

# BME

FOR TECHNICAL AND ENGINEERING MANAGEMENT

AN ACT III PUBLICATION

AUGUST 1989

\$3.00

INSIDE:  
THE REPLACEMENT  
CYCLE

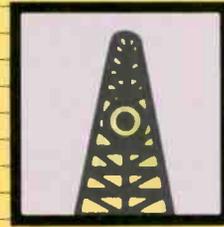
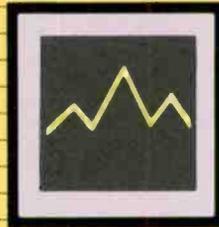
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# THE SOURCE

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# 1989



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**For The Broadcast Industry**

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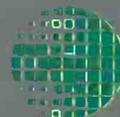
THE DPS-270 Time Base Corrector. True S-VHS Y/C component processing – at a more than affordable price. The DPS-270 offers S-VHS Y/C and NTSC composite inputs and outputs, as well as a 5.5 MHz bandwidth. This makes the DPS-270 compatible with any 3/4" VTR that accepts external sync and subcarrier. And the unit also provides Y/C to NTSC encoding and NTSC to Y/C decoding.

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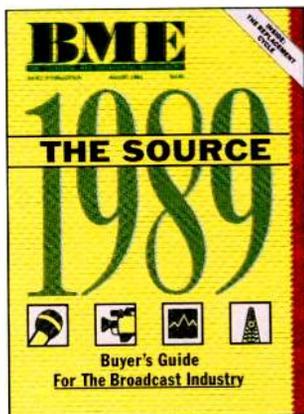
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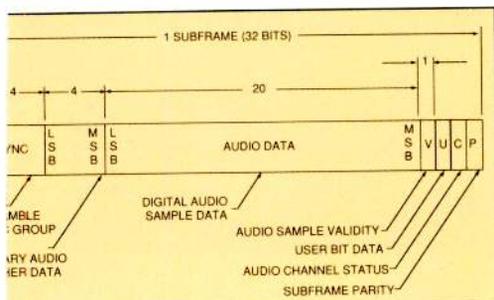


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**On the cover:**  
Cover illustration by Don Krogman



**92 Digital Interconnection**



**33 The Source**

# BME

FOR TECHNICAL AND ENGINEERING MANAGEMENT

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**26 The Replacement Cycle**

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**15 SCES**  
*Downplays HDTV*

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# VIEWPOINT

## **Speedy agreement on a single HDTV standard will benefit all parties.**



**T**he best piece of advice we've heard lately on the HDTV front is, "Don't hold your breath." Continuing delays in readying the competing HDTV systems for testing have set back the onset of transmission system testing from January to April. Even worse, only eight system proponents say they'll have hardware ready for testing before the end of 1990, according to published reports. With six weeks allocated for testing each system, the full round of tests won't be completed before August 1991—assuming everything goes smoothly.

The industry's sluggishness on HDTV testing comes at a time when potential challengers are offering to take control out of our hands entirely. The aptly titled "Strawman II" proposal, authored by Roy Beasley of the Defense Management Board, suggests that all over-the-air transmission of HDTV be tabled for five years, during which time the Defense Department would completely direct HDTV development. NAB has been quick to condemn the proposal, which even the author admits is unlikely to gain acceptance. (See this month's "Update" pages for more details on Strawman II.)

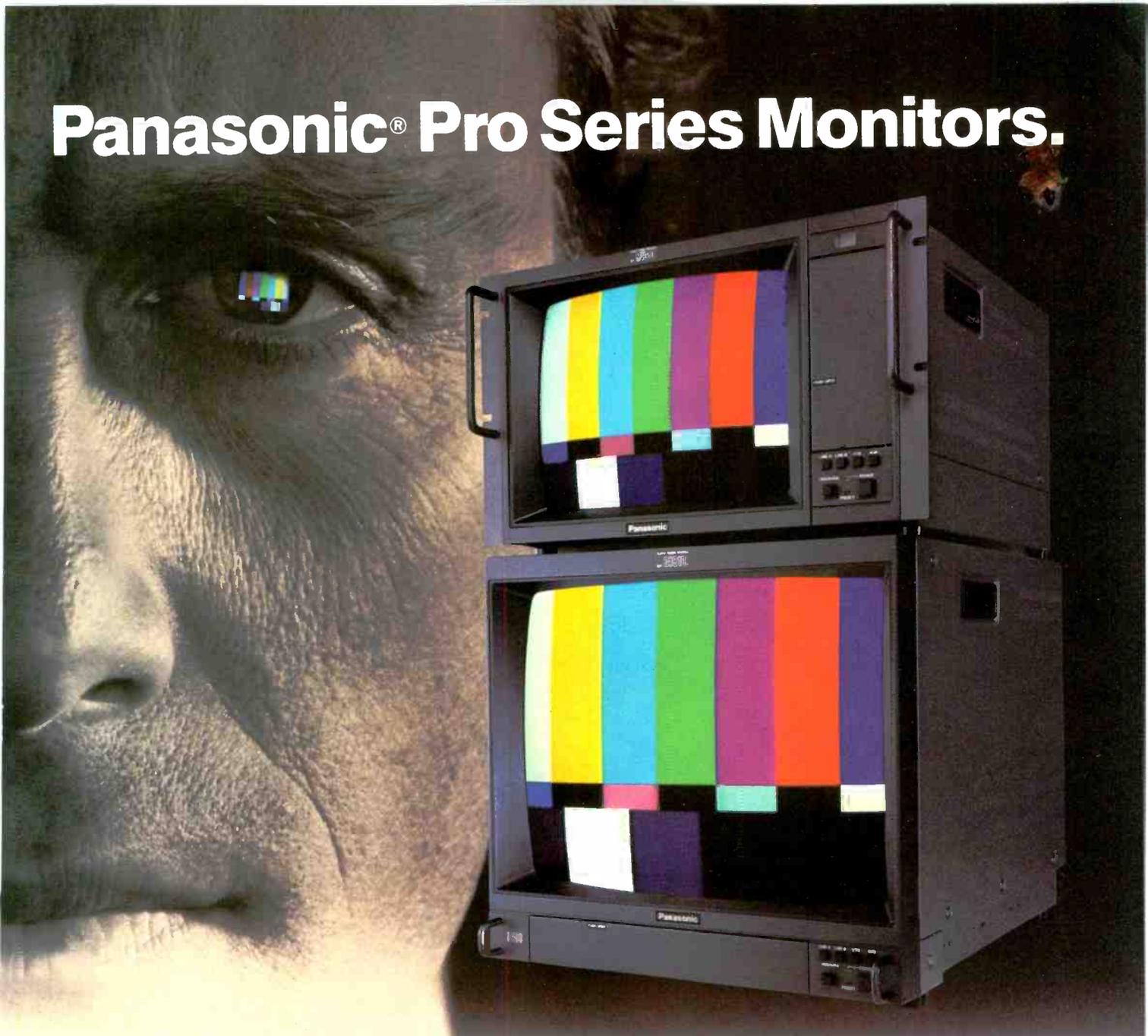
Fortunately, not all news on the HDTV front is negative. As we went to press, the FCC announced that it had extended the charter of its "blue-ribbon" advisory committee on advanced television systems for a second two-year term. The work of the ATS committee, far from being over, is just beginning to get underway in several key areas. One of the biggest hurdles it currently faces concerns the determination of testing parameters, which must be thorough and accurate and at the same time fair to all the proposed systems. We urge the ATS planning subcommittee to do its best to reach a consensus on a choice of appropriate video software for the tests—software that we hope will be challenging enough to unmask potential flaws long before they become encoded into a standard, but will not create unnecessarily unrealistic hurdles. We also urge the subcommittee to test the competing HDTV systems with at least two channels of digital audio. Stereo audio is now an accepted part of television broadcasting, and any "advanced" television system that shortchanges audio will shortchange the industry.

We repeat our conviction, stated here a few months back, that a speedy agreement on a single HDTV standard will benefit all parties. Even with the best scenario, HDTV testing will take many months. We hope the industry can put aside any factional or political differences and move forward without unnecessary delays. ■

A handwritten signature in green ink that reads "Eva J. Blinder". The signature is fluid and cursive, with a long horizontal flourish extending to the right.

Eva J. Blinder  
Editor

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# UPDATE

*SCES Downplays HDTV...Dr. Glenn Departs NYIT;  
Settlement in the Works?...Terrestrial TV:  
Burden Of Proof Is On Stations...NABET and  
ABC/Cap Cities Fail to Agree on Contract:  
No Strike Action Planned*

## SCES Downplays HDTV

**W**hile consumer electronics pundits at the giant Summer Consumer Electronics Show (SCES) held in Chicago in June clamored loudly for HDTV, manufacturers griped that "consumer confusion" was clouding the picture for their favorite new "push" items like LCD projection TV.

"Unless the consumer electronics industry gets a hot new product like HDTV, industry attempts to upgrade

consumers to multifeatured, higher-performance and more profitable high-end models simply won't work," said Robert Angus, correspondent for International Thomson consumer electronics publications. "What we don't need are

compromises that will result in something short of true HDTV, nor delays which will put the whole thing off until our children are fully grown."

In response, most manufacturers soft-pedalled the format. This year, HDTV displays were mounted by just three companies: Hitachi, Panasonic and a joint theater-size exhibition with Surround Sound put on by Barco, Fosgate and Stewart Filmscreen. In contrast, Sony showed a 42-inch Improved Definition TV (IDTV) with a suggested retail price of \$40,000. "It's a top-of-the-line model and it's not for everyone," Sony said. LCD projection TV systems were offered by Sharp (a 100-inch projection model with a suggested retail price of \$5000) and JVC, whose model featured extremely detailed picture quality due to an "Innovision"-style lens.

Other show category highlights included 8 mm and sophisticated free-standing video editing systems. Sony demonstrated Hi8 high-band 8 mm video systems complete with insert and assemble editing capability, while

Toshiba launched equipment enabling home users to achieve sophisticated DVE-style digitized edits and effects on S-VHS. Both Panasonic and Miami, FL-based Instant Replay showed universal standard VHS-format VCRs, a configuration which professional broadcasters have seen for some years. Though not an exhibitor, tape company TDK announced it will begin U.S. shipments of Hi8 8 mm videocassettes and video floppy disks "in the near future." TDK's Hi8 tapes will come in both metal particle and metal evaporated configurations. Video floppy disks are used with electronic still video cameras.

The Compact Disc Interactive (CD-I) format took one small step forward following a joint announcement supporting the format from Matsushita, Sony and Philips.

On the political front, the CES sponsored three panel discussions devoted to HDTV. Speaking at a session called "What Is Congress Doing?" Representatives Tom Campbell (R-CA), Mike Oxley (R-OH) and Matthew Rinaldo (R-NJ) all agreed to disagree with the American Electronic Association's \$1.35 billion proposal to support a government-backed R & D consortium. "Our country was made great by free enterprise," said Oxley. "Sometimes I think we're too defensive

*The 40-inch, rear-projection LCD TV costs \$5000, excluding screen.*



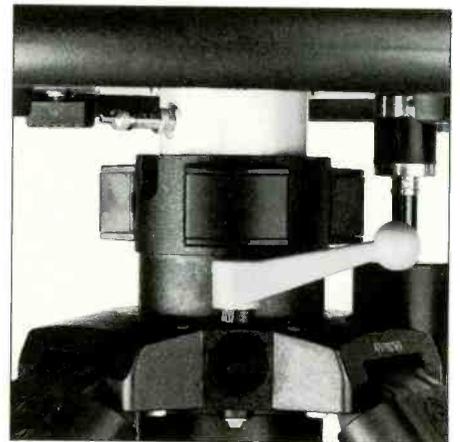
*JVC's HR-S100000 S-VHS Hi-Fi editing recorder, launched at SCES, provides jog/shuttle controls, pre-roll editing and programmable automatic assemble editing.*

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because we're so tied up with this trade deficit with the Japanese that we tend to overlook our strengths."

Other update panels were represented by Bill Hassinger, assistant chief of the FCC's Mass Media Bureau, and Richard Wiley, chairman of the FCC's advisory committee on advanced television (ATS). Hassinger said the Commission is tentatively planning to release a third notice of inquiry on advanced television systems this fall, subject to a timely installation of incoming commissioners. Wiley reported his committee is hampered because systems for test are not becoming available quickly. The David Sarnoff Research Center is the only advanced television system proponent which has set an availability date for tests (April 2, 1990 for the first stage of its Advanced Compatible Television system (ACTV-D)). ■

## Dr. Glenn Departs NYIT; Settlement in the Works?

A cross-licensing agreement is among the options being considered by Dr. William Glenn, inventor of the Vista NTSC-compatible HDTV transmission system, and the New York Institute of Technology in the wake of the inventor's departure from the school.

NYIT, which holds the patent for the system, confirmed that the two entities have held preliminary discussions about the possibility of instituting a cross-licensing agreement between Florida Atlantic University, Glenn's new affiliation, and NYIT. The goal is to provide for some type of cooperative arrangement for Glenn's continued involvement with the system he developed in conjunction with his wife, Dr. Karen Glenn.

"There are discussions going on related to a cross-licensing arrangement," said Ken Solomon, acting

director, NYIT. "It's certainly a possibility."

No matter what the outcome of these discussions, Glenn, who joined FAU in early July, is in the process of setting up a laboratory at the school to move ahead with his own research in the HDTV field.

Asked why he left NYIT, Glenn cited disagreements with NYIT management about how to best exploit the technology he developed.

"I am very interested in seeing the HDTV system proceed," Glenn said. "I had some disagreements with NYIT management about how to get this technology out and in use. I felt NYIT management was obstructing the process. Florida Atlantic, on the other hand, was very eager to work with me in the field of HDTV. I think it's a very healthy environment in which to do that."

FAU, part of the Florida State University system, has what Glenn considers to be a very aggressive graduate program in electrical engineering and oth-

## NABET and ABC/Cap Cities Fail to Agree: No Strike Action Planned

**A**fter a series of meetings in mid-July between ABC/Cap Cities' chief negotiator, Jeffrey Ruthiger, and NABET's John Krieger, the two sides are no closer to a contract agreement. Krieger says the union won't be provoked into a strike despite the failure of the conglomerate to meet its demands.

"After ABC/Cap Cities' March 31 'final offer' they came back to us with seven proposals at the meetings in July," stated Krieger. "It was significant that the company did make seven moves in response to the 18 we asked for. However, they were not as significant to us as they were to them. We told them that the only way we could give them some assurances that the contract would be ratified is if they would do two things: Drop their separate seniority clause and provide that any radio people who were laid off would be guaranteed jobs in TV. The company rejected it."

As a result of the failure of the two sides to reach an agreement, ABC/Cap Cities has indicated it will implement all of the sections proposed in its final offer of March 31. It has not specified when this will take place. These proposals, according to Krieger, threaten the job security of NABET members.

