jernonimo Road #123-C
Irvine, CA 92718
Contact: Carl Yanchar,
President
714-770-6601 FAX: 714-770-6575

Lamp Technology Inc

1645 Sycamore Avenue
Bohemia, NY 11716
Contact: Janet Lang,
Marketing Director
800-533-7548 FAX: 516-567-1806

Landsman Media Inc

7 North Airmont Road #6
Suffern, NY 10901-5105
Contact: Dean Landsman,
President

Landy Associates Inc

412 Commerce Lane #A
Berlin, NJ 08009-9253
Contact: James E. Landy, President
609-767-0400 FAX: 609-767-4407

Larcan Communications Equip

6520 Northam Dr
Mississauga, ON L4V 1H9 CANADA
Contact: P C Turner, President
416-678-9970 FAX: 416-678-9977

Larry Bruce Communications

1344 Madonna Rd Ste 163
San Luis Obispo, CA 93405
Contact: Larry Bruce, President
805-546-0242 FAX: 805-546-0442

Lasalle Music & Pro Audio

993 Main Street
East Hartford, CT 06100-2233
Contact: Marek Stycos,
Pro Audio Mgr
617-536-2030 FAX: 617-536-4878

D N Latus & Co Inc

PO Box 1720
Helena, MT 59624
406-442-3940

Lawrence Behr Associates Inc

PO Box 8026
Greenville, NC 27835
Contact: Lawrence Behr, President
919-757-0279 FAX: 919-752-9155

Lawrence L Morton Associates

1231 Mesa Oaks Lane
Mesa Oaks, CA 93436-2309
Contact: Lawrence Morton, President
805-733-4275 FAX: 805-733-4793

Lazard Freres

1 Rockefeller Plaza
New York, NY 10020
Contact: Steve Rattner,
General Partner

Leader Instruments Corporation

380 Oser Ave
Hauppauge, NY 11788
Contact: Joe Fisher,
Product Marketing Manager
516-231-6900 FAX: 516-231-5295

Leaming Industries

15339 Barranca Pkwy
Irvine, CA 92718
Contact: Kim Litchfield,
Technical Sales
714-727-4144 FAX: 714-727-3650

Lee Bayley & Associates

3401 Plantation Drive
Irving, TX 75062
Contact: Lee Bayley, President
214-252-0099 FAX: 214-594-1352

Lee Randall

15611 Bluff Springs
San Antonio, TX 78247-2934
Contact: Lee Randall

Legacy Broadcasting Partners

11111 Santa Monica Blvd #1650
Los Angeles, CA 90025
Contact: Carl Hirsch

Leitch Incorporated

825K Greenbrier Circle
Chesapeake, VA 23320
Contact: John Walter,
President/General Manager
804-424-7920 FAX: 804-424-0639

Leitch Video International Inc

220 Duncan Mill Rd, Ste 301
Ontario, Canada M3B 3J5
Contact: David Strachan, International
Sales Manager
416-445-9640 FAX: 416-445-0595

Lenco

PO Box 348
Jackson, MO 63755
Contact: Jim Rhodes, Audio Prod Mgr

Leonine Technology

PO Box 32550
San Jose, CA 95152
Contact: John Leonard, Pres

Leventhal, Senter & Ierman

2000 K St NW #600
Washington, DC 20006-1809
Contact: Sally Buckman

Lexicon Inc

100 Beaver St
Waltham, MA 02154
Contact: Larry Rich, Bdct Sales Mgr
617-891-6790 FAX: 617-891-0340

Lift Display Inc

Riverside Place, 115 River Road
Edgewater, NJ 07020
Contact: Otto Schubert, President

Lightning Deterrent Corp

5321 South Kedzie Ave
Chicago, IL 60632
Contact: Don Hudalla, Mktg Mgr

Lightning Eliminators & Cnslt.

6687 Arapahoe Rd
Boulder, CO 80303
Contact: Ralph L. Auer, VP Marketing
303-447-2828 FAX: 303-447-8122

Lindahi Sales Corp

10680 SW Wedgwood Street
Portland, OR 97225
Contact: Bob Lindahl, President
503-644-9643 FAX: 503-227-3776

Lindco Commercial Audio

57 Glencoe Rd
Columbus, OH 43214
Contact: Christopher E Lind

Lindos

2028 Stoneman Street
Simi Valley, CA 93065-1127
Contact: Steve Dove, Technical Manager

Lineau Assoc Inc

5501 Twin Knolls Road #103
Columbia, MD 21045-3260
Contact: Sales Mgr

Lines Video Systems

219 S Jefferson
Springfield, MO 65806
Contact: Bud Lines, Vice President
417-862-5533 FAX: 417-862-1829

Charles J Lipow Inc

P.O. Box 2899
Canoga Park, CA 91306
Contact: Charles Lipow

Lipsner-Smith Company

4700 West Chase
Lincolnwood, IL 60646
Contact: Thomas A. Tisch, Dir. of Marketing
708-677-3000 FAX: 708-677-1311

Lita Broadcasting Dist

7138 NW 72nd Ave
Miami, FL 33166
Contact: Luis C. Endara, Pres
305-887-1223 FAX: 305-887-0405

Litronix Corp

6912 NW 72nd Ave
Miami, FL 33166
Contact: Luis C. Endara, Pres
305-887-1223 FAX: 305-887-0405

Logitek

3320 Bering Dr
Houston, TX 77057
Contact: Tag Borland, President
800-231-5870 FAX: 713-782-7597

Lohnes & Culver

8309 Cherry Lane
Laurel, MD 20707-4830
Contact: Robert Culver, Partner
301-776-4488

Lone Star Tower Co

P.O. Box 1009
San Angelo, TX 76902
Contact: Kenny Speciale, Owner

Lontos Sales & Motivation

P.O. Box 2874
Laguna Hills, CA 92654
Contact: Pam Lontos, President
714-831-8861 FAX: 714-831-8645

Lowrey Tower Service

P.O. Box 573
Lorena, TX 76655
Contact: Skip Lowrey, President

Loral Microwave-Narda

435 Moreland Rd
Hauppauge, NY 11788
Contact: Robert Johnson, Manager,
Instrument Applications
516-231-1700 FAX: 516-231-1711

Lyle Cartridges

115 S Corona Ave
Valley Stream, NY 11582
Contact: Eric Lewinter, VP
800-221-0906 FAX: 516-561-7793

**M A Benington Inc**

2459 Cuchura Drive
Birmingham, AL 35244
Contact: Mike Benington, President

M/A-Com Mac Inc

347 Rogers Street
Lowell, MA 01852-4345
Contact: Yong Lee, Pres
617-272-3100 FAX: 312-635-3032

Mackenzie Laboratories Inc

P.O. Box 3029
Arcadia, CA 91006
Contact: A R Taylor

MC Communications

13140 Coit Road, Suite 515
Dallas, TX 75240
Contact: Catherine Minster, Account Exec.

MCG Electronics

12 Burt Dr
Deer Park, NY 11729
Contact: James P Lane, Ad Coordinator
800-851-1508 FAX: 516-586-5120

MCL Inc

501 S Woodcreek Road
Bolingbrook, IL 60440-4999
Contact: Frank Morgan, Ad Manager
708-759-9500 FAX: 708-759-5018

MDL/Microwave Devlp Lab Inc

10 Michigan Dr
Natick, MA 01760

MIT Inc

14130 NW Science Park Dr
Portland, OR 97229
Contact: Mo Wagner, Pres

M.R.N. Radio

P.O. Box 2888
Daytona Beach, FL 32115
Contact: John McMullin, President

MKA Systems c/o Miller Kaplan

10911 Riverside Drive
N Hollywood, CA 91602
Contact: George Riven

MXR Innovations

215 Tremont St C/O App Resch
Rochester, NY 14608
Contact: Mitch Milton

Mackle Designs

12230 Woodinville Dr.
Woodinville, WA 98072
Contact: ick Vartian,
MIDI Dev/ Prod Support
206-487-4333 FAX: 206-487-4337

Maclaren Communications

2021 Wethersfield Court
Reston, VA 22091
Contact: Jason Taylor, President

Mag-Head Engineering Co.

686 Mendelssohn Avenue
Minneapolis, MN 55427
Contact: Gary Hoonsbeen, Sales
800-433-8522 FAX: 612-545-1321

Magnifax Int

Rt 1
Rogers, AR 72756
Contact: Dennis W. Tallakson, Pres
501-925-1818 FAX: 501-925-1841

Magnetic Reference Laboratory

229 Polaris Ave Ste 4
Mountain View, CA 94041
415-965-8187 FAX: 415-965-8548

Magni Systems Inc

9500 SW Gemini Drive
Beaverton, OR 97005
Contact: Ed Kiyoi, Domestic
Sales/Marketing Manager
503-626-8400 FAX: 503-626-6225

Magnum Towers Inc

9370 Elder Creek Road
Sacramento, CA 95829
Contact: Lawrence Smith, President
916-381-5053 FAX: 916-381-2144

Magrill Engineering

PO Box 1010
Fairfield, FL 32634
Contact: Barry Magrill, Owner
904-591-3005

Major Custom Cable Inc

HCR 61 Box 82
Attenburg, MO 63732
Contact: Jody Overbey, General Manager
314-824-5212 FAX: 314-824-5215

Malarkey-Taylor Associates

1130 Connecticut Ave NW, #700
Washington, DC 20036
Contact: Tony Kern, Vice President
Financial Services

Mairite Communications Group

1660 West Second Street
Cleveland, OH 44113-1454
Contact: Milton Maltz, Chairman/CEO

The Management

PO Box 1-36457
Ft Worth, TX 76136
Contact: Peter Charlton, Pres
800-334-7823 FAX: 817-624-9741

Manger Eng-Beau Motors Div.

Bethmour Road
Bethany, CT 06524
Contact: Paul Manger, President
203-288-9351 FAX: 203-735-4543

Manhattan Production Music

311 West 43rd Street #702
New York, NY 10036
Contact: Ron Goldberg, National Sales
Manager
800-227-1954 FAX: 212-262-0814

Manlon Outdoors

211 N Broadway
Green Bay, WI 54303-2757
Contact: Ms Derse Smith Todd, Sales
Promo Dir

Marantz Professional Products

700 North Commerce
Aurora, IL 60504
Contact: Mehdi Alister, General Manager
708-820-4800 FAX: 708-820-8103

Marathon Products

69 Sandersdale Road, Box 623
Charlton, MA 01507
Contact: Richard Myers Sr., Pres/Owner
508-248-3157

Marcom

PO Box 66507
Scotts Valley, CA 95066
Contact: Martin Jackson, President
408-438-4273 FAX: 408-438-6617

Marconi Communications

11800 Sunrise Valley, 10th Floor
Reston, VA 22091-5302
Contact: John White, Marketing

Marketing Horizons Inc

1001 Craig Road #100
St. Louis, MO 63144-5277
Contact: Earl W Wims Phd, Chairman

Marketing Technics

6666 N Oliphant
Chicago, IL 60631
Contact: George Vadik, Ad Mgr

Marketron Inc

101 Lincoln Center Drive #300
Foster City, CA 94404
Contact: Jerome Cronin, President

Mark IV Audio

9900 Baldwin Place
El Monte, CA 91731
Contact: Rick Sanchez, Bdct & Prod. Mktg. Mgr.
800-877-1771 FAX: 818-444-1342

Marti Electronics

P.O. Box 661
Cleburne, TX 76031
Contact: Dan Rau,
Director of Sales & Marketing
817-645-9163 FAX: 817-641-3869

Martin Audio Video Corp

423 West 55 St
New York, NY 10019
Contact: Joseph Helguera, Advertising & Mkt.
212-541-5900 FAX: 212-541-9129

Mastertone-Tapex Co., Inc.

3608 Davison Road
Des Moines, IA 50310
Contact: Vic Blacketer, Owner-Sales Mgr.
515-255-3232 FAX: 515-274-3087

Master Software Systems

3565 Green Street
Muskegon, MI 49444
Contact: Kenneth Norton, Division Manager
616-726-2837 FAX: 616-733-1107

Maxagrid International Inc

1350 Walnut Hill Lane #135
Irving, TX 75038
Contact: James Tiller Jr, President/CEO

Maxtec International Corp

6470 W Cortland Street
Chicago, IL 60635
Contact: Gregg Elmore, Advertising
Manager

May & Reeves Advertising

450 Harvard Avenue #2R
Santa Clara, CA 95051-6445
Contact: Jaci Reeves

McCarter Electronics

5940 Kayron Drive NE
Atlanta, GA 30328
Contact: David Moore

McClain Enterprises

P.O. Box 23344
Nashville, TN 37202-3344
Contact: Carolyn McClain, President

McClanathan & Associates, Inc.

P.O. Box 939
Portland, OR 97207-0939
Contact: Robert A. McClanathan, President
503-246-8080 FAX: 503-246-6309

McCurdy Radio Industries

108 Carnforth Rd
Toronto ON M4A 2L4 Canada
Contact: Omar Fattah
416-751-6262 FAX: 416-751-6455

McKenney Broadcast Engineering

Route 3 Box 205
Russellville, AR 72801
Contact: Bill McKenney, President

McMartin Incorporated

P.O. Box 309
Elkhorn, NE 68022-0309
Contact: John Miller, President
712-366-1300 FAX: 712-366-3915

McVay Media Inc

2001 Crocker Road #260
Cleveland, OH 44145
Contact: Michael McVay, President

Media & Marketing

11288 Ventura Blvd #462
Studio City, CA 91604
Contact: Mel Lambert, President

Media America Promotions

11 West 42nd Street, 27th Floor
New York, NY 10036
Contact: Gary Schonfeld, President

Media/ Communications Partners

75 State Street #2500
Boston, MA 02109
Contact: John G. Hayes, Associate
617-345-7200 FAX: 617-345-7201

Media Computing Inc

3506 East Meadow Dr
Phoenix, AZ 85032
Contact: Larry L Baum, Mgr. Tech. Operations
602-482-9131 FAX: 602-992-6572

Media Concepts Inc

8210 E 71st St, Suite 310
Tulsa, OK 74133-2908
Contact: Marvin Lane

Media Consultants Inc

119 Hamilton Road
Ridgewood, NJ 07450
Contact: Paul Anovick, President

Media Designs

100 Park Avenue, 5th Floor
New York, NY 10017
Contact: Scott Randall, President

Media Graphics

821 Virginia Ave.
Langhorne, PA 19047
Contact: Bob Jeffrey, Owner

Mediamark

413 Boylston Street 7th fl
Boston, MA 02116-3314
Contact: Tony Franceschelli, President

Media Perspectives

606 Cooper Landing Rd, Bldg A St4B
Cherry Hill, NJ 08002
Contact: Steven Apel, President
609-482-7979 FAX: 609-482-0957

Media Research Graphics

4615 Rubio Avenue
Encino, CA 91436
Contact: Allen Klein, President

Media Services Group

446 Third Street
Neptune Beach, FL 32266
Contact: George Reed, Vice President

Media Services Group

P.O. Box 3724
Arlington, VA 22203-0724
Contact: Mitt Younts, President

Media Specialists

4955 E Andersen Avenue, #140
Fresno, CA 93727-1521
Contact: John Lee Walker, President

Media Star International

11 W 42nd Street, 27th Floor
New York, NY 10036
Contact: Dan Forth

Media Touch Music

13450 Spring Grove Avenue
Dallas, TX 75240
Contact: David Gerety, Director of Sales
603-893-5104 FAX: 603-893-6390

Media Venture Partners

1650 Tysons Blvd #790
McLean, VA 22102
Contact: Charles Giddens, President
703-827-2727 FAX: 703-827-2728

- Media Vision**
8609 Springdell Place
Chevy Chase, MD 20815
Contact: Deborah cover-Lewis,
President
- Media Works**
P.O. Box 142
Merrick, NY 11566
Contact: Ron Yurman, Partner
- Medvision Ltd**
10655 NE 4th, #404
Bellevue, WA 98004
Contact: Bill McMahon, President
- Merlin Engineering Works**
1880 Embarcadero
Palo Alto, CA 94303
Contact: John Streets, Pres
- Metropolis Audio Marketing Inc**
1199 Amboy Ave
Edison, NJ 08837
Contact: Tom Bensen
- Meyer Marketing**
258 S Military Trail
Deerfield Beach, FL 33442
, Sales Manager
- MF&A**
100 W Market, #200
Leesburg, VA 22075
Contact: Paul Draisay
- Michael Fox Auctioneers**
3835 Naylor's Lane
Baltimore, MD 21208
Contact: William Fox, Chairman
- Micro Communications Inc**
PO Box 4365
Manchester, NH 03108-4365
Contact: Jennie E. Allen,
Inside Sales & Advertising
603-624-4351 FAX: 603-624-4822
- Micro Controls Inc**
228 NE Wilshire, Suite E
Burlington, TX 76028
Contact: Jeff Freeman, President
817-295-0965
- Micro Phase Communications Inc**
999 C Edgewater Blvd, #138
Foster City, CA 94404
Contact: Roger K. Parr,
President
415-368-8379
- Micro Technology Unlimited**
P.O. Box 21061
Raleigh, NC 27619-1061
Contact: Dave Cox, President
- Microdyne Corporation**
491 Oak Road
Ocala, FL 32672
Contact: Thomas H. Kidd, International
Sales Manager
904-687-4633 FAX: 904-687-3392
- Micron Audio Products Ltd**
410 Garibaldi Avenue
Lodi, NJ 07644-3710
914-761-6520
- Microtime Inc**
1280 Blue Hills Ave
Bloomfield, CT 06002
Contact: Chris Smith, G. Mathias
- Microtran Co**
145 East Mineola Ave PO Box 236
Valley Stream, NY 11582-0236
Contact: Janet Drobnicki,
Advertising Dept.
516-561-6050 FAX: 516-561-1117
- Microwave Data Systems**
300 Main Street
East Rochester, NY 14445
Contact: Paul Jacobs
- Microwave Filter Co**
6743 Kinne St
E Syracuse, NY 13057
Contact: Elizabeth Buck,
Mktg. Research/Publicity
800-448-1666 FAX: 315-463-1467
- Microwave Networks Inc**
10795 Rockley Road
Houston, TX 77099
Contact: Milton Lutz
- Mid-America Automation Corp**
1822 Laramie
Manhattan, KS 66502
Contact: Dave McFarland, Pres
913-537-3289
- Midas**
200 Sea Lane
Farmingdale, NY 11735
Contact: Allan Nichols, Sales Manager
516-249-3660 FAX: 516-420-1863
- MidAmerica Electronics Service**
410 Mt Tabor Road
New Albany, IN 47150
Contact: Peter C.L. Boyce, President
812-945-1209 FAX: 812-945-1859
- Mid-Continent Tech Services**
4878 Castle Lane
San Antonio, TX 78218
Contact: F Lee Thompson, Consult Engineer
- Midlen & Guillot**
3238 Prospect St, N.W.
Washington DC 20007
Contact: Greg Guillot, Partner
202-333-1500 FAX: 202-333-6852
- Mid-Maine Remodeling**
809 Unity Road
Benton, ME 04927
Contact: Joe McSwain
- Mid-State Comm & Electronics**
One Clear Road
Oriskany, NY 13424
Contact: David Stevenson, Prject
Management
315-736-3061 FAX: 315-736-8250
- Mike Joseph**
11 Punchbowl Drive
Westport, CT 06880
Contact: Mike Joseph, President
- Mile High Tower Services**
P.O. Box 8
Shirley, AR 72153
Contact: Chuck Horn, President
- Miller & McCall**
11103 West Avenue #200
San Antonio, TX 78213-4915
Contact: Douglas McCall, Vice President
- Miller Tower Company**
60 West 57th street, Suite 5E
New York, NY 10019
Contact: Keith Miller, Vice President
212-582-2063 FAX: 212-262-2416
- Milton Q. Ford & Associates**
4006 Baronne Way
Memphis, TN 38117
Contact: Milton Ford, President
- Mirkwood Engineering**
50 Park Avenue
Claremont, NH 03743
Contact: Gary Savoie
- Milam Audio Co**
1470 Valle Vista
Pekin, IL 61554
Contact: Ken Musselman, Sales Mgr
309-346-3161 FAX: 309-346-6431
- Mitch Craig Productions**
P.O. Box 241655
Memphis, TN 38124-1655
Contact: Mitch Craig, President
- Jay Mitchell Assoc**
PO Box 1285, Route 2
Fairfield, IA 52556
Contact: Jay Mitchell, President
515-472-4087 FAX: 515-472-6457
- Mitsubishi International Corp**
1597 McCandless Drive
Milpitas, CA 95035
415-651-9931
- Mitsubishi Pro Audio Group**
27771 Ave Hopkins
Valencia, CA 91355
Contact: William E Windsor,
Sr Mktg Exec
818-898-2341
- MJI Broadcasting**
666 Fifth Avenue, 34th Floor
New York, NY 10103
Contact: Josh Feigenbaum,
President
- MJM Research**
11539 W 83rd Terrace
Lenexa, KS 66215
Contact: C.C. McCartney,
President
- Modular Audio Products**
Brookhaven R&D Park 1 Roned Rd
Shirley, NY 11967
Contact: Peter Visconti, Mktg Mgr
- Modulation Sciences Inc**
12A World's Fair Drive
Somerset, NJ 08873
Contact: Eric Small, President
908-302-3090 FAX: 908-302-0206
- Moffet, Larson & Johnson Inc**
5203 Leesburg Pike, Suite 800
Falls Church, VA 22041
Contact: Wallace E. Johnson,
President
703-824-5660 FAX: 703-824-5672
- Mo' Money Associates**
P.O. Box 12591
Pensacola, FL 32574
Contact: Cliff Mowe, President
- Monfort Electronics Mkt**
8788 Robbins Rd
Indianapolis, IN 46268
Contact: Sales Mgr
FAX: 317-876-2384
- Monroe Electronics Inc**
100 Housel Ave
Lyndonville, NY 14098
Contact: Roland Phillips,
Applications Engineer
716-765-2254 FAX: 716-765-9330
- Moody Broadcasting Network**
820 N. Lasalle Drive
Chicago, IL 60610
Contact: Bob West,
Director of Network Development
- Morcom International**
5130 Duke Street, Suite 6
Alexandria, VA 22304
Contact: Manuel Ojeda
703-750-3414
- Morgan Capitol/A Wayne**
1202 Nueces Street
Austin, TX 78701
Contact: Barbara Morgan, President
- Morgan Stanley & Co**
1251 Ave of the Americas 29th Flr
New York, NY 10020
Contact: Paul Taubman, Associate
- Moseley Associates Inc**
111 Castilian Dr
Santa Barbara, CA 93117
Contact: J. Hamdani/D. Chancey,
Exec. VP & COO/Natl Sales Manager
805-968-9621 FAX: 805-685-9638
- Motorola AM Stereo**
1216 Remington Rd
Schaumburg, IL 60173
Contact: Steve Kravitz
312-576-0554 FAX: 312-576-3258
- MRRN Radio**
1801 International Speedway Blvd
Daytona Beach, FL 32114
Contact: John McMullin, President/GM
904-254-6760 FAX: 904-254-6716
- Muddy Mitch Productions**
4315 Azalea #220
Liste, IL 60532
Contact: Mitch Donars, President
- Mullaney Engineering Inc**
9049 Shady Grove Court
Gaithersburg, MD 20877
Contact: John J Mullaney, President
301-921-0115 FAX: 301-590-9757
- Multicomm Telecommunications**
2004 South 800 East
Salt Lake City, UT 84105-3107
Contact: Bev Schronce
- Multilink**
6220 Owensmouth Ave #365
Woodland Hills, CA 01367-2207
Contact: John Ulrick, Pres
- Multiphase Consulting**
5827 Columbia Pike Ste 310a
Falls Church, VA 22041
Contact: John Bisset, Project Manager
703-379-1665 FAX: 703-998-2966
- Multi-Technical Services**
150 Clayton Commerce Center
Clayton, NC 27520
Contact: Lyn Williams, Technical Director
- Murphy Studio Furniture**
4153 N Bonita St
Spring Valley, CA 92077
Contact: Dennis Murphy, Pres
619-698-4658 FAX: 619-698-1268
- Music Director Programming**
PO Box 51978
Indian Orchard, MA 01151
Contact: Budd Clain, General Manager
413-783-4626 FAX: 413-783-3168
- Musicminder**
216 Grace Avenue
Sacramento, CA 95838
Contact: Richard Irwin
- Music Scan**
3000 Riverchase Gall #1111
Birmingham, AL 35244
Contact: Mark Schreiber,
Director of Sales
- The Musicworks Inc**
128 Holiday Ct Ste 114
Franklin, TNN 37064-1397
615-790-1200
- Mutual Broadcasting System**
1755 S Jefferson davis Highway
Arlington, VA 22202
Contact: Jack Clements, President
- Myat Inc**
380 Chestnut Street, P.O. Box 425
Norwood, NJ 07648-0425
Contact: Philip Cindrich, President
201-767-5380 FAX: 201-767-4147

NKT Elektronik

Brondbystervej 95
Golstrup, DK-2600 Denmark

Nady Systems Inc

6701 Bay Street
Emeryville, CA 94608
Contact: Tono Rondone,
Ad Director
510-652-2411 FAX: 510-652-5075

Nakamichi America Corp

19701 S Vermont Ave
Torrance, CA 90502
Contact: Kim Wilson,
Nat'l Sales Coordinator, Pro Audio
213-538-8150 FAX: 213-324-7614

Nalpak Video Sales Inc

1937-C Friendship Dr
El Cajon, CA 92020
Contact: Robert Kaplan, President
619-258-1200 FAX: 619-258-0925

Narac Bdcst

10406 N LA Highway 169
Belcher, LA 71004-7705
Contact: P Palagonia

Nards Inc.

1446 Emerson Avenue
McLean, VA 22101
Contact: Mike Nardella, President

Nasdaq

1735 K Street NW
Washington, DC 20006
Contact: Craig Thompson

Natl Assoc of Home Builders

15th & M Street NW
Washington, DC 20005
Contact: Spencer Levine

National Audio Co Inc

Box 3657, G.S.
Springfield, MO 65808
Contact: Steve Stepp, President
417-863-1925 FAX: 417-863-7825

National Black Network

463 Seventh Avenue
New York, NY 10018
Contact: Sydney L Small,
Chairman

National Broadcast Talent Coor

Dept R/ P.O. Box 20551
Birmingham, AL 35216
Contact: Wynn Alby, President

National Broadcasting School

2532 Wild Oak Drive
Los Angeles, CA 90068-2563
Contact: Bill Brock, President

National Cassette

613 N Commerce Street
Front Royal, VA 22630
Contact: Paul Brown,
General Manager

National Guard Bureau

5109 Leesburg Pike #401A
Falls Church, VA 22041
Contact: Joseph Johnston

National Supervisory Network

PO Box 578
Avon, CO 81620
Contact: Bill Sepmeier, Pres
800-345-8728

Nationwide Communications

One Nationwide Plaza
Columbus, OH 43216
Contact: Steve Berger

Nautel Electronic Laboratories

Hacketts Cove, RR 1
Tantallon, NS B0J 3J0 CANADA
Contact: Jorgen Jensen,
Manager Sales & Marketing
902-823-2233 FAX: 902-823-3183

Nautel Maine Inc.