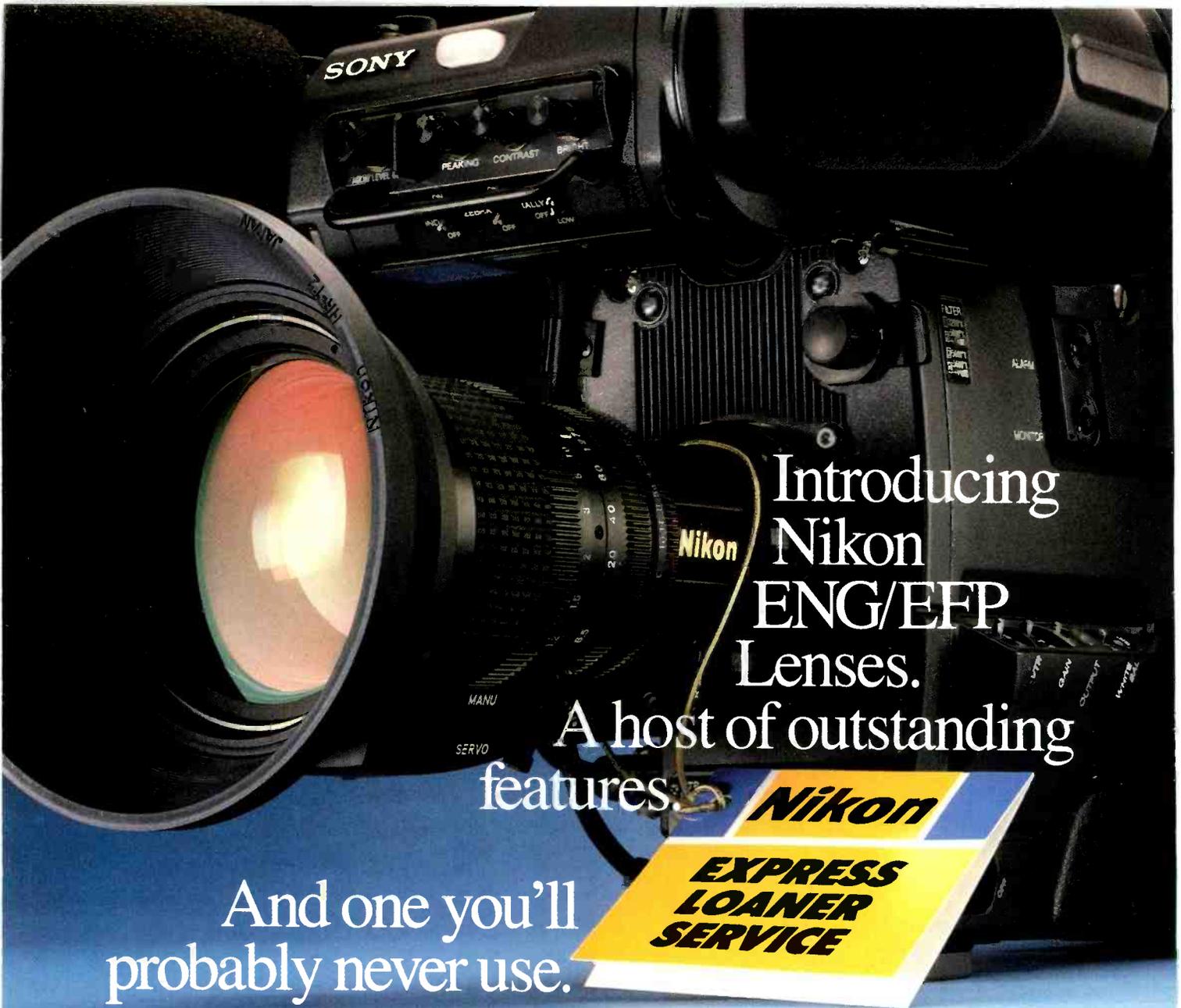
"We estimate that these proposals will, by the end of the four-year agreement, cost us 400 jobs," he said. "The proposals deal with work rules and jurisdictions and the ability to do work by nonunion people—managers and anyone else they can get to perform the work. The bulk of their proposals—170 in all—are geared to making it more difficult for NABET-represented people to perform their jobs."

This no-strike stance represents a new approach for NABET, says Krieger. Accordingly, he will use a new weapon—the law—to deal with the company.

"We told them we foresee a long legal battle," said Krieger. "Not only with the National Labor Relations Board, but also in the courts."

According to Krieger, NABET is in the process of filing several charges against ABC/Cap Cities.

The issue, as presented by ABC/Cap Cities, is the ability of the company to remain competitive in the changing broadcast entertainment industry. "They told us they have a shrinking audience because of the intrusion of cable and other forms of entertainment. They can't afford to be restricted by what programs they can pick up and by whom. Even the pickups won't be as well done if you have a lot of high school kids manning the equipment, as opposed to professionals." ■



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er supporting sciences related to HDTV development. Graduate students are readily available to assist him.

According to NYIT's Solomon, the school is moving ahead with development of the Vista system.

"Some of the staff has developed new ideas about how to proceed with the system—even since Glenn's departure," said Solomon.

According to Glenn, the Vista system is unique in that it is outfitted with HDTV realtime operating hardware—a transmitter encoder and a receiver decoder—while other proposed NTSC-compatible HDTV transmission systems use either computer simulations or offer only enhanced definition capabilities.

"Although the Vista system is still in its early development stage in terms of overcoming problems like propagation and other things that introduce artifacts into the picture, the system could undergo tests at any time," said Glenn. "Realistically, in any of these systems when you start over-the-air testing you find a lot of problems that need solving."

Looking at the larger picture, Glenn expressed dismay over the general state of HDTV transmission systems in the U.S. He is concerned that if the FCC advisory committee is successful in setting up a competitive shootout, the U.S. could lose.

"In a shootout where the winner takes all, the European or Japanese system will win out," he said.



*Dr. William Glenn has moved to Florida Atlantic University.*

"They are the only organizations that have enough financial backing to go through the rather extensive testing procedures that the FCC has set out."

As a possible solution, Glenn proposes the estab-

lishment of an organization comprised of the main researchers in the HDTV field who could design a viable system. This was a successful solution, he notes, for the development of NTSC. ■

## Terrestrial TV: Burden Of Proof Is On Stations

Terrestrial TV, the 40-year-old AT&T service, once provided the only

means of sending programming from city to city. Today, satellites have largely supplanted its use at the networks.

Small stations, however, still use TTS for sports, news and remotes. Now, TTS customers face service cuts—and the service itself faces possible extinction—

unless the affected users can prove they still need it.

The NAB Science and Technology Department, which has monitored the situation since June, was unsure whether it would take advantage of the opportunity to file an opposition, citing a seeming lack of concern among its members.

"Under the Communications Act of 1934, the burden is on the affected industry to show that the proposed tariffs are unreasonable," said Michael Rau, vice president of the NAB Science and Technology Department.

"Generally speaking, it's a big burden to overcome, since the system is carrier-initiated," Rau continued. "We've asked our members if there is interest in opposing the plan and as of yet there hasn't been a big response."

According to Rau, the handful of smaller TV stations this ruling would affect—stations that have not used the AT&T service in eight months—are located in 115 of the 206 areas of the country where the service is available.

"Small stations that may lose TTS have other options," said Rau. "These stations don't have to buy an entire satellite uplink or satellite ENG truck," he said. "They can always borrow or rent."

No matter what the outcome, AT&T says it plans to continue TTS to all stations currently using it. Stations that use it infrequently will still have the opportunity to purchase the service on a request-by-request basis. ■



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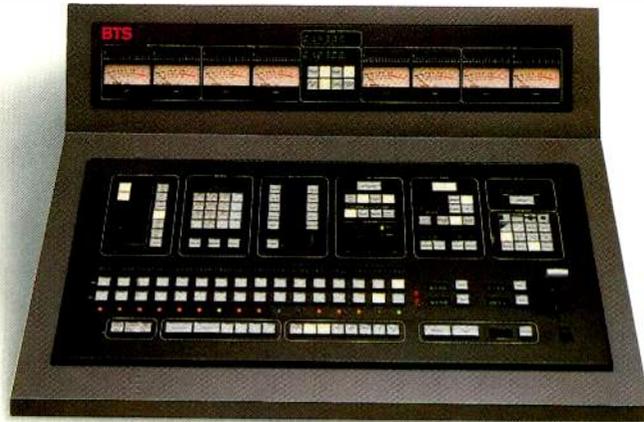
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# BTS

The name behind what's ahead.

## Superconductors Face New Challenges

By Eva J. Blinder

The development of superconductors, an area of great potential for any industry dependent on electronics, has been the subject of intense research in the year and a half since *BME* initiated its "Tech Watch" column in February 1988 with an article on superconductors. Since then, much has been accomplished toward the practical application of superconductors. Recent roadblocks, however, have clouded the practical future of superconductivity and pointed to new research directions for scientists.

The biggest obstacle to practical application of superconductivity is the finding, reported late last spring, that magnetic fields cause superconductors to lose their superconductivity. Since virtually all the proposed industrial applications of superconductors result in the generation of magnetic fields, this finding is a great blow to the fledgling superconductor industry. Equally discouraging, none of the superconducting compounds discovered so far is capable of carrying a large electrical current.

These recent discoveries have thrown the future of this field into doubt. Many of the uses proposed so far for superconductors either create or require large magnetic fields. The new findings mean that researchers will have to focus either on applications that do not require large currents—for example, certain military infrared-sensing devices—or on ways of circumventing the limitations.

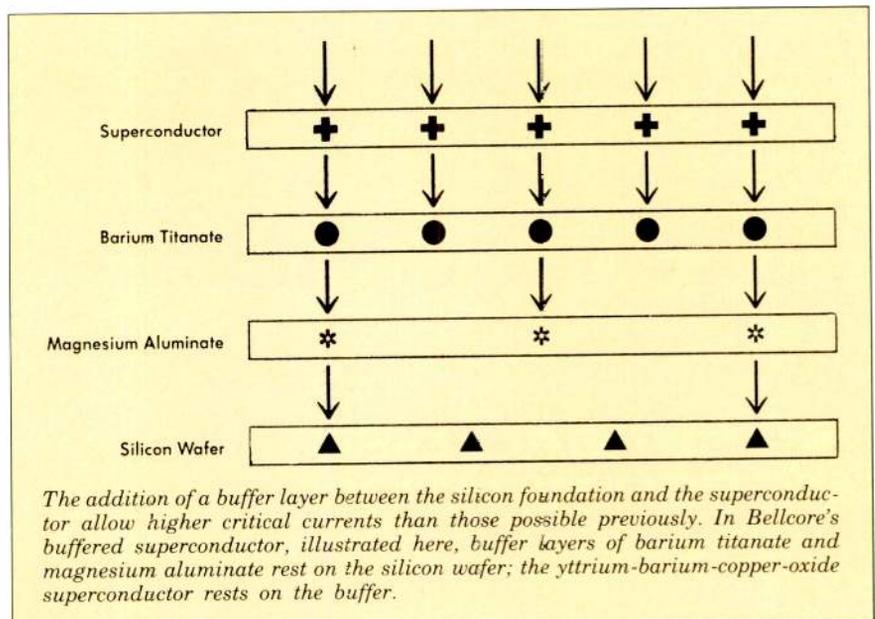
At very low temperatures, the lines of magnetic force in superconductive materials bunch together in a regular "lattice" pattern that allows current to travel with no resistance. If the temperature is raised or the material is subjected to a magnetic field, however, the lattice pattern breaks up and the lines of magnetic force be-

come tangled, causing resistance to develop. This finding throws a monkey wrench into the development of high-temperature superconductors (*i.e.*, above 0 Kelvin), which until recently had appeared promising.

Nevertheless, researchers are not about to give up on superconductivity, and companies such as American Superconductor Corp. of Cambridge, MA and Conductus, Inc., of Sunnyvale, CA, continue to search for ways to make practical use of high-temperature superconductors. American Superconductor, a commercial venture with close ties to the Massachusetts Institute of Technology, is seeking to develop a high-temperature superconducting wire. Conductus, which has financial and technical backing from Hewlett-Packard and which was recently named to participate in a \$475,000 California Competitive Technology Grant, has embarked on a project to develop and demonstrate a superconducting quantum interface device, or SQUID.

Some of the more interesting recent research in superconductivity revolves around its possible application in the fabrication of integrated circuits. Dr. Jagdish Narayan, professor of materials science and engineering at North Carolina State University, and a team of researchers have produced a stable, high-quality, single-crystal superconductor film deposited directly on a silicon substrate. This and similar advances by other scientists are merely the first steps in creating a superconducting integrated circuit—but such chips, if and when they do arrive, promise far greater speed than is possible with current chip architectures.

The material used by Narayan in his research on superconducting ICs is a "1-2-3" superconductor, so named because it consists of one part yttrium, two parts barium, three parts copper and approximately seven parts oxygen. This material,  $YBa_2Cu_3O_7$ , belongs to a new class of what are known as "high-temperature" super-



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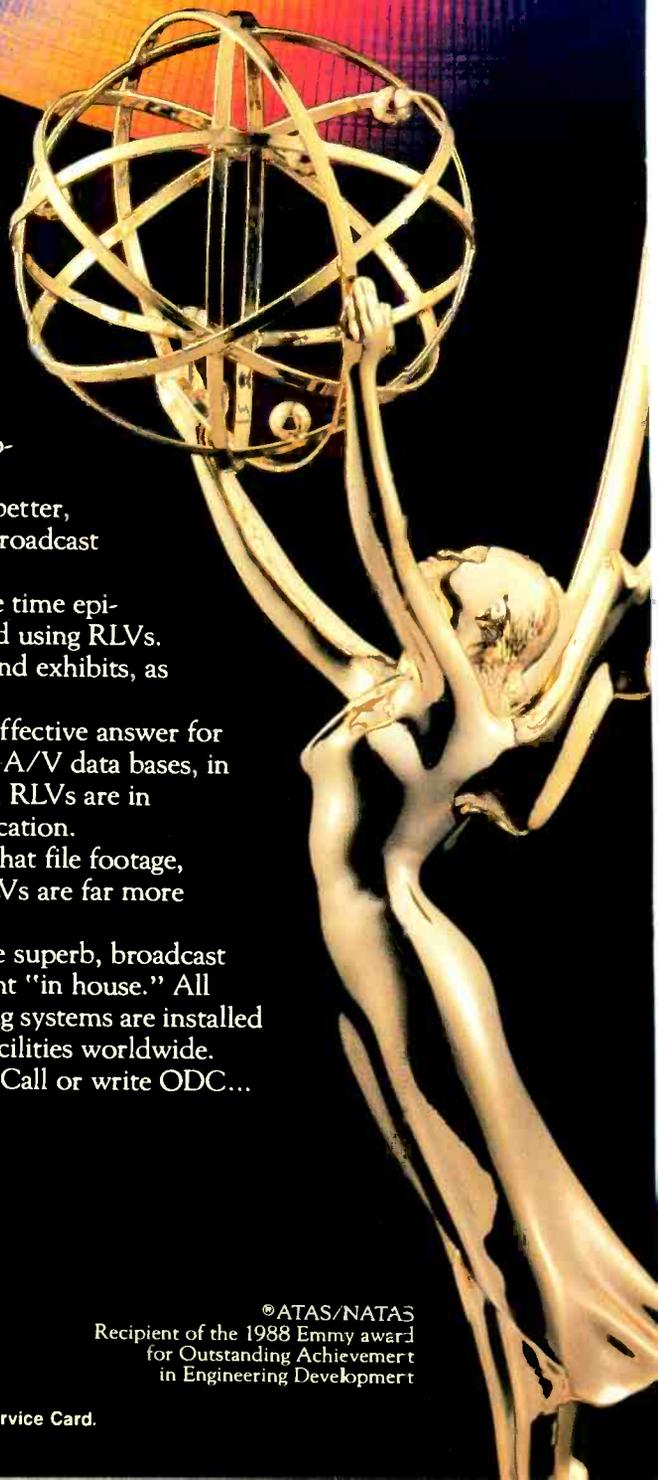


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## TECH WATCH

conductors. The first known superconductors were metals and required temperatures close to absolute zero (0 Kelvin) in order to exhibit their superconductivity. The new high-temperature superconductors are ceramics, some of which are able to exhibit superconductivity at temperatures as high as 125.15 degrees Kelvin, or 148 degrees below zero Centigrade.

One difficulty encountered in making direct film deposits of  $\text{YBa}_2\text{Cu}_3\text{O}_7$  on silicon is that the difference in the elastic properties of the two materials causes the film to crack. The Narayan team overcame this difficulty by developing a new process, biased laser deposition, that grows the film at a temperature of 500 degrees C rather than the 650 to 900 degrees C previously required.

In this process, a pulsed laser is used to strip atoms from a sample of superconductor material. The atoms are deposited, in layers just one ten-millionth of a centimeter thick, on a heated substrate in a vacuum chamber. To achieve the desired composition, oxygen is pumped toward the substrate and a charged ring creates an electric field which "biases" the rates at which light atoms and heavy atoms travel toward the substrate.

Narayan explains that biased laser deposition, unlike other processes tried in Japan and the U.S., preserves the crystal structure because it does not require high-temperature annealing, or heating, to give the film its superconducting properties.

Moreover, film produced by this process has a critical current density of one million amperes per square centimeter which, according to Narayan, is sufficient for supercomputer applications. A temperature below 77 degrees Kelvin is necessary to maintain the current density, but this can be achieved by using inexpensive liquid nitrogen as the coolant. Critical current is the maximum current a superconductor can carry before losing its superconductive properties.

The biased laser deposition process, however, has one drawback. It results in a film crystal that is imperfect and

### *The new high-temperature superconductors exhibit superconductivity at temperatures as high as 125.15 degrees Kelvin.*

aligned with the substrate in only one direction. Narayan expects to improve these properties by optimizing the voltage, laser and substrate variables.

Working with the same materials, but taking a different approach, researchers at Bellcore, Nippon Electric Company (NEC) and Rutgers University, under the leadership of Bellcore's Venky Venkatesan, have achieved a critical current density of 60,000 amperes per square centimeter at 77 degrees Kelvin. Further, these films become superconductive at 87 K, a full 10 degrees above the temperature of liquid nitrogen.

A year ago, the Venkatesan team succeeded in depositing "1-2-3" superconductor directly onto silicon. Three problems made the technique impractical, however. First, the superconductive film reacted chemically with the silicon substrate at the 650-degree C temperature necessary for the film to be successfully deposited. Second, the differing elastic properties of

the film and the silicon substrate caused the film to crack. Third, since the crystal structures of the film and the silicon substrate do not match, it was difficult to put properly oriented films on silicon.

All of these problems, according to Venkatesan, have been solved by using an appropriate buffer layer between the superconducting film and the silicon substrate. The buffer layer was developed by Yoichi Miyasaka and other researchers at NEC. It consists of magnesium aluminate grown directly on the silicon by chemical vapor deposition and a second layer of barium titanate deposited by sputtering.

For the project, NEC provided wafers of silicon coated with thin layers of magnesium aluminate and barium titanate. Venkatesan and coworkers at Bellcore and Rutgers used the pulsed-laser deposition technique to apply a single-crystal superconducting layer to the coated silicon wafers. The presence of the buffer layers allowed the crystal structure of the superconductor to lock successfully to that of the silicon substrate.

Venkatesan credited the success of the project to the researchers' joint efforts. He added, "This experiment very clearly suggests the usefulness of the buffer layer could be enormous. A variety of films could be grown for different commercial purposes with proper orientation on a host of substrates if the correct buffer layer is chosen." ■



*Bellcore's low-temperature pulse-laser deposition technique produces a smoother-surfaced superconductor (right) than one produced with a high-temperature process (left).*

# THE REPLACEMENT CYCLE

BY BETH JACQUES

*Engineers used to replace equipment when it wore out. Today accountants make the decisions.*

**T**here was a time, in happier days, when chief engineers had close to *carte blanche* to replace something if it broke. And a decision at the station across town to buy a new "showbiz technology" box automatically led the general manager to reach for his wallet. No more. Any engineer who cherishes his job babies his gear so that it expires—or better yet, retires into honorable duty in an off-line or off-air suite—promptly in sync with his station's depreciation cycle. While equipment reliability is said to be improving, thanks in large part to solid-state technologies and the wide availability of ICs, most broadcasters find their equipment replacement needs cycle with their amortization schedule. That rate is staying stable at around five years. When equipment reaches the end of that cycle and can get the financial OK for replacement, it is often replaced by new technology. And new technologies—which beget new formats—are coming into the market at an increasingly dizzy pace. People who need them right away, such as post-production facilities and state-of-the-art broadcasters, buy them right away; everyone else buys them five years later.

"I don't think the rate is changing at all," engineering management sources at CBS Broadcasting told BME. "We use equipment the full five

years allowed for depreciation—or a good deal longer, because equipment doesn't die promptly after five years when the depreciation allowance does." CBS often upgrades equipment slated for replacement with new technology at the conclusion of a product's amortization cycle. A replacement-*cum*-upgrade is going on now as the network installs a Sony Library Management System (LMS) using D-2 composite digital videotape transports. "This installation represents a replacement for us and it's our first significant technology switch, but it only applies to the LMS system," the CBS spokesman told us. While CBS feels D-2 may become the major form of playback-to-air for all programming in the future, the network has no plans to scrap either its existing Betacam or one-inch Type C equipment.

Replacing and upgrading equipment with new technology outside a budget cycle is often motivated by competitive pressures in a hot market. "The Boston market is a product-driven market," said Karl Renwanz, VP, engineering and operations for WNEV-TV. The Boston station operates 27 field cameras and 27 edit bays, and handles all its production in-house. "The platform to making great-quality programming is technology, and that's the fuel that keeps this market going," he said. "We're one of the better-equipped stations in the country, but our competition is right up there with us." WNEV-TV's

goal is to be the best it can be in terms of technology, features capabilities and finished on-air productions, and each equipment purchase must further that goal, Renwanz said.

While television field equipment is of necessity on a five- to six-year replacement cycle because it gets heavy use, technology changes are currently tending to occur every five years or so. "Throughout the '70s and '80s, you can see how each five-year cycle is a quantum leap in technology from the previous level," Renwanz said, pointing out the evolution from 3/4-inch U-matic to Betacam, Betacam SP and currently "the scent of D-2." The station amortizes its equipment over a five-year period, "but if something has life, we still use it," Renwanz said.

A case in point is the station's nine RCA TK-46 studio cameras, 11-year-old models which the station continues to use. "The studio is a more docile environment than the field," Renwanz pointed out. He plans to replace them with CCD models when that design demonstrates a qualitative increase in image quality and the features required in advanced studios such as computer setup and interface between full studio automation equipment.

Similarly, WNEV will not replace its one-inch Type C tape machines, which are gradually being replaced with Betacam SP and metal tape setups. The station operates some 145 Betacam SP units, which have "virtu-

ally permeated the station in every area," he said. Using Betacam SP with metal tape costs more initially, but delivers better editing flexibility, durability and less signal-quality loss than oxide tape in the edit process. Other stations replace equipment on the basis of utility. "We change our equipment when it wears out or needs replacement," said Talmage Ball, director of engineering at KSL-TV, Salt Lake City. According to Ball, KSL-TV doesn't necessarily move to new technology at that replacement point unless it delivers better signal quality. For example, the station recently upgraded from 3/4-inch U-matic to Betacam for its spot news operation.

"We would have replaced the 3/4-inch machines when they wore out and kept them until then because it's nice equipment, but the Betacams really are better," he said.

A specific application requirement also drove a move to new camera technology, when the station bought a Sony PB3-60 to replace an RCA TK-47 to enable operation with a long triax cable. "The TK-47 was in great shape and it made great pictures, but it just couldn't run 3000 feet on a triax," Ball said.

KSL-TV's policy requires amortization of equipment over seven years. While technological improvement precipitated the station's changes in cameras and tape format, Ball likes to budget for spares and engineering maintenance to push equipment to his seven-year limit. "I don't like to budget for replacement when a piece of equipment is still on the books," he said, even though he feels that a five-year equipment lifespan would be more realistic for some of the latest portable equipment. "Portable cameras and tape decks can get pretty used up after five years," he said.

On the other hand, KSL-TV only recently replaced its 17-year-old RCA F line series transmitter (with two NEC models). The RCA unit lost just seconds per year, and the only reason Ball felt he ought to budget for a replacement was because it was getting increasingly difficult to get spare



### How Long It Lasts: A Broadcaster Survey

Here's the average length of product life by equipment category, according to broadcasters and facilities we surveyed. One caveat: Equipment must be well-maintained to achieve similar results. Also, estimates of equipment life reflect the widely divergent priorities of stations and post houses; stations are much more likely to avoid replacing equipment until it is fully depreciated, while post houses are driven by competitive pressures to replace equipment as new technology becomes available. Therefore, these estimates, especially those referring to studio equipment, indicate the length of a technology cycle, as our sources see it, and not the useful life of the equipment, which generally is much longer.

Manufacturers we contacted tended to confirm these figures in most cases, although they gave longer expected lifespans for studio cameras, reflecting the actual useful life. Typical comments from camera manufacturers: "High-quality equipment is made to last forever, and they do." "Before you wear it out, it will be obsolete."

parts. "It was hard to get management to make it a priority with so few seconds of downtime," he conceded.

"You replace equipment to gain an ROI, a leg up in doing things that were cumbersome to do before," said a CE at a major-market independent TV station who asked to remain anonymous. "Getting new equipment which will save you manpower is also a really popular thing to do these days." He attributes these trends to factors which are both market-driven and, in light of the recent American corporate economic climate, merger and acquisition-driven.

This metro-area station feels the rate of replacement has changed. "There has been an explosion of new products, and you can't stay static like you used to," he said. "From the user's point of view, it makes life

simpler if there's only one choice, but if I buy something for the station, it's nice to have a choice, to have more ways to consider doing a particular job."

The replacement rate has changed dramatically for cameras, this insider said. Formerly, cameras had a long, fairly stable life of some eight years, but with ENG cameras, "You're lucky if you get five." In common with his colleagues, this CE attributes the comparatively short lifespan of field gear to the harsh conditions it endures, as well as accelerating technological development. He attributes the acceleration and proliferation of videotape formats to the development of the digital time base corrector (in the mid-'70s), which enabled the use of helical tape in broadcasting. "Things took off in lots of directions

# REPLACEMENT CYCLE

from that point," he said.

While the usable life of one-inch formats has been between eight and 10 years, this engineer feels that figure has decreased. "Newer machines in general have shorter lives," he said, citing a five-year target for field tape equipment and six to seven for editing gear.

On the facilities front, the replacement cycle can spin at a dizzying pace—high-tech must often be replaced even before it's paid for.

"What I call 'showbiz technology'—DVEs, graphics and digital effects equipment, production switchers—is an equipment category that can be scary," said Mike Fayette, president of Chicago facility Post Effects. "We could buy an item that literally is no longer marketable the way we thought just two years after we buy it. For instance, suppose you buy a \$200,000 DVE this year to discover in 18 months a \$20,000 item will do even more: Then what do you do? Replace a \$200,000 item that hasn't even depreciated yet?"

Post Effects handles the problem by supplementing its initial purchases with new generations of more powerful, less expensive equipment and simultaneously moving the initially state-of-the-art equipment into a less visible, but still useful, role. "We use four generations of DVEs here," Fayette told *BME*. "We started with an NEC Eflex/Optiflex six years ago, which was then state of the art. It isn't now, but it still makes pictures smaller and moves them around, so we use it a lot at a reduced rate in offline rooms, or for someone on a budget, or as backup for the more modern DVEs. So we continue to get usefulness, but we don't replace it. To stay competitive in the market, however, we bought an ADO a year later, and then a year after that an [Abe-kas] A53D, and then a DF/X a year after that. So right now, we use four generations of digital effects equipment. They all coexist and nothing replaced anything that came before it."

Other special factors which come into play for a facility replacing its equipment include productivity. "The productivity of any given piece of

equipment is my primary consideration in deciding to replace it," said Fayette. "If a one-inch machine is productive and still works and is more than five years old, we have little inclination to replace it. We'll continue to use it while it's earning money and while the maintenance costs are reasonable, and until it can no longer generate income for us." Adding that banks often question loans to production facilities because they fear the high-tech equipment must, *ipso facto*, become obsolete after a short period of time, Fayette points out that such fears are untrue for a whole category of equipment that doesn't have to be replaced quickly. "Terminal equipment like patch bays and DAs, monitors, a good, well-made VTR which should give, hopefully, 10 years of use, a proc amp—these are long-term items," he said.

Broadcast cameras are the only area in which the facility replaces an item rather than recycling it. "The performance improvements in camera technology in the last five to 10

years and the speed with which CCDs are overtaking tubes has made old cameras unmarketable for us," Fayette said. Calling cameras a "third technology," Fayette says each new generation of camera makes the previous one obsolete, so he tends to sell his older cameras on the used market when he buys a new one. "Original imaging is crucial in this market: You don't want to sell a client 400 lines of resolution when you can get 700 lines," he said. "That's not the case with DVEs—sometimes you just want a simple zoom with no tricks, and a four-year-old DVE can do that nicely."

Post Effects is also in the equipment rental business and Fayette points out that the camera technology curves show sufficient improvement every two years to warrant turning the equipment over completely. Noting that some exceptional designs, like the five-year-old Ikegami HL79E, will continue "living forever" because they have gained terrific acceptance, Fayette says that most peo-

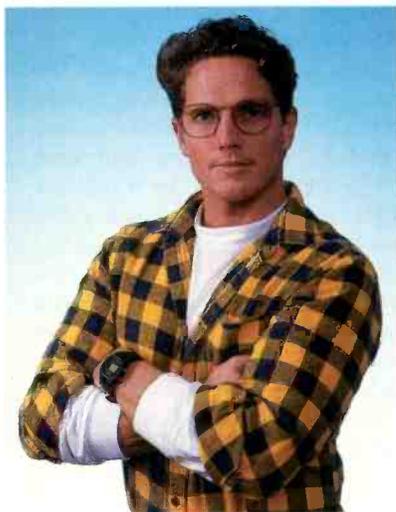
## MTBF: THE MEANINGLESS SPEC

Quoted as a specification relating to equipment life cycle, the term "Mean Time Between Failure" (MTBF) arose several times in researching this article. Most broadcasters discount it when considering equipment buys and most manufacturers don't quote it. We wondered why, so we asked Bland McCartha, general manager, small format products, and Peter Zackett, general manager, studio recorders, of Ampex. Here's what they said: "MTBF is primarily a statistically derived number pertaining particularly to parts counts. We don't generate such a figure because it's not meaningful. For industries such as airlines and the military, which perform maintenance tasks on a recurring basis, service life of a part between failure is important to know, but we don't know anyone in our business who quotes one. It can be defined for a piece of equipment, but it won't mean much to a broad-

caster. When you consider nonmechanical problems, where there is no wear involved, and with solid-state technology, equipment can post an extremely long MTBF—and it will be obsolete technology before it ever breaks."

McCartha and Zackett cited mechanical gear such as a VTR, which has an extremely long product life if it gets proper maintenance, as an example. "You'll reach the end of the product's economic life before you reach the end of the useful service life," they said. The Ampex executives further note that the bulk of Ampex business is expansion into new markets, new applications and current user growth. "The replacement market is stable," they say, "and when it peaks, it coincides with a format change." Equipment replacement at such transition points takes place over a five to seven year-plus period, the Ampex executives said. ■

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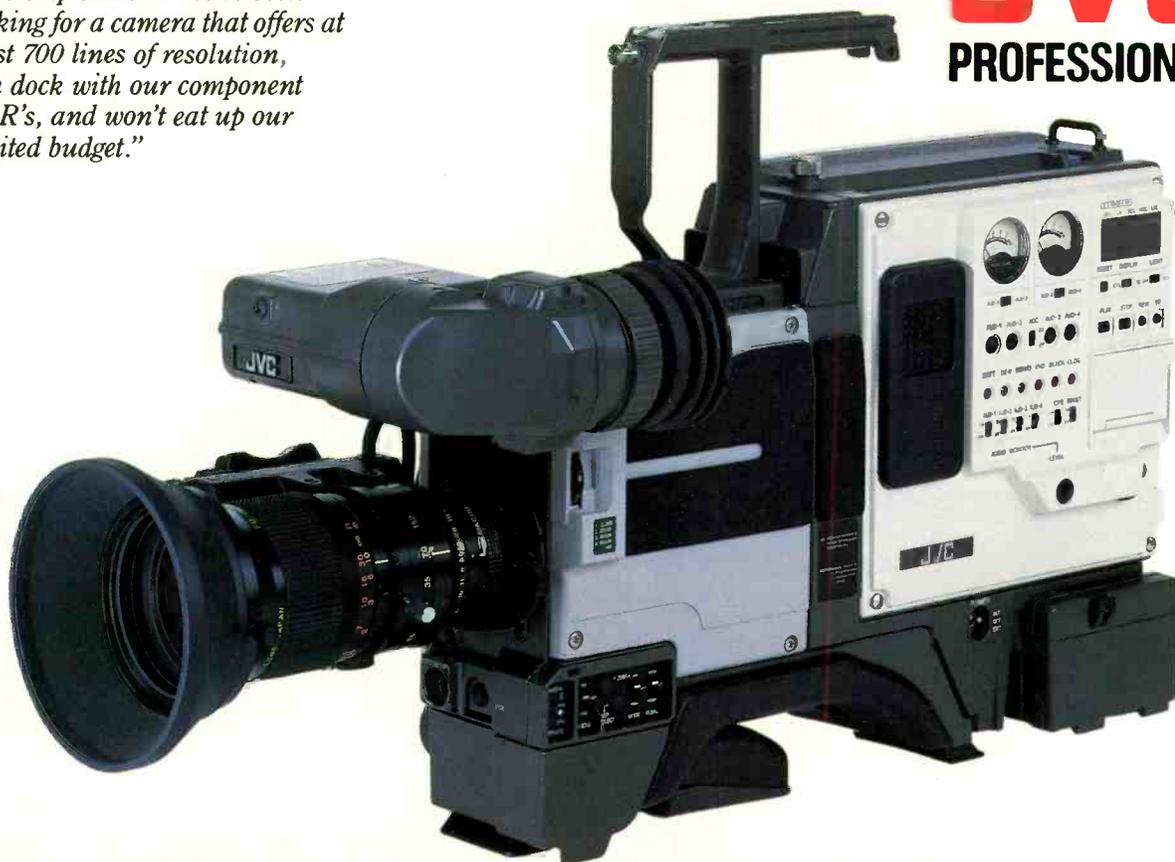
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# REPLACEMENT CYCLE

ple no longer buy tube cameras. "We're on the third generation of CCD cameras," he said, adding that CCD technology has changed every year.

On the radio broadcast front, Dave Burns, national marketing director of Harris-Allied Broadcast Equipment, reports the rate of replacement is flat.