201 Target Industrial Circle
Bangor, ME 04401
Contact: Jorgen B. Jensen, Manager Sales
& Marketing
207-947-8200 FAX: 207-947-3693

NBC Radio Network

1700 Broadway
New York, NY 10019
Contact: William J Battison, President

NEA Tower Services

2206 Mary Jane
Jonesboro, AR 72401
Contact: David Primm, Owner

Neotek Corp

1154 W Belmont
Chicago, IL 60657
Contact: Tom Lay, Marketing Director
312-929-6699 FAX: 312-975-1700

Netcom

1465 Palisade Avenue
Teaneck, NJ 07666
Contact: James Tronolone, President
201-837-8424 FAX: 201-837-8384

Netwell Noise Control

6125 Blue circle Drive
Minnetonka, MN 55423-3835
Contact: Mark Rustad, President
800-638-9355 FAX: 612-939-9836

Network Production Music Inc

16935 W Barnardo Drive, #100
San Diego, CA 92127
619-451-6400

The Network

5423 Ramblewood Lane, S.E.
Olympia, WA 98503
Contact: Katherine Arnold

Neumade Products Corp

200 Connecticut Ave
Norwalk, CT 06584
Contact: Jeff Buchanan,
Account Executive
203-866-7600 FAX: 203-866-7522

Neumann

6 Vista Drive
Old Lyme, CT 06371
Contact: Jeff Alexander, Product Manager

Neutrik USA Inc

195-53 Lehigh Avenue
Lakewood, NJ 08701-4527
Contact: James Cowan, General Manager

Rupert Neve Inc

Berkshire Industrial Pk
Bethel, CT 06801
Contact: Barry Roche, Pres
203-744-6230

Newcity Communications

10 Middle Street
Bridgeport, CT 06604
Contact: Dick Ferguson, President

New England Media Inc

102 Swanton Road
St. Albans, VT 05478
Contact: David Kimel, President

New Resource

28 Mount Blue St
Norwell, MA 02061
Contact: Sales Mgr

New World Music & Sound

5620 Keamy Mesa Rd
San Diego, CA 92111
Contact: Jim Scott, Owner
800-854-2005 FAX: 619-569-2040

Norman Fischer & Associates

1209 Parkway
Austin, TX 78703
Contact: Norman Fischer, President
512-476-9457 FAX: 512-476-0540

Nitty Gritty Record Care

4650 Arrow Hwy, Suite F4
Montclair, CA 91763
Contact: Michael Baskind, National Sales
Mgr
714-625-5525

Nick Anthony & Associates

399 Great Oaks Trail
Wadsworth, OH 44281
Contact: Nick Anthony, President
216-336-4570 FAX: 216-336-0312

Norac Industrial Services, Inc

P.O. Box 771
Gray, ME 04039
Contact: Paul Caron, President
207-657-3579

Nordic Software

917 Carlos Drive
Lincoln, NE 68505-2059
Contact: James Wrenholt, President
402-488-5086 FAX: 402-488-2914

Normex Electronic Co. Ltd.

55 Montpellier Blvd
St Laurent, PQ, H4N 2G3 CANADA
Contact: Jerome Masson, Vice
President/General Manager
514-748-7811 FAX: 514-744-2797

North American Network

2316 18th Street NW
Washington, DC 20009
Contact: Tom Sweeney, President

North Coast Marketing

707 West 10th St
Erie, PA 16502
Contact: Sales Mgr

Northeast Broadcast Lab Inc

PO Box 1179
S Glen Falls, NY 12803
Contact: Gary Crowder, Director of
Marketing & Sales
800-227-1093 FAX: 518-793-7423

Northeastern Telecommunication

234 East College Avenue
State College, PA 16801
Contact: Reza Karamooz, President

Northern Transdata Networks

2 Fleets Point Drive
West Babylon, NY 11704-8304
Contact: Angela De Pascale, Industry Sales
Manager

North Star Tower

P.O. Box 462
Canton, NY 13617
Contact: John Liptak, Owner
315-386-4932 FAX: 315-379-0951

Northwestern Inc

15938 SW 72nd Avenue
Portland, OR 97224-7936
Contact: Robert Lindahl, Pres
800-547-2252

Nortronics Co Inc

1000 Superior Blvd #302
Wayzata, MN 55391
Contact: Jim Tusing, Director of Sales
612-545-0401 FAX: 612-540-8678

Nott, Ltd

4001 La Plata Highway
Farmington, NM 87401
Contact: Ron Nott, President
505-327-5646 FAX: 505-325-1142

Nova Communications

408 E 6th Street
Front Royal, VA 22630
Contact: Keith Arnett, Owner

NPR Satellite Services

2025 M Street, NW
Washington, DC 20036
Contact: Miriam Lenett, Marketing
Specialist

Fred A. Nudd Corporation

1743 Route 104, P.O. Box 577
Ontario, NY 14519
Contact: Tom D. Nudd, Director of
Sales/Engineering
315-524-2531 FAX: 315-524-4249

Rick Nudd Ltd

4897 Arbor Rd
Walwort, NY 14568
Contact: Rick Nudd, Owner
315-524-5495

Numark Electronics

P.O. Box 729
New York, NY 10018-0968
Contact: Todd M. Jensen, Sales/Service
Manager
908-225-3822 FAX: 908-287-2155

Nytone Electronics

2424 South 900 West
Salt Lake City, UT 84119

NZ Marketing

602 W Fir Street
San Diego, CA 92101
Contact: John Peterson, General Manager

Oakwood Audio Labs, Ltd

652 King Edward St
Winnipeg, MB R3H 0P2 CANADA
Contact: Ron Paley, Broadcast Sales
Manager
204-786-6715 FAX: 204-783-5805

Ocean Audio Inc

366 Las Cases Avenue
Pacific Palisades, CA 90272
Contact: David Hadler, President
213-459-2743 FAX: 213-454-6043

O'Connor Creative Services

P.O. Box 5432
Playa Del Rey, CA 90296
Contact: Harry O'Connor, President

O'Grady & Associates

P.O. Drawer D
Goshen, NY 10924
Contact: Jim O'Grady, President

Old Dominion Bdct Engr Service

9505 Lakewater Ct
Richmond, VA 23229
Contact: Sam Straus, President
804-740-4717 FAX: 804-740-4717

Olympia Broadcasting Networks

7745 Carondelet Avenue
St Louis, MO 63105-3315
Contact: Stephen Buryard,
President

Omega Communications Company

109 Moore Street
Moorestown, NJ 08057-1218
Contact: Robert L. Eboch, Jr, Owner
609-234-2118

Omega International

6 Hutton Center Drive, #800
Santa Ana, CA 92707
Contact: Mark Hutchins
714-553-0564 FAX: 714-553-0533

Omega Scientific Corporation

4246 Gate Crest
San Antonio, TX 78127
Contact: Carl Milam, Vice President

Omnia Group Inc

601 South Boulevard
Tampa, FL 33606
Contact: Dale Smrekar,
Vice President
800-525-7117 FAX: 813-254-8558

Omni-Lambda

P.O. Box 39
Burk, NY 12917
Contact: Peter Holt

Omnimusic
52 Main Street
Port Washington, NY 11050
Contact: Laura Johnson,
Executive Assistant
800-828-6664 FAX: 516-944-6586

Omnisoft Systems
P.O. Box 167581
Oregon, OH 43616
Contact: Lew Dickey, Partner

Omnitronix
1374 Cinnamon Drive
Ft Washington, PA 19034
Contact: David Solt, President
215-542-9580 FAX: 215-542-9582

One Stop Broadcast Supply
2210 S M Street
Oxnard, CA 93033-7147

Opamp Labs Inc
1033 N Sycamore Ave
Los Angeles, CA 90038
Contact: B Losmandy, Manager
213-934-3566 FAX: 213-462-6490

Orban Associates, Div of AKG
1525 Alvarado Street
San Leandro, CA 94577
Contact: David Roudabush,
National Sales Manager
510-351-3500 FAX: 510-351-0500

Douglas Ordon & Company Inc
4646 West McLean Avenue
Chicago, IL 60639-3428
Contact: Greg Groeper,
Sales Manager
312-889-5532 FAX: 312-889-2308

Orion Pictures
1888 Century Park East
Los Angeles, CA 90067
Contact: Christine La Monte,
Sr VP Publicity

Ortofon Inc
122 Dupont St
Plainview, NY 11758
Contact: Michele Port
516-349-9180

Osborn Communications
405 Lexington Avenue 54th Floor
New York, NY 10174
Contact: Frank Osborn, President

Otari Corporation
378 Vintage Park Dr
Foster City, CA 94404
Contact: John Carey,
VP Sales and Marketing
415-341-5900 FAX: 415-341-7200

Ott & Associates
9225 Chatham Grove Lane #D
Richmond, VA 23236
Contact: Rick Ott, President

Owl Engineering
1306 West County Rd F, Suite 105
St. Paul, MN 55112
Contact: Garrett G. Lysiak, P.E., Owner
612-631-1338 FAX: 612-631-3502

Oval Window
251 W Central St, Suite 111
Natick, MA 01760
Contact: Bob Gilmore, Marketing Director

Professional Audio Supply
5700 E Loop 820 S
Ft Worth, TX 76119-7099
Contact: Lee Edwards, VP/Marketing
817-483-7474 FAX: 817-483-9952

PME
2400 Natoma Station Drive #104
Folsom, CA 95630-8154
Contact: William Fink, Consultant

Pacific Rcdrs & Engineering
2070 Las Palmas Dr
Carlsbad, CA 92009
Contact: Jack Williams, President
619-438-3911 FAX: 619-438-9722

Paia Electronic Inc
3200 Teakwood
Edmond, OK 73013
Contact: Linda Kaye, Exec VP

Paladin Corp
3543 Old Conejo Rd, No. 102
Newbury Park, CA 91320
Contact: Harriet Diss,
Sales & Marketing Administrator
800-272-8665 FAX: 800-272-5257

Palex Co
6330 Ashdale Rd
Cleveland, OH 44124
Contact: H Heller, CE

PAMS Jingles
4631 Insurance Lane
Dallas, TX 75205
Contact: Ben Freedman, President
800-522-7267 FAX: 114-521-8578

Pan American Satellite
One Pickwick Plaza
Greenwich, CT 06830
Contact: Kate Whiting

Panasonic Industrial Co
One Panasonic Way
Secaucus, NJ 07094
Contact: Ad Mgr
201-348-7620

Panasonic/Prof Audio Systems
6550 Katella (Ramsa Division)
Cypress, CA 90630
Contact: Steve Woolley,
Sales & Marketing Manager
714-373-7277 FAX: 714-373-7903

Paragon Research
550 S Wadsworth Blvd #401
Denver, CO 80226
Contact: Roger Wimmer,
President

Paramount Communications Syst
304 Elm Terrace
Atco, NJ 08004-1024
Contact: Michael Moskowitz,
President
609-869-0222 FAX: 609-753-8785

Paramount Pictures
5555 Melrose Avenue
Los Angeles, CA 90038
Contact: Cheryl Boone Isaacs, Sr VP
National Publicity

Parcom Inc
7136 Clarendon St.
San Jose, CA 95129-3511
Contact: Darryl E. Parker, President
817-481-7221 FAX: 817-488-7615

Park Leasing Co
PO Box 1719
Des Moines, IA 50306
Contact: Bob Arnold, Pres

Parsons Audio
192 Worcester St
Wesley Hills, MA 02181
Contact: Mark Parsons, Owner
617-431-8708 FAX: 617-431-8710

Patch Bay Designation
4742 San Fernando Rd
Glendale, CA 91204
Contact: Scott Lookholder, Ad Mgr
818-241-5585

Pathfinder Consulting
1145 Kensington Road
Kensington, CT 06037
Contact: Daniel Hayden,
President

Patrick Bdctg Consulting
607 Greenwood Avenue
Lehigh Acres, FL 33936-4027
Contact: Joe Patrick, President

Patrick Communications
P.O. Box 134
Glenelg, MD 21737-0134
Contact: Larry Patrick, President

Patrick Programming Services
1730 Minor Avenue #1270
Seattle, WA 98101
Contact: Terry Patrick, President

Pat Thompson Company
3200 Cherry Creek South Drive #500
Denver, CO 80209-3246
Contact: Pat Thompson, CEO

Paul Dean Ford, P.E.
3775 West Dugger Avenue
West Terre Haute, IN 47885-9794
Contact: Paul Dean Ford, Owner
812-535-3831 FAX: 812-535-3341

Paul Kagan Associates
126 Clock Tower Place
Carmel, CA 93923
Contact: Paul Kagan, President

POA/ Products Group
PO Box 410, 701 County Line Road
Palmer Lake, CO 80133-0410
Contact: Frank Hofmeister,
Managing Associate
719-488-2270 FAX: 719-488-2648

Payne Engineering
Route 5, Box 20
Chickasha, OK 73018
Contact: Chris Payne, Owner
405-224-3470 FAX: 405-222-4131

PC Boards
2110 14th Ave, South
Birmingham, AL 35205
Contact: Ralph Lindstrom, Owner
205-933-1122 FAX: 205-933-2954

Peak Audio
3107 Bedlington Pl
Holland, PA 18966
Contact: M Sirkis

Pearson Presentations
7704 Willow Wind Court #101
Dallas, TX 75230-5645
Contact: Pat Pearson, President

Peavey Electronics Corp
711a St Box 2898
Meridian, MS 39301
Contact: Lance Schmidt,
Sales & Mktg Dir
601-483-5365 FAX: 601-464-4278

Pelrice-Phelps Inc - AVSD
2000 North 59th St
Philadelphia, PA 19131
Contact: Frank Brady,
General Manager
800-862-6800 FAX: 215-878-5252

Pelrice-Phelps, Inc.
7-7 Metropolitan Court
Gaithersburg, MD 20878
Contact: Herb Lee,
Sales Manager
301-948-5266 FAX: 301-948-9747

Penny & Giles Inc.
2716 Ocean Park Blvd Ste 1005
Santa Monica, CA 90405-5209
Contact: Neal Handler, Sales Office
Supervisor
310-393-0014 FAX: 310-450-9860

Penta Laboratories, Inc.
21113 Superior St.
Chatsworth, CA 91311
Contact: Carol Landsman,
Director of Marketing
818-882-3872 FAX: 818-882-3968

Periphex
115-1B Hurley Road
Oxford, CT 06478
Contact: Burton Piaser, Sales Manager
203-264-3985 FAX: 203-262-6943

Perry Enterprises
3062 Robb Circle
Lakewood, CO 80215
Contact: Al Perry, President

Peter's Technical Service
10406 N LA Highway 169
Belcher, LA 71004-7705
Contact: Peter Palagonia, Owner

Peter W. Dahl Co.
5869 Waycross Avenue
El Paso, TX 79924
Contact: Gary Komassa, Corp. Secretary
915-751-2300 FAX: 915-751-0768

Peterson Media Services
3397 Wrightwood Drive
Studio City, CA 91604
Contact: Al Peterson, President

Petramco
4009 Indianapolis Street
St Petersburg, FL 33703
Contact: Howard Trickey, Operations Mgr.

Phase Linear
4134 N United Parkway
Schiller Park, IL 60176
Contact: Peter Horsman, Natl Sales Mgr
Pro Div

Phasetek
550 California Road #11
Quakertown, PA 18951
Contact: Kurt Gorman, President
215-536-6648 FAX: 215-536-7180

Philadelphia Music Works
P.O. Box 947
Bryn Mawr, PA 19010
Contact: Andrew P Mark, President

Philips Components
100 Providence Pike
Slatersville, RI 02876
Contact: Greg J Murphy, Marketing Mgr.

Philips Components
2001 Blue Heron Blvd.
Riviera Beach, FL 33404
Contact: Gayle Frisch, Marcom Coordinator
407-881-3200 FAX: 404-881-3300

Phoenix Systems
POB 297
Hickory, MS 39332
Contact: John H Roberts, Pres

Photocomm, Inc.
13130 Stafford Rd.
Stafford, TX 77477
Contact: David Tutten, Sales Manager
713-933-1578 FAX: 713-933-1599

Pia Radio Sports
680 N Lake Shore Drive #800
Chicago, IL 60611
Contact: Brad Saul, CEO

Pike & Fischer, Inc.
4600 East-West Highway, #200
Bethesda, MD 20814
Contact: Zachary Wheat, Marketing
Manager

Pittsburgh Int'l Teleport
P.O. Box 14070
Pittsburg, PA 15239
Contact: George Sperry, Jr., General Mgr.
800-634-6530 FAX: 412-337-1754

PIRod Inc
1200 N Oak Road/ PO Box 128
Plymouth, IN 46563-0128
Contact: L. Brown Sanders,
V.P. Marketing-Sales
219-936-4221 FAX: 219-936-6796

Plante Industria/Comercial

8525 NW 53rd Terrace 108
Miami, FL 33166
Contact: Nils Manzieri

Plastic Capacitors Inc

2623 N Pulaski Rd
Chicago, IL 60639
Contact: Tom Brown,
Vice President
312-489-2229 FAX: 312-489-0496

Plastic Reel Corp of America

Brisbin Ave
Lyndhurst, NJ 07071
Contact: Pat Baccarella, VP
201-933-5100 FAX: 201-933-9464

Plastics Technology Inc

1353 Wellsley Ct
Mobile, AL 36695-3544
Contact: Larry Cable

PMA Marketing, Inc.

4359 S Howell Avenue, #106
Milwaukee, WI 53207-5056
Contact: Pat Martin, President
414-482-2638 FAX: 414-483-1980

Pneumatron

P.O. Box 99
Bethel, PA 19507
Contact: Tadd Bueb,
President
717-933-5393

Polar Research

POB 1
Thief River Fall, MN 56701
Contact: Kim Ballou

Pollak Media

984 Monument Street #105
Pacific Palisade, CA 90207
Contact: Carol Holt, Vice President
Operations

Polyline Corp - PolyQuick Div.

1243 Rland Rd
Des Plaines, IL 60016
Contact: Ed Kaiser, President
708-390-7744 FAX: 708-390-9886

Pomar Electronics

1615 Sta Maria
Laredo, TX 78040
Contact: Oscar Pomar, President
210-722-9437 FAX: 210-722-1795

Portland Instruments/ROH

6120 San Fernando Road
Glendale, CA 91201
Contact: Richard F. Herbert,
Director of Manufacturing
818-500-0137 FAX: 818-240-1828

Posthorn Recordings

142 West 26th St
New York, NY 10001
Contact: Jerry Bruck, Owner/Pres
212-242-3737 FAX: 212-924-1243

Potomac Instruments

932 Philadelphia Ave
Silver Spring, MD 20910
Contact: David G Harry,
Sales Manager
301-589-2662

Power Film Systems Inc

PO Box 485
Yellville, AR 72687
Contact: Alice Milligan, Sales Dir
501-449-4091 FAX: 501-449-6000

Precision Design

27106 South 46th Ave
Kent, WA 98032
206-852-5070

Precision Electromagnetics

12001 Lanham-Severn Road
Bowie, MD 20720
Contact: Bob Loyd

Premiere Radio Networks

6255 Sunset Blvd Penthouse 2203
Hollywood, CA 90028
Contact: Kraig Kitchin, VP Sales

Press Promotions Inc

523 South Louisiana Street #401
Little Rock, AR 72201
Contact: Carl Evans

Presmagraphics

P.O. Box 703
Milwaukee, WI 53201
Contact: R Schmacztle

Pristine Systems

8489 West Third St, Suite 1017
Los Angeles, CA 90048
Contact: Boyce Williams, President
213-852-0737 FAX: 213-655-6207

Pro Audio USA

2020 Pennsylvania Ave N, #420
Washington, DC 20006
Contact: Eric Hompe, President
202-625-0804 FAX: 202-625-0878

Pro-Bel

220 Duncan Mill Road, Ste 301
Don Mills, Ont, M3B 3J5 CANADA
Contact: Geoff Snell, Systems Engr. Mgr
800-387-0233 FAX: 416-445-0595

Pro Digital

222 Brookthorpe Circle
Broomall, PA 19008
Contact: Paul Plotnick

Pro Media

3563 San Pablo Dam Rd
El Sobrante, CA 94803
Contact: Ellen Goldstein, Sales Manager
415-222-0307 FAX: 415-223-9147

Priscomm, Inc.

3188 Airway Ste K
Costa Mesa, CA 92626
Contact: Allan F. Karl, VP/ Acct Services
714-433-7400 FAX: 714-433-7306

Procart

7012 27th St West
Tacoma, WA 98466
206-565-4546

Professional Audio Marketing

P.O. Box 765
Melville, NY 11747
Contact: Stan Somers, President
516-367-8620 FAX: 516-367-4325

Professional Audio Supply

5700 East Loop 820 South
Ft Worth, TX 76119
Contact: Lee Edwards, VP Sales &
Marketing

Professional Management Serv.

P.O. Box 141
Greenville, SC 29602-0141
Contact: William Sanders, General Manager
803-370-2400 FAX: 803-370-2314

Professional Sound Systems

2527 Treelane Avenue
Monrovia, CA 91016
Contact: William Wysock, Owner

Programming Plus

PO Box 90486
Pacific Beach, CA 92109-0860
619-272-7587

Promotional Ventures

2420 Greenbough Drive #1
Southlake, TX 76092
Contact: Gary Webb, General Partner
800-772-7732 FAX: 817-488-2236

Promusic, Inc.

6555 NW 9th Ave, Suite 303
Ft Lauderdale, FL 33309
Contact: Cheryl Mathauer, Manager
305-776-2070 FAX: 305-776-2074

Prophet Systems Inc

113 West 4th Street
Ogallala, NE 69153
Contact: Kevin Lockhart, Project Director

Pro Video

2302 W Badger Road
Madison, WI 53713
Contact: Jim Stiener

Puopolo Consulting

37 Martin St
Rehoboth, MA 02769
Contact: Dana Puopolo, President

Pyramid Audio Inc

450 W Taft Dr
S Holland, IL 60473
Contact: Robert Vukelich, President
708-339-8014 FAX: 708-339-8024

Q**QEI Corporation**

One Airport Dr, PO Box 805
Williamstown, NJ 08094
Contact: Jeff R Detweiler, Sales Manager
800-334-9154 FAX: 609-629-1751

QSC Audio Products, Inc.

1675 MacArthur Blvd
Costa Mesa, CA 92626-1440
Contact: Laurel Vieaux,
Marketing Assistant
714-754-6175 FAX: 714-754-6174

Quad Eight Electronics

39545 163rd Street East
Palmdale, CA 93550-9611
Contact: William E Windsor, Senior
Marketing Executive

Questcom Radio Brokerage

18310 Montgomery Village Ave #220
Gaithersburg, MD 20879
Contact: Donald R Bussell, President

Quick Set Inc

3650 Woodhead Dr
Northbrook, IL 60062
Contact: Mark Stolman

Quintessence Audio

P.O. Box 4900
Tulsa, OK 74159
Contact: Douglas Brown, Director
918-582-1200

R**R & A Broadcast Services**

8684 Route 21
Naples, NY 14512
Contact: Mike Hotchkiss, Owner
716-374-5280

R & R Technical Services

4021 Wood River #608
Corpus Christi, TX 78410
Contact: Ron Berry, Owner

R-Columbia Products Co Inc

2008 St Johns Ave
Highland Park, IL 60035
Contact: Irving Rozak
312-432-7915

Radiation Sys Inc/Mark Ant Div

1757 S. Winthrop Dr.
Des Plaines, IL 60018
Contact: Sharon Krause,
Ad Coordinator
708-298-9420 FAX: 708-635-7946

Radio Computing Service, Inc.

Two Overhill Road, #100
Scarsdale, NY 10583
Contact: Lee Facto, VP/General Manager
914-723-8567 FAX: 914-723-6651

RAKS

201 Rt 17 Ste 300
Rutherford, NJ 07070
201-438-0119

R.C. Crisler & Co

600 Vine Street #2710
Cincinnati, OH 45202
Contact: Clyde Haehnie, Executive Vice
President

R.C. Rawson

582 Market Street #700
San Francisco, CA 94104
Contact: Chris Rawson, Vice President
Marketing & Sales

RE America

31029 Center Ridge Road
Westlake, OH 44145
Contact: P. Andrew Bosworth, VP Sales
216-871-7617 FAX: 216-871-4303

RE Instruments Corp

31029 Center Ridge Rd
Westlake, OH 44145
Contact: Terrence M. Ruane, Sales &
Marketing Manager
216-871-7617 FAX: 216-871-4303

R.E. Meador & Associates

P.O. Box 36
Lexington, MO 64067
Contact: Ralph Meador, President
816-259-2544 FAX: 816-259-6424

R F Anderson & Associates

Rd #1 box 688
Portage, PA 15946
Contact: R F Anderson, Owner

Richardson Electronics/RF Gain

116 S Long Beach Rd
Rockville Centre, NY 11570
Contact: Stuart Ochs, Sales Manager
800-348-5560 FAX: 516-872-4450

RF Scientific Inc

5644 Commerce Drive #C
Orlando, FL 32809-2978
Contact: Angelo Miceli, VP

RF Specialties of California

3463 State St Ste 229
Santa Barbara, CA 93105
Contact: Sam Lane, GM
805-682-9429 FAX: 805-682-5170

RF Specialties of Florida

PO Box 397
Niceville, FL 32578
Contact: Bill Hoisington
904-678-8943 FAX: 904-729-2744

RF Specialties of Missouri

22406 NE 159th St
Kearney, MO 64060
Contact: Chris Kreger, President
816-635-5959 FAX: 816-635-4508

RF Specialties of Pennsylvania

795-20 Pine Valley Dr
Pittsburgh, PA 15239
Contact: Thomas Monahan, President
412-733-1994 FAX: 412-327-9336

RF Specialties of Texas

PO Box 7630
Amarillo, TX 79114-7630
Contact: Don S. Jones,
President/Owner
806-372-4518 FAX: 806-373-8036

RF Specialties of Washington

19237 Aurora Ave N
Seattle, WA 98133
Contact: John Schneider, President
206-546-6546 FAX: 206-546-2633

RF Systems (Div of Audiolab)

5831 Rosebud Ln Bldg C
Sacramento, CA 95841
Contact: Robert E. Stofan, President
916-348-0200 FAX: 916-348-1512

RF Technology Inc

16 Testa Pl
So Norwalk, CT 06854
Contact: John Brandt, Engr

R.M. Lowry & Company

6302 E Monte Cristo Avenue
Scottsdale, AZ 85254
Contact: Bob Lowry, President
602-483-0586 FAX: 602-443-1025

RM&E Inc.

3600 Hacienda Blvd, Suite F
Fort Lauderdale, FL 33314
Contact: Lutz H. Meyer, President

R Morgan Burrow Jr, P.E.