He cites the lifting of the three-year radio ownership rule which has, in effect, turned radio stations themselves into products rather than customers for products. "Let me give you an example," he told *BME*. "We've had a client for close to 12 years which is a well-run, small-market station. They never bought anything

gold-plated, but they bought exactly what they needed. Today they told me, 'Dave, we can't buy anything, because our management is buying radio stations.' Lifting the three-year rule has had the biggest impact on us as suppliers as anything that has ever come down the road."

Resources for equipment purchases in radio began to tail off some five years ago. Burns credits this to the beginnings of station trading kicked off by the overthrow of the three-year rule and to the end of a "purchase surge" instigated, first, by a number of major- and medium-market startups some 12 years ago, and second, a "catch-up" response in power and equipment quality hikes developed for competitive stations by market making consultants like Lee Abrams. "If you're the number-one station, you have to sound like it, and you couldn't do that on old equipment and a CBX Volumax," Burns said. "Some of the bigger stations said, 'Hey, we have to change or die,' so there was a heck of a surge."

Today it's different. "A lot of people are sitting around with five-year-old equipment," Burns says. "Not to say no one's bought anything, but it's flattened out."

Stations replace equipment today, he said, when it becomes a matter of diminishing returns to repair anything, or when a real cost-benefit advantage can be gained, or when peer pressure demands a change in a competitive market. "Some stations are committed to a state of excellence, but those are few and far between," he said.

The most important trends in replacement equipment Burns has noted include an upgrade to the Denon CD cart machine—a format change to digital equipment which is rapidly becoming a household word, Burns said—and a move to pro gear and away from equipment traded out from a local hi-fi or semi-pro shop. Burns also reports growth in transmitters due, he says, to technology developments that make high-efficiency designs like the Harris DX series attractive because they can generate a good ROI.

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stick to what you have longer," said Rick Cruz, formerly CE of WQIO-FM, Mt. Vernon, OH, and now CE of WMGG-FM/WNMI-AM, Columbus, OH. "If you do make a technology change, you don't always go all the way out. For instance, a selling point for us when we bought our new audio console was that it contained a five-year warranty. We thought, 'Gee, for five years they'll stand behind it,' and that's important for equipment which is sensitive to things like lightning strikes and announcer abuse." Cruz thinks manufacturers are paying more attention to factors like reliability. "You wouldn't have found a five-year warranty 10 years ago," he said, attributing the current state of affairs to improved solid-state technology and easier field service. "You can walk into a radio electronics part store in your home town and pick up most ICs," he said, adding that the current economic climate which mandates contract engineering is coming home to roost in terms of equipment maintenance. Fewer people who are knowledgeable about broadcast equipment are coming into the field, leaving complicated tasks to the station's chief engineer.

To Cruz, proper maintenance is the crux of any radio replacement cycle. "You can easily get 25 years from a transmitter which is maintained properly—that means cleaning it weekly," he said. WQIO replaced its 20-year-old Gates FM10H transmitter two years ago with a Harris FM 25 K-1 series, the first in the country. "We took the opportunity of a power upgrade [20,000 W ERP to 50,000 W ERP] to make a technology upgrade," Cruz explained, adding that the Gates unit still worked and has been placed on standby. "The Harris gave us new advances in exciters and digital technology, which is expandable, plus new features like a self-diagnostic autpower function," he added.

Cruz also sees improved reliability and functionality in today's crop of audio cart machines. "They have to compete with CD players and other media, so companies are taking more care in R&D and in developing reliable, field-serviceable cart machines," he said. Formerly, Cruz

would place a cart machine on backup status after seven years, but now a unit can go well over 10 before he'll consider taking it out of the air studio and retiring it, or moving it into the production studio.

In the end, as Post Effects' Mike Fayette sums it up, it's not any category or class of equipment which is

itself unreliable. "Just some equipment from some manufacturers," he joked. "Replacement is common sense. Portable equipment that travels in the field depreciates faster due to wear and tear. If you rack an ATR, it can go for 20 years—but if you take it rafting on the Amazon, it will go pretty fast." ■



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# THE SOURCE 1989

Welcome to The Source 1989, the latest edition of *BME's* annual directory of the companies that supply and service the broadcasting industry. This year's updated buyers guide is designed to give you quick and accurate access to your suppliers.

The category-by-category Product Guide that begins on page 35 is divided into four general sections: video equipment, audio equipment, RF and general equipment, and services. To find out who offers a particular service or type of equipment, turn first to the general category and then scan the alphabetical headers until you find the one you're looking for. Company addresses, phone numbers and product lines are found in the alphabetical listing of manufacturers that begins on page 50.

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CAMERA PICKUP TUBES	GRAPHICS SYSTEMS, 2D	STILL STORE SYSTEMS	VIDEO RECORDERS, SOLID STATE
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CART PLAYBACK SYSTEMS	ANIMATION & MODELING	SWITCHERS, PRODUCTION	VIDEO T&M
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ATRS, FIELD	COMPACT DISC EQUIPMENT	MICROPHONES, ACCESSORIES	STUDIO AUTOMATION EQUIPMENT
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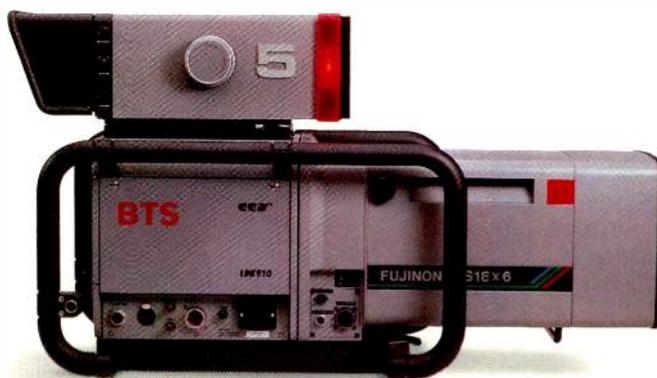
AM STEREO EQUIPMENT	MDS, SMATV SYSTEMS	RF AMPS, SWITCHES	TOOLS
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MOBILE VEHICLE CONSTRUCTION		

## ALPHABETICAL LISTING OF MANUFACTURERS ..... 50

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LDK 91 CCD Portable Camera

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Together, these fully compatible CCD cameras will make your old ideas about picture quality go right down the tubes. For complete information and technical specifications on the new LDK 910 and LDK 91, call BTS at 1 800-562-1136, ext. 13.

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# PRODUCT GUIDE

## VIDEO PRODUCTS

### CAMCORDERS

AMPEX  
BTS  
IKEGAMI ELECTRONICS  
JVC PROFESSIONAL PRODUCTS  
PANASONIC BROADCAST  
PANASONIC INDUSTRIAL  
SHARP ELECTRONICS CORP.  
SONY BROADCAST  
SONY PRO VIDEO  
THOMSON VIDEO EQUIPMENT

### CAMERAS, ENG/EFP

AMPEX  
BTS  
HITACHI DENSHI AMERICA  
IKEGAMI ELECTRONICS  
JVC PROFESSIONAL PRODUCTS  
NEC AMERICA  
PANASONIC BROADCAST  
PANASONIC INDUSTRIAL  
SHARP ELECTRONICS CORP.  
SONY BROADCAST  
SONY PRO VIDEO  
THOMSON VIDEO EQUIPMENT  
TOSHIBA AMERICA

### CAMERAS, STUDIO

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IKEGAMI ELECTRONICS  
JVC PROFESSIONAL PRODUCTS  
NEC AMERICA  
SHARP ELECTRONICS CORP.  
SONY BROADCAST  
THOMSON VIDEO EQUIPMENT  
TOSHIBA AMERICA

### CAMERA LENSES

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APOLLO AUDIO VISUAL

ARRIFLEX CORP.  
CANON USA  
CENTURY PRECISION OPTICS  
COMPREHENSIVE VIDEO SUPPLY  
FILM VIDEO EQUIPMENT SVCE.  
FRIES ENGINEERING  
FUJINON  
INNOVISION OPTICS  
NIKON  
SCHNEIDER CORP. OF AMERICA  
SCHWEM TECHNOLOGY  
TAMRON INDUSTRIES

### CAMERA PICKUP TUBES

AMPEREX ELECTRONIC CORP.  
EEV  
RICHARDSON ELECTRONICS  
SONY BROADCAST

### CAMERA SUPPORT EQUIPMENT

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BOGEN PHOTO CORP.  
CANON USA  
CHAPMAN/LEONARD  
CINEMA PRODUCTS CORP.  
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ELICON  
FGV PANTHER  
FUTURE PRODUCTIONS  
GEOCAM  
KARL HEITZ, INC.  
HOFFEND & SONS  
ITE  
MATTHEWS STUDIO EQUIPMENT  
MILLER FLUID HEADS  
MITCHELL CAMERA CORP.  
O'CONNOR ENGINEERING LABS  
PERROTT ENGINEERING LABS  
QUICK-SET  
SACHTLER CORP. OF AMERICA  
TSM/TOTAL SPECTRUM MFG.  
TYLER CAMERA SYSTEMS  
ULTIMATTE CORP.  
VINTEN BROADCAST

### CART PLAYBACK SYSTEMS

AMPEX  
ASACA/SHIBASOKU CORP.  
CHANNELMATIC  
LAKE SYSTEMS CORP.  
MATCO  
ODETICS BROADCAST  
PANASONIC BROADCAST  
SOLUTEC  
SONY BROADCAST

### CHARACTER GENERATORS

ABEKAS VIDEO SYSTEMS  
AMPEX  
AMTEL SYSTEMS  
ASTON ELECTRONICS  
BTS  
CHYRON CORP.  
COMPREHENSIVE VIDEO SUPPLY  
COMPUTER GRAPHICS LABS  
CV TECHNOLOGIES  
DIGITAL ARTS  
DIGITAL F/X  
DUBNER COMPUTER SYSTEMS  
ESE  
EVERTZ MICROSYSTEMS  
FOR-A CORP. OF AMERICA  
THE GRASS VALLEY GROUP  
HARRIS BROADCAST  
HARRIS VIDEO SYSTEMS  
KNOX VIDEO  
LAIRD TELEMEDIA  
3M BROADCAST  
MPB TECHNOLOGIES  
MULTIDYNE ELECTRONICS  
PROGRESSIVE IMAGE  
QUANTA CORP.  
QUANTEL  
VIDEO DATA SYSTEMS

### CLOCKS, TIMERS

ALAMAR ELECTRONICS  
APHEX SYSTEMS  
AUDIOLAB ELECTRONICS  
BEAVERONICS

CHANNELMATIC  
DATUM  
ESE  
EVERTZ MICROSYSTEMS  
FOR-A CORP. OF AMERICA  
LEITCH VIDEO  
SIGMA ELECTRONICS  
TORPEY CONTROLS/KEY VIDEO  
VORTEX COMMUNICATIONS

### COLOR CORRECTORS

COLORGRAPHICS SYSTEMS  
COMPREHENSIVE VIDEO SUPPLY  
CORPORATE COMMUNICATIONS  
CONSULTANTS  
FOR-A CORP. OF AMERICA  
FORTEL  
JAMES GRUNDER ASSOCIATES  
LAIRD TELEMEDIA  
NYTONE ELECTRONICS  
QUALITY VIDEO SUPPLY  
QUANTEL  
RANK CINTEL  
SIERRA VIDEO SYSTEMS  
THOMSON VIDEO EQUIPMENT

### DIGITAL DISK RECORDERS

ABEKAS VIDEO SYSTEMS  
ADVANCED DESIGNS CORP.  
ASACA/SHIBASOKU CORP.  
DSC/DIGITAL SERVICES CORP.  
QUANTEL

### DIGITAL VIDEO EFFECTS

A.C.E.  
ABEKAS VIDEO SYSTEMS  
ALTA GROUP  
AMPEX  
ASACA/SHIBASOKU CORP.  
CEL ELECTRONICS  
DIGITAL F/X  
DSC/DIGITAL SERVICES CORP.  
ECHOLAB  
FOR-A CORP. OF AMERICA  
JAMES GRUNDER ASSOCIATES  
HOTRONIC  
MICROTIME

NEC AMERICA  
PINNACLE SYSTEMS  
PROGRESSIVE IMAGE  
QUANTEL  
SHIMA SEIKI U.S.A.  
SHINTRON CO.  
SONY BROADCAST  
THOMSON VIDEO EQUIPMENT  
TOSHIBA AMERICA

### **EDIT CONTROLLERS**

ADRIENNE ELECTRONICS  
AMHERST  
AMP PRODUCTS CORP.  
AMPEX  
ARTI  
BHP  
BROADCAST ELECTRONIC  
SVCES.  
CEL ELECTRONICS  
CMX CORP.  
COMPREHENSIVE VIDEO SUPPLY  
CONVERGENCE CORP.  
CV TECHNOLOGIES  
EDITRON USA  
EVERTZ MICROSYSTEMS  
FOR-A CORP. OF AMERICA  
THE GRASS VALLEY GROUP  
JVC PROFESSIONAL PRODUCTS  
M&R DATA SERVICES  
PALTEX  
PEP  
QUANTA CORP.  
QUANTA EDITING PRODUCTS  
SONY BROADCAST  
TECCOM  
UNITED MEDIA  
VIDEOMEDIA

### **EDIT SYSTEMS, MULTISOURCE**

AMPEX  
AUDIO KINETICS  
BHP  
CMX CORP.  
COMPREHENSIVE VIDEO SUPPLY  
CONVERGENCE CORP.  
CV TECHNOLOGIES  
EDITRON USA  
FOR-A CORP. OF AMERICA  
THE GRASS VALLEY GROUP  
PALTEX  
QUALITY VIDEO SUPPLY  
QUANTA CORP.  
QUANTA EDITING PRODUCTS  
SONY BROADCAST  
UNITED MEDIA  
VIDEOMEDIA

### **EDIT SYSTEMS, RANDOM ACCESS**

ARTI  
AVID TECHNOLOGIES  
ASACA/SHIBASOKU CORP.  
BHP  
CINEDCO  
CMX CORP.  
THE GRASS VALLEY GROUP  
MONTAGE GROUP  
QUANTEL  
SPECTRA SYSTEMS  
SUNDANCE TECHNOLOGY  
UNITED MEDIA

### **EDITOR INTERFACES, ACCESSORIES**

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FOROX CORP.  
LYON LAMB VAS  
TECCOM

### **ELECTION REPORTING SYSTEMS**

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DUBNER COMPUTER SYSTEMS  
DYNATECH NEWSTAR  
THE GRASS VALLEY GROUP

### **FRAME SYNCHRONIZERS**

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CEL ELECTRONICS  
DIGITAL PROCESSING SYSTEMS  
FOR-A CORP. OF AMERICA  
HARRIS BROADCAST  
HARRIS VIDEO SYSTEMS  
HOTRONIC  
I-DEN VIDEOTRONICS  
JVC PROFESSIONAL PRODUCTS  
LEITCH VIDEO  
MICROTIME  
NEC AMERICA  
NOVA SYSTEMS  
PRIME IMAGE  
PROGRESSIVE IMAGE  
SHINTRON CO.  
TOKO AMERICA  
TOSHIBA AMERICA  
VIDEOTEK

### **GRAPHICS SYSTEMS, 2D**

A.C.E.  
ADVANCED DESIGNS CORP.  
AMPEX  
AURORA SYSTEMS  
BTS  
CHYRON CORP.  
COLORGRAPHICS SYSTEMS  
COMPUTER GRAPHICS LABS  
CUBICOMP  
DIGITAL ARTS  
DIGITAL F/X  
DUBNER COMPUTER SYSTEMS  
THE GRASS VALLEY GROUP  
HARRIS BROADCAST  
HARRIS VIDEO SYSTEMS  
KNOX VIDEO  
MICROTIME  
PINNACLE SYSTEMS  
QUANTA CORP.  
QUANTEL  
SHIMA SEIKI U.S.A.  
SOLUTEC  
SYMBOLICS

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ASACA/SHIBASOKU CORP.  
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AURORA SYSTEMS  
BTS  
CIRCUIT STUDIOS  
COLORGRAPHICS SYSTEMS  
CUBICOMP  
DIGITAL ARTS  
DIGITAL F/X  
DUBNER COMPUTER SYSTEMS  
EVERTZ MICROSYSTEMS  
THE GRASS VALLEY GROUP  
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HARRIS VIDEO SYSTEMS  
INTELLIGENT LIGHT  
MICROTIME  
PINNACLE SYSTEMS  
SHIMA SEIKI U.S.A.  
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ASACA/SHIBASOKU CORP.  
BTS  
FAROUJIA LABS  
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HITACHI DENSHI AMERICA  
IKEGAMI ELECTRONICS  
REBO RESEARCH  
SIERRA VIDEO SYSTEMS  
SONY BROADCAST  
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APOLLO AUDIO VISUAL  
ARRIFLEX CORP.  
AVAB AMERICA  
BARBIZON  
BARDWELL & MCALISTER  
BOGEN PHOTO CORP.  
WALTER S. BREWER CO.  
CINE 60  
CINEMILLS CORP.  
COMPREHENSIVE VIDEO SUPPLY  
COOL-LUX LIGHTING  
DEDOTEC USA  
DESISTI LIGHTING/DESMAR  
ELECTRONICS DIVERSIFIED  
FGV PANTHER  
FREZZOLINI ELECTRONICS  
GE LIGHTING  
THE GREAT AMERICAN MARKET  
GTE LIGHTING DIV.  
HMI LIGHTING  
HOFFEND & SONS  
KLI EGL BROS.  
LEE COLORTRAN  
LEONETTI CO.  
LIGHTING METHODS  
LOWEL-LIGHT MFG.  
LTM CORP. OF AMERICA  
LUXOR  
MATTHEWS STUDIO EQUIPMENT  
MILLER PROFESSIONAL EQUIP.  
MODULITE  
MOLE-RICHARDSON  
MUSCO MOBILE LIGHTING  
OLESEN  
OSRAM CORP.  
PACKAGED LIGHTING SYSTEMS  
PERROTT ENGINEERING LABS  
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GRAHAM-PATTEN SYSTEMS  
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### MONITORS, VIDEO

ASACA/SHIBASOKU CORP.  
BARCO INDUSTRIES  
COMSAT-WORLD SYSTEMS DIV.  
CONRAC DISPLAY PRODS.  
ELECTROHOME  
HITACHI DENSHI AMERICA  
HOODMAN CORP.  
IKEGAMI ELECTRONICS  
JVC PROFESSIONAL PRODUCTS  
LENCO ELECTRONICS  
MITSUBISHI PROF. ELECTRONICS  
PANASONIC INDUSTRIAL CO.  
SHARP ELECTRONICS CORP.  
SONY BROADCAST  
SONY PRO VIDEO  
VIDEO DISPLAY CORP.  
VISTEK

### NTSC ENCODERS/ DECODERS

ASACA/SHIBASOKU CORP.  
BROADCAST VIDEO SYSTEMS  
CENTRAL DYNAMICS LTD.  
COMPREHENSIVE VIDEO SUPPLY  
CONRAC DISPLAY PRODS.  
FAROUJIA LABS  
FOR-A CORP. OF AMERICA  
INTELVIDEO  
LENCO ELECTRONICS  
LYON LAMB VAS  
OMICRON VIDEO  
PANASONIC BROADCAST

PROGRESSIVE IMAGE  
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SHINTRON CO.  
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TELEMET  
THOMSON VIDEO EQUIPMENT  
TRUEVISION  
TTE  
VIDEO ASSOCIATES LABS  
VISTEK  
VORTEX COMMUNICATIONS  
YAMASHITA ENGINEERING

### PROJECTORS, VIDEO

GE PROJECTION DISPLAY  
HITACHI DENSHI AMERICA  
IKEGAMI ELECTRONICS  
INFORMATION DISPLAY  
MITSUBISHI PROF. ELECTRONICS  
SONY BROADCAST

### REMOTE MOTION CONTROL

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INTERACTIVE MOTION CONTROL

### ROBOTIC CAMERA SYSTEMS

A.F. ASSOCIATES  
TELEMETRICS  
TSM/TOTAL SPECTRUM MFG.  
VINTEN BROADCAST

### STANDARDS CONVERTERS

A.F. ASSOCIATES  
ALTA GROUP  
CEL ELECTRONICS  
EIGEN VIDEO  
FORTEL  
MERLIN SNELL & WILCOX  
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QUANTEL  
SHINTRON CO.  
THOMSON VIDEO EQUIPMENT  
TOKO AMERICA  
VIDEO INTERNATIONAL  
VORTEX COMMUNICATIONS  
YAMASHITA ENGINEERING

### STILL STORE SYSTEMS

ABEKAS VIDEO SYSTEMS  
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ASACA/SHIBASOKU CORP.  
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BTS  
CEL ELECTRONICS  
DUBNER COMPUTER SYSTEMS  
HARRIS BROADCAST  
HARRIS VIDEO SYSTEMS  
LEITCH VIDEO  
OKTEL CORP.  
PINNACLE SYSTEMS  
QUANTEL  
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SHINTRON CO.  
SONY BROADCAST

### SWITCHERS, MASTER CONTROL

AMPEX  
BSM SYSTEMS  
BTS  
CCI  
THE GRASS VALLEY GROUP  
IMAGE VIDEO  
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OMICRON VIDEO  
TORPEY CONTROLS/KEY VIDEO  
UTAH SCIENTIFIC

### SWITCHERS, PRODUCTION

ABEKAS VIDEO SYSTEMS  
ALAMAR ELECTRONICS  
ALTA GROUP  
AMPEX  
AMX  
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COMPREHENSIVE VIDEO SUPPLY  
CROSSPOINT LATCH CORP.  
ECHOLAB  
FOR-A CORP. OF AMERICA  
THE GRASS VALLEY GROUP  
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KAITRONICS CORP.  
MATRIX SYSTEMS CORP.  
ROSS VIDEO  
SHINTRON CO.  
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AUBURN INSTRUMENTS  
BSM SYSTEMS  
BTS  
CCI  
CEL ELECTRONICS  
CENTRAL DYNAMICS LTD.  
CHANNELMATIC  
COMPREHENSIVE VIDEO SUPPLY  
DATATEK CORP.  
DI-TECH  
DYNAIR ELECTRONICS  
DYNAMIC TECHNOLOGY  
ESE  
FOR-A CORP. OF AMERICA  
THE GRASS VALLEY GROUP  
HEDCO  
IMAGE VIDEO  
INTERGROUP TECHNOLOGIES  
JVC PROFESSIONAL PRODUCTS  
KAITRONICS CORP.  
LAIRD TELEMEDIA  
LEITCH VIDEO  
LENCO ELECTRONICS  
MATCO  
MATRIX SYSTEMS CORP.  
MULTIDYNE ELECTRONICS  
MYCOMP TECHNOLOGIES CORP.  
OMICRON VIDEO  
QUALITY VIDEO SUPPLY  
SCHMID TELECOM  
SHINTRON CO.  
SIERRA VIDEO SYSTEMS  
SIGMA ELECTRONICS  
SOLUTEK  
TELEMET  
THOMSON VIDEO EQUIPMENT  
TORPEY CONTROLS/KEY VIDEO  
UTAH SCIENTIFIC  
VIDEO ACCESSORY CORP.  
VIDEOTEK  
VITAL INDUSTRIES  
VORTEX COMMUNICATIONS

### SWITCHING AUTOMATION

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BTS  
CCI  
CHANNELMATIC

CONNOLLY SYSTEMS  
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FLORICAL SYSTEMS  
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GRUMMAN ELECTRONICS  
ISS ENGINEERING  
MEDIA COMPUTING  
TORPEY CONTROLS/KEY VIDEO  
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VIDEO DATA SYSTEMS  
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LENCO ELECTRONICS  
LYON LAMB VAS  
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PROGRESSIVE IMAGE  
QSI SYSTEMS  
SIERRA VIDEO SYSTEMS  
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VIDEOTEK  
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COMAD COMMUNICATIONS  
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GENEVA GROUP  
MICROTRAN CO.  
RECORTEC  
RESEARCH TECHNOLOGY INTL.  
SIRA  
TABER  
VIDEO MAGNETICS  
WEIRCLIFFE

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EDITRON USA  
EVERTZ MICROSYSTEMS  
MULTI-TRACK MAGNETICS  
UNITED MEDIA

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MARCONI COMMUNICATION  
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NYTONE ELECTRONICS  
RANGERTONE RESEARCH  
RANK CINTEL  
STEADI-FILM  
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VIDEO BROKERS

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COMPROMPTER  
COMPU = PROMPT  
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DYNATECH NEWSTAR  
ELECTRONIC SCRIPT  
PROMPTING  
LYNN GREENBERG  
LISTEC VIDEO CORP.  
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SISCOM  
TEKSKIL INDUSTRIES  
TELESCRIPT

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FORTEL  
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HARRIS VIDEO SYSTEMS  
HOTRONIC  
I-DEN VIDEOTRONICS  
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LENCO ELECTRONICS  
MICROTIME  
NOVA SYSTEMS  
OKTEL CORP.  
PANASONIC BROADCAST  
PRIME IMAGE  
PROGRESSIVE IMAGE  
SHINTRON CO.  
ZAXCOM VIDEO

### TIME CODE EQUIPMENT

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CIPHER DIGITAL  
COHERENT COMMUNICATIONS  
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DATUM  
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EVERTZ MICROSYSTEMS  
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VID VIDEO  
VIDEO LAB  
VORTEX COMMUNICATIONS

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TELEVISION EQUIPMENT ASSOC.  
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MICROTIME  
OPTICAL DISC CORP.  
PROGRESSIVE IMAGE  
SHINTRON CO.  
TECCOM  
TELEMET  
TELMAK  
TOKO AMERICA  
ULTIMATTE CORP.  
VIDEO ASSOCIATES LABS  
VIDEOTEK

### VIDEO RECORDERS, SOLID STATE

NEC AMERICA  
SONY BROADCAST

### VIDEO RECORDERS, OTHER

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POLAROID CORP.  
SONY INFORMATION SYSTEMS

### VIDEO T&M

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DIGITAL PROCESSING SYSTEMS  
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AMPEX RECORDING MEDIA  
AUDICO  
BASF SYSTEMS CORP.  
CARPEL VIDEO  
FUJI PHOTO FILM U.S.A.  
MAXELL CORP. OF AMERICA  
SONY MAGNETIC PRODUCTS CO.

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HITACHI DENSHI AMERICA  
PANASONIC BROADCAST  
SONY BROADCAST  
THOMSON VIDEO EQUIPMENT

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BTS  
HITACHI  
SONY BROADCAST

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TOSHIBA AMERICA

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VIDEO LAB  
VORTEX COMMUNICATIONS

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OTARI CORP.  
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SONY PRO AUDIO  
STUDER REVOX AMERICA  
TASCAM

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FOSTEX  
OTARI CORP.  
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INOVONICS  
KAHN COMMUNICATIONS  
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LPB  
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SESCOM  
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SPECTRA SONICS  
SYMETRIX  
TEXAR

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· OPAMP LABS  
· ORION RESEARCH  
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· RADIO DESIGN LABS  
· RADIO SYSTEMS  
· RAMKO RESEARCH  
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· H&E MICRO-TRAK CORP.  
· INDUSTRIAL RESEARCH  
· KAITRONICS CORP.  
· MCMARTIN INDUSTRIES  
· MITSUBISHI PRO AUDIO  
· RUPERT NEVE INC.  
· NUMARK ELECTRONICS  
· OPAMP LABS  
· PACIFIC RECORDERS  
· PANASONIC PRO AUDIO/RAMSA  
· PRECISION DESIGN  
· PROTECH AUDIO CORP.  
· RAMKO RESEARCH  
· RICHMOND SOUND DESIGN  
· SCHAFER WORLD COMM.  
· SHURE BROTHERS  
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· SPECTRA SONICS  
· STUDER REVOX AMERICA  
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· AMEK/TAC US OPERATIONS  
· AMPEX  
· AMS INDUSTRIES  
· AUDITRONICS  
· AUTOGRAM CORP.  
· FOCUSRITE AUDIO  
· FOR-A CORP. OF AMERICA  
· FOSTEX  
· GRAHAM-PATTEN SYSTEMS  
· THE GRASS VALLEY GROUP  
· HARRISON CONSOLES  
· INTERNATIONAL MUSIC/AKAI  
· KLARK-TEKNIK  
· LOGITEK  
· MACKIE DESIGNS  
· NEOTEK CORP.  
· RUPERT NEVE INC.  
· OPAMP LABS  
· ORION RESEARCH

· PACIFIC RECORDERS  
· PANASONIC INDUSTRIAL CO.  
· PANASONIC PRO AUDIO/RAMSA  
· RICHMOND SOUND DESIGN  
· SAMSON TECHNOLOGIES  
· SECK  
· SOLID STATE LOGIC  
· SONY PRO AUDIO  
· SPECTRA SONICS  
· STUDER REVOX AMERICA  
· WARD-BECK SYSTEMS LTD.  
· WHEATSTONE CORP.  
· YAMAHA MUSIC CORP.

## MONITOR SPEAKERS

· ACOUSTIC RESEARCH  
· ATLAS/SOUNDOLIER  
· AUERNHEIMER LAB & CO.  
· AURATONE CORP.  
· BGW SYSTEMS  
· BROADCAST AUDIO CORP.  
· CARVIN CORP.  
· CETEC GAUSS  
· CETEC IVIE  
· DELTA ELECTRONICS  
· ELECTRO-VOICE  
· FOSTEX  
· ALAN GORDON ENTERPRISES  
· GOTHAM AUDIO CORP.  
· INTERNATIONAL MUSIC/AKAI  
· JBL PROFESSIONAL  
· LOGITEK  
· MIKROLAB  
· PANASONIC INDUSTRIAL CO.  
· PANASONIC PRO AUDIO/RAMSA  
· RADIO DESIGN LABS  
· ROH/DIV. ANCHOR AUDIO  
· SPECTRA SONICS  
· STUDER REVOX AMERICA  
· TANNON NORTH AMERICA  
· TELECTRO SYSTEMS  
· UREI  
· WESTLAKE AUDIO  
· YAMAHA MUSIC CORP.

## NOISE REDUCTION EQUIPMENT

AKG ACOUSTICS  
ANT TELECOMMUNICATIONS  
ATL/AUDIO TECHNOLOGIES  
CRL/CIRCUIT RESEARCH LABS  
DOLBY LABORATORIES  
EVENTIDE  
OPAMP LABS  
PACIFIC RECORDERS  
RAMKO RESEARCH  
SYMETRIX  
TECTAN  
TEXAR  
VALLEY INTERNATIONAL

## REMOTE PICKUP, RENG

MARTI ELECTRONICS  
MOSELEY ASSOCIATES  
OLD DOMINION  
TFT

## REVERB, SPECIAL EFX

AKG ACOUSTICS  
APPLIED RESEARCH & TECHNOLOGY  
ATL/AUDIO TECHNOLOGIES  
EVENTIDE  
GOTHAM AUDIO CORP.  
LEXICON  
SPECTRA SONICS  
YAMAHA MUSIC CORP.

## SOUND INSULATING MATERIAL

ALPHA AUDIO  
FM TUBECRAFT  
RPG DIFFUSOR SYSTEMS

## STUDIO AUTOMATION EQUIPMENT

BROADCAST AUTOMATION  
BROADCAST ELECTRONICS  
CONCEPT PRODUCTIONS  
DIGITAL CREATIONS  
DKW SYSTEMS  
GEFEN SYSTEMS  
GENERIC COMPUTER SYSTEMS  
HARRISON CONSOLES  
IGM COMMUNICATIONS  
INNOVATIVE AUTOMATION  
MEDIA TOUCH SYSTEMS  
RADIO COMPUTING SVCS.  
SCHAFFER WORLD COMM.  
SENTRY SYSTEMS  
SONO-MAG CORP.  
SYSTEMATION

## TELCO INTERFACE EQUIPMENT

COMREX CORP.  
ESE  
FARRTRONICS  
GENTNER ELECTRONICS  
HM ELECTRONICS  
INTERNATIONAL MICROWAVE  
ITI ELECTRONICS  
KAHN COMMUNICATIONS  
MCCURDY RADIO INDS.  
MONROE ELECTRONICS  
OLD DOMINION  
R-COLUMBIA PRODUCTS  
RTS SYSTEMS  
RUSSCO ELECTRONICS MFG.  
STUDER REVOX AMERICA  
TELEX COMMUNICATIONS  
TELNOX  
TELOS SYSTEMS  
TROMPETER ELECTRONICS  
WARD-BECK SYSTEMS LTD.