17221 Beauvoir Blvd
Rockville, MD 20855
Contact: R Morgan Burrow Jr

RMS Electronics Inc

41 Hartz Way
Secaucus, NJ 07604
212-892-1000

ROHN Inc

PO Box 2000
Peoria, IL 61656
Contact: R.A. Kleine,
Vice President
309-697-4400 FAX: 309-697-5612

RPG Diffusor Systems Inc

651-C Commerce Drive
Upper Marlboro, MD 20772
Contact: Dr Peter D'Antonio,
President/CEO
301-249-5647 FAX: 301-249-3912

R.P.M. Associates

1612 Greenfield Drive
Richmond, VA 23235
Contact: Bill James
804-232-5197

RPMC, Inc.

17514 Ventura Blvd #202
Encino, CA 91316
Contact: Robert Olshaver,
Executive Producer
818-501-7762 FAX: 818-501-8848

RPS Communications

3 Bittersweet Court
Centerport, NY 11721
Contact: Randolph Savicky, President
516-754-3300 FAX: 516-754-8168

RRN Inc

111 Fifth Avenue #1300
New York, NY 10003-1005
Contact: Patricia Barnes,
Operations Manager

RTMedia Inc

6235 LaCosa Drive
Dallas, TX 75248-4926
Contact: Rick Torcasso, President

RTW Micrographics

207-B Leitersburg Road
Greencastle, PA 17225-1131
Contact: Robert Wertime,
Researcher
717-597-4785

Racom Products

5504 State Road
Cleveland, OH 44134
Contact: David Williams,
Product Manager
800-722-6664 FAX: 216-351-0392

Radiation Systems

1757 Winthrop Drive
Des Plaines, IL 60018
Contact: Sharon Krause,
Ad Coordinator

Radio-Active Promotions

1234 Thrid Street #16
Santa Monica, CA 90401
Contact: Damon Knight

Radio Advantage Corporation

395 Pleasant Valley Way
West Orange, NJ 07052-2924
Contact: Ron Weener, President

Radio Advertising Bureau

304 Park Avenue South 7th Floor
New York, NY 10010
Contact: Gary Fries, President

Radio Amex

86 Trinity Place
New York, NY 10006
Contact: Tom Mariam, Manager
212-306-1637

Radio Design Labs

PO Box 1286
Carpinteria, CA 93013
Contact: Jerry Clements, Director of
Marketing
805-684-5415 FAX: 805-684-9316

Radio Direct

15060 Ventura Blvd, #360
Sherman Oaks, CA 91403
Contact: Steve Syatt, President

Radio Et Cetera

1000 Business Center Circle #213
Newbury Park, CA 91320
Contact: Rick Lemmo

Radio Express

3575 Cahuenga Blvd W #390
Los Angeles, CA 90068
Contact: Tom Rounds, President

Radiomail

11300 Sorrento Valley, #255
San Diego, CA 92121
Contact: Gregory Spraul, Travis Industries

Radio Maintenance Technology

4710 Baywood Lane
Beaumont, TX 77706
Contact: David Cunningham

Radio Management Consulting

123 S Broad Street, #214
Lancaster, OH 43130-4304
Contact: Gregory Eyerma, President

Radio Marketing Department

155 Sun Valley Way
Morris Plains, NJ 07950-2017
Contact: Liene Adams, President

Radio Media Department

P.O. Box 610
Lee's Summit, MO 64063
Contact: Carolyn Craft, Radio/Media
Consultant

Radio On

129 Hollywood Avenue
Oxnard, CA 93035
Contact: Jeff Nack

Radio Online

Box 50262
Amarillo, TX 79121
Contact: Ron Chase

Radio Plus

2190 SE 17th Street #307
Ft Lauderdale, FL 33316-3121
Contact: Michael Dalfonzo, President

Radio Programming & Mgmt

4198 Orchard Lake Road
Orchard Lake, MI 48323
Contact: Tom Krikorian, President
800-521-2537 FAX: 313-681-3936

Radio Ranch

P.O. Box 130233
Houston, TX 77019
Contact: Neil Chavigny, Owner

Radiosoft

120 North Riverside Drive
Edgewater, FL 32132
Contact: Peter Moncure, President

Radio Resources & Services

1201 South Sharp St
Baltimore, MD 21230
800-547-2346 FAX: 301-783-4835

Radio Programming Consultant

1910 Kensington Drive
Carrollton, TX 75007
Contact: Cal Casey, President
214-492-1753 FAX: 214-492-1753

Radio Systems Engineering

4289 Roan Ridge
Las Vegas, NV 89120
Contact: Gale Gilbreath, Owner/President
702-454-2085 FAX: 702-898-8731

Radio Systems Inc

110 High Hill Rd
Bridgeport, NJ 08014-0458
Contact: Paul McLane, USA Sales Manager
609-487-8000 FAX: 609-467-3044

Radio Television Technique

544 Redfield Avenue
Los Angeles, CA 90042-4931
Contact: Jonathan Sugay, General
Manager

Radiotechniques

P.O. Box 367
Haddon Heights, NJ 08035
Contact: Edward Schober, President
609-546-8008 FAX: 609-546-1841

Radio Today Entertainment

1776 Broadway, 4th Floor
New York, NY 10019
Contact: Ramona Rideout, VP/Affiliate
Relations
212-581-3962 FAX: 212-459-9343

Radio/TV Commission, SBC

6350 W Freeway
Fort Worth, TX 76150
Contact: Rachel Williamson, Asst.
Marketing Director

Radio Ventures I, L.P.

7910 Woodmont Avenue, #1200
Bethesda, MD 20814
Contact: Jerry Lyman, President/CEO

Radioware

3965 Lively Lane
Dallas, TX 75220-1869
Contact: Carl Barringer, President

Rah Rah Productions

P.O. Box 75304
Tampa, FL 33675-5304
Contact: Chris Turner, Vice
President/Corporate Mgr

Raines Electromagnetics

13420 Cleveland Dr
Potomac, MD 20850
Contact: Jeremy K Raines, President
301-279-2972

Raks Corp of America Inc

Amarillo, TX 79121
Rutherford, NJ 07070
Contact: Sinan Turkomer, Exec VP
201-438-0119 FAX: 201-438-3185

Steve Raleigh Bdct Service

POB 3403
Princeton, NJ 08540
Contact: Steve Raleigh, Pres

Ram Broadcast Systems Inc

P.O. Box 3100
Barrington, IL 60011-3100
Contact: Ron Mitchell, Pres
708-382-7575 FAX: 708-382-8818

Ramko Research

3501 Sunrise Blvd, No. 4
Rancho Cordova, CA 95742
Contact: Mike Pardee, National Sales
Coordinator
916-635-3600 FAX: 916-635-0907

RANE Corporation

10802 47th Ave W
Mukilteo, WA 98275-5098
Contact: Larry Winter, VP Mktg
206-355-6000 FAX: 206-347-7757

Rantel Research

13 C Street, #F
Laurel, MD 20725
Contact: David Tate, President

Ray D Eisbrenner & Co

2950 W Square Lake Road, #100
Troy, MI 48098-5724
Contact: Eric Hood,
Vice President

Reach Inc

301 South 68th St
Lincoln, NE 68510
Contact: Jon Canaday, Pres

Real Time Designs Inc

20944 Sherman Way, Suite 205
Canoga Park, CA 91304
Contact: Robert Copriviza, CEO

Recognition Services

5415 N College Avenue
Indianapolis, IN 48220
Contact: Steve Weinstein

Redco Audio Products

300 Long Beach Blvd
Stratford, CT 06497-7116
Contact: Bob Berliner, Owner
203-256-0532 FAX: 203-254-1509

Redgate Communications

3349 Boise Way
Cooper City, FL 33026
Contact: Stan Schneider,
Sr Mgr Client Services

Redwood Marketing

P.O. Box 270007
Nashville, TN 37227-0007
Contact: Claude Hill, President
615-254-7400 FAX: 615-242-5774

Reef Industries

P.O. Box 750245
Houston, TX 77075-0245
Contact: Renee Dollinger, Mktg Mgr
713-943-0070 FAX: 713-947-2053

Reel Bonus Radio Promotions

72-811 Highway 111 #200
Palm Desert, CA 92260
Contact: Rick Banik, Multi-Media
Advertising

Register Data Systems

PO Box 980
Perry, GA 31069
Contact: Lowell Register, President
800-521-5222 FAX: 912-987-7595

Remote Sound Engineering

P.O. Box 616
Ooltewah, TN 37363
Contact: Mike Aldridge

Renkus-Heinz, Inc.

17191 Armstrong Avenue
Irving, CA 92714
Contact: Frank Ostrander, Chief Engineer
714-250-0168 FAX: 714-250-1035

Reprise

3300 Warner Blvd
Burbank, CA 91505
Contact: Rich Fitzgerald,
VP Director of Promotions

Research Associates Inc

230 S Sierra Madre
Colorado Springs, CO 80903
Contact: Bill Cook, Pres & GM
719-594-9464 FAX: 719-578-5688

Research Concepts Company

P.O. Box 65117
Baltimore, MD 21209
Contact: Jay Krakowitz, President

Research Specialists Inc

5830 N 44th Place
Phoenix, AZ 85018
Contact: Mack McCoy, President

RTI Research Technology Intl
4700 West Chase
Lincolnwood, IL 60646-1689
Contact: Tom Tisch, VP Marketing
708-677-3000 FAX: 708-677-1311

Resha Communications
3 Wescroft Road
Reading, MA 01867
Contact: David Kruh, Creative Services
Director

Resource Solutions Inc
1097 3rd Avenue SW
Carmel, IN 46032
Contact: Chauncey Olin

RF Industries/Connector Div
7620 Miramar Road #4100
San Diego, CA 92126-4202
Contact: Jack A. Benz, President
619-549-6340 FAX: 619-549-6345

Rhino Communications
9441 LBJ Fwy #210
Dallas, TX 75243
Contact: John Tyler, President

Richard A Foreman Associates
330 Emery Drive East
Stamford, CT 06902
Contact: Richard Foreman, President

Richard Hirschmann of America
Industrial Row/Box 229
Riverdale, NJ 07457
Contact: Daniel Beggs, National Sales Mgr.
201-835-5002 FAX: 201-835-8354

Richardson Electronics
40W267 Keslinger Rd
LaFox, IL 60147
Contact: Bob Birkeneder, Division Manager
- Broadcast
800-348-5580 FAX: 708-208-2550

Rick Allen Creative Services
545 Eighth Avenue #401
New York, NY 10018
Contact: Rick Allen

Riggins Electronic Sales
3272 E Willow St
Long Beach, CA 90806
Contact: George Riggins, Pres
310-598-7007

Riley Representatives
14330 Midway Road, #207
Dallas, TX 75244
Contact: Jack Riley, Owner

Ritz Audio Visual Associates
6620 Virginia Manor Road
Beltsville, MD 20705
Contact: Robert Duvorak, Executive Vice
President
301-206-3101 FAX: 301-206-3105

River City Sound Productions
P.O. Box 750786
Memphis, TN 38175
Contact: Bob Pierce, Operations Manager
800-755-8729

Riviera Broadcast Leasing
9200 Sunset Blvd, No. 601
Los Angeles, CA 90069
Contact: Henri Ballinger

Robert A. Chaisson Inc
Indian Waters Drive
New Canaan, CT 06840
Contact: Robert Chaisson, President

Robert Michelson Inc
127 W 26th Street
New York, NY 10001
Contact: robert Michelson, President

Robert Rounsaville & Associates
3104 E. Shadowlawn Avenue NE
Atlanta, GA 30305
Contact: Robert Rounsaville, Owner

Roberts-Cooke Research
44 Shelly Drive
Mill Valley, CA 94941-1579
Contact: Dave Roberts, President

Rockwell International
1220 N. Alma Road (406-110)
Richardson, TX 75081
Contact: David Orr, VP/GM
214-996-5999 FAX: 214-996-5409

Rodman-Brown & Associates
1544 Lighthouse Drive
Naperville, IL 60565
Contact: Tom Rodman, President/CEO

Roland Corporation US
7200 Dominion Circle
Los Angeles, CA 90040-3647
Contact: Al Dugus, Advertising Manager

Rones Consultant Company
114 Sansome Street #535
San Francisco, CA 94104
Contact: Neil Rones, Owner

Ron Hummel Productions
3110 Stonegate Drive
Alamo, CA 94507-1762
Contact: Ron Hummel, President

Ron Krob
4910 Four Star Court
Fort Collins, CO 80524
Contact: Ron Krob, Technical Consultant
303-484-2704

Rosat Acoustics
3 Hanson Street
Boston, MA 02118-2120
Contact: Robert Rosati, President
617-423-5546 FAX: 617-423-5884

Rosco Labs Inc
36 Bush Ave
Port Chester, NY 10573
914-937-1300

Roscom General
P.O. Box 1208
Roswell, GA 30077
Contact: Bob Stewart
404-992-2230 FAX: 404-992-6538

Roscom General
P.O. Box 129, Deer, AR 72628
Contact: Tom Butler
501-253-8127 FAX: 501-253-8567

Roscom General
6301 Jackpine Drive
Bellvue, CO 80512
Contact: John Shideler
303-482-9254 FAX: 303-482-6123

Rose Engineering
P.O. Box 68
Armonk, NY 10504
Contact: Don Rose, Principal
914-273-1820 FAX: 914-273-1820

Rohde & Schwarz, Inc
4425 Nicole Drive
Lanham, MD 20706
Contact: Scott Elkins
301-459-8800 FAX: 301-459-2810

Ray H. Rosenblum
PO Box 38296
Pittsburg, PA 15238
Contact: Ray H. Rosenblum,
Media Broker/Station Appraiser
412-963-6311

Rosler Creative
4624 Cherokee Trail
Dallas, TX 75209
Contact: Peter Rosler, Owner

RP Communications
25 West Street
Bristol, VT 05443
Contact: Bob Cham, President
802-453-4369 FAX: 802-453-4369

RRadco Group
1218 Winners Cup Circle
St Charles, IL 60174
Contact: Steve Kravitz, President
708-513-1386 FAX: 708-513-1386

Rusleng Corp
320 Dewey St
Bridgeport, CT 06605
Contact: Frank Ruskay, Jr., President
203-384-1266

Russco Electronics Mfg Inc
3330 E Tulare Ave #3280
Fresno, CA 93702-2727
Contact: Vickey Turley, Sales Manager
209-291-5591 FAX: 209-291-9601

Rusty Walker
P.O. Box 417
Luka, MS 38852
Contact: Rusty Walker, President



S & J Technical Services
3436 Cox Lane
Columbus, IN 47203
Contact: John Kocur

S/B Valley International
P.O. Box 2758
Nashville, TN 37219-0758
Contact: Liz Clark, Ad Manager

S C M S Inc
10201 Rodney Blvd
Pineville, NC 28134
Contact: Bob Cauthen, President
800-438-6040 FAX: 704-889-4540

SCA Data Systems Inc
225 Arizona Avenue, Suite 350
Santa Monica, CA 90401-1203
Contact: Corinne Weber,
Operations Manager
310-576-0655 FAX: 310-576-0566

S.W.R. Inc.
PO Box 856, Cambria City Ind Park
Ebensburg, PA 15931
Contact: Ed Edmiston, President
800-762-7743 FAX: 814-472-5552

Saddle River Holdings Corp
28 W Grand Avenue
Montvale, NJ 07645
Contact: Rob Breiner

Sage Alerting
700 Canal Street
Stamford, CT 06902
Contact: Jerry Lebow,
President

Saha
P.O. Box 3047
Bayamon, PR 00621
Contact: Jose Fernandez,
Consultant

Salant Broadcast Consulting
Two Trolley Square Ste. 305
East Haven, CT 06512
Contact: Pete Salant
203-468-9887 FAX: 203-468-7219

Saki Magnetics, Inc.
26600 Agoura Rd
Calabasas, CA 91302
Contact: Trevor Boyer, Director of
Marketing & Sales
818-880-4054 FAX: 818-880-6242

Satellite Consultants Intl
PO Box 1509
Idaho Springs, CO 80452
Contact: Ms Terri Johnson,
VP Sales Mktg

Satellite Music Network
12655 N Central Expwy, Suite 600
Dallas, TX 75243
Contact: Martin Raab, Jr

Satellite Production Network
601 Van Ness Avenue #552
San Francisco, CA 94102-3200
Contact: Ron Barbarita, President
415-783-0737 FAX: 415-885-2211

Satellite Systems Corp.
101 Malibu Drive
Virginia Beach, VA 23452-4446
Contact: Larry Hayes, Vice President
Engineering
415-962-8000 FAX: 415-962-8180

Satellite Systems Inc
121 Alsace Way, Ste 310
Colorado Springs, CO 80906
Contact: Michael Lowery

Satellite Transmission
3003 Moffett Ln
Houston, TX 77489
Contact: Barry Frishman, Mgr Audio Sales
713-438-3600 FAX: 713-438-9407

Satterfield & Perry
Two Bala Plaza #300
Bala Cynwyd, PA 19004
Contact: Jack Satterfield

Savoy Media
411 South Yellow Springs
Springfield, OH 45506
Contact: Ray McCoy, Owner

Sax Freeman Assoc
1401 McCormick Dr
Landover, MD 20785
Contact: Ted Dietz

S/B Valley International
P.O. Box 40306
Nashville, TN 37204
Contact: Liz Clark, Ad Manager

SB Management
P.O. Box 12837
San Luis Obispo, CA 93406
Contact: Michael Hesser, President

Scala Electronic Corp
PO Box 4580
Medford, OR 97501
Contact: Dan Fowler, Mktg Mgr
503-779-6500 FAX: 503-779-3991

SCA Promotions
8300 Douglas Avenue, #625
Dallas, TX 75225
Contact: Doug McCrum, Executive VP

Schafer Digital
201 Lathrop Way, Ste D
Sacramento, CA 95815
Contact: James G. Hansen, President/ CEO
916-646-3444 FAX: 916-646-3493

Schafer International
17804 Cabela Drive
San Diego, CA 92127
Contact: Paul Schafer, President
619-673-8080 FAX: 619-673-8210

Schafer World Communications
PO Box 31
Marion, VA 24354
Contact: Bob Dix, President
703-783-2000 FAX: 703-783-2064

Schmid Telecomm. America Inc
7249B Browning Rd
Pennsauken, NJ 08109
Contact: Thomas E. Newman, Sales Mgr.
609-683-0228 FAX: 609-683-0864

Peter E Schmitt Co, Inc
240 Grand Ave
Leonia, NJ 07605
Contact: Sales Mgr

Schoeps/Posthorn Recordings
142 West 26th St 10th Floor
New York, NY 10001
Contact: Jerry Bruck, Owner-President
212-242-3737 FAX: 212-924-1243

Scientific Atlanta Inc
420 North Wickham Rd
Melbourne, FL 32935
Contact: Kent Malinowski,
Dir Broadcast Radio & Data Systems
407-255-3000 FAX: 407-255-3016

Scollon Productions
I-26 & SC 234, P.O. Box 486
White Rock, SC 29177
Contact: Elery Locklear, Vice President

Sconnix Broadcasting Company
1921 Gallows Road, #D
Vienna, VA 22182
Contact: Randy Odeneal, Partner

Scott Technical Services
224 Shiloh Dr
Jackson, MS 39212
Contact: Philip Scott, Owner

Scream'n Eagle Communications
478 Teal Lane
Tallahassee, FL 32308-4747
Contact: Gerald Brinkley,
President

L J Scully Mfg Corp
138 Hurd Ave
Bridgeport, CT 06604
Contact: L J Scully Jr, Pres
203-368-2332

Secoa
2731 Nevada Ave N
Minneapolis, MN 55427
612-546-6313

Selco Products
7580 Stage Rd
Buena Park, CA 90638
Contact: Celeste Martinez,
Marketing Manager
213-921-0681 FAX: 714-739-1507

Selectronics
2204 Del Paso Blvd
Sacramento, CA 95815
Contact: Robert Phillips, Owner

Sellmeyer Engineering
P.O. Box 356
McKinney, TX 75069
Contact: J.S. Sellmeyer, Consulting
Engineer
214-542-2056 FAX: 214-542-2056

Semper-Barris Inc
90 Merrick Avenue
East Meadow, NY 11554-1500
Contact: Andrew Batkin, President

Sencore Inc
3200 Sencore Dr
Sioux Falls, SD 57117
Contact: John Perry, Natl Sales Mgr
605-339-0100

Sennheiser Electronic Corp
6 Vista Dr, PO Box 987
Old Lyme, CT 06371
Contact: Albert C. Zang, Manager Pro
Products
203-434-9190 FAX: 203-434-1759

Sentry Systems
2211 Fifth Ave
Seattle, WA 98121
Contact: Bob Arnold,
General Manager
800-426-9082 FAX: 206-441-6582

Sequola Electronics
1131 Virginia Ave
Campbell, CA 95008
Contact: Mel Crosby, Sales Mgr
408-866-8434

Sescom Inc
2100 Ward Dr
Henderson, NV 89015
Contact: Franklin Miller, Pres
702-565-3400 FAX: 702-565-4828

SG Communications
3444 N Dodge, Suite A
Tucson, AZ 85716
Contact: Ron Blackburn,
Marketing/Sales Director
800-824-7865 FAX: 602-323-6980

SGS-Thomson
211 Commerce Drive
Montgomeryville, PA 18936
Contact: Ed Gdowik, Regional Sales
Manager

Shaffer Communications Group
3050 Post Oak Blvd, Suite 1700
Houston, TX 77056
Contact: Jim Murphy,
Operations Manager
713-621-4499 FAX: 413-621-5751

Shalico Inc
PO Box 1089
Smithfield, NC 27577
Contact: Michael Sutton
919-934-3135

Shamrock Broadcasting
4444 Lakeside Drive
Burbank, CA 91505
Contact: Bill Clark, President

Shane Media Services
2450 Fondren Road, #112
Houston, TX 77063
Contact: Ed Shane, Consultant
713-952-9221 FAX: 713-952-1207

Sharepoint Management
2118 Flowerwood
Birmingham, AL 35244-1103
Contact: Bill Thomas, President
205-985-2970 FAX: 205-985-2933

Shaughnessy & Associates
6309 N O'Connor #220 LB154
Irving, TX 75039-3510
Contact: Patrick Shaughnessy,
President/CEO

Sheer & Chaskelson Research
274 Madison Ave, Suite 1406
New York, NY 10016
Contact: Douglas Sheer, Co-Director

Shenandoah Tower Service
P.O. Box 956
Staunton, VA 24401
Contact: David Anthony, Owner

Shepler Electronics
5653 Weymouth Dr
Rockford, IL 61111
Contact: J Shepler, Sr Design Engr

Shively Labs
19 Harrison Rd
Bridgton, ME 04009
Contact: Jonathan R Clark,
Marketing Manager
207-647-3327 FAX: 207-647-8273

Shook Electronic Enterprises
18975 Marbach Lane #200
San Antonio, TX 78266-2132
Contact: J Hollenbeck Shook, Dir
512-653-6761

Shure Brothers Inc
222 Hartrey Ave
Evanston, IL 60202
Contact: Nancy Calvert, Advertising
708-866-2200 FAX: 708-866-2279

Sierra Automated Systems & Eng
2112 N Glenoaks Blvd
Burbank, CA 91504
Contact: Al Salci, VP Marketing
818-840-6749 FAX: 818-840-6751

Signal Communications
5161 River Road Bldg 2A
Bethesda, MD 20816
Contact: Carol Ryder,
Account Executive

Silco Super Promotions
1000 E William Street #100
Carson City, NV 89701
Contact: Neil Landau, Tour Director

Silliman and Silliman
8601 Georgia Avenue, Suite 910
Silver Spring, MD 20910
Contact: Robert Silliman, Partners
301-589-8288 FAX: 301-589-8291

Silver Lake Audio
2590 Hillside Court
Baldwin, NY 11510
Contact: Steve Kirsch, President
516-623-6114 FAX: 516-377-4423

Sine Systems
1020 Maxwell Avenue
Nashville, TN 37206-3554
Contact: John Pate, President
615-228-3500 FAX: 615-227-2367

Singularity Corporation
P.O. Box 4176
Scottsdale, AZ 85261
Contact: Richard Gerdes,
Dir. of Engineering
602-391-9337

Si-Tex
PO Box 6700
Clearwater, FL 34618
Contact: William F Burgin, Mktg Mgr

W Lee Simmons & Associates Inc
1036 William Hilton Pky, No. 200f
Hilton Head Isle, SC 29928
Contact: W. Lee Simmons, President
800-277-5417 FAX: 803-842-3371

Sixty-Second LP Inc
329 Riverside Avenue #200
Westport, CT 06880
Contact: Jeff Craig, Vice President

Sklar Communications
100 Park Avenue 5th Floor
New York, NY 10017
Contact: Rick Sklar, President

Skyhawk Communications
P.O. Box 2078
Seminole, OK 74868
Contact: Rick Bales, President
405-382-0042 FAX: 405-382-0029

Skyhook Towers
2128 South Norton Avenue
Independence, MO 64057
Contact: Michael Bogard, President

Skyline Antenna Management Inc
42090 Northwest Station NW
Washington, DC 20015-0690
Contact: Peter Kovaleski, President
203-684-4444 FAX: 203-684-9459

Sky Tower Service
P.O. Box 11493
Lynchburg, VA 24506
Contact: Greg Harrington, Owner
804-845-9479

Skywatch Weather Center
347 Prestley Road
Bridgeville, PA 15017
Contact: Richard Mancini, President
800-SKYWATCH FAX: 412-221-3160

S.M.A.R.T.S.
P.O. Box 293
Emmetsburg, IA 50536
Contact: John Schad, President

C Smidt Broadcast Advisor
61 Birch Road
Andover, MA 01810-3348
Contact: Clark Smidt, Broadcast Advisor

Spanish Broadcasting System
26 West 56th Street
New York, NY 10019
Contact: Raul Alarcon Senior, Chairman

Spaw & Henning
4350 Shawnee Mission #250
Fairway, KS 66205
Contact: David Spaw

Smith and Company
5910 John Hancock Center
Chicago, IL 60611
Contact: James Smith, President

Society National Bank
800 Superior Avenue
Cleveland, OH 44114
Contact: Kathleen Mayher, VP Manager,
Comm. Lending

Software Link
180 East Post Road
White Plains, NY 10601
Contact: Robert Signer, President

SoftWright
1010 South Joliet, Ste 204
Aurora, CO 80012
Contact: Larry D. Ellis, P.E., President
303-344-5486 FAX: 303-344-2811

Solid State Logic
Bebroke
Oxford, OX5 1RU England
Contact: Noel Bell
44-08675-435

Somich Engineering
1208 Stoney Run Trail
Broadview Heights, OH 44147
Contact: Jim Somich, President
216-526-4561 FAX: 216-991-1932

Sonex Division of Illbruck Inc
3800 Washington Avenue North
Minneapolis, MN 55412
Contact: Eric Johnson, National Sales
Manager
800-662-0032 FAX: 612-521-5639

Sonic Broadcasting Inc
108 Amanda Drive
Anderson, SC 29621
Contact: Kerry Fink,
Director Research & Development

Sonny Bloch's Company
40 East 63rd Street
New York, NY 10021
Contact: Susan Pasarelli

Sonocraft Company
575 Eighth Avenue, 2nd Floor
New York, NY 10018
Contact: Ed Sternbach, Advertising
Manager

Sono-Mag Corp
1833 W Hovey Ave
Normal, IL 61761
Contact: Jon A. Housour, VP Sales
309-452-5313 FAX: 309-452-2521

Sontec Electronics
Audio Drive
Goldbond, VA 24094
Contact: Burgess MacNeal, General
Manager
703-626-7256 FAX: 703-626-7257

Sony Business & Prof Group
3 Paragon Drive
Montvale, NJ 07645
Contact: Ron Remschel, Marketing
Manager-Audio Products
201-358-4196 FAX: 201-358-4907

Soper Sound Music Library
PO Box 498
Palo Alto, CA 94301
Contact: Bruce Hemingway,
Sales Manager
800-227-9980 FAX: 415-321-9261

Sorenson Broadcasting
604 N Kiwanis Plaza
Sioux Falls, SD 57104
Contact: Dean Sorenson, President

Sound America Corp

5669 Highway 17 South
Savannah, GA 31405
Contact: Fred Hines, President
912-238-1771 FAX: 912-238-1750

Sound Com Corp

227 Depot St
Berea, OH 44017
Contact: Roy Stuewe
216-234-2604 FAX: 216-234-2614

Sound Concepts

Box 135
Brookline, MA 02146
Contact: John Bubbers

Sound Creations

21 Royal Oak Road
Lawrenceville, NJ 08648
Contact: Cliff White, Program Director

Sound Ideas

105 W Beaver Creek Rd Suite 4
Rich. Hill, ONT, L4B 1C6 CANADA
Contact: Brian Nimens, Pres
416-886-5000 FAX: 416-886-6800

Sound Merchandising

926 Sheridan Rd
Glencoe, IL 60022
Contact: Sales Mgr

Sound Technology

1400 Dell Avenue #A
Campbell, CA 95008
Contact: Robert Anderson, VP
408-378-6540 FAX: 408-378-6847

Soundcraft

8500 Balboa Blvd
Northridge, CA 91329
Contact: David Kimm, Dir. of Mkt. Development
818-893-4351 FAX: 818-893-3639

South Central Sound

1400 E New Boston Rd #35
Nash, TX 75569-2300
Contact: Dan Wasmouth, Owner

Southeast Electronics Inc

3719 Richmond Street
Jacksonville, FL 32205-9425
904-356-3007

Southern Tower Service Co

PO Box 1387
Suffolk, VA 23434
Contact: James L Corlew
804-539-8365 FAX: 804-539-2047

Spaceage Electronics Corp

3324 Constance
New Orleans, La 70115
Contact: Claude Cadella, National Sales
800-624-6599

Space Com Systems Inc

3801 S Sheridan Road
Tulsa, OK 74145-1129
Contact: Al Stern, Vice President/ General
Mgr
918-665-6690 FAX: 918-621-5601

Spaulding & Assoc., Consult Eng

883 San Simeon Drive
Mountain View, CA 94043
415-961-5018 FAX: 415-961-5018

SPECTRA SONICS

3750 Airport Rd
Ogden, UT 84405
Contact: Jean Dilley, Controllor
801-392-7531 FAX: 801-392-7531

Spectrum Research

1808 Landmark One
Cherry Hill, NJ 08034
Contact: Peter Mokover, President

Spencer Broadcast Inc

Glendale, AZ 85308
Contact: Charles Spencer, President
602-242-2211 FAX: 602-843-2860

A W Sperry Instruments

245 Marcus Blvd
Hauppauge, NY 11788
Contact: Dennis Carroll, VP Sales &
Marketing
516-231-7050 FAX: 516-434-3128

Sphere Electronics

13855 S Carus Road
Oregon City, OR 97045-9509
Contact: David Holmes

Sports & Entertainment Network

3333 Cambridge Street
Las Vegas, NV 89109
Contact: Tom Page, Affiliate Relations
Director
702-731-5200 FAX: 702-731-4200

Sprague Magnetics Inc

15720 Stagg St
Van Nuys, CA 91406
Contact: John Austin, Jr, Audio Sales
Manager
818-994-6602 FAX: 818-994-2153

SSAC Co

Box 1000
Baldwinsville, NY 13027
Contact: Gary Weeks, Director of Marketing
315-638-1300 FAX: 315-635-0333

Stadlen Radio Associates

3123 Adirondack Drive NE
Cedar Rapids, IA 52402-3309
Contact: Richard Stadlen, President
319-365-0410 FAX: 319-365-0567

Stainless Inc

Third & Montgomery Sts
North Wales, PA 19454
Contact: H William Guzewicz
215-699-4871

Standard Tape Laboratory Inc

26120 Eden Landing Rd, No. 5
Hayward, CA 94545
Contact: Frank G Lennert, Pres
415-786-3546 FAX: 415-786-1180

Stanford Research Systems

1290 Reanwood Avenue
Sunnyvale, CA 94089
Contact: Dave Ames

Stan Raymond & Associates

P.O. Box 8231
Longboat Key, FL 34228
Contact: Stan Raymond, President
813-383-9404 FAX: 813-383-9132

Stan Ray Productions

Rt 1, S-7610 Chapel Road
Hill Point, WI 53937
Contact: Stan Ray, Owner

Stanton Magnetics Inc

101 Sunnyside Blvd
Plainview, NY 11803
Contact: Pete Bidwell, Vice President
516-349-0235 FAX: 516-349-0230

Stantron Inc

1224 Montague Street #c-4527
Pacoima, CA 91331-2211
Contact: Guy Tessier

Star Case Manufacturing Co Inc

648 Superior Avenue
Munster, IN 46321
Contact: Ralph G. Hoopes, Vice President
Sales & Marketing
800-822-STAR FAX: 219-922-4442

Star Communications

1 Kendall Square #1400
Cambridge, MA 02139-1562
Contact: Tom Star

Stardate, Univ of Texas

McDonald Observatory
Austin, TX 78712
Contact: Rita Pirone Noak, Marketing
Manager

Starmagic Radio

P.O. Box 595
New York, NY 10023-0595
Contact: Michael Jordan

Star Media

17304 Preston Road #265
Dallas, TX 75252
Contact: William Steding, President

Starstream Communications Grp

9800 Richmond #300
Houston, TX 77042
Contact: Garry R Firth, President

Star Systems

326 South Broadway #D
Salem, NH 03079
Contact: Ed Byrne, President
603-893-1544 FAX: 603-894-6565

STC Broadcast Consultants

3720 Greenwich Drive
El Paso, TX 79912
Marketing Manager

Steinkamp Engineering

PO Box 3101
Quincy, IL 62305
Contact: Jeff Steinkamp, Registered
Engineer
217-224-6284

Stellar Communications, Inc.

P.O. Box 1120
Vinita, OK 74301
Contact: Tom Snow, President
918-256-7883 FAX: 918-256-2558

Stellavox

13897-J Willard Road
Chantilly, VA 22021
Contact: Bill Peugh, Director
703-378-1515 FAX: 703-378-1517

Stephen Aaron Enterprise

P.O. Box 515764
Dallas, TX 75251
Contact: Steve Bergenholz, Ad Manager

Stephens Communications

2425 Beauchamp Road
Little Rock, AR 72210
Contact: Stephen McNamara, President
501-821-5756 FAX: 501-821-4424

Steven L Delay Co

P.O. Box 1125
Pawnee, IL 62558-1125
Contact: Steven Delay, Owner
217-498-7339 FAX: 217-498-8197

Stevens, Kirkland, Kreer

35 E Wacker Dr, Suite 1780
Chicago, IL 60601
Contact: H.B. Kreer

Steve Vanni Assoc. Inc.

PO Box 422
Auburn, NH 03032
Contact: Steve Vanni, Owner
603-483-5365 FAX: 603-483-0512

Storeil Corp

PO Box 80523
Atlanta, GA 30366
Contact: Carolyn Galvin, President
404-458-3280 FAX: 404-457-5585

Strak International

7512 Stewart Gray #4
Downey, CA 90241
Contact: Yombo Aderinto

Stram Electronics Corp

4800 S Westshore Blvd, #714
Tampa, FL 33611
Contact: Michael Stram, Owner
813-831-8551

Strategic Radio Research

180 N Wabash
Chicago, IL 60601
Contact: Kurt Hanson, President

Stratford Research

P.O. Box 167581
Toledo, OH 43616
Contact: Lewis W. Dickey Jr, President

Strother Communications

3795 N Morrison Blvd
Hammond, LA 70401
Contact: Ron Strother, President

Structural Systems Tech, Inc

6867 Elm St
McLean, VA 22101
Contact: J Cabot Goudy, President

Studer Editech

3744 Red Oak Way
Menlo Park, CA 94061
Contact: Andraes Koch, VP & General Mgr.

Studer Revox America, Inc.

1425 Elm Hill Pike
Nashville, TN 37210
Contact: Thomas M. Jenny,
V.P. & General Manager
615-254-5651 FAX: 615-256-7619

Studio Center

200 W 22nd Street
Norfolk, VA 23517
Contact: Larry Crowley, President

Studio Technologies

5520 West Touhy Ave
Skokie, IL 60077
Contact: B. Govednik/G. Kapes, Comm.
Mgr/President
708-676-9177 FAX: 708-982-0747

Studio Technology

#4 Pennsylvania Avenue
Malvern, PA 19355
Contact: Vince Fiola, Director
215-640-1229 FAX: 215-640-5680

Studio-Sonics Corp

450 E Rano Drive
Mount Prospect, IL 60056-2161
Contact: James R Stemke, Pres
312-843-7400

Suministros Gonzalez

3250 SW 21st Street
Miami, FL 33145
Contact: Manuel J Gonzalez, Owner
305-448-5066 FAX: 305-448-5127

Summit Audio Inc

644 N Santa Cruz Avenue, Suite 7
Los Gatos, CA 95030
Contact: Mike Papp, President
408-395-2448 FAX: 408-395-1403

Summit Communications Group

115 Perimeter Center Place #1150
Atlanta, GA 30346
Contact: Owen Weber, Executive VP/Radio

Summit Software Systems Inc

1966 13th Street Ste 200
Boulder, CO 80302
Contact: Timmi Perrin, Sales Manager
303-443-9866 FAX: 303-443-9934

Sunbelt Mfg Co

Vienna Industrial Park
Vienna, GA 31092
Contact: Ben Johnston, Mktg Mgr

Sunkyong Magnetic/America

4041 Via Oro Avenue
Long Beach, CA 90810
Contact: Joseph Kempler, Technical
Director

Sun Radio Network Inc

2857 Executive Drive #100
Clearwater, FL 34622
Contact: Richard Benton, Media Specialist

Sunspot

7925 Serendipity Lane
Charlotte, NC 28226-8609
Advertising Manager

Superadio Ltd Partnership
225 Turnpike Road
Southborough, MA 01772
Contact: Andy McLean, Operations
Manager

Superior Electric
383 Middle Street
Bristol, CT 06010
Contact: Ted Gladis, Manager
203-582-9561 FAX: 203-582-3784

Surcom Associates
2215 Faraday Ave, No. A
Carlsbad, CA 92008
Contact: A J Link, President
619-438-4420 FAX: 619-438-4759

Swaine Studio Inc
2515 Harriman Ln
Redondo Beach, CA 90278
Contact: Gay D Swaine, Pres

SW Casueyly Inc
9311 San Pedro Suite 600
San Antonio, TX 78216
Contact: Charles Amato

Swiderski Electronics Inc
1200 Greenleaf Avenue
Elk Grove Village, IL 60007
Marketing Manager

Switchcraft Inc
5555 N Elston Ave
Chicago, IL 60630
Contact: Herbert C. Klapp, Manager
Marketing Communications
312-792-2700 FAX: 312-792-2129

Symetrix Inc
4211 24th Ave West
Seattle, WA 98199
Contact: Jon Bosaw,
National Sales Manager
206-282-2555 FAX: 206-283-5504

Synergistic Technologies
Three Parkway Center #102
Pittsburgh, PA 15220
Contact: Gary Jones

Systemation
337 N Water Street
Decatur, IL 62523
Contact: Maureen Bellinger,
Executive Assistant
217-428-7101 FAX: 217-423-9764

Systems Development Group
5744 Industry Lane Suite J
Frederick, MD 21701-7286
Contact: Skip Warrington,
Executive Officer

Systems Wireless Ltd
465 Herndon Parkway
Herndon, VA 22091
Contact: William Sien, Vice President
703-471-7887 FAX: 703-437-1107

Szabo Associates Inc
3355 Lenox Road 9th fl
Atlanta, GA 30326
Contact: Peter Szabo, President
404-277-2464 FAX: 404-266-2165

Tac Hammer Communications
516 Tyler Court
Edina, MN 55343
Contact: Tac Hammer, President

TAI
7733 Telegraph Road
Montebello, CA 90640
Contact: David Oren,
Product Manager

T & W Tower/Antenna
P.O. Box 898
Hurlock, MD 21643
Contact: Patrick Todd

T.H.E.A.T.A. Digital Co
5330 Darry Avenue
Agoura Hills, CA 91301
Contact: Neal Sinclair

TCI
6560 Backlick Road, Suite 215
Springfield, VA 22150
Contact: J B Straud Sr, Director

TDK Electronics Corp
12 Harbor Park Dr
Port Washington, NY 11050

TEI Electronics
19850 Pheasant Drive
New Berlin, WI 53146
Contact: Tom Winnicki, President

TFT Inc
3090 Oakmead Village Dr
Santa Clara, CA 95051
Contact: Darryl E. Parker,
Director of Marketing
408-727-7272 FAX: 408-727-5942

THC Associates
15 Plum Grove Way
Gaithersburg, MD 20878
Contact: Tom Creighton, Consultant

TM Century, Inc.
14444 Beltwood Parkway
Dallas, TX 75244
800-937-2100 FAX: 800-749-2121

TM Communications
14444 E. Beltwood Parkway
Dallas, TX 75244-3201
Contact: David Tyler

TOA Electronics Inc
601 Gateway Blvd, Suite 300
S San Francisco, CA 94080
Contact: Christine Foran, Marketing
Communications Mgr
800-733-7088 FAX: 415-588-3349

T.O.M.A. Research
11818 SE Mill Plan Blvd #302
Vancouver, WA 98684
Contact: Teanna Jordan,
Office Manager

Television Technology Corp
650 South Taylor Avenue
Louisville, CO 80027
Contact: Russ Erickson, Sales Manager
800-TTC-1099 FAX: 303-673-9900

T.Z. Sawyer Tech Consultants
6204 Highland Drive
Chevy Chase, MD 20815-6610
Contact: Timothy Z. Sawyer,
President
800-255-2632 FAX: 301-913-5799

Taber Manufacturing & Engrg Co
1880 Embarcadero Way
Palo Alto, CA 94303
Contact: Veldon Leverich
415-493-3811 FAX: 415-855-2302

Talentmasters
Parkway 575 #310
Woodstock, GA 30188
Contact: Don Anthony, President

Talent Network
Box 521509
Longwood, FL 32752
Contact: Gary Kines

Tandberg, Inc.
Orch Rdg Crp Pk, Bldg 2, Fields Ln
Brewster, NY 10509
Contact: Morten Moseby, Manager
914-277-3320 FAX: 914-277-3995

Tannoy-Tgl North America Inc
300 Gage Ave Unit, No. 1
Kitchener, Ont, N2M 2C8 Canada
Contact: Mark Kinzie, Technical Support
519-745-1158 FAX: 519-745-2364

Tapecaster
7174A Industrial Drive
South Haven, MS 38671
Contact: Robert E Jones, President
601-349-2881 FAX: 601-349-2882

Tape Video Services
3374 Given
Memphis, TN 38122
Contact: Ed Chapman

Tape World
220 Spring Street
Butler, PA 16001
Contact: David Grecni, Owner
800-245-6000

Tapscan
3000 Riverside Galleria K #830
Birmingham, AL 35244-2335
Contact: J Christian, President

Target Head Enterprise
5360 East Raymond St
Indianapolis, IN 46203
Contact: Geo Cecil Frye

Target Tuning
6 Caesar Place
Moonachie, NJ 07074
Contact: Dan Flohr, Pres
201-935-8880 FAX: 201-935-6548

TASCAM
7733 Telegraph Road
Montebello CA 90640
Contact: Ken Hirata, Marketing
Communications Manager
213-726-0303 FAX: 213-727-7656

Taube Violante Advert
PO Box 504
Norwalk, CT 06856
Contact: Jean Crawford

Taylor Communication Service
51 Penway
Houston, TX 32752
Contact: David Taylor, President

Tech Laboratories Inc
500 Tenth Street
Palisades Park, NJ 07650
Contact: Bernard M. Ciongoli,
President
201-944-2221 FAX: 201-944-1653

Technet Systems Group
P.O. Box 422
Auburn, NH 03032
Contact: Steve Vanni, Owner
603-483-5365 FAX: 603-483-0512

Technical Services
P.O. Box 57
Rupert, VT 05768
Contact: Peter Morton

Technidisc
2250 Meijer Drive
Troy, MI 48084-7111
Contact: Leon Chick, Sales

Techni-Tool
5 Apollo Rd Box 368
Plymouth Meeting, PA 19462
Contact: Bonnie Burgemeister, Adv Mgr

Technology Plus
6502 Robin Forrest
San Antonio, TX 78239
Contact: Bill Smith, Proj Mgr

Techron
1718 W Mishawaka Road
Elkhart, IN 46517
Contact: Larry Shank,
TEF Sales Manager

Techsonics 2 Music Library
709 Shadowfield Court
Chesapeake, VA 23320
Contact: Steve Peppos,
Executive Producer

Techtime Inc
1111 Maggie Lane
Billings, MT 59101
Contact: Chuck Naylor

Tech/Write Communications
209 Sleepy Hollow Street
Ashland, OR 97520-1206
Contact: Bruce Borgerson, Owner

Tectan Inc
PO Box 271872
Concord, CA 94572
Contact: William D. Leasy, VP Sales
510-798-2222 FAX: 510-798-2224

Tek Media Supply Company
4700 West Chase
Lincolnwood, IL 60646
Contact: Sherwin Berger, General Manager
708-677-3000 FAX: 708-677-1311

Tektronix Inc
P.O. Box 500
Beaverton, OR 97077
503-627-7111

Telcom Group Intl
2921 Carlisle Blvd NE, #200
Albuquerque, NM 87110
Contact: David Morgan, President

Telectro Systems Corp
96-18 43rd Ave
Corona, NY 11368
Contact: Harry Sussman, President
718-651-8900 FAX: 718-651-4103

Teléfonken
1350 I Street NW, #800
Washington, DC 20005-3305
Contact: Gary Von Kampen

Teletech Inc
P.O. Box 924
Dearborn, MI 48121
Contact: Kenneth Hoehn, VP & General Mgr.
313-562-6873 FAX: 313-562-8612

Television Engineering
6400 Hollis, Suite #12
Emeryville, CA 94608
Contact: David Dunaway, West Dist Sales Mgr

Tele-Wire Supply Co
1620 W Crosby Rd
Carrollton, TX 76006

Telex Communications Inc
9600 Aldrich Ave South
Minneapolis, MN 55420
Contact: Ronald Taylor, Advertising Mgr.
612-884-4051 FAX: 612-884-0043

Telfax Communications
2501 N. Loop Drive, Suite 900
Ames, IA 50010
Contact: Craig Pringle, Owner
515-296-9911 FAX: 515-296-9910

Telos Systems
2101 Superior Avenue
Cleveland, OH 44114
Contact: Nancy Gadish, Operations Mgr.
216-241-7225 FAX: 216-241-4103

Telo Technology
1305 Upland Drive
Stanwood, WA 98292
Contact: Dan Rupe, Owner
206-387-3558

Telsat
Av. Insurgentes S1802 Pso 5, Col Fla
Mexico DF 01030
Contact: Ing. Salvador Landeros A., Dir. Gen.
525-534-3547 FAX: 525-524-3403

Telular
1215 Washington Ave
Wilmette, IL 60091
Contact: Richard Wasserman, Technical
Sales Supervisor
708-256-8000 FAX: 708-256-3555

Temtron Electronics Ltd

15 Main St
E Rockaway, NY 11518
Contact: Sid Sussman
516-599-6400

Tenco Tower

9723 Folsom Blvd
Sacramento, CA 95827-1326
Contact: Donald J. Tennes, Owner
916-638-8833 FAX: 916-638-8858

Tennaplex Systems Ltd

21 Concourse Gate
Nepaan, ON, K2E 7S4 Canada
Contact: Manfred Muenzel, President
613-226-5870 FAX: 613-727-1247

Tentel Corp

4475 Golden Foothill Pkwy
El Dorado Hills, CA 95762
Contact: Wayne Graham, Sales Mgr
916-939-4005 FAX: 916-939-4114

Tepeco Corp

PO Box 680
Rapid City, SD 57709-0680
Contact: Jerry Johnson, Sales Mgr
605-343-7200

Texas Electronics Inc

PO Box 7225B
Dallas, TX 75209
Contact: Sam F. Eason, Marketing Manager
800-424-5651 FAX: 214-631-4218

Text Technologies Inc

P.O. Box 24268
Denver, CO 80224-0268
Contact: John Clark, Pres
303-751-7619

That Corporation

15 Strathmore Road
Natick, MA 01760
Contact: Gary Hebert, VP Engineering
508-658-6335 FAX: 608-653-5334

Thermodyne Intl Ltd

20850 S Alameda
Long Beach, CA 90810
Contact: Gary Ackerman, Vice President
213-603-1976 FAX: 213-603-1929

3M Magnetic Media Division

Bldg 223-55-01, 3M Center
St Paul, MN 55144-1000
Contact: Richard J Collins
612-733-1082

3-15 Productions Inc

502 commercial Street
Boston, MA 02109
Contact: Tom Sullivan

3-Strikes Custom Design

45 Church Street
Stamford, CT 06906
Contact: Felicia Kreiss, Advertising
Manager

360 Systems

18740 Oxnard St, #302
Tarzana, CA 91356
Contact: Robert Easton, President
818-342-3127 FAX: 818-342-4372

The Austin Company

3650 Mayfield Road
Cleveland, OH 44121
Contact: Don Archibale, Director of
Planning

The Breeze

1748 20th Avenue NW
New Brighton, MN 55112-5419
Contact: Tom Pelissero, Operations
Manager

The Broadcast Team

770 W Granada Blvd #201
Ormond Beach, FL 32174
Contact: Mark Edwards, President
904-676-1157 FAX: 904-676-1127

The Capener Company

620 C Street, Ste 600
San Diego, CA 92101
Contact: M.W. Hegerman, Account
Executive

The Daily Insider

Box 792
Concord, CA 94522
Contact: Terry Marshall

The Domain Group Ad Agency

289 Main Place
Carol Stream, IL 60188
Contact: Tou Soung, Supervisor

The Holt Corporation

P.O. Box 9595
Allentown, PA 18105-9595
Contact: Arthur Holt, President

The Hook Factory

12732 NE Hassalo
Portland, OR 97230
Contact: Bryan O'Neal-Green, President

The Interep Radio Store

100 Park Avenue
New York, NY 10017
Contact: Marc Guild, President

The Mahlman Company

1 Stone Place, 3rd Floor
Bronxville, NY 10708
Contact: Robert Mahlman, President

The Management

P.O. Box 996
Opelika, AL 36801
Contact: Danny Tankersley, Southeastern
Sales

The Media Gallery

PO Box 652
Torrance, CA 90508
Contact: Ruth Presslaff, President
310-533-0855 FAX: 310-533-0842

The Media Groupe

657 East Thach Avenue
Auburn, AL 36830
Contact: Michael Shelley, President

The Miley Collection

P.O. Box 5103
Evansville, IN 47716-5103
Contact: John Miley, President

The Morning Show Cons Group

46 Hannah Lane
Monroe, CT 06468
Contact: Bob James

The Network

P.O. Box 868
Rainier, WA 98576
Contact: Katherine Arnold

The Nissen Group, Inc.

32 Ridge Drive
Port Washington, NY 11050
Contact: Robert J Nissen,
President/Consultant

The Programming Associates

40 Bellam Blvd
San Rafael, CA 94912
Contact: Don Sainte-Johnn, President

The Radio Agency

100 Presidential Blvd
Bala Cynwyd, PA 19004
Contact: Mark Lipoky

The Radio Group

2001 Salvio Street, Ste 11
Concord, CA 94520
Contact: David Isenberg

The Radio Mall

2412 Unity Avenue North
Minneapolis, MN 55422-3450
Contact: Dave Dworkin, President
612-522-6256 FAX: 612-522-6256

The Radioguide People Inc

24725 W 12 Mile Road Ste 316
Southfield, MI 48034
Contact: Arthur R. Vuolo, Jr., President
313-355-0022 FAX: 313-353-0660

The Research Group

1100 Olive Way #1200
Seattle, WA 98101
Contact: Bill Moyes, Chairman

The Sillerman Companies

150 E 58th Street 19th Floor
New York, NY 10155
Contact: Robert Sillerman,
Chairman/CEO

The Spotwise Agency

Shipway Place
Boston, MA 02129
Contact: Larry Crowley, President

The Source

9540 Washington Blvd
Culver City, CA 90232
Contact: Thom Ferro, Executive
VP/General Manager

The Summit

1227 W McNolla, #500
Fort Worth, TX 76104
Contact: Denise Graham

The Talk Radio Company

13971 80th Avenue North
Seminole, FL 34646
Contact: Ed Hartley, President

The Ted Hepburn company

PO Box 43263
Cincinnati, OH 45243-0263
Contact: Todd Hepburn,
Vice President

The Telemart Company

7431 NW 14th Street
Ocala, FL 32675-4482
Contact: Sidney Betz, Manager

Thermodyne International Ltd.

20850 South Alameda Street
Long Beach, CA 90810
Contact: Gary S. Ackerman, Senior Vice
President
310-603-1976 FAX: 310-603-1929

Thoben Van Huss & Associates

107 N Pennsylvania #503
Indianapolis, IN 48204
Contact: Phillip Thoben, President

Thompson Consulting

1031 San Antonio Avenue
Alameda, CA 94501
Contact: Sam Thompson

Thompson Creative

4631 Insurance Lane
Dallas, TX 75205
Contact: Ben Freedman, Vice President/
General Sales Mgr
800-723-4643 FAX: 214-521-8578

Thor Electronics Corp

321 Pennsylvania Ave
Linden, NJ 07036
Contact: Angelo Crudele, President
800-686-8467 FAX: 908-486-0923

Three 'R' Premiums

66 Sudbury Lane
Westbury, NY 11590-1514
Contact: Ralph Roach

Tichenor Media Systems Inc

100 Crescent Court #1777
Dallas, TX 75201
Contact: McHenry T Tichenor Jr, President

Time & Temperature Co of SD

PO Box 3605
Rapid City, SD 57709-3605
Contact: Don Grant, VP Sales & Mktg
605-787-4805

Tim Moore & Associates

100 Michigan Avenue/Edgewater
Charlevoix, MI 49720
Contact: Tim Moore, President

Tinet Inc

2611 Temple Heights Dr, Ste F
Oceanside, CA 92056
Contact: Paul Scott

Titus Technologies Labs

77 Kreiger Lane, Ste 914
Glastonbury, CT 06033
Contact: Lawrence Titus, President
203-633-5472 FAX: 203-633-8244

Time Logic, Inc.