## TURNTABLES

ACOUSTIC RESEARCH  
AEG BAYLY  
BROADCAST ELECTRONICS  
ALAN GORDON ENTERPRISES  
GOTHAM AUDIO CORP.  
LPB  
MCMARTIN INDUSTRIES  
NUMARK ELECTRONICS  
RUSSCO ELECTRONICS MFG.  
SHURE BROTHERS  
STANTON MAGNETICS

## RF, OTHER PRODUCTS

### AM STEREO EQUIPMENT

CRL/CIRCUIT RESEARCH LABS  
DELTA ELECTRONICS  
KAHN COMMUNICATIONS  
MOTOROLA AM STEREO  
ORBAN ASSOCIATES  
POTOMAC INSTRUMENTS

### ANTENNAS, TOWERS

ADELPHON  
ALLIED TOWER CO.  
ANDREW CORP.  
AUDIOLAB ELECTRONICS  
BLONDER-TONGUE LABS  
BOGNER BROADCAST EQUIP.  
CABLEWAVE SYSTEMS  
CENTRAL TOWER  
COMAD COMMUNICATIONS  
COMTECH ANTENNA  
COMWAVE  
CONIFER CORP.  
CORTANA CORP.  
DELTA ELECTRONICS  
DIELECTRIC COMMUNICATIONS  
ELECTRONIC RESEARCH  
ELLIS TOWER CO.  
EXPRESS TOWER  
FLASH TECHNOLOGY  
FORT WORTH TOWER  
GABRIEL ELECTRONICS  
HARRIS CORP., BROADCAST DIV.  
JAMPRO ANTENNAS  
JOHNSON ELECTRONICS  
KLINE TOWERS  
L&R COMMUNICATIONS LTD.  
LDL COMMUNICATIONS  
MAGNUM TOWERS  
MARCOM  
MARTI ELECTRONICS  
MCI/MICRO COMMUNICATIONS  
MICROFLECT CO.  
MOTOROLA COMMUNICATIONS  
FRED A. NUDD CORP.  
ALLEN OSBORNE ASSOCIATES  
RAPID DEPLOYMENT TOWERS  
RF TECHNOLOGY  
ROHN  
SCALA ELECTRONICS  
SG COMMUNICATIONS  
SHIVELY LABS  
SIRA  
STAINLESS

SWR  
TENNAPLEX SYSTEMS  
THOMSON-LGT  
TOWNSEND ELECTRONICS  
TRANSMISSION STRUCTURES  
UNITED ROPEWORKS U.S.A.  
UTILITY TOWER CO.  
VALMONT INDUSTRIES  
THE WILL-BURT CO./TMD  
WORLD TOWER CO.

## BUSINESS AUTOMATION

AT&T COMMUNICATIONS  
AUTOMATED BUS. CONCEPTS  
CBSI  
COLUMBINE SYSTEMS  
COMPUTER CONCEPTS CORP.  
DATACOUNT  
DECISION  
DIGITAL EQUIPMENT CORP.  
DSI COMMUNICATIONS  
DUBNER COMPUTER SYSTEMS  
INTERNATIONAL MICROWAVE  
JEFFERSON PILOT DATA SVCS.  
KAMAN SCIENCES  
RATIONAL BROADCAST  
REGISTER DATA SYSTEMS  
TAPSCAN  
TWENTIER SYSTEMS  
UNIQUE BUSINESS SYSTEMS  
VCI/VIDEO COMMUNICATIONS

## CONNECTORS, JACKFIELDS

ADC TELECOMMUNICATIONS  
ANIXTER BROS.  
AUDIO ACCESSORIES  
BENCHMARK MEDIA SYSTEMS  
WALTER S. BREWER CO.  
BRINTEC CORP.  
CAL SWITCH & SIGNAL  
CAM-LOK  
CAMBRIDGE PRODUCTS  
CANARE CABLE  
COMPREHENSIVE VIDEO SUPPLY  
DABURN ELECTRONICS  
DIALIGHT CORP.  
FARRTRONICS  
GENTNER ELECTRONICS  
RICHARD HIRSCHMANN  
ITI ELECTRONICS  
JENSEN TOOLS  
KINGS ELECTRONICS CO.  
LEMO USA  
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PEERLESS SALES  
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SCALA ELECTRONICS  
SCANTEX LABORATORIES  
SWITCHCRAFT  
TRIMM  
TROMPETER ELECTRONICS  
UNION CONNECTOR  
VEAM, DIV. LITTON SYSTEMS  
WARD-BECK SYSTEMS LTD.

### DIPLEXERS, MULTIPLEXERS

BLONDER-TONGUE LABS  
MODULATION ASSOCIATES  
TECTAN  
VIDEOPLEX

### EBS EQUIPMENT

EMERGENCY ALERT RECEIVER  
GORMAN REDLICH MFG.  
MCMARTIN INDUSTRIES

### ENG/EFP VEHICLES

BAF COMMUNICATIONS CORP.  
E-N-G MOBILE SYSTEMS  
GRAY COMM. CONSULTANTS  
MIDWEST COMMUNICATIONS  
MOBILE-CAM PRODUCTS  
MZB/GRAY  
SHOOK ELECTRONICS USA  
TELEVISION ENGINEERING  
WOLF COACH

### EQUIPMENT ENCLOSURES

ADELPHON  
BALLY  
EMCOR/CRENLO  
KINTRONIC LABS

### EXCITERS

ISS ENGINEERING  
MCMARTIN INDUSTRIES  
QEI CORP.  
TOWNSEND ELECTRONICS  
VECTOR TECHNOLOGY

### FIBEROPTIC SYSTEMS

ARTEL COMMUNICATIONS CORP.  
AVANTEK  
COMLUX  
COMPREHENSIVE VIDEO SUPPLY  
DYNAIR ELECTRONICS

THE GRASS VALLEY GROUP  
MERET  
PCO, INC.  
RE INSTRUMENTS CORP.  
REBO RESEARCH  
RF TECHNOLOGY  
ROCKWELL INTERNATIONAL  
SIECOR  
TELEMET, DIV. GEOTEL  
VEAM, DIV. LITTON SYSTEMS

### HUM ELIMINATORS

ALLEN AVIONICS  
AUDIO-VIDEO ENGINEERING CO.  
BROADCAST VIDEO SYSTEMS  
EDCOR  
TTE

### LIGHTNING PROTECTION

CORTANA CORP.  
LEA DYNATECH  
LIGHTNING ELIMINATORS  
SCALA ELECTRONICS

### MDS, SMATV SYSTEMS

COMWAVE  
CONIFER CORP.  
ITS CORP.  
MCL/MICRO COMMUNICATIONS

### MICROWAVE FOR ENG

BROADCAST MICROWAVE  
CONIFER CORP.  
HARRIS BROADCAST MICRO-  
WAVE  
IKEGAMI ELECTRONICS  
INTERNATIONAL MICROWAVE  
ITELCO U.S.A.  
M/A-COM MAC  
MARTI ELECTRONICS  
MICROWAVE RADIO CORP.  
NARDA MICROWAVE  
NURAD  
RF TECHNOLOGY

### MICROWAVE, INTERCITY

AVANTEK  
BROADCAST MICROWAVE  
HARRIS BROADCAST MICRO-  
WAVE  
INTERNATIONAL MICROWAVE

ISS ENGINEERING  
M/A-COM MAC  
MARTI ELECTRONICS  
MICROWAVE RADIO CORP.  
MOTOROLA COMMUNICATIONS  
NURAD  
RF TECHNOLOGY  
TOWNSEND ELECTRONICS

### MOBILE PRODUCTION UNITS

BAF COMMUNICATIONS CORP.  
BTS  
GRAY COMM. CONSULTANTS  
MIDWEST COMMUNICATIONS  
ROSCOR  
SHOOK ELECTRONICS USA  
TELEVISION ENGINEERING  
WOLF COACH

### MODULATORS, DEMODULATORS

BLONDER-TONGUE LABS  
LNR COMMUNICATIONS  
MODULATION ASSOCIATES  
STANDARD COMMUNICATIONS  
TELEMET

### MTS EQUIPMENT

CATEL TELECOMMUNICATIONS  
CRL/CIRCUIT RESEARCH LABS  
MCMARTIN INDUSTRIES  
MODULATION SCIENCES  
STUDIO TECHNOLOGIES  
TEKTRONIX  
THOMSON-LGT

### NEWSROOM COMPUTERS

BASYS  
COLUMBINE SYSTEMS  
COMPROMPTER  
DATA CENTER MGT.  
DYNATECH NEWSTAR  
JEFFERSON PILOT DATA SVCS.  
M&R DATA SERVICES  
MEDIA COMPUTING  
TUI COMPUTER SVCS.  
TWENTIER SYSTEMS  
VCL/VIDEO COMMUNICATIONS

### POWER SUPPLIES, BATTERIES

ADCOUR

ALEXANDER BATTERIES  
ANTON/BAUER  
WALTER S. BREWER CO.  
CHRISTIE ELECTRIC CORP.  
CINE 60  
COMPREHENSIVE VIDEO SUPPLY  
CONTROL CONCEPTS  
CURRENT TECHNOLOGY  
PETER W. DAHL  
ENERGEX SYSTEMS  
FREZZOLINI ELECTRONICS  
G&M POWER PRODUCTS  
HIPOTRONICS  
JENSEN TOOLS  
KAY INDUSTRIES  
LEA DYNATECH  
LIGHTNING ELIMINATORS  
MCG ELECTRONICS  
MITCHELL CAMERA CORP.  
MOTOROLA COMMUNICATIONS  
ONAN CORP.  
PACO ELECTRONICS USA  
PEP  
PERROTT ENGINEERING LABS  
PRO BATTERY  
SOLA  
SUPERIOR ELECTRIC CO.  
SYNERGYSTIC BATTERIES  
TELEDYNE ENERGY SYSTEMS

### REMOTE MONITORING SYSTEMS

ANDREW CORP.  
BIRD ELECTRONIC CORP.  
CAT SYSTEMS  
COMTEK  
DIELECTRIC COMMUNICATIONS  
DSI COMMUNICATIONS  
HALLIKAINEN & FRIENDS  
HUGHEY & PHILLIPS  
MOSELEY ASSOCIATES  
POTOMAC INSTRUMENTS  
SCHAFFER WORLD COMM.  
THOMSON-LGT

### RF AMPS, SWITCHES

BLONDER-TONGUE LABS  
CATEL TELECOMMUNICATIONS  
ISS ENGINEERING  
ITT JENNINGS  
KELTEC FLORIDA  
MCL  
MCMARTIN INDUSTRIES  
MOTOROLA COMMUNICATIONS  
MU-DEL ELECTRONICS  
QEI CORP.  
RF TECHNOLOGY

SWR  
TEPCO CORP.  
TTE  
WIDE BAND ENGINEERING

## RF COMPONENTS

CHICAGO CONDENSER CORP.  
EDCOR  
ITT JENNINGS  
KINTRONIC LABS  
MARK ANTENNA PRODUCTS  
MU-DEL ELECTRONICS  
NORTH HILLS ELECTRONICS  
RICHARDSON ELECTRONICS  
SCALA ELECTRONICS  
TTE  
WIDE BAND ENGINEERING

## RF LOADS, FILTERS

ALTRONIC RESEARCH  
ELECTRO IMPULSE LAB  
ELECTRONIC RESEARCH  
MCMARTIN INDUSTRIES  
MICROWAVE FILTER CO.  
MU-DEL ELECTRONICS

## RF TEST EQUIPMENT

AVCOM OF VIRGINIA  
BELAR ELECTRONIC LAB  
BIRD ELECTRONICS  
BOONTON ELECTRONICS CORP.  
COAXIAL DYNAMICS  
DELTA ELECTRONICS  
JOHN FLUKE MFG.  
RICHARD HIRSCHMANN  
HOLADAY INDUSTRIES  
MARCOM  
MCMARTIN INDUSTRIES  
PESA ELECTRONICA  
QEI CORP.  
RE INSTRUMENTS CORP.  
ROHDE & SCHWARZ  
TFT  
TOWNSEND ASSOCIATES

## SATELLITE EARTH STATIONS

ADVENT COMMUNICATIONS  
ALDEN ELECTRONICS  
ANDREW CORP.  
ANTENNA TECHNOLOGY CORP.  
AVANTEK  
AVCOM OF VIRGINIA  
BLONDER-TONGUE LABS

COMTECH ANTENNA  
CONUS COMMUNICATIONS  
DALSAT  
DX COMMUNICATIONS  
HARRIS BROADCAST MICRO-  
WAVE  
HUBBARD COMMUNICATIONS  
KELTEC FLORIDA  
MARK ANTENNA PRODUCTS  
MICRODYNE CORP.  
MIRALITE COMMUNICATIONS  
MODULATION ASSOCIATES  
PESA ELECTRONICA S.A.  
PINZONE COMMUNICATIONS  
RADIATION SYSTEMS  
SATCOM TECHNOLOGIES  
SCIENTIFIC-ATLANTA  
STANDARD COMMUNICATIONS  
TECTAN  
VARIAN ASSOCIATES  
VERTEX COMMUNICATIONS  
WEGENER COMMUNICATIONS

## SCA EQUIPMENT

ADVANCED MICRO-DYNAMICS  
BROADCAST TECH. OF CO.  
CRL/CIRCUIT RESEARCH LABS  
EMERGENCY ALERT RECEIVER  
INTERNATIONAL TELETRONICS  
ISS ENGINEERING  
JOHNSON ELECTRONICS  
MARCOM  
MARTI ELECTRONICS  
MCMARTIN INDUSTRIES  
MICRO CONTROLS  
TECTAN

## SNG SYSTEMS

ADVENT COMMUNICATIONS  
BAF COMMUNICATIONS CORP.  
CALHOUN SATELLITE COMM.  
DALSAT  
GRAY COMM. CONSULTANTS  
GTE SPACENET  
HUBBARD COMMUNICATIONS  
MARCONI COMMUNICATION  
MIDWEST COMMUNICATIONS  
ROSCOR

## STEREO GENERATORS

CATEL TELECOMMUNICATIONS  
ISS ENGINEERING  
ITS CORP.  
LNR COMMUNICATIONS  
MCMARTIN INDUSTRIES  
QEI CORP.  
STANDARD COMMUNICATIONS

## STLS, TSLS

AMERICAN LASER SYSTEMS  
BEXT  
CATEL TELECOMMUNICATIONS  
HARRIS BROADCAST MICRO-  
WAVE  
INTERNATIONAL MICROWAVE  
INTRAPLEX  
ITELCO U.S.A.  
MARTI ELECTRONICS  
MICRO CONTROLS  
MOTOROLA AM STEREO  
MOTOROLA COMMUNICATIONS  
NURAD  
RF TECHNOLOGY  
ROCKWELL INTERNATIONAL  
WEGENER COMMUNICATIONS

## STUDIO FURNITURE

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APOLLO AUDIO VISUAL  
THE AUDIO BROADCAST GROUP  
BENCHER  
BRETFORD MFG.  
BROADCAST ELECTRONICS  
DELCOM USA  
DSI COMMUNICATIONS  
EMCOR CRENLO  
ERGO-90  
FERNO WASHINGTON  
GRINNAN FIXTURE CO.  
H&E MICRO-TRAK CORP.  
HOWE TECHNOLOGIES  
PACIFIC RECORDERS  
RADIO SYSTEMS  
RUSLANG CORP.  
STANTRON  
STATUS CABINETRY  
ULTIMATE SUPPORT SYSTEMS  
UNI-SET CORP.  
WHEELIT  
WINSTED CORP.

## TAPE STORAGE SYSTEMS

FIDELIPAC  
GRINNAN FIXTURE CO.  
H&E MICRO-TRAK CORP.  
NEUMADE PRODUCTS CORP.  
PLASTIC REEL CORP.  
RADIO SYSTEMS  
RESEARCH TECHNOLOGY INTL.  
RUSLANG CORP.  
STOREEL CORP.  
VIDEO STORAGE CONCEPTS  
WESTERN INTL. COMM.

## TELETEXT EQUIPMENT

EEG ENTERPRISES  
NORPAK CORP.