11992 Challenger Ct.
Moorpark, CA 93021
Contact: Cindy Spencer, Marketing
Manager
800-238-1055 FAX: 805-529-6744

TK Video

10512 Sweetbriar Drive
Siver Spring, MD 20903-1237
Contact: Eric Hillman

Tobias & co ltd

4248 Gate Crest
San Antonio, TX 78217
Contact: Gordon Tobias, President
512-599-0789 FAX: 512-599-0799

Toby Arnold & Assoc Inc

3234 Commander Drive
Carrollton, TX 75006
Contact: Lawrence Mangiameli, VP

Todd Wallace Associates

6044 E Foothill Drive North
Paradise Valley, AZ 85253
Contact: Todd Wallace, President
800-528-6082 FAX: 602-948-7800

Tony Lease Incentive Tours

806 S.W. Broadway
Portland, Or 97205
Contact: Tony Lease, President

Torbet Radio

One Dag Hammarskjold Plaza
New York, NY 10017
Contact: Tony Fasolino, President

Tower Network Services

P.O. Box 4065
Miami, FL 33269-4065
Contact: Jim Tiner

Tower Structures Inc

1869 Nirvana Avenue
Chula Vista, Ca 92011
Contact: Steven Hopkins, President
619-421-1181 FAX: 619-421-0533

Townsend Broadcasting Systems

P.O. Box 2439
Springfield, MA 01101-2439
Contact: Barry R Huntsinger

Transamerica Intl Broadcasting

4811 NW 79th Avenue #5
Miami, FL 33168
Contact: Hermen Fortuny

Transamerica Mktg. Serv., Inc.

8130 Boone Blvd #350
Vienna, VA 22182-2640
Contact: Michael Lonneke, President,
Bdct. Div.
703-903-9500 FAX: 703-903-9511

Transcom Corporation

1077 Rydal Road #101
Rydal, PA 19046-1712
Contact: Martin Cooper, President
800-441-8454 FAX: 215-884-0738

Transmission Structures Ltd

PO Box 907, 227 South Vann Street
Vinita, OK 74301
Contact: Tom Snow, Vice President
918-256-7883 FAX: 918-256-2558

Transtector Systems Inc
10701 Airport Dr
Hayden Lake, ID 83835
Contact: Tom Wobker, VP Corporate
Marketing
208-772-8515 FAX: 208-772-6619

Trimm Inc
400 West Lake Street
Libertyville, IL 60048
Contact: Jacalyn Fagg,
Sales & Marketing
708-362-3700 FAX: 708-680-3888

Tri-Tech Inc
2415 East Skelly Dr
Tulsa, OK 74105
918-425-5588

Trompeter Electronics Inc
31186 La Baya Drive
Westlake Village, CA 91362-4047
Contact: Ray Calvin, VP Sales & Marketing
818-707-2020 FAX: 818-706-1040

Turtle Beach Systems
P.O. Box 5074
York, PA 17405
Contact: Jeff Klinedinst, Marketing Director
717-843-6916 FAX: 717-854-8319

Television Equip. Assoc., Inc.
Box 393
South Salem, NY 10590
Contact: Bill Pegler, President
914-763-8893 FAX: 914-763-9158

2B System Corporation
6575 Arrow Drive
Sterling Heights, MI 48078
Contact: Matt Mrowczynski,
Broadcast Promotions

27th Dimension
P.O. Box 1149
Okeechobee, FL 34973-1149
Contact: Rex Bell, General Manager

TWR Lighting Inc
1630 Elmview
Houston, TX 77080
Contact: Patrick Feller, General Manager
713-973-6904 FAX: 713-973-0205

UAR Professional Systems
8535 Fairhaven
San Antonio, TX 78229
Contact: Robert Bruce, Mgr
512-690-8888

U.P.I. Radio Network
1400 Eye Street, NW
Washington, DC 20005
Contact: David Oziel, News Director

US Tape & Label
1561 Fairview Ave
St Louis, MO 63132
Contact: Byron Crecelius, VP Mktg

U.S. Tower Services
5263 Agro Drive
Frederick, MD 21701
Contact: Norman Jeweler, President
301-874-5885 FAX: 301-874-5887

Uher of America
7067 Vineland Ave
N Hollywood, CA 91605
Contact: Patricia Belgiorno, Vice President
818-764-1120 FAX: 818-764-1129

Undyne Communications
555 Saturn Blvd #B
San Diego, CA 92154-4731
Contact: Bill Alfredo, President/CEO

Unistar Radio Networks
1675 Broadway, 17th Floor
New York, NY 10019
Contact: Nick Verbitsky,
Co-Chairman/CEO

United Communications
1090 Chateau Drive
Helena, AL 35080-9604
Contact: Dave Robinson

United Recording
681 Fifth Ave
New York, NY 10022
Contact: Anita Adams

United Rope Works
151 Commerce Drive
Montgomeryville, PA 18936
Contact: Rosely Stronski,
Administration Manager
215-368-6611 FAX: 215-362-7956

Univenture CD Pkg & Storage
6145-A Scherers Place, Suite A
Dublin, OH 43017-1272
Contact: Andrew Blank, Mktg. Coordinator
614-761-2669 FAX: 614-793-0202

Universal Pictures
100 Universal City Plaza
Universal City, CA 91608
Contact: Sally Van Slyka, National Publicity
& Promotions

Universal Electronics, Inc.
4555 Groves Rd. Ste 13
Columbus, OH 43232
Contact: Thomas Harrington, President
614-866-4605 FAX: 614-866-1201

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8500 Balboa Blvd
Northridge, CA 91329
Contact: Steve Armstrong, Director of Sales
818-893-8411 FAX: 818-893-3639

US Army Reserve
1815 N Fort Myer Drive #501
Arlington, VA 22209
Contact: Mark Zimmer, Public Affairs Office

US Centers for Disease Control
1901 L Street NW, #300
Washington, DC 20036
Contact: Richard Schusterman

US Radio
1207 Chestnut Street, #200
Philadelphia, PA 19107
Contact: Ragan Henry, Chairman

USA Radio Network
2290 Springlake
Dallas, TX 75234
Contact: Martin Maddoux, President
2140492-3900 FAX: 214-241-6826

USA Today/Decisionlines
9B Terrace Way
Greensboro, NC 27403
Contact: Janet Newell, Sales/Marketing
Manager

Utility Tower Company
PO Box 12369
Oklahoma City, OK 73157
Contact: Ron Nelson, Jr., VP & Sales
405-946-5551 FAX: 405-947-8486

VIF International
PO Box 1555
Mountain View, CA 94042
Contact: Gordon Mackechnie, Advisor,
International Operations
800-848-4428 FAX: 408-739-0809

Vacuum Tube Industries Inc.
506 N Warren Ave, PO Box 2009
Brockton, MA 02405
Contact: Gene Tosti, General Manager
508-584-4500 FAX: 508-584-0098

Thomas J. Valentino, Inc.
500 Executive Blvd
Eimsford, NY 10523
Contact: Thomas Valentino, President
914-347-7878 FAX: 914-347-4764

Valley Audio Products
9020 West 51st Terrace
Merriam, KS 66203
Contact: Dave Anderson, President
913-432-3388 FAX: 913-432-9412

Valley International Inc
PO Box 2758
Franklin, TN 37219-0758
Contact: Norman Baker, President
615-370-5901 FAX: 615-370-5907

Vallie Consulting
14016-B Sullyfield Circle
Chantilly, VA 22021
Contact: Dan Vallie, President
703-802-0700 FAX: 703-802-0714

Vaimont Industries
Valley, NE 68064
Contact: Larry Hibler, Manager of
Communication Products

Vanner Inc
4282 Reynolds Drive
Hilliard, OH 43026-1297
Contact: Jay Bowling, National Sales
Manager
614-771-2718 FAX: 614-771-4904

Vantaga Associates
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Albuquerque, NM 87112-3721
Contact: Rick Harris, President

Vaughn Communications
7951 Computer Ave So
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Contact: Beth Evans
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Vega, a Mark IV Company
9900 E. Baldwin Pl
El Monte, CA 91731-2294
Contact: Kenneth M. Bourne, Vice
President, Marketing
818-442-0782 FAX: 818-444-1342

Vega Wireless
9900 Baldwin Place
El Monte, CA 91731
Contact: James Stoffo,
Marketing Manager
800-877-1771 FAX: 818-444-1342

Verda Corp
5321 South Kedzie Avenue
Chicago, IL 60632
Contact: Mr. Don Hudalla, President
414-961-2185

Versa Count
553 Lively Blvd
Elk Grove Village, IL 60007
Contact: Charles Piper

Versatech Industries Inc
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Bixby, OK 74008
Contact: Gene B. Randall Jr, Pres
918-366-7400 FAX: 918-366-7400

Vertigo Recording
12115 Magnolia Ste 116
N Hollywood, CA 91607
Contact: Charles Bolis
818-907-5161

Viacom Broadcast Group
1515 Broadway
New York, NY 10036
Contact: Bill Figenshu,
President/Radio Division

Viasat Technology Group
150 Executive Drive
Edgewood, NY 11717-8320
Contact: Sherrill Hansen, Marketing
Administration

Videonics
1370 Dell Avenue
Campbell, CA 95008
Contact: Darryl Gorr

Videoquip Research Limited
418 Calverton Court
Harleysville, PA 10438
Contact: Fred Majewski,
National Marketing Manager
215-361-2757 FAX: 215-361-3281

Village Sound
640 Sunset
White Lake, MI 48383
Contact: Ken Johnson

Vinylweld Inc
2011 W Hastings St
Chicago, IL 60608
, Marketing Manager

VIR James Engineers
965 S Irving St
Denver, CO 80219
Contact: Timothy C. Cutforth, President
303-937-1900

Voice of America
330 Independence, SW #3356
Washington, DC 20547
Contact: John Appleton, Dir of International
Exhibits

Voyageurs Communications
P.O. Box 282
International Falls, MN 56649
Contact: Leroy Hervey, President

W

Walker Media Inc
98 Primrose Lane
Young Harris, GA 30582
Contact: John Hurbut, VP/Broker

Walt Disney/Touchstone
500 S Buena Vista Street
Burbank, CA 91521
Contact: Terry Press, Vice President
Publicity

Walter Wulff & Associates
P.O. Box 77028
Atlanta, GA 30357
Contact: Walter Wulff, President
404-881-6786 FAX: 404-881-6786

Walters-Storky Design Group
262 Martin Ave
Highland, NY 12528
Contact: John Storky, Vice President
914-691-9300 FAX: 914-691-9361

Ward-Beck Systems Ltd
841 Progress Ave
Scarborough, ON M1H 2X4 Canada
Contact: Eugene L. Johnson,
Sales Engineer
416-438-6550 FAX: 416-438-3865

Warner Brothers
3300 Warner Blvd
Burbank, CA 91510
Contact: Russ Thyret Sr,
VP/Marketing & Promotion

Warren Electronic Systems Inc
250 Thunderbird, Suite 5
El Paso, TX 79912
Contact: Pete Warren, III, President
915-581-0306 FAX: 915-584-8005

Washington Professional System
11157 Veirs Mill Road
Wheaton, MD 20902
Contact: Robert Forman,
Sales Manager

Waters Manufacturing
Longfellow Ctr
Wayland, MA 01778
Contact: Peggy Angel, Ad Mgr

WaveFrame Corporation
4730 Woodman Avenue, Suite 405
Sherman Oaks, CA 91423
Contact: Chuck Grindstaff, President
818-981-9235 FAX: 818-981-9239

Wavnet, Inc.
4646 W McLean Avenue
Chicago, IL 60639-3428
Contact: Greg Groeper, President
312-889-5532 FAX: 312-889-2308

Wayne Audio
RR 2 Box 232
Moncks Corner, SC 29461
Contact: Joseph Kelley

Weather Central
5725 Tokay Blvd
Madison, WI 53719
Contact: Charles B. Sholdt, Vice President
608-274-5789 FAX: 608-273-5854

Weather Data Services Inc
125 East 4th Street
Garner, IA 50426
Contact: Jeff Short

Weather Services Corporation
131A Great Rd
Bedford, MA 01730
Contact: George Stamos, Vice President
617-275-8860 FAX: 617-271-0178

Wegener Communications
11350 Technology Cir
Duluth, GA 30136
Contact: Kenneth D Leffingwell,
Manager Communications Services
404-623-0096 FAX: 404-623-0698

Weisel Communications
147 Brookfield Avenue
Youngstown, OH 44512
Contact: Charles Weisel

Weiwood Intl Film Productions
160 Washington SE, #138
Albuquerque, NM 87108
Contact: Bill Swortwood, President

Western Intl Communications
505 Burrard St Ste 1960
Vancouver, Bc, V7X 1M6 Canada
604-526-3214

Westex Tower Inc
P.O. Box 1635
Sweetwater, TX 79556
Contact: James Allen, President

Westlake Audio
2696 Lavery Ct Unit 18
Newbury Park, CA 91320
Contact: Robert Pursell,
Sales Director
805-499-3686 FAX: 805-498-2571

Wheatstone Corporation
6720 V.I.P. Parkway
Syracuse, NY 13211
Contact: Ray Esparolini,
Director of Sales
315-455-7740 FAX: 315-454-8104

White Instruments, Div C VAN R
1514 Ed Bluestein Blvd.
Austin, TX 78721
Contact: Jeff Van Ryswyk,
National Sales Manager
512-389-3800 FAX: 512-389-1515

Brian R White Co, Inc
313 Henry Station Rd
Ukiah, CA 95482
Contact: Larry J Richmond,
Sales Manager
707-462-9795 FAX: 707-462-4800

Wide Range Electronics Corp
174 Chesterfield Industrial Blvd.
Chesterfield, MO 63005
Contact: Gail Stecker, Manager
800-728-4017 FAX: 314-532-5492

Wiederkehr Inflatibles
1604 Euclid Street
St Paul, MN 55106
Contact: Matt Wiederkehr,
President

Wilkinson Electronics
PO Box 1385
Broomfield, CO 80020
Contact: Mkt Mgr

Will-Burt Company
P.O. Box 900; 169 South Main Street
Orville, OH 44667
Contact: Steven Pinkley,
Accounts Manager
216-682-7015 FAX: 216-684-1190

William A Exline, Inc
4340 Redwood Hwy, #F-230
San Rafael, CA 94903
Contact: Andrew McClure, President

Martin Williams
10 So 5th St
Minneapolis, MN 55402
Contact: Marlene Ordof

Wiltronix Inc
16850 Oakmont Ave
Washington Grove, MD 20880
301-258-7676

Winchell Marketing Comm
1315 Cherry St
Philadelphia, PA 19107
Contact: Joan Meagher

Windstar Studios
525 Communications Circle
Colorado Springs, CO 80905
Contact: Dane Scott, Vice President

Winsted Corp
10901 Hampshire Ave South
Minneapolis, MN 55438
Contact: G R Hoska, Vice President
800-447-2257 FAX: 612-944-1546

Wireready Newswire Systems Inc
31-H Union Avenue
Sudbury, MA 01776
Contact: David M. Gerstmann,
President
800-833-4459 FAX: 508-443-5988

Wireworks Corp
380 Hillside Ave
Hillside, NJ 07205
Contact: Angela Kelly,
Customer Service Manager
908-686-7400 FAX: 908-686-0483

Wohler Technologies
1349 Kansas St
San Francisco, CA 94107
Contact: Will C. Wohler, President
415-285-5462 FAX: 415-821-6414

Wood & Company
431 Ohio Pike, #210N
Cincinnati, OH 45255
Contact: Larry Wood, President

Wood & Douglas Inc
P.O. Box 1631
Melbourne, FL 32902
Contact: L. Lyman, Vice President
407-253-0845 FAX: 407-951-4630

World Talk Network
1440 Broadway, 24th Floor
New York, NY 10018
Contact: Rich Wood, Network Director

Worldwide Specialty Sales
2023 E 45th Street
Davenport, IA 52807-1401
Contact: Melvin LaForce

Worldwide Technologies
8 Patrician Drive
E Northport, NY 11731
Contact: Harvey Luntenfeld, President

World Tower Co Inc
PO Box 405
Mayfield, KY 42066
Contact: Jeff Sholar, Vice President
502-247-3642 FAX: 502-247-0909

Worrell Assoc
300 College St
Ft Worth, TX 76104
Contact: Chuck Worrell

WFMT Fine Arts/Beethoven Sat
303 East Wacker Drive
Chicago, IL 60601
Contact: Steven Pinkley, Director
312-565-5000 FAX: 312-565-5169

WS Consulting Services
P.O. Box 179
Oswego, NY 13126
Contact: WM Schleinitz, President

WSI Corporation
4 Federal Street
BillERICA, MA 01821
Contact: Marty Cohen, Marketing
Communications Manager
508-670-5000 FAX: 508-670-5100

Yale Electronics
6616 Sunset Blvd
Hollywood, CA 90028
Contact: David Langford

Yamaha International Corp
PO Box 6600
Buena Park, CA 90622
Contact: Bob Shomaker
714-522-9011 FAX: 714-739-2680

Yancey Marketing Corporation
11350 N Meridian #370
Carmel, IN 46032
Contact: Richard Yancey, President

Z
Zapnews
4002 University Drive
Fairfax, VA 22030
Contact: Jim Hood, President

Zarecki Radio Consulting
129 Brookside
Danbury, CT 06811
Contact: Tom Zarecki,
President
203-748-8411 FAX: 203-798-1970

Zephyr Weather Information Ser
40 Washington St
Westborough, MA 01581
Contact: Kevin A. Porreco,
Manager, Zephyr Sales
508-898-3511 FAX: 508-836-3711

Zercom Corp.
Box 84, Zercom Drive
Merrifield, MN 56465
Contact: Denny Schmidt,
Sales
218-765-3151 FAX: 218-765-3900

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777 Front Street
Burbank, CA 91502
Contact: M. Pistone,
Advertising Coordinator
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Zimmer Broadcast Co
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Cape Girardeau, MO 63701
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COMPANY PROFILES

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VP/ Operations: Tim Ryan

VP/ Marketing: Terrence A. Becht

Construction Services: Steve Rhinerson

Director of Engineering: Len Cook, P.E.

Central Tower Inc. (CTI) was founded to provide superior products and services to the communications industry. Our dedicated team of 63 engineering, manufacturing and construction professionals are experienced in completing your project on time and within budget.

CTI engineers and manufactures products for the AM, FM, TV, LPTV, Cable and Wireless Cable Industries. Fifteen guyed tower designs, three self-supporting tower designs and monopoles are available to provide the best solution to customer needs. Both standard and custom engineered tower lines are available.

Central Tower is recognized as a leader in the tower and construction industry. In 1991 over twenty percent of new FM licensees chose Central Tower to provide and install their towers.

Products:

- Guyed towers
- Self supporting towers
- Antenna poles
- Ice shields
- Transmission bridges
- Grounding systems
- Related products
- Custom fabrication

CTI products are available directly from the factory or through one of our authorized dealers: Harris Allied, Continental Electronics, BE, and RF Specialties.

Services:

- Construction
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- Inspections
- Structural analysis
- Antenna and line installation
- Rebuilding / field tuning FM antennas
- FM antenna pattern consultation
- Project management

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Circuit Research Labs, Inc.

Circuit Research Labs, Inc., better known as CRL Systems, is located in the heart of the Arizona desert in Tempe, AZ. Founded in 1974 as a broadcast radio consultant company, CRL has expanded into a manufacturer of high quality audio processing equipment for AM, FM, Shortwave radio and Television.

CRL uses a unique modular approach to processing, which allows the users to choose the products and configuration which best suit their needs. This allows the broadcaster to begin with an "economy" system and later upgrade to a more "deluxe" system. With a commitment to providing the audio professional with reliable products and unparalleled service, CRL continues to research and develop new products to meet the needs of the present and future.

CRL equipment is marketed worldwide; 65% of sales are international, and 35% are domestic. CRL relies on dealers both domestically and internationally for final product distribution.

Principal domestic dealers:

Audio Broadcast Group, Bradley Broadcast Sales, Broadcasters General Store, Broadcast Services/EME, Broadcast Supply West, Caughill-Palitz, Continental Electronics, Crouse-Kimzey Co., Euro Tecnolige, Giesler Broadcast, Harris-Allied Broadcast Equipment, M.W. Persons & Associates, Northeast Broadcast Labs, Professional Audio Supply, RF Specialties Group, SCMS Inc., Warmus & Associates.

1993 Trade Shows where CRL will exhibit:

NAB '93, Radio '93, SBE National '93, Regional SBE shows, Univ. of Wisconsin Broadcasters Clinic, NRB, and other select state and regional shows.

Circle (145) On Reader Service Card

World Radio History

Audio Broadcast Group, Inc. was founded in 1960 (doing business as Audio Distributors, Inc.) by Jim Kaminga and **Dave Veldsma** at the present address of 2342 S. Division, Grand Rapids, Michigan.

In 1973 all the retail hi-fi operations were relocated doing business as the House of Sound. During 1979, the Commercial Sound/Telephone Communications Division was sold to ASCOM, formed and operated by former employees.

During 1982 the corporate name was changed to "**Audio Broadcast Group, Incorporated**", to reflect more accurately the marketing emphasis of the company.

A number of changes have taken place at **Audio Broadcast Group (ABG)** since June 1 of this year. **Dave Howland** is now the Sales and Marketing Manager, along with continuing his regular sales activity. **Cindy Edwards** is a new staff member coming to **ABG** from Broadcast Services and Broadcast Electronics. Cindy was hired to head up our southeastern sales office in North Carolina.

Jack Conners was added to the **Audio Broadcast Group** staff in October of 1991. He will be handling the area of sales that **Dave Veldsma** has been taking care of...mainly RF sales; however, in addition to the RF sales, Jack will be handling the majority of sales activity in Michigan, Illinois and Wisconsin. Jack was with Harrison for a period of time and was also an engineer at Interlochen Center for the Arts prior to joining the **ABG** staff.

Phyllis Freeman, Vice President and Chief Operating Officer, will continue to handle the executive and management duties of the company. **Jerry Bufka** will remain the primary contact with our vendors as our Purchasing Agent. Jerry is also very active in sales and customer service.

Dave Veldsma, our President and CEO is taking a less active role in the day to day operations of the company. Dave has kidney disease and as of this writing is at home recuperating from a kidney transplant.

ABG is very active in the manufacturing of broadcast studio furniture, both custom and standard lines, as well as prewired studio system packages. With over 200 systems installed to date, we count among our satisfied clients such diverse customers as **FOX** affiliate **WKBD-TV** in Detroit, **CBN** in Virginia Beach, **Bonneville's Mix 105** in New York and **WKAR** Public Broadcasting from Michigan State University.

We can also supply complete AM and FM transmitter and RF installations, as well as all major lines of broadcast "on air" and "production" studio gear. **ABG** is proud to be the industry's **single source supplier**.



Please be sure to visit us at all the major 1993 trade shows to see for yourself what so many others already know. For outstanding workmanship in studio furniture and systems, delivered on time, within budget, nobody can match the **Audio Broadcast Group**.

Let's get our heads together!

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An example of a studio project involving Multiphase

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Multiphase is recognized as an authorized installer for C-QUAM® AM Stereo systems, and also provides system tune-ups for existing stereo installations. Multiphase maintains a stock of rental test equipment which includes:

- **Delta's "HEART MONITOR"**
PRH-1—tests the condition of all types of transmission lines
- **The AM SPLATTER MONITOR**
Verify NRSC and transmitter performance. Also minimize IPM
- **OIB Operating Impedance Bridges**
and RG-3/RG-4 Receiver/Generators
"try before you buy"

For test equipment rental application notes, circle 51 on reader service card.

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2716 Gainesborough Drive
Dallas, Texas 75287
214-307-8773 Toll Free: 1-800-67/RADIO
President: Harry Nelson

Harry Nelson & Associates is a full-service consultant that can provide stations using satellite-delivered programming with:

- **A first class station media kit**
You'll get this powerful sales tool without expending cash or man hours. HNA will research and produce a top notch kit that will keep your sales staff bringing in higher revenue
- **Talent on staff that is better than your satellite network —for no out-of-pocket expense!**
You'll get this talent for just 18 minutes per broadcast day
- **A comprehensive report on the most desirable, affordable automation systems available**
This 15-page report outlines the advantages and disadvantages of most major systems in use today, so you can choose the system best suited to your station's needs
- **A complete video sales training course covering 30 sessions**
Plus in-house training seminars and a marketing newsletter
- **A Personality Workshop—to provide training and support for your entire staff of professionals**
Our course offers the cutting edge in performance and growth
- **Twice monthly market analyses and progress reports to give you the edge on the competition!**
Think of HNA as your own R&D department; we'll give your entire market an in-depth written analysis, including specific points of attack you can use against your competitors!

Our only clients are stations that use, to a greater or lesser degree, satellite delivered programming. We have assembled a plan that promises your success using this programming.

Why should you believe Harry Nelson? Harry spent nearly a decade at Satellite Music Network as an operations manager and morning man. The company grew from under 100 stations to over 1000 in that time. He worked with both John Tyler, founder/president/CEO and ABC/Capital Cities and understands the entrepreneurial spirit that makes every company grow and prosper.

Harry has programmed stations in Dallas, San Antonio, Bangor and Boston and has worked with "The Legends" for more than 25 years.

Harry Nelson has given motivational talks for the National Association of Broadcasters and developed a truly unique Personality Workshop for air personalities.

Circle (167) On Reader Service Card

World Radio History



VALENTINO INC., produces the VALENTINO PRODUCTION MUSIC AND SOUND EFFECTS LIBRARIES.

The **VALENTINO PRODUCTION MUSIC LIBRARY** is a more than 60 Compact Disc Production Music collection used by television and radio stations around the world. Each CD is categorized by subject matter and each selection is timed for full length versions, :60 second, :30 second and :15 second versions especially prepared for commercial uses. Also, rhythm only versions are given for background uses.

The **VALENTINO PRODUCTION SOUND EFFECTS LIBRARY** is a more than 50 compact Disc, Production Sound Effects service with each CD again categorized as to subject matter and each sound effect giver individualized tracks on each CD. The Sound Effects Library is a professional package used by producers and programmers not only in the United States, but around the world.

Details regarding both libraries are available at no charge by contacting the company at 500 Executive Blvd., Elmsford, NY 10523 (USA) telephone (914) 347-7878 FAX (914) 347-4764. A complete 65 page multi-lingual catalog will be sent with a demonstration disc of both libraries.

The company exhibits at numerous trade shows where the libraries can be picked up and the catalog can be acquired. Some of these are the NAB in Las Vegas, NV (USA), NAB Radio (USA and Europe), VIDEO EXPO (BRAZIL), IBC (Europe), TV Symposium (Europe), CIRT (MEXICO) and others.



Circle (191) On Reader Service Card



Penta Laboratories

21113 Superior Street
Chatsworth, California 91311

Telephone: 818-882-3872

Fax: 818-882-3968

Penta Laboratories has produced electron tubes for more than four decades. The company, based in Chatsworth, Calif., provides a full spectrum of products for all applications, including not only broadcast but industrial, marine and avionic.

The company developed the first beam-power pentode tube in the early 1950s, and today remains at the forefront of vacuum tube technology, pursuing an aggressive program of product development. Yet its extensive inventory of replacement tubes shows Penta has never turned its back on the past.

Penta Laboratories maintains an inventory of more than one million parts and 6,000 line items.

"The technical accomplishments of Penta Laboratories through the years are a source of great pride to all of us associated with the company," said company president Steven Sanett. "But our success as a manufacturer and marketer of superior electron tubes would not have been possible without the human touch—devotion to serving the needs of our customers."

Penta sells direct and through International agents.

The company will be exhibiting at NAB 1993 in Las Vegas, Nevada in April.

Circle (176) On Reader Service Card

World Radio History



The founders of J.N.S. share over half a century of station and broadcast equipment manufacturing experience. This hands-on exposure has led to the development of products that do jobs essential to the broadcaster, but in an intelligent way. Founders include John E. Leonard, Jr., President and John N. Stannard, Vice-President.

The firm spans two continents. J.N.S. Electronics, Inc. corporate, sales and service offices are in San Jose, CA. Manufacturing occurs in both California and Australia.

Products currently include audio routing switchers, a modular rack frame system, and digital audio transmission systems.

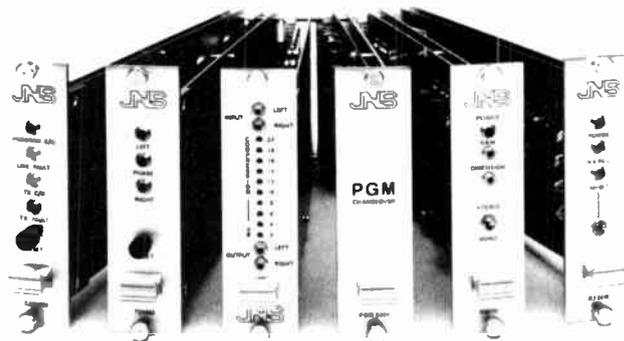
D-MUX - Digital Aural Program Transmission

D-Mux - the linear J.N.S. digital transmission multiplexer. Simply use the D-Mux with any digital telephone service (E1, T1, ISDN, partials, etc.), its fiber optics interface, its companion link for international broadcasters, or even twisted pairs to enter the digital age. D-Mux supports audio responses from 3kHz to 15 kHz and gives mono or stereo performance exceeding 16 bit technology.

'the FRAME'

The 8000 series modular system can be configured to amplify, switch, match, equalize, demodulate, display or generate. Two sizes are available to house and power from 2 or up to 10 modules. Over 25 modules are currently available for 'the FRAME', with new modules in development for release in 1993. Jobs being done by these modules include-

- Mono or Stereo Audio Distribution
- Audio Monitor Amplifiers
- Audio Switching
- Video Distribution
- Audio Failure Sensing
- Stereo Presence/Validity
- Program Changeover, auto or manual
- RF Demodulation
- Off-air Monitoring
- Peak/VU Audio Metering



Modules from 'the FRAME'

SWITCHERS

J.N.S. audio switchers are noted for **ALL** having, as a minimum, **CD quality** performance. Frequency responses of 20 Hz to 20 kHz, distortions under 0.01% and noise at or toward 100dB are standard.



8310

8310 - Affordable 10 in x1 out stereo

8310B - Stereo, 10 in x1 out, expandable to 100in, local and remote controllable, computer controllable.

9000 - Full matrix switch, from 1x15 to 100x100 (mono, stereo, and machine control), Control surfaces of all types, including computer control. Memory of last selection through hours of power outage standard.

See the current and new J.N.S. products at NAB in Las Vegas or from our distributors. Products are available through select distributors and by direct sales.

J.N.S. Electronics, Inc.

P.O. Box 32550

San Jose, CA 95152

408 729-3838/FAX 408 926-1003

Circle (103) On Reader Service Card



**144 Pleasant Grove Road
Bluff City, TN 37618**

Phone: 615-878-3141

FAX: 615-8787-4224

President: Thomas F. King

VP/Sales: Gwen B. King

Customer Service Rep: Donald Hastings

Production Manager: Boyd Wright



Founded in 1962 by Louis A. King P.E., Kintronic Laboratories got its start in the fabrication of isolation transformers and custom RF components. The company has since grown in size to encompass a facility of 17,500 square feet and a staff including four electrical engineers and twenty-six clerical and manufacturing personnel.

Kintronic has also grown in reputation to be the leading independent manufacturer of custom AM antenna systems and components in the US. The firm also has established a reputation for high quality products and service worldwide.

Kintronic Laboratories' President Thomas King holds a Bachelors and a Masters Degree in Electrical Engineering; he also has completed two years of graduated study towards his Doctorate in the field. King has 10 years of experience in defense electronics, and an additional eight years in broadcast engineering. He is also a member of NAB, SBE and the IEEE Broadcast Technology Subgroup and an Associate Member of AFCCE.

Major products from Kintronic include directional broadband antenna phasing systems, antenna tuning units, AM non-directional and directional multiplexed antenna systems, dummy loads, equipment racks, rigid transmission line and accessories, and RF contactors. Other products from the company include RF fixed and variable inductors, isocouplers, lighting chokes and custom RF components. In addition, Kintronic Labs now manufacturers a full line of shortwave/HF equipment including dipole curtain, log periodic, rhombic or half-wave dipole antennas, open wire transmission line, wall feedthrough panels and open wire transmission line manual or motorized switches.

Kintronic is also the stocking distributor for Sangamo/Cornell Dublier Mica Capacitors as well as for Jennings vacuum capacitors and contactors, and maintains Cablewave transmission line and accessory products in stock.

Direct marketing and distributors are employed by Kintronic Laboratories for sales, and the company has distribution agreements with RF Specialties, Harris Allied, NE Broadcast Lab, and Souther Coastal Marketing Services.

Kintronic plans to exhibit in 1993 NAB convention.

Dear Customer,

Hall Electronics, Inc. was founded in 1987 with the express idea of providing broadcasters with a source of quality rebuilt equipment complete with accessories, warranty and right of return privilege. Since that beginning as a one person company we have grown both in personnel and services offered. In addition to rebuilt equipment, we now offer a complete line of new equipment, rebuild and repair service for customer owned equipment update support products, and component for field repair. We have four technicians, two sales engineers and business support personnel to serve you. Whatever your need, give Phil Davis or me a call... We'll be glad to help!

Best wishes,
Jon Hall

What we mean by FULL SERVICE:

Rebuilt Equipment Our definition of 'rebuilt.'

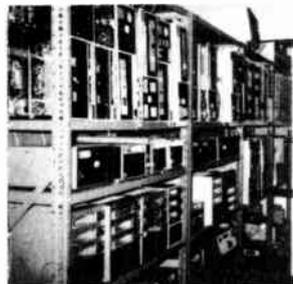
Rebuilt equipment should be truly rebuilt! To some, rebuilt means sort of clean and sort of working. To us it means that the equipment should operate in a like-new fashion, be reliable, and look good too. Each piece of equipment that we rebuild is torn down and thoroughly cleaned. Failure and wear prone components such as electrolytic capacitors and bearings are replaced. A spec sheet is provided with each unit as final verification that it meets the original manufactures specifications. Each Hall Electronics rebuild comes with mating connectors, a 90 day warranty, and a 10 day right of return privilege



- Our pre-rebuilt equipment is generally in stock (not consignment) ready to be rebuilt to order.

CUSTOMER SERVICE & SUPPORT

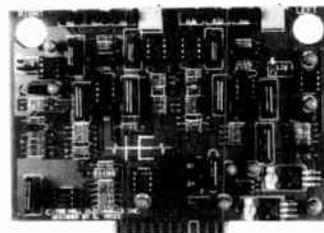
- We'll be glad to quote prices for rebuilding equipment that you own. We offer rebuild services for ITC, Tascam, Otari, Revox, and other brands. We are also an authorized service center for Otari and Tascam .



- We offer many types of new components and engineering supplies such as tape heads, transformers, mica capacitors, coaxial cable and other RF components. Also available are used and new surplus audio and RF components.

RETROFIT KITS

- We make our own line of circuit cards for ITC Premium line cart machines. These cards will update your indestructible old ITC equipment to 'state-of-the-art' performance. Reproduce audio and cue cards as well as a power supply capacitor replacement card are available. We also stock heads and other components for ITC equipment of all vintages.



- Retrofit circuitry is also offered for various Harris, McMartin, RCA, Autogram, and other ITC Models.

NEW EQUIPMENT

- We proudly offer quality broadcast and pro audio products from over 150 fine companies. Just a few of the companies that we represent:

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INDICES & REPRINTS

Buyers Guide Index 121

The Buyers Guide Index is a comprehensive list of 1992's equipment reports, referenced by company name.

Buyers Guide Reprints 122

The final element in this part of the **Radio World Directory** features selected reprints from last year's Buyers Guides, paid for by the companies represented. Companies are alphabetical in order.

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BUYERS GUIDE

TECHNOLOGY UPDATE

ITC Series 2 Bucks Digital Trend

by Bruce Helling
Marketing Communications Mgr.
ITC

BLOOMINGTON, Ill. When ITC introduced the Series 2 last spring, more than a few of our broadcast industry friends, and a few competitors, wondered why we chose to develop and market yet another NAB-type cartridge machine. Especially with "digital" being the buzzword.



The Series 2 cart machine combines record and playback electronics in a 1/3 rack unit package.

Well, it has been said by some for close to 10 years now that cart machines are on the way out, yet they continue to be the day in, day out bread-and-butter money makers for a majority of radio stations in the U.S. and abroad.

Recreating history

In 1982, we retired one of our most popular cart machine lines ever, ITC's Premium Line, in favor of the Delta Series. We had taken our time in developing the Delta Series, listening to what broadcasters from all types of markets were saying about their studio needs, and the Delta turned out to be even more popular than its predecessor.

The same concept of listening to the market, combined with innovative and efficient technical design execution, holds true for the Series 2 some 10 years later.

The Series 2 combines record and playback electronics in a one-third rack unit

package. Space is money. The basics pioneered by ITC over the years provided the platform to build on: motherboard/daughterboard construction, microprocessor logic, triple cue tones, high-speed recue, audio mute at EOM, primary tone add/defeat, replay lock-out and multi-turn potentiometers.

The mechanics started with a heavy-duty cast aluminum deck, precision adjust head block, constant tension car-

a unique cam-latching pressure roller mechanism and super-efficient solenoid provide smooth, silent pull-up and consistent contact. We also added an On/Off switch, micro-adjust Kevlar® tape guides, a removable fuse case, the heavy-duty motor from our 99B Series master recorder/reproducers and a completely new and improved controller. No fluff, just usable features the customers asked for, period.

One feature we didn't need to add because it comes standard is our technical service and customer service staff (available toll-free in North America), plus a four-year limited warranty.

The new machine

So, why the new machine? Because the NAB tape cartridge machine remains a reliable, economical and operationally friendly method for recording music and spots available. Sure, we've also been busy perfecting our DigiCenter® Digital Audio Platform, but true advancement is a slow process of combining new technology with operational variables and customer needs, while ensuring quality and reliability. We've just now created a successful marriage, but that's another story.

A large population of broadcasters worldwide continues to need reliable, high-quality, cost- vs. feature-efficient cartridge machines. They have an investment that shouldn't be taken lightly, or simply dismissed.

If you're in the cart machine market,

tridge hold-down mechanism, dynamic motor braking and more.

Improvements

From there, we looked to our customers for improvements. Our design team

Cart machines continue to be the day in, day out money makers for a majority of radio stations in the U.S. and abroad.

added an easy-to-read digital tape timer, high-resolution LED bar-graph metering, multi-function Record/Bias/Cue metering select, a looping function, optical sensor for mono/stereo cartridge and Dolby HX Pro™ headroom extension.

For servicing, we added a cleaning mode for normal maintenance, and a slide-out chassis for full access. For the daily production room/studio pounding,

the new Series 2, plus our economical Series 1 and top-of-the-line 99B Series, guarantee that you still don't have to settle for anything less than an ITC.

□ □ □

For information on the Series 2, contact Bruce Helling in Illinois: 800-447-0414; fax: 309-828-1386; or circle Reader Service 44.

Reprinted From Radio World December 23, 1992

TECHNOLOGY UPDATE

New AC/CHR Library Debuts on CD

by **Hank Landsberg**
President
Halland Broadcast Services Inc.

GLENDORA, Calif. Halland Broadcast Services Inc.'s new CD library for broadcasters, "The Eighties Plus," is a compilation of AC and CHR hits from 1980 through 1992. The library features 768 songs on 44 compact discs.

Selecting the songs to be included on The Eighties Plus was definitely not a trivial matter. Simply using all of the No. 1 hits doesn't produce a valid playlist, because record sales statistics do not provide an accurate picture of what listeners actually want to hear years later.

Audience testing

Many times a new record will run up the charts, but is never requested after its initial popularity falls. For this reason, audience testing was used to find songs that are playable and programmable even several years after their release.

After much research and testing, The Eighties Plus playlist was finalized. With 768 songs covering the years 1980 through 1992, that's about 62 songs for each year in the era. Our playlist includes all of the best AC artists, plus numerous, hard-to-find selections that broaden the scope of the library. The overall tempo of The Eighties Plus is just slightly "hot," making it appropriate for AC, Hot AC and CHR formats.

Another aspect of music selection is determining which version of a song to use. In the 1980s, most labels released several versions of a record, including the vinyl 45, the CD single, the CD radio edit single, the CD album, the extended dance mix and so on. In producing The Eighties Plus, Halland was careful to select the version most appropriate for airplay.

This was usually the radio-edited version, provided that it was available on CD (or studio master tape). Occasionally, the CD-album version was used, but only if it was of reasonable length. It's interesting to note that with the popularity of compact discs, the old 45 RPM time limit of 3:30 no longer applies to hit music; the average song length on The Eighties Plus is about 4:20.

Technical excellence was another requirement in producing the library. Of the source material used, 97 percent was digital. Only a few dozen songs were

sourced from vinyl, because they weren't available in any other form. Advanced digital editing and other proprietary techniques were used to optimize audio quality regardless of the source.

Double-checked

Everything was double-checked for mono compatibility and consistency in overall audio level and balance. To preserve all of the dynamics, no compression or limiting was ever used. Virtually all transfers were done digitally to prevent any distortion or noise during the

mastering process.

All tunes were accurately timed, with intro times and end-type (fade or cold) noted. These times, along with other information, were compiled into a master database, which is supplied on floppy disk with each library.

□ □ □

For a complete song list or additional information, contact Steve Steinberg at Halland's Glendora, Calif. office: 818-963-6300; fax: 818-963-2070; or circle Reader Service 16.

Reprinted from Radio World September 23, 1992.

TECHNOLOGY UPDATE

Pro-Disk-464 Grows with You

by **Mark Calice**
Product Specialist
Otari Corporation

FOSTER, Calif. The ProDisk-464 is a true multitrack, high-speed, hard disk-based digital audio recording and editing system.

The ProDisk provides a solid, reliable and expandable platform that we think can dramatically reduce your production costs. System configuration may accommodate from four to 64 channels of simultaneous digital and analog inputs and outputs in any combination.

Field upgrades also are possible in blocks of four channels. The Macintosh visual interface provides the quickest learning curve available, and because all audio processing is handled elsewhere, the system always runs at top speed with no slowdowns.

Current DSP options include real-time internal mixing, panning and level control, while future upgrades will handle time compression/expansion, pitch shift and EQ.

ProDisk's obsolescence-proof Programmable Logic Array and TDM SCSI disk technologies assure compatibility with tomorrow's storage products and software enhancements. The ProDisk's hardware architecture provides plug-in compatibility with standard multitrack tape machines, while the ability to punch in and out on any or all tracks assures a consistent and familiar operational base.

Standard features include unlimited length fades and crossfades, 8mm tape backup and restore at 3 speed, audible Fast Forward and Rewind, Multitrack and Cue List style user interface with interlinking sound libraries, full SMPTE time code support, sound quality yielding 96 dB dynamic range, high quality scrubbing and a visual waveform edit display capable of edits down to the sample.

Otari also provides complete system solutions, bundling Macintosh computers with any ProDisk purchase.

Optional features include multitrack digital I/O in AES, EBU, S/PDIF, SDIF-2 and PD formats and additional 8mm tape drives to improve backup and restore times.

As the ProDisk-464 is a constantly evolving product, forthcoming enhancements will include a configurable hardware control surface with transport, jog/shuttle, soft-keys and dedicated editing keys, CMX auto-assemble/conform, a graphic style editing and list assembly interface and central storage of sound effects libraries, accessible from any ProDisk terminal.

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For information, contact Mark Calice at Otari: 415-341-5900; fax: 415-341-7200; or circle Reader Service 99.

Reprinted from Radio World February 19, 1992.

USER REPORT

PR&E's Radiomixer Console Puts the 'Mix' in WZMX-FM

by Gene Faltus
CE, WZMX-FM

FARMINGTON, Conn. When new ownership took over at WZMX two years ago, we adopted the attitude that this was a new station. Actually, for the first nine months, it wasn't that difficult, since I constituted the entire staff. Our format: rebroadcasting NOAA weather.

But from the start, Multi-Market Communications was dedicated to building new studios at a site that would allow growth.

I had the luxury of several months to choose equipment for the newsite.

For my console selections, I spent time on the phone asking users how they liked their choices. One message came through loud and clear—those who had the least amount of trouble and the highest satisfaction rate were Pacific Recorders & Engineering users.

Fell in love

I fell in love with the PR&E Radiomixer at once. Starting up a station anywhere is an expensive proposition, but we were originating a new station in New England during a deep recession, and value for every item was paramount. So I was pleasantly surprised at the final cost for the Radiomixer. We had it customized with a master Mic Off button, so that with one button, all the studio mics could be turned off at once.

This was a feature that our PD wanted, and was put in from the factory. We also had remote control panels for two tape decks put in. We also use two channels for "remote" inputs, for such sources as EBS, traffic reports, Marti and other studios. So we added to the Radiomixer two remote input selector panels.

Even with these added features, the bottom line put us under budget for the air studio, and we gained having the Pacific name on the console. In fact, the final cost for the Radiomixer was less than the cost would have been for my second choice of console.

One feature that I think is the best on the market is the hybrid/telephone interface system. The console provides both a composite or dual channel feed to our

tapedecks.

We normally use the dual feed, which means that one channel of the tape deck gets just the caller and the other gets the talent. Then, on playback, we put the tape deck into mono on the Radiomixer, and we get both sides on the air. This makes it easy to take off listener comments for future use.

Or, playing back dedications, we select the Radiomixer to feed both left and right with just the caller side of the tape playback. At times, we have used the composite feed, which creates a mix of both caller and host, and sends it to both channels of the tape deck.

Three control modes

The system also has three control modes. It determines what gets sent to the caller. The choices are program, off-line mix or auto. The program mode



WZMX-FM's air staff learned how to use PR&E's Radiomixer in a day.

sends the contents of the program bus, minus the caller, while off-line mix can be selected with a button on each channel, which is external, right below the Program 1 and 2 buttons.

No more fooling around with internal DIP switches. The talent can change at anytime which channels the caller hears. The auto mode allows for automatic switching between program and offline busses.

Installation was a breeze. I knew that even though I had a lot of upfront time, when the time came to put it together, there would be a crunch. I ordered the Pacific pre-wired logic and control package. This saved me time and the documentation was excellent.

I chose to do the audio wiring myself. The three studios of Pacific equipment and the furniture arrived on the first Friday in May—three weeks later we

were on the air from our new site. At first, I was a little concerned over the use of Molex connectors, never having done any large amount of wiring with them. I had in the past used other consoles which used insulation displacement, solder terminals or screw terminals, none of which I really liked.

Pacific recommended an optional Molex installation tool, which I highly recommend if you are doing multiple studios or are on a tight time schedule. It is a "ratchet" type tool that saves effort and time. With three studios to do, including an eight-track studio using a Pacific ABX, I know that I would not have made the schedule with any other brand.

Learn in a day

When it came time to teach the air staff how to use the console, they learned in an afternoon. This is noteworthy, since some are not technically inclined.

During the past 14 months, we have had a few minor problems, all of which were taken care of by Pacific. We had incoming power problems, which blew out the power supply to the console in production "B," our only non-Pacific console. The only problem that resulted on the Radiomixer was short life on indicator bulbs. The other problem was that a couple of the On buttons for two channels shorted, so those channels couldn't be turned off. Pacific was aware of the problems and

replaced the switches.

It turned out they had received a bad batch of switches from their supplier. There also was a small error in the manual, which indicated that the talkback button turned the talkback mic on when depressed. Not true, as the mic was always on, and the button provided the ability to externally control the talkback.

To me, the bottom line is: Would I buy another Radiomixer? After 14 months, the answer is yes. As our company grows and we need additional consoles, the Radiomixer will be our choice.

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For information on the Radiomixer from Pacific Recorders & Engineering, contact Jack Williams in California: 619-438-3911; fax: 619-438-9277; or circle Reader Service 23.

Reprinted from Radio World August 19, 1992.

TECHNOLOGY UPDATE

'RCS Works!' with Master Control

by **Kenny Lee**
Project Manager
Radio Computing Services

SCARSDALE, N.Y. If you want to know how to knock down the walls of your radio station, read on. This article, however, is not about crowbars and sledgehammers. It describes a new digital audio system that also distributes digital sound and other vital data throughout your radio station.

"RCS Works!," an integrated, digital radio station for the future, breaks down communication walls by allowing staff and management to access key information when and where it's needed. It's also a complete digital audio broadcast system.

A central component of RCS Works! is our Master Control program. Its new digital audio option stores and plays music and commercials with full digital quality. The system even provides instant access to sound effects or jingles at the press of a button. Master Control interfaces with CD jukeboxes and satellite network services, and can operate in either a live-assist or fully automated mode.

Master Control workstation

Music, commercials, promos, jingles and other audio data are loaded into the system from a Master Control workstation in your production studio. The program features a computer "cart wall," which allows you to store and retrieve audio using a familiar concept. For each audio element in the cart wall, you can define a "label" to show information such as title, artist, client, start date, stop date, out cue and so on. You can even create rotation instructions directly within the cart wall.

Master Control can accept new audio at any time, even while it is playing on the air. Unlike some systems, you don't have to switch the system off the air to enter new audio. Master Control can even upload different audio from two or more studio workstations simultaneously.

The program automatically senses the beginning of sound to ensure that all audio elements respond precisely and consistently to a start command.

Master Control is a production workhorse, too. It provides comprehensive digital editing functions such as audio "scrubbing" and cut and paste editing, making it easy to produce creative, imaginative spots and promos. The production module also features time expansion and compression functions, a digital filter to remove unwanted background noise and an audio "scratch pad" for storing and manipulating audio "work parts."

The Master Control air studio module is the focal point for your on-air operations. The monitor shows a schedule containing all broadcast elements in exact chronological order. The DJ can easily change the schedule, but only if you allow it. A schedule adjustment must conform to your policy, or it won't be executed.

Electronic copy book

Master Control eliminates studio paper clutter, too. The system's electronic copy book displays live commercials, tags, liners, promos, weather forecasts, event calendars and other station features. The information is shown in large, easy-to-read type on a scrolling video display.

Master Control also provides full audio playback information. The system includes date and time displays, count-up and countdown timers for each audio element and complete status information for each audio channel.

Master Control's air studio module can be configured for use with up to three video displays—one for the log, another for copy, scripts and messages, and a third for digital audio status. You also can assign all system data to a single video display.

Master Control is just a part of RCS Works! The system integrates your traffic system and many RCS products, including Selector, the music scheduling system; Linker, the schedule management system; SongTrack, the radio research system; MUSICbase, the music information system; and Pro-Rate, the mega-rates software system.

RCS Works! enhances information flow by effectively removing the walls of your radio station. For example, the PD can edit the broadcast schedule any time without entering the air studio. Master Control's log is instantly updated to reflect the change.

Even more power

The audio networking option of RCS Works! provides even more power. As soon as a sound element is added to Master Control, it is available at all other audio workstations in the building. The PD can hear any song while working at Selector, or audition the promo for an upcoming contest without leaving his desk.

RCS Works! can support any number of audio workstations at strategic locations in your station. This means that an account executive can play a new spot for a client directly from the workstation in her office, without bothering your production director for a cassette copy.

RCS Works! provides automatic and accurate reconciliation of all scheduling components, too. Master Control keeps a log of the schedule as it airs, including any changes, and electronically updates the schedules in Selector, Linker and your traffic system. And RCS Works! provides an open architecture, meaning any other computer, such as a traffic system, can be easily integrated.

Electronically connected

For years RCS has envisioned a radio station that's electronically connected and controlled. We've gathered ideas and opinions from broadcasters around the world. We've built "handshaking" into our product line, allowing programs to interconnect and communicate. This planning has culminated in RCS Works!, the link that bridges, integrates and empowers our complete product line.

RCS Works! is modular and can be custom configured. You don't have to commit to all the component parts. You start with as basic a system as you like, and then expand it when your needs change.

If you've been dreaming of an integrated, digital radio station, wake up. RCS Works! can provide a technically superior on-air sound and complete digital sound and data networks.

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For information on RCS Works!, contact Kenny Lee, project manager, at RCS in New York: 914-723-8567; fax: 914-723-6651; or circle Reader Service 177.

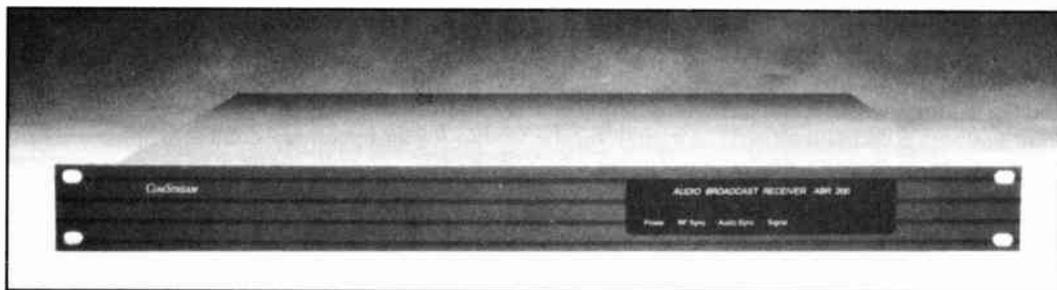
Reprinted from Radio World September 23, 1992.

TECHNOLOGY UPDATE

ComStream Digital Networks Streamline Radio Operations

by John Puetz
Marketing Manager
Audio Products
ComStream

SAN DIEGO, Calif. There is a better way to transmit CD-quality audio from place to place, and the way to do it is using the latest in compressed digital audio satellite networks. These integrated networks can streamline your radio group operations, cut your satellite transponder costs by half, build new profit centers, get your audio where it couldn't get to before, or customize business audio applications.