## TOOLS

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WALTER S. BREWER CO.  
CANARE CABLE  
COMPREHENSIVE VIDEO SUPPLY  
JENSEN TOOLS  
QUALITY VIDEO SUPPLY  
TROMPETER ELECTRONICS

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COMARK COMMUNICATIONS  
GABRIEL ELECTRONICS  
MARK ANTENNA PRODUCTS  
MARTI ELECTRONICS  
MCI/MICRO COMMUNICATIONS  
MOTOROLA COMMUNICATIONS  
PINZONE COMMUNICATIONS  
SHIVELY LABS  
SWR  
TOWNSEND ELECTRONICS

## TRANSMITTER REMOTE CONTROL

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ANDREW CORP.  
BURK TECHNOLOGY  
CAT SYSTEMS  
DSI COMMUNICATIONS  
GE BROADCAST SYSTEMS  
GENTNER ELECTRONICS CORP.  
GRINNAN FIXTURE CO.  
HALLIKAINEN & FRIENDS  
HARRIS CORP., BROADCAST DIV.  
INTERNATIONAL MICROWAVE  
INTERNATIONAL TELETRONICS  
MARTI ELECTRONICS  
MICRO CONTROLS  
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ENERGY-ONIX BROADCAST  
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INTERNATIONAL MICROWAVE  
INTERNATIONAL TELETRONICS  
ITELCO U.S.A.  
LPB  
MARCOM  
MARCONI COMMUNICATION  
MCMARTIN INDUSTRIES  
MOSELEY ASSOCIATES  
NAUTEL  
QEI CORP.  
TEPCO CORP.  
TTC  
VARIAN ASSOCIATES

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BROWNING LABS  
COMARK COMMUNICATIONS  
COMWAVE  
EMCEE BROADCAST PRODUCTS  
GE BROADCAST SYSTEMS  
GRINNAN FIXTURE CO.  
HARRIS CORP., BROADCAST DIV.  
ISS ENGINEERING  
ITELCO U.S.A.  
ITS CORP.  
LDL COMMUNICATIONS  
MARCONI COMMUNICATION  
MCMARTIN INDUSTRIES  
MIDWEST COMMUNICATIONS  
MOSELEY ASSOCIATES  
NEC AMERICA,  
PESA ELECTRONICA S.A.  
TEPCO CORP.  
THOMSON-LGT  
TOWNSEND ELECTRONICS  
TTC  
VARIAN ASSOCIATES  
WATCO

## TRANSMITTER, POWER TUBES

BURLE INDS.  
ECONCO BROADCAST SVCE.  
EEV

FREELAND PRODUCTS CO.  
ITELCO U.S.A.  
MOTOROLA COMMUNICATIONS  
RICHARDSON ELECTRONICS  
THOMSON CSF/ELECTRON  
TUBE DIV.  
THOMSON ELECTRON TUBES &  
DEVICES  
VARIAN ASSOCIATES  
VIDEO MAGNETICS  
VACUUM TUBE INDS.  
WATCO

## TRANSPORTATION CASES

A&S CASE CO.  
ANVIL CASES  
WILLIAM BAL CORP.  
CALZONE CASE CO.  
DUGGAN MFG.  
EXCALIBUR INDUSTRIES  
FIBERBILT CASES  
HARDIGG INDUSTRIES  
JENSEN TOOLS  
K&H PRODUCTS/PORTABRACE  
KANGAROO VIDEO PRODUCTS  
NALPAK VIDEO SALES  
QUALITY VIDEO SUPPLY  
STAR CASE MFG.  
TELEPAK SAN DIEGO  
THERMODYNE INTL.  
VIKING CASES

## WIRE, CABLE

ALPHA WIRE CORP.  
ANIXTER BROS.  
BELDEN WIRE & CABLE  
BENCHMARK MEDIA SYSTEMS  
BI-TRONICS  
WALTER S. BREWER CO.  
BRINTEC CORP.  
CAM-LOK  
CANARE CABLE  
CHESTER CABLE, DIV. ALCATEL  
COMPREHENSIVE VIDEO SUPPLY  
CONNECTRONICS CORP.  
DABURN ELECTRONICS  
JENSEN TOOLS  
QUALITY VIDEO SUPPLY  
SPECTRA SONICS  
TOWNSEND ELECTRONICS  
TROMPETER ELECTRONICS  
UNION CONNECTOR  
WIREWORKS CORP.

## SERVICES

### EQUIPMENT DISTRIBUTORS

ALLIED BROADCAST EQUIP.  
THE AUDIO BROADCAST GROUP  
BARRETT ASSOC.  
BCS/THE BROADCAST STORE  
BRADLEY BROADCAST SALES  
BROADCAST SUPPLY WEST  
CAMERA MART  
CENTRAL TOWER  
INFORMATION DISPLAY  
INNOVATIVE AUTOMATION  
LANDY ASSOCIATES  
MAZE BROADCAST  
MEDIA CONCEPTS  
MIDWEST COMMUNICATIONS  
PACIFIC RADIO ELECTRONICS  
RADIO SYSTEMS  
RAM BROADCAST SYSTEMS  
ROSCOR  
SWIDERSKI ELECTRONICS  
SYSTEM ASSOCIATES  
TECHNISPHERE CORP.  
TVI/THEATRE VISION  
VIDEO BROKERS

### FINANCIAL SERVICES

A.F. ASSOCIATES  
VIDEO FINANCIAL.

### MOBILE VEHICLE CONSTRUCTION

ALPHA VIDEO & ELECTRONICS  
THE AUDIO BROADCAST GROUP  
BAF COMMUNICATIONS CORP.  
JOHN CROWE PRODUCTIONS  
DELCOM USA  
LANDY ASSOCIATES  
LERO ELECTRIC CORP.  
MIDWEST COMMUNICATIONS  
MOBILE-CAM PRODUCTS  
MORTON HI-TECH FURNISHINGS  
PEIRCE-PHELPS  
PESA ELECTRONICA S.A.  
ROSCOR  
ROSNER TELEVISION SYSTEMS  
SPECIALTY VEHICLES  
WOLF COACH

### SATELLITE DISTRIBUTION

AT&T COMMUNICATIONS

CYCLE SAT  
IDB COMMUNICATIONS  
NPR SATELLITE SERVICES  
WOLD COMMUNICATIONS

### STUDIO DESIGN & CONSTRUCTION

A.F. ASSOCIATES  
ACOUSTIC SYSTEMS  
ALLIED BROADCAST EQUIP.  
ARBEN DESIGN  
THE AUDIO BROADCAST GROUP  
B&B SYSTEMS  
BAF COMMUNICATIONS CORP.  
WALTER S. BREWER CO.  
DELCOM USA  
DSI COMMUNICATIONS  
INDUSTRIAL ACOUSTICS  
INFORMATION DISPLAY  
LAKE SYSTEMS CORP.  
LANDY ASSOCIATES  
LERO ELECTRICAL CORP.  
MORTON HI-TECH FURNISHINGS  
MYCOMP TECHNOLOGIES CORP.  
PACIFIC RECORDERS  
PEIRCE-PHELPS  
RADIO SYSTEMS  
REES ASSOCIATES  
ROSCOR  
ROSNER TELEVISION SYSTEMS  
SWIDERSKI ELECTRONICS

### TECHNICAL/ ENGINEERING CONSULTANT

B&B SYSTEMS  
BDS  
BOWEN BROADCAST SERVICE  
WALTER S. BREWER CO.  
CENTRAL TOWER  
DATAWORLD  
DELCOM USA  
DSI COMMUNICATIONS  
INFORMATION DISPLAY  
LANDY ASSOCIATES  
MCI/MICRO COMMUNICATIONS  
RADIO SYSTEMS  
ROSCOR  
ROSNER TELEVISION SYSTEMS  
SG COMMUNICATIONS  
SOLL, INC.  
SWR  
THOMSON-LGT

# ALPHABETICAL LISTING OF MANUFACTURERS

## A

### **ABEKAS VIDEO SYSTEMS**

101 Galveston Dr., Redwood  
City, CA 94063  
415 369-5111

Electronic still stores; character  
generators; digital video efx; dig-  
ital disk recorders; production  
switchers.

### **ACCOM**

1430-F O'Brien Dr., Menlo Park,  
CA 94025  
415 328-3818  
Digital image enhancers.

### **ACCU-WEATHER**

619 W. College Av., State  
College, PA 16801  
814 237-0309  
Weather graphics/radar.

### **ACCURATE SOUND**

3515 Edison Way, Menlo Park,  
CA 94025  
415 365-2843  
High-speed audio tape duplicat-  
ing equip.

### **A.C.E.**

Hanworth Trading Estate,  
Hampton Rd. W., Feltham, TW13  
6DH England  
01 894 5622  
2D graphics systems; digital vid-  
eo efx.

See ad pg. 113 Circle #145

### **ACO PACIFIC**

2604 Read Av., Belmont, CA  
94002  
415 595-8588  
Mics, accessories.

### **ACOUSTIC RESEARCH**

630 Tumpike St., Canton, MA  
02021  
617 821-2300  
Studio monitors; turntables.

### **ACOUSTIC SYSTEMS**

415 E. St. Elmo Rd., Austin, TX  
78745  
512 444-1961/800 531-5417  
Studio design & construction.

### **ACRODYNE INDUSTRIES**

516 Township Line Rd., Blue  
Bell, PA 19422  
215 542-7000  
TV transmitters; translators;  
turnkey transmission systems.

### **ACS SOFTWARE**

2135 E. Sunshine, Ste. 106,  
Springfield, MO 65804  
417 887-9923  
Computer software for produc-  
tion and management.

### **ADAMS-SMITH**

34 Tower St., Hudson, MA  
01749  
508 562-3801  
Time code equip.; electronic au-  
dio editors; ATR synchronizers.

### **ADC TELECOMMUNICATIONS**

4900 W. 78 St., Minneapolis,  
MN 55435  
612 835-6800  
Connectors, jackfields.

### **ADCOUR**

18 Billings St., Sharon, MA  
02067  
617 784-8123/800 232-3557  
Power supplies, batteries.

### **ADELPHON**

Box 7256, Ft. Worth, TX 76111  
817 335-8666  
Antennas, towers; tower-mount-  
ed housing.

### **ADM TECHNOLOGY**

1626 E. Big Beaver Rd., Troy, MI  
48007-2525  
313 524-2100  
Portable audio mixers; on-air  
consoles, mixers; audio routing  
switchers.

### **ADRIENNE ELECTRONICS**

11994 Marjon Dr., Nevada City,  
CA 95959  
916 265-8288  
Router; control board for IBM PC;  
video routing switchers, DAs;  
time code equip.; audio routing  
switchers.

### **ADVANCED DESIGNS CORP.**

804 N. College Av.,  
Bloomington, IN 47402  
812 333-1922  
2D graphics systems; digital disk  
recorders.

### **ADVANCED MICRO-DYNAMICS**

7 Lomar Dr., Pepperell, MA  
01463  
508 433-8877  
Transmitter remote control; SCA  
equip.

**ADVANCED VIDEO ASSOC.**

400 Walnut, Ste. 101,  
Redwood City, CA 94063  
415 792-8684

Audio & video DAs.

**ADVENT COMMUNICATIONS**

Alma Rd., Chesham, Bucks, HP5  
3HE UK  
49 477 4400

SNG systems; satellite earth stations.

**AEG BAYLY**

167 Hunt St., Ajax, ON L1S 1P6  
Canada

416 683-8200

Radio transmitters; studio ATRs; turntables.

**A.F. ASSOCIATES**

100 Stonehurst Ct., Northvale,  
NJ 07647

201 767-1201

Standards converters; video test equip.; robotic camera systems; studio design & construction; production/postpro facility; financial svcs..

See ad pg. 48 Circle #119

**AGFA CORP.**

100 Challenger Rd., Ridgefield  
Park, NJ 07660  
201 440-2500

Videotape; audio tape, carts.

**AKG ACOUSTICS**

77 Selleck St., Stamford, CT  
06902

203 348-2121

Audio processing; noise reduction; mics, accessories; audio reverb, special efx.

**ALAMAR ELECTRONICS**

489 Division St., Campbell, CA  
95008

408 866-9373

Production switchers; clocks, timers.

**ALDEN ELECTRONICS**

40 Washington St., Westboro,  
MA 01581

508 366-8851

Weather graphics/radar; satellite earth stations.

**ALEXANDER BATTERIES**

Box 1508, Mason City, IA 50401  
515 423-8955

Power supplies, batteries; battery analyzers & chargers.

**ALIAS RESEARCH**

110 Richmond St. E. #501,  
Toronto, ON M5C 1P1 Canada  
416 362-9181

3D modeling, animation.

**ALLEN & HEATH**

5 Connair Rd., Orange, CT  
06477

203 795-3594

Portable audio mixers; on-air consoles, mixers; post-production consoles.

**ALLEN AVIONICS**

224 E. Second St., Milneola, NY  
11501

516 248-8080

Video filters, delay lines, hum eliminators.

**ALLIED BROADCAST EQUIPMENT**

Box 1487, Richmond, IN 47374  
317 962-8596

Equipment distributor; studio design & construction.

**ALLIED TOWER CO.**

12450 Old Galveston Rd.,  
Webster, TX 77598

713 486-7691

Antennas, towers.

**ALLSOP**

Box 23, Bellingham, WA 98227  
206 734-9090

Tape erasers, degaussers.

**ALPHA AUDIO**

2049 W. Broad St., Richmond,  
VA 23220-2075

804 358-3852

Electronic audio editors; Sonex acoustic foam.

**ALPHA VIDEO & ELECTRONICS**

200 Keystone Dr., Camegle, PA  
15106

412 429-2000

3/4-, 1/2-inch VTRs; mobile vehicle construction.

**ALPHA WIRE CORP.**

711 Lidgerwood Av., Elizabeth,  
NJ 07207

201 925-8000

Wire, cable.

**ALTA GROUP**

535 Race St., Ste. 230,  
San Jose, CA 95126

408 297-2582

TBCs; frame synchronizers; standards converters; video processing equip.; electronic still stores; digital video efx; production switchers.

**ALTEC LANSING**

10500 W. Reno, Oklahoma City,  
OK 73128

405 324-5311

Mics, accessories.

**ALTRONIC RESEARCH**

Box 249, Yellville, AR 72687  
501 449-4093

Dummy loads.

**AMBER ELECTRO DESIGN**

3391 Griffith St., St. Laurent, QU  
H4T 1W5 Canada

514 735-4105/800 361-3697

Audio test equip.

**AMCO ENGINEERING**

3801 Rose St., Schiller Park, IL  
60176

312 671-6670

Studio furniture.

**AMEK/TAC US OPERATIONS**

10851 Burbank Blvd., N.  
Hollywood, CA 91601

818 508-9788

Portable audio mixers; on-air consoles, mixers; post-production consoles; serial interfaces; moving fader automation system.

**AMERICAN BROADCAST SYSTEMS**

8222 Jamestown Dr., #109B,  
Austin, TX 78758

512 837-3737

Television automation systems.

**AMERICAN LASER SYSTEMS**

751 S. Kellogg Av., Goleta, CA  
93117

805 967-0423

STLs, TSLs.

**AMERICAN STUDIO EQUIPMENT**

8922 Norris Av., Sun Valley, CA  
91352

818 768-8922

Lighting equip.; camera support equip.

**AMHERST ELECTRONIC INSTRUMENTS**

Box 201, Haydenville, MA  
01039

413 268-7204

Time code equip.; switching automation; video processing equip.; VTR editor/controllers.

**AMP PRODUCTS CORP.**

Box 1776, S. Eastem, PA  
19398-1776

215 647-1000

Sync & pulse gens/procs; video processing equip.; VTR editor/controllers.

**AMPEREX ELECTRONIC CORP.**

Providence Pike, Slatersville, RI  
02876

401 762-3800

Pickup tubes; solid state imaging devices.

**AMPEX**

401 Broadway, Redwood City,  
CA 94063-3199

415 367-2011

ENG/EFP cameras camcorders; digital VTRs; one-inch VTRs; 3/4-, 1/2-inch VTRs; cart automation/MERPS; TBCs; electronic still stores; character generators; 2D graphics systems; 3D modeling, animation; digital video efx; VTR editor/controllers; multisource video editors; random access video editors; production switchers; MC switchers; videotape; on-air consoles, mixers; post-production consoles; studio ATRs.

See ad pg. 20-21

**AMPEX RECORDING MEDIA CORP.**

401 Broadway, MS 22-02,  
Redwood City, CA 94063

415 367-3809

Videotape; audio tape, carts.

**AMS INDUSTRIES**

Box 31864, 3827 Stone Way N.,  
Seattle, WA 98103

206 633-1956

Audio processing; on-air consoles, mixers; post-production consoles; digital audio workstations.

**AMTEL SYSTEMS**

33 Main St., #303, Nashua, NH  
03060

603 880-9011

Character generators; tape synchronizers; video routing switchers, DAs; time code equip.; ATR synchronizers.

**AMX**

12056 Forestgate Dr., Dallas, TX  
75243

214 644-3048/800 222-0193

TBCs; production switchers; remote control systems.

**ANDREW CORP.**

10500 W. 153 St., Orland Park,  
IL 60462

312 349-3300

Antennas, towers; remote monitoring systems; transmitter remote control; satellite earth stations; transmission line.