The ABR200 Audio Broadcast Receiver from ComStream

The digital age is here in the computers on our desks, the information we process and the music we listen to. The new digital audio network takes advantage of that new technology to cut the costs and boost the quality of using satellite. And once the signal is up there, virtually no location is unreachable, either physically or economically.

That may seem like a lot of benefits from a single network, but the new integrated digital audio network from ComStream is accomplishing those things every day.

Three main components

There are three main components to the audio network, which usually is set up for point-to-multipoint broadcast. The first component is a single hub where each audio channel from your studio or other audio source is encoded, multiplexed and modulated for transmission over the satellite. At the other end of the satellite transmission is the second component, the integrated receiver-decoder (ABR200). Third is the Audio Network Management System (ANMS), a PC-based system that monitors, configures and controls the network and keeps a log of the activity.

What can the new digital audio network do for you? Several users throughout the world already have discovered innovative answers to this question.

One of the most interesting applications is that of Radio Netherlands. The network was faced with several hurdles in providing radio broadcasts to its Dutch Antilles territories in the Caribbean. Poor audio quality, long distances and escalat-

ing costs of leased Intelsat circuits meant declining listenership and a lack of timely news for its Antilles customers.

But now with the new compressed digital audio, news and public affairs programming play the same day—within minutes or hours of the time they are produced at Radio Netherlands International in Hilversum.

Radio Netherlands even had an additional problem in that no satellite footprint could cover the entire Netherlands-to-Caribbean expanse. But because the ComStream products operate at C- and Ku-band, the link could be made by hopping first to Florida via Ku-band and then from there to the Antilles via C-band.

Even with two uplinks, transponder lease charges are reduced by 50 percent per month over the system that was being used. Guy Pappot, CE at Radio Netherlands, says the network will pay for itself in 24 months.

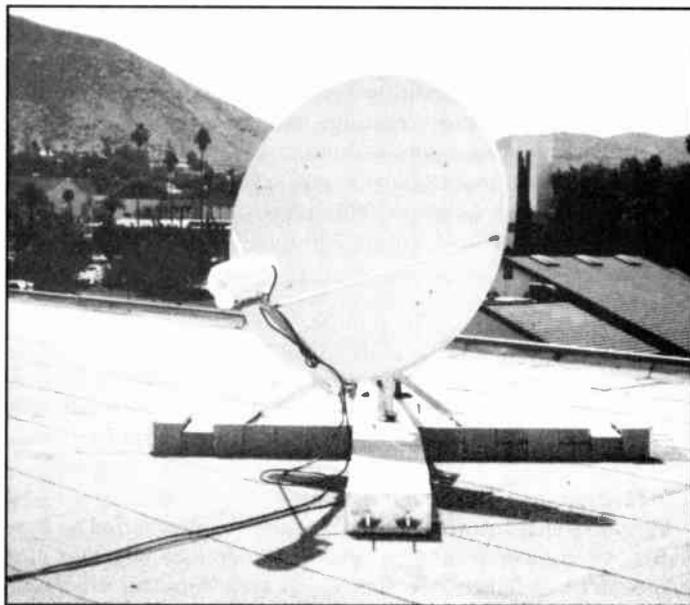
Narrow niche format

Another application where a network is producing efficiencies is embodied by The Rocky Mountain Radio Network, installed by National Supervisory Network (NSN), a ComStream distributor. This is a network supplying 24-hour programming, commercial inventory, news, sports and weather from a central studio in Vail to stations in Breckenridge, Aspen, Steamboat Springs and Telluride—all ski resorts in Colorado.

The Rocky Mountain network shows how this new system is a perfect fit when there is a narrow niche format, in this case targeted to skiers, that can be distributed to many locations with only a slight variation in programming. The ComStream network and ANMS enables broadcast group operators to gain the economies of originating from a single studio,

but still customize the broadcast by inserting regional commercials, news and weather information.

Remote broadcasts also lend themselves to the new network. ▶



KSGN 1.8m ComStream audio uplink in Riverside, Calif.

California Digital, another ComStream distributor, implemented one of the first VSAT audio systems about three years ago to bring Rick Dees to listeners of KIIS in Los Angeles—whether he was broadcasting from across town at the zoo or from hundreds of miles away in Puerto Vallarta.

Greater Media, another California Digital customer, is also using the new network to pipe Howard Stern from New York to L.A. Both the remotes and the inexpensive coast-to-coast link are at a far reduced cost and at a far superior quality than leased land lines or an expensive backhaul using a conventional satellite system.

Broadcasters also gain a secondary benefit from using the digital audio satellite network when they discover it can become a profit center of its own. In the just-mentioned case of remote broadcasts, users are finding a market in leasing out their turnkey system to other broadcasters when they aren't using it themselves.

Around the world

Other digital audio satellite networks are installed in the Far East, Canada and Australia, and are coming soon to more of Europe, South America and Central America.

The new network provides its benefits through a combination of the latest in audio compression techniques and the best in satellite transmission technology. Together, these two produce

cost savings of 35 to 65 percent over other satellite transmission alternatives and deliver CD-quality digital audio to virtually any location. Compression means a full 20 kHz stereo channel can be transmitted in as little as 128 kilobits per second (kbps), which translates to 160 kHz of satellite bandwidth, while retaining CD-quality sound.

Flexible and expandable

The compression technique by ComStream is the MUSICAM algorithm. MUSICAM enables the ComStream network to be flexible and expandable without costly hardware replacement. It features multiple digital bit rates (64, 96, 192, 256 or 384 kbps). Users can start with a single channel and build to 50 channels by simply adding more encoder/muxes and satellite modems at the hub. Any future upgrades in the algorithm will be implemented in the encoder as well, so once the receivers are in place, all changes in configuration or channel additions are simply programmed in by the user.

This digital audio distribution network promises to continue to bring improved, efficient broadcasts to listeners around the world.

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For information, contact John Puetz in California at 619-458-1800; fax: 619-552-0488; or circle **Reader Service 184**.

Reprinted from *Radio World* September 23, 1992.

USER REPORT

LPB Consoles: The Industry Workhorse

by William Lakatas
Director of Engineering
HGF Media Group

ALLENTOWN, Pa. There are many advantages to operating several radio stations, including the ability to standardize on certain pieces of equipment.

This standardization helps keep your spare parts inventory to a minimum and enables your maintenance engineers to become thoroughly familiar with the equipment—fewer hassles, quick repairs and lower costs.

Of course, when you purchase a radio station, you don't have control over which equipment you "inherit"—you deal as best you can with the equipment that comes with the license. I have been fortunate in that the vast majority of consoles in our group have been LPB products. The stations we owned and the stations we've bought have all had some LPB consoles. The standardization process has been that much easier for me.

We currently have 21 consoles in the group. Thirteen of those are LPB consoles, with 11 of them being Signature II or Signature III Series consoles. I am very happy with them.

The LPB Signature Series of consoles has to be the industry "workhorse."

These consoles can take all of the abuse, misuse and daily wear and tear that can be imagined—and they still continue to function.

My LPBs are used for both on-air and production. They are as versatile and as easy to use as any console I've ever seen. They are easier to maintain than anything I've worked on and they sound good on the air.

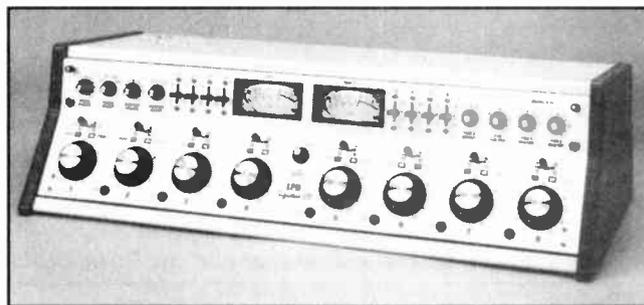
The LPB Signature Series of consoles comes in either mono

or stereo configurations with up to 12 faders. There are three inputs per fader. The output bus consists of an "on-air" bus (Program 1) and three Program 2 outputs. Additional outputs are provided for feeding tape recorders and for feeding a mono source (mono sum options on stereo consoles).

Also, LPB has introduced in the past year a mix-minus kit for its Signature Series. This Mix-Minus kit allows you to inter-

face the board with any broadcast-quality telephone equipment such as Gentner, Symetrix or Hnat-Hindes. You can finally do away with that "speaker-phone" in the control room and allow your air talent to carry on a phone conversation by using his studio mic and his headphones. The mix-minus adaptor works excellently.

LPB has an excellent reputation for high quality, low cost products. Not only is the initial cost well within almost anyone's budget, but the cost of maintaining the equipment is about as inexpensive as



The Signature III is among 13 LPB consoles owned by HGF Media Group.

I can imagine. Here in Allentown, we're home to Mack Trucks. Their slogan is "Built Like a Mack." Perhaps the phrase "Built Like an LPB" should become part of every broadcaster's vocabulary.

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For information on the LPB Signature Series, contact Ed Devecka at 215-644-1123; fax: 215-644-8651; or circle **Reader Service 197**.

Reprinted from *Radio World Directory* 1992.

USER REPORT

Dolby Digital DSTL KIX at 106

by **Grady Moates**
Owner/Operator
Loud & Clean

BOSTON I like it when a product makes a difficult problem easy to solve. I had been fighting dirty audio for more than a year at KIX 106 in Woonsocket/Providence, R.I., and had been through nearly everything in the chain making improvements that should have been audible but weren't.

After setting up a CD player and audio processing at the transmitter and hearing a striking difference, it became apparent that the problem was in our recent-generation composite STL link.

Second STL

KIX 106 had planned to purchase a second STL system for hot-standby purposes, so we decided to delay factory repair of the composite system and step into the digital age with a new digital STL.

My recommendation for the Dolby DSTL was based mostly



Steve Forshay (l), Tom Daily and Grady Moates gather around their ally, the Dolby DSTL.

on my experience with other Dolby products, in particular the company's analog noise reduction gear.

The Dolby people made the transition a real pleasure. On May 19, 1992, Tom Daily and Steve Forshay brought in the system, along with a spectrum analyzer. A quick setup on the bench to make certain that no in-transit damage had occurred made us more confident that we'd have an early night.

At midnight, we pulled the plug and installed the DSTL transmitter in about an hour, including interfacing the Pawtucket Red Sox Network audio to the Auxiliary 7 kHz channel and the remote control to the voice-grade channel. Our mood was quite cheerful when we stopped for snacks at Christy's, and we were at the transmitter site before 2 a.m.

While I yanked stuff out of the rack and moved things

around, Steve hooked up the spectrum analyzer to the hose from the dish and said, "Hello, what's this?"

We'd left the DSTL transmitter off, after showing the overnight announcer where the on-switch was, so there should have been nothing to see. But there, floating nicely above the grass, was a carrier on our frequency.

The plot thickens

After checking the level of our transmitter's received signal, we found that this interfering carrier was only about 27 dB down. Since the DSTL runs about 1 W and our old composite link was closer to 10 W, this meant that the interfering carrier was about 36 dB down with the old system—not hot enough to

All the work we'd put into the KIX 106 system finally came pounding out of the speakers.

hear, but hot enough to add sideband information that would show up as distortion.

"Aha!" I cried. Or something like that.

After the DSTL receiver was mounted and all connections were complete, we turned on the new system. That's when I started to get really impressed. The front panel stereo headphone jack, complete with volume control, allowed us to monitor not only the left and right program audio, but also the sports network and the remote control signal. The front panel meter (a good old high-quality analog meter movement) allowed us to see all the usual stuff, but with an interesting addition called "Bit Error Rate," calibrated in log increments. It was hard against the left-hand peg.

"So what's this mean?" I queried.

Tom smiled and said, "No data errors detected in a billion bits."

After setting levels on the Aux and voice grade channels, we called the overnight jock and said, "Go for it." A couple of tweaks to get the L-R nulled in mono and we were done by 3 a.m. We posed so my buddy Bob could shoot a few pictures and we were outthere.

But how does it sound?

Well, I had to back off on the audio processing considerably. All of a sudden the station was just loud. Nearly every control on the compressor, limiter, clipper and filter stages went counterclockwise, some by a lot. Adding all the reductions in processing together, I went down about 12 dB, without losing that full, punchy sound. All the work we'd put into the KIX 106 system over the previous year and hadn't heard finally came pounding out of the speakers.

Tom and Steve left the next afternoon, and that evening I spent about four hours reconfiguring the old stuff for hot standby. The DSTL makes configuring just about any other STL system as a hot standby simple and easy. An RF splitter gives RF

SPECIAL REPORT

Radiating Cable Uses

by **Richard Crompton, App. Eng.**
LPB Inc.

to both receivers, and the DSTL provides floating "form C" contacts to control the external switching.

Placing a relay in a box to switch the composite output of the DSTL stereo generator was quick and easy. Remote control interface was almost as simple.

In the transmitter unit, the SCA is demodulated to recover the FSK, which then is demodulated to recover the data. This makes it easy to simultaneously provide FSK to the DSTL transmitter and 110 kHz SCA to the composite STL transmitter. At the receive location, a small isolation transformer, a trace cut and a dip relay in the Burk unit allowed the DSTL to insert FSK directly, interrupting the demodulated SCA signal from the composite link. If the DSTL receiver fails to receive valid data, the relay drops out and restores the internal connection from the SCA demodulator to the FSK demodulator. Nifty.

Since the KIX 106 installation, I've had an opportunity to test compatibility of the DSTL with analog systems in the crowded Boston STL band. My client and another station both run dual mono links on the same channel, one carrier 125 kHz below the channel center, the other carrier 125 kHz above. When I received an interference complaint from the other station, I stuck a DSTL system on my station on the channel center frequency, between the dual mono carriers. The other station's problem went completely away; they could hear no evidence of my presence on the channel.

Oh, one more thing—the PD hasn't complained about the sound lately.

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Loud & Clean is a radio facility design, construction and maintenance organization in Boston.

For information on Dolby products, contact Kevin Tam in California at 415-558-0200; fax: 415-863-1373; or circle Reader Service 49.

Reprinted from Radio World October 21, 1992.

Radiating cable can be described as a unique form of "antenna." Why? Read on.

The term "antenna" is actually a misnomer. A radiating or leaky cable is actually operated as a terminated transmission line. The characteristic impedance load termination at the end of the cable is the actual antenna, but terminations do not radiate usefully.

Like all current-carrying transmission lines, there is a field surrounding the cable. It is this field that we utilize, hence we incorrectly call the radiating cable an "antenna." This surrounding field is the induction field; it is highly localized to the immediate vicinity of the cable.

While most other types of antennas strive to provide maximum coverage area, a radiating cable system is used to provide coverage of a small and specific geographic area. Practical reception range from the cable, in the AM broadcast band, will be limited to approximately one hundred feet.

To produce a controlled amount of radiation from a coaxial cable, the cable is manufactured with some form of openings in the outer shield.

Andrew "Radiax," originally designed for VHF use in subways, resembles a semi-rigid transmission line with a solid slotted outer shield. Other radiating cables manufactured for specific AM broadcast band use employ a sparse copper braid for the outer jacket.

LPB produces the NF-1D cable for transmission zones of no more than 1000 feet. The NF-2D cable, also made by LPB, is a lower loss, heavy duty cable, which may be used for a linear transmission zone of up to 5000 feet. The cable is coaxial, with drain wire and a polyvinylchloride jacket.

Almost all applications of radiating cable have been in the AM broadcast band, where a standard AM radio is the receiver.

Travelers' information services (TIS), authorized in Part 90.242 of the Commission's Rules, may use either a radiating cable or a short vertical antenna. The first TIS installation, at the Los Angeles International Airport in 1972, employed two buried cable transmission zones.

A more recent installation is the system on the approach road to the Dulles International Airport near Washington, DC. Part 15 of the Rules allows unlicensed operation in the AM broadcast band under certain conditions which can be met by a radiating cable system operating at low power input.

A wide variety of applications have utilized this approach. Perhaps the best known are those on the entrance and exit roads to Disney's Magic Kingdom and EPCOT Center. A timely repeating message prepares visitors with information about daily features, hours of operation, ticket prices, etc., before they even get to the parking area.

In New Jersey, a visitor listening on 530 kHz while driving through the Animal Safari at Six Flags Great Adventure hears a series of informational tapes as he progresses from one animal area to another.

Drive-in theaters and churches have long been users of radiating cable systems buried in the parking lot, to provide patrons a system that does not annoy the neighbors and is less expensive to maintain.

A length of approximately 7000 feet of type NF-2D radiating cable, a product found in most buried cable systems, can be driven by a small AM transmitter operating at about 20 watts.

These systems may be placed end-to-end to provide a sequence of messages as in the Great Adventure Animal Safari, or the system may be extended almost indefinitely using linear RF amplifiers and additional cable lengths.

The highly confined radiation pattern of a radiating cable system is advantageous for many specialized applications. In addition to the several examples above, the "smart road" of the future may prove to be based upon the induction field from a buried radiating cable.

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Editor's note: For additional information on radiating cable and its applications, contact John Tiedeck at LPB: 215-644-1123, or circle Reader Service 22.



A typical equipment cabinet for a buried cable system along a road.

Comrex STLX Is a Dream for Remotes

by Kurt Haase
Director of Engineering
WTAE(AM)-WVTV(FM)

PITTSBURGH "The Comrex STLX is a remote broadcast engineer's dream."

I'm quoting myself here as I remember making that statement more than six years ago when I first experienced the STLX. My sentiments on the product have only been reinforced since. I have always been a big fan of Comrex products. They satisfy the three most important considerations in selecting broadcast equipment: they work, they work and they continue to work.

The STLX is a stand-alone remote production console with integral two-line frequency extension capability. The outstanding performance of two-line frequency extension technology is well established. What makes the STLX unique is its packaging and capabilities.

Comrex has managed to take frequency extension technology to the next level by incorporating it into a production console main-



The Comrex STLX is WTAE(AM)-WVTV(FM)'s idea of a remote broadcast engineer's dream.

frame that meets all but the most demanding remote broadcast applications.

When I first saw the STLX, I was immediately impressed with how it looks. After a few minutes of study, I began to appreciate how well thought out and ergonomic the console layout is. It became readily apparent how the integrated functions of the STLX are designed to save setup time and improve upon existing remote production capabilities. Comparing how we interconnected existing remote equipment showed just how consolidated the process becomes when using the STLX.

The console is equipped with a four-microphone mixer. Each channel has an on/off switch, switchable AGC, a Penny & Giles short fader and PTT intercom capability with the telephone line used for station monitoring or IFB. The latter has proven to be a very effective and convenient method for talent to communicate directly with the studio. Two of the channels can be switched to accept line level and have a trimmer pot in advance of the console preamp and fader. This feature has proven useful at NFL stadiums where unknown levels are present on the ref's mic feed.

Each microphone input has a headphone position. The jacks for mic and headphone are paired side by side in four groups. A seven-pin XLR connector is used for the headphone. This is because the headphone amplifiers in the console are balanced, two-channel. I chose instead to go with conventional unbalanced

TRS jacks, sacrificing the balanced connection and 6 dB of power.

Headphone crosstalk has not been a problem, nor has driving higher impedance headphones (600 ohm). Each headphone position has an independent left/right level control and a five-input pre-selector arranged in matrix fashion for the right channel headphone (ring). It includes a "listenback" position to monitor a dialed connection to the station coupler line.

A master volume control for "listenback" and a variable external input provides flexibility in satisfying monitoring requirements. The remaining three inputs provide the capability to individually monitor the other console channels. The switches are not interlocking, so a mix of all headphone matrix inputs is possible if so desired. The left channel of the headphone is dedicated to monitor the output of the console.

Comrex has made use of the two-line frequency extension extremely easy. Switches and jacks associated with this function have been arranged on the right side of console, logically grouped to provide easy control. Those familiar with Comrex's stand-alone 2XP encoder will find many similarities.

Four modular telephone jacks provide interface for three dial tone lines and a telephone. Interlocked switching enables switching of the three lines to a single telephone instrument. A momentary release button makes disconnecting the telephone instrument from the line convenient after the line has been transferred to the internal modem. A group of three locking switches transfers the telephone lines directly to the internal modems and listen back coupler after they have been dialed and connected at the studio end.

An LED alerts you if there is an incoming call or, more important, if you forget to switch the telephone instrument off of one of the outgoing program lines. The latter is grouped with the line balance test tone switch to alert you of impending calibration problems with the studio decoder.

Emergency switching is provided to enable a swap (reverse) of the low and high outgoing program lines and provide optimized single line operation. A selectable fixed transmission equalizer is provided for situations where poor line response may require it.

Other features include a large VU meter with a peak overload LED and switchable 1 kHz test tone.

When we at WTAE think of applications for the STLX, we think of a remote production console with optional two-line frequency extension sometimes and vice versa at other times.

I emphasize this because our STLX is used just as often as a remote production console only when an RPU transmitter, equalized broadcast loop or satellite is the transmission medium. The STLX has two +8 dBm outputs for these applications. Its performance in the role of a remote production console has been outstanding.

The console is compact and lightweight (an important consideration, as we all know). An optional custom road case is available, which I highly recommend. It's about the size of a large suitcase and comes with wheels so it can be rolled in an upright position.

The case has additional compartments that can store mics, headphones, cables, etc. This one case is all you'll need for most remotes. An optional battery pack is available, which uses

individual replaceable nickel cadmium D cells. The charger is built into the console and conveniently connects to the pack through a three-pin DIN connector. A momentary push button will measure the charge from the front panel VU meter.

The STLX has been in operation at WTAE(AM) AND WVTY(FM) for the past six years. It has been up and down the three rivers of Pittsburgh, traveled all over the USA covering the Pittsburgh Steelers and University of Pittsburgh play by play and has had a little R&R in Disney World (it's even been to Ireland once).

We have two STLX units and I'm happy to report they have never failed us. That's quite a testimony when you consider the rough handling remote equipment goes through at airports and on the road. I highly endorse the Comrex STLX for every radio station who has broadcast rights for professional or college sports.

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For information, contact Lynn Distler at Comrex Corp. in Massachusetts: 508-263-1800; fax: 508-635-0401; or circle Reader Service 188.

Reprinted from Radio World August 19, 1992.

TECHNOLOGY UPDATE

Telephone Information Made Easy!

by Hank Landsberg, President
Henry Engineering

Radio and TV broadcasters always have a need for "information lines," where a listener can call a phone line to receive the latest sports scores, the ski report, concert updates, or similar "public service" information. In the past, most broadcasters have used a (worn out) cart machine to play informative messages to the caller. There are two drawbacks to this 'low tech' approach: (1) the tape wears out and becomes unreliable, and (2) you can only have one message per phone line. If you need to give out five messages, you need at least five phone numbers, one for each message.

Now there's a better way to do it! It's the Telephone Information System, a new product from Henry Engineering. The Telephone Information System (TIS) is a comprehensive system for disseminating various messages via a regular telephone line. The TIS can store up to 10 separate messages in its digital memory. Callers can select the message(s) to be heard by simply pressing the buttons on their telephone. Thus, with only one phone line, up to 10 different messages can be given out, with each caller 'customizing' the messages played.

Loading messages into the TIS is as easy as pressing the "Record" button and speaking into the Mic. Up to 10 messages can be stored. The first message is always a "menu": it tells the caller what other messages are available

on the system, e.g. "Press 1 for the weather report, press 2 for the ski report, press 3 for concert information... etc." After the menu message, up to nine more informative messages can be loaded. It doesn't matter how long each message is, as long as the total time for

receptionist. The TIS can be used with an external telephone in this mode. If the caller presses the "#" button, the TIS will produce a 'ringing' sound, to alert the operator to pick up the external telephone. The call is then routed to the telephone for regular conversation.

Each TIS unit will handle one telephone line. At some stations is necessary to have multiple phone lines 'in rotary' due to high caller volume. If this is the case, simply use one TIS unit for each incoming phone line. The advantage of this system is that any message can be accessed from any phone line. (It is not necessary to have a separate phone number for each information service.) Multiple TIS units can be 'linked' together, so that when messages are recorded into the first TIS

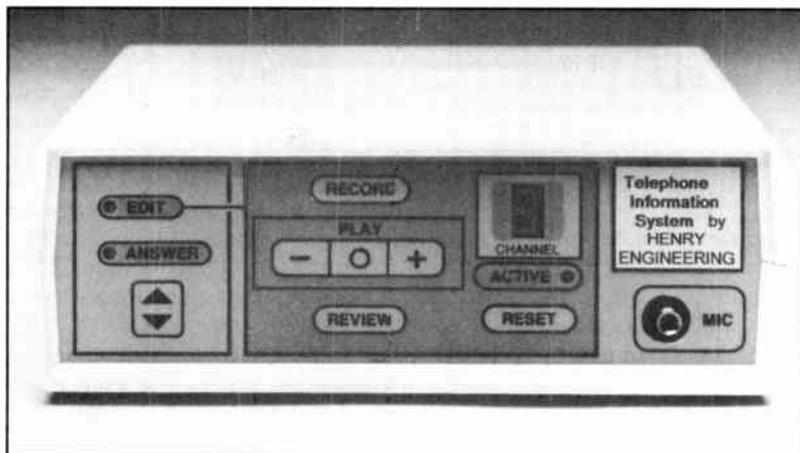
unit, they will be digitally copied to all TIS units simultaneously.

Messages can be easily changed by re-recording. A microphone is supplied with the unit, although messages can also be loaded from tape (or other line-level source) by using an appropriate attenuator patch cord. The TIS features battery backup for the digital memory, so that messages will not be lost during a short-term AC power failure.

The Telephone Information System is an efficient and reliable means of providing listener information, without the drawbacks and difficulty of older tape-based systems.

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For more information, RW readers may contact: Hank Landsberg, Henry Engineering, 503 Key Vista Drive, Sierra Madre, CA 91024 TEL: 818-355-3656; FAX: 818-355-0077; or circle Reader Service 116.



Telephone Information System by Henry Engineering

all messages added together doesn't exceed 8 1/2 minutes. The messages are stored in digital memory. There are no moving parts: no carts to jam, no mechanisms to wear out or get dirty. The messages sound as good after 10,000 plays as they did on the first play.

The TIS is connected to a regular phone line using a standard modular phone cord. Just plug it in and it's ready to go. When the TIS is called, it will answer on the first ring, and immediately play the menu message. As the caller is listening to the menu, he may select any message(s) for instant playback by simply pressing the buttons on his phone. For example, pressing "5" will play Message #5, pressing "9" will play Message #9, and so on. The caller can replay the menu by pressing zero.

Sometimes it is necessary for a caller to be able to speak to a 'live' operator or

USER REPORT

IBC Gets an Edge with Unity 2000

by **Jeremy Millar**
Group Program Director
Independent Broadcasting Co.

AUCKLAND, New Zealand Independent Broadcasting Co. (IBC) installed the Unity 2000 digital audio processor recently. Manufactured by Cutting Edge Technologies (CET), the processor now can be heard on both IBC's rock station in Wellington and its CHR station in Auckland.

settings, as we believe each of our applications is unique.

One of the biggest advantages we found is that the Unity 2000 actually allows you to change crossover points. We had been looking for more of a "brick wall bass," rather than a "wooly super bass." Custom setting our own crossover points allowed us to get the bottom-end punch we wanted.

We also were interested in getting more punch at night for our CHR dance-based

to match our programming. Later, the unit automatically switches back to its original settings. With the Unity, adjusting processing levels is no problem.

Do everything

At our stations, the Unity has been placed just after the studio and before the composite link. We removed all other processing, because the Unity is a complete audio chain in a single chassis and does the work of several "boxes." It can literally do everything—multiband processing, limiting, composite clipping and stereo generation.

The only improvement I would have suggested would be an output signal prior to the stereo generator for increased flexibility. The company tells me that as of May 1, this has become a standard feature.

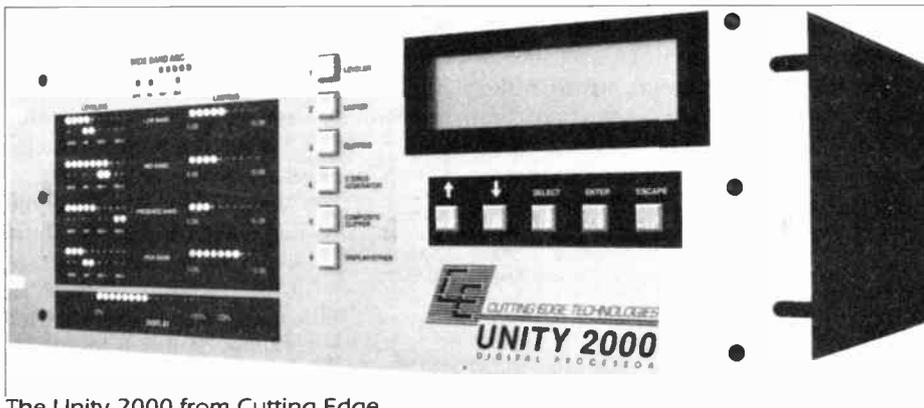
We have been extremely happy with the Unity. It was easy to install, easy to use, flexible and programmable. Just what we were looking for in a processor.

Independent Broadcasting Co. owns and operates seven FM radio stations throughout metropolitan centers in New Zealand. Additionally, IBC operates IRN, a news network servicing 32 client stations.

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For information on Cutting Edge Technology, contact Margot Daly at 216-241-3343; fax: 216-621-2801; or circle Reader Service 7.

Reprinted from Radio World June 24, 1992.



The Unity 2000 from Cutting Edge Technologies offers a variety of processing options for IBC in New Zealand.

The Unity 2000 came to our attention by way of our program consultant and our contract engineers. Both the Pollack Media Group (U.S.) and Broadtech (New Zealand) suggested we take a look at the Unity 2000 to determine whether it would fit our needs here in Auckland. Like many programmers, I like to keep myself well-informed on processing developments. So it was with real enthusiasm that we placed an order with CET.

Upon its arrival, we were reassured that the unit was easy to use and install. The Unity takes up about six inches of rack space. It has a silver/gray front panel with an LED panel to the left and a large LCD panel to the right, making the controls both accessible and easy to use from the front of the box.

Easy to operate

We found the Unity easy to operate. It was clear that a lot of consideration had gone into developing and designing the unit, right down to the ability to change the contrast on the display screen.

The unit comes with suggested pre-programmed settings for different formats. While these were helpful, we found it worthwhile to experiment with our own

station. The Unity made it easy. Since the Unity comes with a daypart option, we simply programmed the settings we wanted with the times we wanted them to take effect, and let the Unity do the rest.

At a pre-designated time each evening, the Unity automatically alters its settings

USER REPORT

WBCY Bases TTC Buy on Track Record

by **Mike Peters**
Vice President
Applied Communication
Technologies

ARCHBOLD, Ohio In the past, it was easy to select a new FM transmitter. You simply called the three major manufacturers and let them fight it out. But we wanted something different—new technology with a proven track record. WBCY at Taylor University in Archbold, Ohio, selected the TTC FMS-

8000, 8 kW solid-state FM transmitter.

The criteria used for determining what new transmitter we would purchase included audio specifications, a proven track record, immunity to lightning and minimum maintenance.

The FMS-8000 is "transparent" to the Model X FM exciter, so specs like FM noise of 92 dB and total harmonic distortion (THD) of 0.007 percent were measured right out of the box. Since there are no tuned circuits to deal with that would

color the signal, synchronous AM noise is -60 dB.

Around the world

The FMS track record is excellent, with units operating all over the world. The downside is that almost 70 percent of these are overseas, so calling other users was difficult. But TTC was quick to get us in touch with their customers in the U.S. Almost every customer was happy, and those that had problems in the early years said TTC was prompt in coming to the rescue. They also said they would purchase another TTC transmitter when the need arose.

Some opponents of solid state FM transmitters are quick to point out that the technology is more susceptible to lightning than a tube transmitter. The FMS-8000 has a DC grounded output (like most modern tube transmitters) and MOVs on the AC input.

This protection is further enhanced by the ferro-resonant power supply, which can withstand voltage swings of -15 percent. We also opted for the TTC surge protector, which extends the warranty to two years. Further, TTC has never lost a low-pass filter to lightning, so we were convinced.

Light maintenance

Maintenance on the FMS-8000 includes vacuuming the transmitter out once in a while, and cleaning the air filter. Since the transmitter site is over an hour's drive away, this was the kind of maintenance schedule we were looking for.

There were only two things that really concerned us. First was the remote control interface to our new Potomac remote control. The hookup was easy once we figured it out, but since you can monitor practically everything in the transmitter, you can tie up a lot of channels quickly.

Second, the manual lacked installation and maintenance sections. TTC currently is updating the manual, but they reminded us the maintenance section will be fairly small compared to a tube transmitter. TTC will concentrate instead on trouble-shooting flow charts and the like.

In summary, we are very pleased with our decision to purchase the FMS-8000. TTC has proven to be a leader in solid state FM at higher powers, and we weren't about to settle for old tube-type technology.

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For information, contact Russ Erickson, TTC sales manager, in Colorado: 303-665-8000; fax: 303-673-9900; or circle Reader Service 110.

Reprinted from Radio World November 25, 1992

TECHNOLOGY UPDATE

Cool Dummy Loads

by Mark Rubin
President
Electro Impulse Laboratory

NEPTUNE, N.J. Dummy loads for AM transmitters involve special considerations for proper selection.

Of utmost importance is power rating. An AM transmitter normally is rated in terms of carrier output, but its dummy load must be rated for the full carrier, plus 100 percent modulation.

For example, a typical 10 kW AM transmitter requires a 15 kW-rated load. Otherwise, the load could overheat when the transmitter was modulated.

Many transmitter manufacturers advertise modulation greater than 100 percent; Electro Impulse Lab loads are conservatively rated, so no further upgrading of the power rating is necessary.

Power measurement techniques normally associated with coaxial line and higher frequencies cannot be used at AM frequencies. For example, most directional coupler-type wattmeters are not normally rated for use below 1750 kHz.

For power measurement in the AM band, a voltage divider-type circuit is available as an optional feature on many Electro Impulse loads. In this circuit, a part of the signal is attenuated by a voltage divider network and then rectified with a diode; a meter circuit is carefully matched and calibrated to the network impedance. This type of power measurement circuit is FCC type accepted.

AM loads are available in many different types of cooling, including convection, forced air-cooled and liquid-cooled. Convection and forced air-cooled are generally preferred for AM service and are readily available.

When sizing a load, remember to consider that all of the power dissipated by the load (carrier plus modulation) will be dissipated as heat. The room where the load is located should be suitably ventilated so that a reasonable temperature can be maintained even on a hot summer day with the load under full power. Loads should not be installed in an air conditioned room unless the air conditioning is properly sized for the full heat the load may dissipate.

Another method of dealing with the dissipated heat is to duct it out of the room. Ducting requires special considerations because it can restrict the cooling of a load. Only add ducting to a load that is specifically designed for ducting—or alternatively, add an air mover to the duct that matches the air flow of the load and place an exhaust hood over the air discharge so as not to add any back-pressure to the load's own air mover.

Also bear in mind that an exhaust fan or duct system will mean that make-up air will be drawn into the room; this could further complicate the cooling of the room and could allow dust and other contaminants to enter.

Electro Impulse Lab loads for AM service use broadband matching techniques and do not utilize expensive tuned circuits. No tuning is required.

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For information on Electro Impulse Laboratory dummy loads, contact Mark Rubin at 908-776-5800; fax: 908-776-6793; or circle Reader Service 93.

Reprinted from Radio World April 22, 1992.



Electro Impulse Laboratory's DACT-7.5KFM dry, convection-cooled dummy load is suitable for 5 kW AM transmitters.

TECHNOLOGY UPDATE

KFWB Makes Switch to SAS 32000

by Dow Jones
Staff Engineer
KFWB(AM)

LOS ANGELES When the current KFWB radio studio plant was built, audio routing was built around an audio distribution amplifier for each source, with all the destinations bridging the output of that DA. All routing throughout the plant utilizes Belden 8450 wire punched down on telephone-type 66 punch-blocks. In total, there are more than 4,500 punchings.

While there are many advantages to using telephone-type punch-blocks to interconnect studio installations, the bridging concept associated with this

frame. The frame accommodates all necessary amplifier modules, switching modules and power supplies to provide 64 mono inputs and 16 mono outputs. A single frame can alternately operate in stereo mode providing 32 stereo inputs and 16 stereo outputs. Expansion beyond these limits is accomplished using multiple frames.

Here at KFWB, since most of our audio sources are mono, we initially installed a 6432 mono system in December 1990. This system required two SAS 32000 switching frames. We recently installed a third frame to expand the system to 48 mono outputs with the same 64 mono inputs.

The input amplifiers provide electroni-

half of the frame load. When either power supply is removed, the other will automatically power the entire frame with no interruption.

All input, output and frame interconnections are made via crimp pins and Euroconnector housings, supplied and mounted on the rear of the SAS 32000 frame. In the installation at KFWB, the SAS 32000 audio routing switcher was supplied pre-wired with appropriate multiconductor shielded cable to facilitate punching down on existing telephone punch-blocks.

Output control

Each of the outputs is controllable by several methods. Full system access and control is allowed from the XCP-3 X-Y control panel or a terminal. A personal computer also can be used.

The XCP-3 has lever wheels to select the output to be controlled, as well as the input select for that output. As the output selector lever wheels are changed, the LED "input active" display shows the current input selected to that particular output. A new input selection may be made on the input lever wheels; depressing the Take push-button will switch immediately to the selected input.

Each output can be controlled by a single controller panel, which can be either a panel with programmable push-buttons or an eight-digit alphanumeric display for that output. The alphanumeric display control panel is available in several configurations, including single and dual output panels.

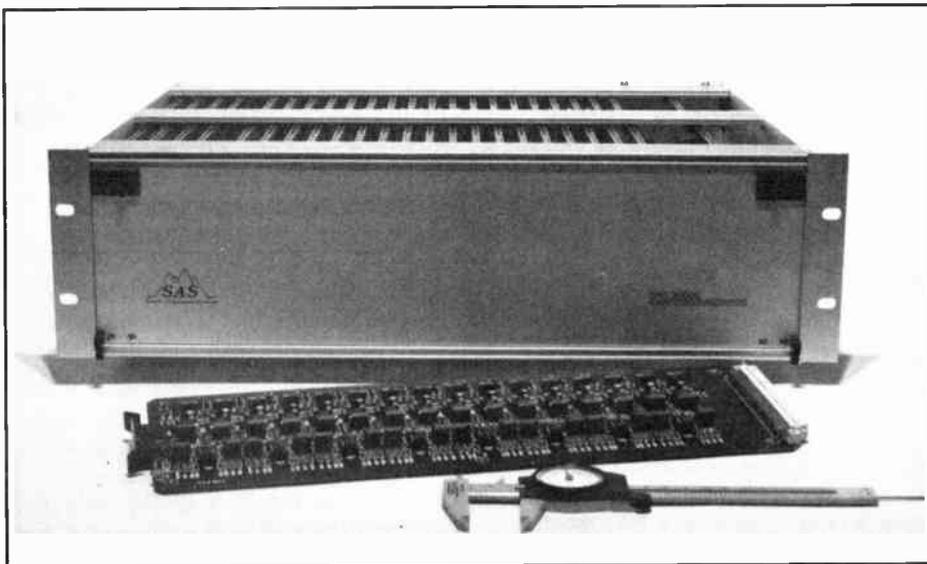
The installation at KFWB has been essentially flawless. About the only problem has been inadvertent improper punching, which is easy to resolve. Since the installation, the system has operated without any failures and is almost forgotten, except for the occasional "guided tour" when the front doors of the frames are opened to show off the blinking LEDs on each output/crosspoint module, which indicates proper operation.

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Dow Jones has worked in the broadcastfield for more than 20 years.

For more information, contact Al Salci at Sierra Automated Systems: 818-840-6749; fax: 818-840-6751; or circle Reader Service 150.

Reprinted from Radio World July 22, 1992.



The Sierra Automated Systems' SAS 32000 stereo audio routing switcher.

technique requires timely effort to unpunch each circuit to isolate problems such as short circuits.

When the time came to upgrade the physical plant, we decided to replace the bridging distribution system with a cross-point routing switcher to simplify management and reduce the cable requirements.

We ultimately decided on the SAS 32000 audio routing switcher manufactured by Sierra Automated Systems and Engineering Corp. of Burbank, Calif.

All necessary modules

The SAS 32000 is a high-quality microprocessor-based audio switching and mixing system housed in a three-rack

cally balanced and fully floating "transformer-like" characteristics. Maximum input level is greater than 28 dBu, allowing freedom from overload. The output amplifiers also provide a balanced, fully-floating "transformer-like" source with a low 60 ohm output impedance. Maximum output level is in excess of 28 dBu, providing ample headroom for our installation.

The SPS-3 switching power supply module can support one entire frame. The SAS 32000 has locations for two SPS-3 modules, each with its own line cord, allowing separate AC feeds to be used for a greater level of redundancy. When two SPS-3 power supplies are installed, each power supply assumes

TECHNOLOGY UPDATE

dB-Cart Employs 21 MB 'Floptical' Disk Drive

by Jeffrey E. DeBry
VP of Sales
Digital Broadcast Associates

PORTLAND, Ore. dB-Cart is the first offering in a new line of digital source equipment from Digital Broadcast Associates. By now you've heard a lot about digital cart machines and how they're going to replace your tried and true analog carts.

At Digital Broadcast Associates, we feel that digital processing provides so many advantages over analog machines, the only question is how to switch.

New and old

dB-Cart takes a unique approach to this problem by combining the familiar user interface of the analog machines with the inherent sound quality improvement and the reliability of digital processing.

In order to achieve maximum storage while maintaining ease of use, dB-Cart's design is based on a 21 megabyte (21MB) "floptical" disk drive. The drive uses both 3.5-inch 21MB floptical diskettes produced by IBM, Iomega and Maxell, and standard 3.5-inch 1.44MB diskettes used with your IBM or Macintosh computer.

The floptical's advantage over other high-storage floppy media is twofold: It's readily available from a variety of sources and it can be bulk-erased and reformatted in the field. The floptical is a combination of CD-ROM optical servo and traditional magnetic recording, two proven technologies.

dB-Cart provides a 32 kHz sampling rate (others are available), with a frequency response of 20 Hz - 15 kHz, ± 0.5 dB. The dB-Cart is capable of storing over 10 minutes of stereo on a single 21MB diskette at full bandwidth; up to 70 seconds of stereo can be stored on a 1.44MB floppy. Multiple spots or programs can be stored on each diskette and played back in any order. The signal to noise ratio is better than 90 dB and the total harmonic distortion is better than 0.05 percent.

Program information

Program information is displayed via a front panel LCD display. The information can be edited with a simple keyboard. Remote operation and secondary or tertiary cues are available and simple to implement. Program material also can be edited for tighter start and stop.

The dB-Cart's design allows for upgrades. Modular construction allows dB-Cart to be fitted with different components as technology changes.

Overall, the dB-Cart offers a simple transition to digital and a host of must-have features. dB-Cart is a sound approach for broadcasters looking forward to the benefits of digital.

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For information, contact Jeffrey E. DeBry at Digital Broadcast Associates in Oregon: 818-567-2873; fax: 818-567-2917; or circle Reader Service 131.

Reprinted from *Radio World* December 23, 1992

USER REPORT

Wake Up Your Station's Sound With Thompson

by Ben Freedman
VP/GM
Thompson Creative

DALLAS While Thompson Creative supplies radio ID jingles for almost every format, this article will focus on one of radio's top formats-adult contemporary.

I have had the privilege of monitoring the radio ID jingles scene since the late 1950s. In the 1950s and 1960s, the AC format was better known as MOR (middle of the road). There was a striking difference between the promotional sound of MOR and the upsurging top 40 format. In those early days of "contemporary radio," the ID jingle was a must for top 40, but many times more of a "back burner" option for MOR.

So what's happened since the 1950s and 1960s? In the 1970s and 1980s, radio, in effect, grew up. We made the switch from AM to FM for music. Now, thousands more stations compete for an audience that has only grown by about 50 percent in 30 years.

One of the big winners is AC. The commanding lead by CHR (top 40) has, in many cases, declined dramatically. A large percentage of today's hot AC/AC-lite AC listeners are transplants from the top 40 of the 1960s and 1970s. Thus, the type of station promotional and image-building styles of top 40/CHR are now regularly incorporated into AC.

In the last few years, our AC subscribers have included many of the up and coming "buzzword" stations, including "Mix" and "Variety." Perhaps the most impressive client of Thompson is the highly respected Nationwide Communications Group. In 1991 and 1992, we have been honored to produce four custom AC packages for Nationwide.

One of the premier hot AC stations for Nationwide is KHM/Mix 96.5 in Houston. Under the direction of Operations Manager John Clay, PD Guy Zapoleon and Production Director Bob Vance, CEO Larry Thompson and our production staff created a new custom package titled Houston Mix I.

The music tracks feature the sound of the 1990s, matching the music mix and the image of the station. In fact, Mix 96.5 recently cut a follow-up package at Thompson Creative, Houston Mix II. Now, Mix 96.5 has a total menu of nearly 50 cuts and more than 100 additional mixouts. The concepts include transition cuts, image line cuts, shotguns, morning show cuts, jock cuts, legal IDs, weather cuts, traffic bed, news bed and more.

Another custom AC package by Thompson Creative

TECHNOLOGY UPDATE

is for Nationwide's KDMX/Mix 102.9 in Dallas. Under the direction of PD Pat McMahon, the Thompson Creative production staff customized a new package targeted for a hot AC/AC audience. Mix 102.9 continues to air the 1991 "Dallas Mix" and has recently updated with various jingles from three other Thompson AC packages.

The fourth custom package created for Nationwide is for Variety 104.7 KVRV in Phoenix. This package has a soft AC touch, suited to the needs of the KVRV image. Nationwide's WOMX in Orlando also features recordings from various Thompson Creative AC packages.

On the lighter side of AC, Thompson Creative recently completed a package for CBS O&O WLTT in Washington, D.C. Under the direction of PD Chuck Morgan, Thompson has produced a menu of image cuts that target lite AC listeners at home and at work.

Thompson Creative also recently created two additional custom AC jingle packages. We were pleased to welcome to our Dallas studios Bruce Gilbert from Variety 96 WVTY in Pittsburgh and Bob DeCarlo from W101 (WUSA) in Tampa. The styles were contemporary, but the use of "live musicians" was more upfront.

Other AC subscribers leasing "re-sings" from Thompson packages include WTMX Chicago, WMJX Boston, CKFM Toronto, KSTP Minneapolis, CJFM Montreal, WLAC-FM Nashville, WWMX Baltimore, WBSB Baltimore, CHFM Calgary, WQAL Cleveland, KSRR San Antonio, WOKY Milwaukee, WMXC Charlotte, WYYY-FM Syracuse and WIVY Jacksonville.

The high growth of AC and its offshoots have shown that there is a stronger need than ever to promote the positive image of the station with musical identification. Radio IDs are captured in the minds of the listeners and also serve as signposts for station features, weather, news and traffic.

ID jingles have a strong future in the world of adult contemporary radio. Thompson intends to lead the way by using the styles and textures of contemporary music to build positive image identification for today's ever-expanding AC format.

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For information on Thompson Creative, contact Ben Freedman in Texas: 800-RADIO ID (800-723-4643); fax: 214-521-8578; or circle Reader Service 146.

Reprinted from Radio World September 23, 1992.

Audio Precision's FASTtest: When Speed Is What You Need

by Tom Mintner
Marketing Director
Audio Precision

BEAVERTON, Ore. Speed always has been an important factor in audio testing. Broadcasters use our Audio Precision FM and TV-BTSC audio proof packages to reduce testing time for broadcast audio proofs from hours to minutes.

But periodic and frequent on-air or live-link testing of extremely short time intervals has been a continuing goal of many users.

A European Broadcasting Union (EBU) recommended standard testing protocol, often called "short interval testing," utilizes an FSK-encoded preamble to define test instrument setups and predetermined tone "sequences" for testing various parameters of a broadcast audio channel. However, some sequences take more than 20 seconds (hardly a "short interval" by U.S. broadcast standards). The shortest of which we are aware still require five seconds of on-air test time.

Although Audio Precision also can supply hardware for running EBU 0.33 audio testing sequences on our System One, we prefer and have recently introduced a newer approach, which we call FASTtest.

FASTtest is Audio Precision's rapid channel testing system for use with any DSP-equipped System One audio test set. Since the FASTtest system consists of software, FASTtest may be retrofitted or added to any DSP System One without the special cost (often in excess of \$25,000) associated with other dedicated "short interval" test systems.

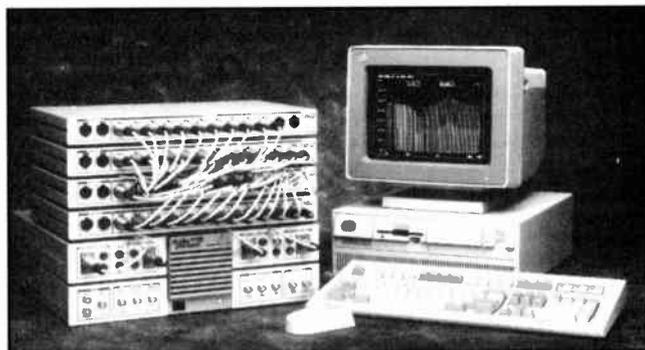
FASTtest also has many other general audio testing applications beyond 0.33 broadcast testing, including tape recorder and general audio testing, generation of calibration waveforms and others.

The system is not an EBU 0.33 technique, but a new method utilizing digital

signal processing to generate a multifrequency test signal, which may then be inserted as a "burst" as short as one second into the on-air channel. Complete startup, acquisition and analysis of results may typically be made in three seconds or less, depending on such factors as PC speed and how many parameters are to be measured. FASTtest can measure frequency response, distortion and noise, all from the same stimulus signal.

The stimulus signal may be chosen from a standard waveform supplied with FASTtest or an easily generated custom signal where the user may specify number, frequency, amplitude and phase of the signal components. Analysis of the acquired signal also is done by DSPs via special Fast Fourier Transform programs.

Since FASTtest signals are generated digitally, they may be recorded to RDAT or other high-quality storage medium. This transfer may be done digitally,



Don't be confused! FASTtest speeds up channel testing and more.

without intervening analog conversions, if the System One used is a Dual Domain model. So a portable RDAT becomes a portable signal source of standard or custom FASTtest stimulus signals.

FASTtest works with System One DSP-equipped audio test systems and DSP capability may be retrofitted to any existing System One unit.

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For information from Audio Precision, contact Tom Mintner at 503-627-0832; fax: 503-641-8906; or circle Reader Service 76.

Reprinted from Radio World January 22, 1992.

TECHNOLOGY UPDATE

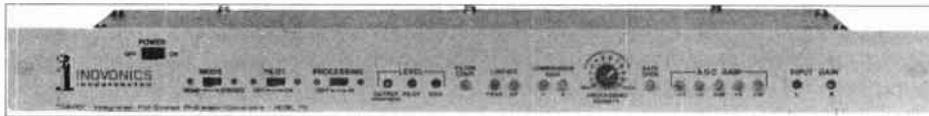
Inovonics' David Features Simplicity

by **Jim Wood**
President, Inovonics

SANTA CRUZ, Calif. The first successful integration of audio processing into the multiplex-FM stereo generator gave FM broadcasters an elegant solution to problems that had plagued their industry since the beginning.

The years since have brought improved generations of the original product, and entry into this same arena by other broadcast equipment manufacturers.

Inovonics' recent development of an integrated processor/generator was



"David" is a giant among processor/generators, according to manufacturer Inovonics.

audio processing—despite the decreasing cost and complexity of true digital signal processing (DSP) hardware and sub systems for audio applications, DSP is not yet as easy as its analog counterpart. Further, DSP requires the appropriate software algorithms to emulate analog processing, so that various laws of physics and acoustics will not be violated and the result will be—if not pleasing—at least tolerable to the ear.

Audio signal path

In keeping the audio processing section of the new Inovonics product simple, portions of the design were adapted from

maybe not a giant-killer, is more formidable than its modest stature might suggest.

Features of the David include a slow, "gain-riding" AGC and a split-spectrum compressor/limiter conforming to the selected pre-emphasis characteristic. Aside from input and output level adjustments, user controls have been reduced to a single knob, which simultaneously varies several different factors affecting program density, or loudness.

Primary low-pass filtering, flat to 16 kHz, includes proprietary overshoot compensation to maximize modulation without composite clipping. Internal combining for an SCA or RDS subcarrier is provided, as is a separate TTL-level pilot output to sync an RDS generator. All component parts used in the David are multiple-source, distributor-stock items for worldwide ease in servicing.

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For information on "David," contact Jim Wood at Inovonics: 408-458-0552; fax: 408-458-0554; or circle Reader Service 63.

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prompted by the climate of the current equipment market, and directed by recent sales trends of existing Inovonics products.

For example, despite the keen interest in, and enthusiasm for, more technically advanced and complex audio processing devices, a market exists for simple, easy-to-use and affordable products.

At the same time, the product must be effective; that is, not only does it have to perform all the basic functions, but also has to provide the "competitive sound" that is universally believed to draw listeners like moths to a flame.

Garden-variety chips

With the proliferation of IC logic devices, a digital approach to FM subcarrier and pilot generation is reduced to a handful of garden-variety chips. What is commonly referred to as "digital synthesis" is related to the elementary "switching" type of stereo generator, but a number of intermediate sine-weighted sampling points are interposed in the commutation between left and right channel program signals.

Today, simple digital logic can yield stereo separation performance and freedom from spurious modulation products that previously could be realized only by fine-tweaking carefully balanced analog designs.

Digital logic makes stereo generation a simple matter. Not so in the case of

earlier endeavors that placed the fewest active components in the audio signal path.

The surprising result immediately suggested the product's nickname: "David." For, like its namesake, this simple, unassuming processor/generator, while

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