**ANGENIEUX CORP.  
OF AMERICA**

7700 N. Kendall Dr., #503,  
Miami, FL 33156  
305 595-1144  
Lenses.

**ANIXTER BROS.**

4711 Gold Rd., Skokie, IL  
60076  
312 677-2600  
Wire, cable; connectors, jack-  
fields; tools.

**R.B. ANNIS CO.**

1101 N. Delaware St.,  
Indianapolis, IN 46202  
317 637-9282  
Sync & pulse gens/procs; head  
cleaners & degaussers.

**ANRITSU AMERICA**

15 Thornton Rd., Oakland, NJ  
07436  
201 337-1111/800 255-7234  
Video test equip.; sync & pulse  
gens/procs.

**ANT TELECOMMUNICATIONS**

205 Perry Pkwy., Galtersburg,  
MD 20877  
301 670-9777  
Noise reduction systems.

**ANTENNA TECHNOLOGY  
CORP.**

1140 E. Greenway St. #2,  
Mesa, AZ 85203  
602 264-7275/800 264-7275  
Satellite earth stations.

**ANTON/BAUER**

1 Controls Dr., Shelton, CT  
06484  
203 929-1100  
Lighting equip.; power supplies,  
batteries.

**ANVIL CASES**

4128 Temple City Blvd.,  
Rosemead, CA 91770  
818 575-8614  
Transportation cases.  
See ad pg. 75 Circle #130

**APHEX SYSTEMS**

13340 Satcoy St., N.  
Hollywood, CA 91605  
818 765-2212  
Audio processing; aural exciter;  
clocks, timers.

**APOLLO AUDIO VISUAL**

60 Trade Zone Ct.,  
Ronkonkoma, NY 11779  
516 467-8033  
Lenses; lighting equip.; studio  
furniture.

**APPLIED RESEARCH &  
TECHNOLOGY**

215 Tremont St., Rochester, NY  
14608  
716 436-2720  
Audio reverb, special efx.

**ARBEN DESIGN**

600 W. Roosevelt, W. Chicago,  
IL 60185  
312 231-5077  
Studio design & construction.

**ARRAKIS SYSTEMS**

2619 Midpoint Dr., Ft. Collins,  
CO 80525  
303 224-2248  
On-air consoles, mixers.

**ARRIFLEX CORP.**

500 Rte. 303, Blauvelt, NY  
10913  
914 353-1400  
Lenses; lighting equip.; camera  
support equip.

**ARTEL COMMUNICATIONS  
CORP.**

22 Kane Industrial Dr., Hudson,  
MA 01749  
508 562-2100/800 225-0228  
Fiberoptic systems.

**ARTI/ADVANCED REMOTE  
TECHNOLOGIES**

307 Orchard City Dr., Ste. 204,  
Campbell, CA 95008  
408 374-9044  
VTR editor/controllers; random  
access video editors.

**A&S CASE CO.**

1111 N. Gordon St., Los  
Angeles, CA 90038  
213 466-6181  
Transportation cases.

**ASACA/SIBASOKU CORP.**

12509 Beatrice St., Los  
Angeles, CA 90066  
213 827-7144/800 423-6347  
HDTV production equip.; cart  
automation/MERPS; NTSC en-  
coders/decoders; video moni-  
tors; video test equip.; electronic  
still stores; 3D modeling, anima-  
tion; digital video efx; digital disk  
recorders; random access video  
editors.

**ASSOCIATED COMPUTER  
SVCS.**

1306 E. Sunshine, Springfield,  
MO 65804  
417 887-9923  
Weather graphics/radar.

**ASTON ELECTRONICS**

346 N. Lindenwood Dr., Olathe,  
KS 66062  
913 782-4007  
Character generators; electronic  
still stores.

**AT&T COMMUNICATIONS**

55 Corporate Dr., #174C51,  
Bridgewater, NJ 08807  
201 658-6597/800 555-8111  
Satellite transmission & tele-  
phone svcs.; 3D modeling, ani-  
mation; business automation.

**ATI/AUDIO TECHNOLOGIES**

328 W. Maple Av., Horsham, PA  
19044  
215 443-0330  
Audio processing; portable audio  
mixers; on-air consoles, mixers;  
audio test equip.; noise reduc-  
tion systems; audio reverb, spe-  
cial efx; audio routing switchers;  
audio amplifiers.  
See ad pg. 55 Circle #121

**ATLAS/SOUNDOLIER**

1859 Intertech Dr., Fenton, MO  
63026  
314 349-3110/800 876-7337  
Mics, accessories; studio moni-  
tors; intercoms.

**AUBURN INSTRUMENTS**

21 William St., Watertown, MA  
02172-4726  
617 923-4747  
Video routing switchers, DAs.

**AUDI-CORD CORP.**

1845 W. Hovey Av., Normal, IL  
61761  
309 452-9461  
Cart decks.

**AUDICO**

219 Crossen Av., Elk Grove, IL  
60007  
312 640-1030  
Tape loaders, reloaders,  
rewinders, length verifiers, la-  
bels; audio tape, carts.

**AUDIO ACCESSORIES**

Mill St., Marlow, NH 03456  
603 446-3335  
Connectors, jackfields.  
See ad pg. 114 Circle #147

**THE AUDIO BROADCAST  
GROUP**

2342 S. Division Av., Grand  
Rapids, MI 49507-3087  
616 452-1596  
Studio furniture; equipment dis-  
tributor; studio design & con-  
struction; mobile vehicle con-  
struction.

**AUDIO KINETICS**

Klnetic Centre, Theobald St.,  
Borehamwood, Herts, WD6 4PJ  
England  
01 953 8118  
Multisource video editors; tape  
synchronizers; electronic audio  
editors; ATR synchronizers.

**AUDIO PRECISION**

Box 2209, Beaverton, OR 97075  
503 627-0832/800 231-7350  
Audio test equip.

**AUDIO-TECHNICA U.S.**

1221 Commerce Dr., Stow, OH  
44224  
216 686-2600  
Mics, accessories.

**AUDIO-VIDEO ENGINEERING  
CO.**

65 Nancy Blvd., Merrick, NY  
11566  
516 546-4239  
Hum eliminators.

**AUDIO/DIGITAL**

1000 S. Bertelsen Rd., #4,  
Eugene, OR 97402  
503 687-8412/800 423-1082  
Broadcast obscenity delay.

**AUDIOLAB ELECTRONICS**

5831 Rosebud Ln., Bldg. C,  
Sacramento, CA 95841  
916 348-0200  
Tape erasers, degaussers; An-  
tennas, towers; clocks, timers.

**AUDIOPAK**

Box 3100, 1680 Tyson Dr.,  
Winchester, VA 22601  
703 667-8125  
Audio tape, carts.

**AUDITRONICS**

3750 Old Getwell Rd., Memphis,  
TN 38118  
901 362-1350/800 638-0977  
On-air consoles, mixers; post-  
production consoles; audio rout-  
ing switchers; mix-minus sys-  
tem.

**AUERNHEIMER LAB & CO.**

4561 E. Florence Av., Fresno, CA  
93725  
209 442-1048  
Studio monitors.

**AURATONE CORP.**

Box 698, Coronado, CA 92118  
619 297-2820  
Studio monitors.



# THINK OF US AS A UNITED NATIONS OF SOUND

Anywhere you find MTE sound equipment — that's practically everywhere in the world — you'll find Magna-Tech service readily available. Not only when you buy your equipment, but for as long as you own it. Our service engineers are on the road virtually every day of the year, calling on customers, checking on equipment, working with local service people.

With sales offices on six continents, we can provide the right post production equipment from a full line that includes magnetic film recorders and reproducers,

telecine magnetic followers, video tape-film interlocks, electronic looping systems, dubbing systems, 16-and-35mm electronic projectors. Or, we can provide total facility engineering and consultation.

More awards have been won for theatrical and television films on MTE equipment than all others combined. We're ready to help you win some too.

Magna-Tech Electronic Co., Inc.  
630 Ninth Ave., N.Y., NY 10036  
Telephone 212-586-7240  
Telex 126191. Cable "Magtech"  
Fax 212-265-3638.

## MAGNA-TECH ELECTRONIC

NEW YORK • LOS ANGELES • LONDON • PARIS • BRUSSELS • KEHL (WEST GERMANY)  
STOCKHOLM • ROME • BARCELONA • ATHENS • JOHANNESBURG • HONG KONG • TOKYO  
SEOUL • TAIPEI • MANILA • SYDNEY • AUKLAND • KUALA LUMPUR • MADRAS • CARACAS



The Sound Heard Round the World®

Circle 120 on Reader Service Card.

**AURORA SYSTEMS**

311 Penobscot Dr., Redwood City, CA 94063  
415 369-9400  
2D graphics systems; 3D modeling, animation.

**AUTOGRAM CORP.**

1500 Capital Av., Plano, TX 75074  
214 424-8585/800 327-6901  
On-air consoles, mixers; post-production consoles.

**AUTOMATED BUSINESS CONCEPTS**

10650 Treena St., #201, San Diego, CA 92131  
619 566-8920  
Business automation (radio).

**AVAB AMERICA**

967 Howard St., San Francisco, CA 94103  
415 421-3562  
Lighting equip.

**AVANTEK**

3175 Bowers Av., Santa Clara, CA 95054  
408 727-0700  
Fiberoptic systems; satellite earth stations; intercity microwave.

**AVCOM OF VIRGINIA**

500 Southlake Blvd., Richmond, VA 23236  
804 794-2500  
Audio test equip.; satellite earth stations; SCPC downconverters, demodulators; spectrum analyzers, sweep generators.  
*See ad pg. 75 Circle #131*

**AVID TECHNOLOGY INC.**

175 Bedford St., Burlington, MA 01803  
617 272-1680  
Digital audio editing & processing; digital video editing & processing.

**B****BAF COMMUNICATIONS CORP.**

17 Everbergh Rd., Woburn, MA 01801  
617 932-3223/800 633-8223  
ENG/EFP vehicles; SNG systems; mobile production units; studio design & construction; mobile vehicle construction.

**WILLIAM BAL CORP.**

Box 875, 947 Newark Av., Elizabeth, NJ 07207  
201 354-9625/800 354-9625  
Transportation cases.

**BALLY ENGINEERED STRUCTURES**

Box 98, Bally, PA 19503  
215 845-2311  
Remote equipment shelters.

**BARBIZON**

426 W. 55 St., New York, NY 10019  
212 586-1620  
Lighting equip.

**BARCO INDUSTRIES**

472 Amherst St., Nashua, NH 03063  
603 880-1430  
Video monitors.

**BARCUS-BERRY ELECTRONICS**

5500 Bolsa Av. #245, Huntington Beach, CA 92649  
714 897-6766  
Audio processing.

**BARDWELL & MCALLISTER**

2621 Empire Av., Burbank, CA 91504  
818 843-6821/800 843-3198  
Lighting equip.

**BARRETT ASSOC.**

3205 Production Av., Oceanside, CA 92054  
619 433-5600  
Used equipment broker.

**BASF SYSTEMS CORP.**

35 Crosby Dr., Bedford, MA 01730  
617 271-4000  
Videotape; audio tape, carts.

**BASYS**

900 N. Shoreline Blvd., Mountain View, CA 94043  
415 969-9810  
Newsroom computers.

**B&B SYSTEMS**

28111 N. Av. Stanford, Valencia, CA 91355  
805 257-4853/800 345-1056  
Audio phase monitors; studio design & construction; technical/engineering consultant.

**BCS/THE BROADCAST STORE**

4525 Valerio St., Burbank, CA 91505  
818 845-7000  
Equipment distributor.

**BDS**

5203 Leesburg Pike, #800, Falls Church, VA 22041  
703 824-5666  
Technical/engineering consultant.

**BEAVERONICS**

8 Haven Av., Port Washington, NY 11050  
516 883-4414  
Clocks, timers; downstream keyers.

**BELAR ELECTRONICS LABORATORY**

119 Lancaster Av., Box 76, Devon, PA 19333  
215 687-5550  
Demodulators, modulation monitors, frequency monitors & controllers.  
*See ad pg. 115 Circle #148*

**BELDEN WIRE & CABLE**

Box 1980, Richmond, IN 47375  
317 983-5200/800 BELDEN-4  
Wire, cable.

**BENCHER**

333 W. Lake St., Chicago, IL 60606  
312 263-1808  
Copystands.

**BENCHMARK MEDIA SYSTEMS**

3817 Brewerton Rd., N. Syracuse, NY 13212  
315 452-0400  
Mic preamps; audio metering systems; audio DAs; interface systems; wire, cable; connectors, jackfields.

**BEXT**

739 Fifth Av., #7A, San Diego, CA 92101  
619 239-8462  
FM exciters, amplifiers; STLs, TSLs.

**BEYER DYNAMIC**

5-05 Burns Av., Hicksville, NY 11801  
516 935-8000  
Mics, accessories; headphones.

**BGW SYSTEMS**

Box 5042, Hawthorne, CA 90251-5042  
213 973-8090/800 252-4800  
Studio monitors.

**BHP**

1800 Winnemac Av., Chicago, IL 60640-2662  
312 989-2140  
VTR editor/controllers; multi-source video editors; random access video editors.

**BI-TRONICS**

76 Main St., Tuckahoe, NY 10707  
914 793-3221  
Wire, cable.

**BIAMP SYSTEMS**

Box 2160, Portland, OR 97208-2160  
503 641-7287  
Audio processing; portable audio mixers; on-air consoles, mixers; ALC & AGC amps; monitor/power amps.

**BIRD ELECTRONIC CORP.**

30303 Aurora Rd., Solon, OH 44139-2794  
216 248-1200  
Remote monitoring systems; RF power measurement & termination equip.

**B&K PRECISION**

Maxtec International Corp., 6470 W. Cortland St., Chicago, IL 60635  
312 889-9087  
Video test equip.; audio test equip.

**BLONDER-TONGUE LABS**

1 Jake Brown Rd., Old Bridge, NJ 08857  
201 679-4000  
Antennas, towers; satellite earth stations; RF amps; diplexers, multiplexers & modulators.

**BOGEN COMMUNICATIONS**

50 Spring St., Box 575, Ramsey, NJ 07446  
201 934-8500  
Audio processing; audio test equip.; mics, accessories; audio amps, preamps.

**BOGEN PHOTO CORP.**

17-20 Willow St., Fair Lawn, NJ 07410  
201 794-6500  
Lighting equip.; camera support equip.

**BOGNER BROADCAST EQUIP.**

603 Cantiague Rock Rd., Westbury, NY 11590  
516 997-7800  
Antennas, towers.

**BOONTON ELECTRONICS CORP.**

791 Rt. 10, Randolph, NJ 07869  
201 584-1077

Audio test equip.; RF test equip.

**BOWEN BROADCAST SERVICE**

8343 Lynn Haven Av., El Paso, TX 79907

915 598-5556

Technical/engineering consultant.

**BRADLEY BROADCAST SALES**

8101 Cessna Av., Gaithersburg, MD 20879

301 948-0650/800 732-7665

Equipment distributor.

**BRETFORD MFG.**

9715 Soreng Av., Schiller Park, IL 60176

312 678-2545

Studio furniture.

**WALTER S. BREWER CO.**

Box 35746, Tulsa, OK

74153-0746

918 493-7323/800 255-9458

Lighting equip.; power supplies, batteries; wire, cable; connectors, jackfields; tools; lighting system design; technical/engineering consultant.

**BRINTEC CORP.**

1600 W. Main St., Willimantic, CT 06226-1128

203 456-8000

Wire, cable; connectors, jackfields.

**BROADCAST AUDIO CORP.**

11306 Sunco Dr., Rancho

Cordova, CA 95742

916 635-1048

On-air consoles, mixers; studio monitors; audio DAs.

See ad pg. 96 Circle #138

**BROADCAST AUTOMATION**

4125 Keller Springs, #122,

Dallas, TX 75244

214 380-6800

Radio studio automation.

**BROADCAST ELECTRONIC SVCS.**

4668 Monument Point Dr., Jacksonville, FL 32225

904 646-1630

Edit system accessories.

**BROADCAST ELECTRONICS**

4100 N. 24 St., Quincy, IL 62305

217 224-9600

Radio transmitters; on-air consoles, mixers; cart decks; turntables; radio studio automation; digital recorder player; studio furniture.

See ad pg. 8 Circle #103

**BROADCAST EQUIPMENT RENTAL CO.**

4545 Chermak St., Burbank, CA

91505-1063

818 841-3000

Equipment rental service.

**BROADCAST MICROWAVE SVCS.**

7322 Convo Ct., San Diego, CA 92111

619 560-8601

ENG microwave; intercity microwave; microwave antennas.

**BROADCAST SUPPLY WEST/BSW**

7012 27 St. W., Tacoma, WA

98466

800 426-8434

Equipment distributor.

**BROADCAST TECHNOLOGY OF COLORADO**

Box 1310, Gunnison, CO 81230

303 641-5503

SCA equip.

**BROADCAST TECHNOLOGY PARTNERS**

525 Woodward, Bloomfield

Hills, MI 48013

313 540-4380

FMX FM broadcasting system.

# Your Problem Solvers

from **ATI**



- Mike
- Line
- Phono
- Mixing
- Matching
- Metering
- Monitoring
- Processing
- Distribution
- Rack Mounting

**AUDIO TECHNOLOGIES, INC.**

328 W. Maple Ave., Horsham, PA 19044 • (215) 443-0330 • FAX (215) 443-0394



# Team Camera Mart: Solving your problems with the right equipment at the right price.

We teach our people how to meet your video needs, not how to meet their quotas.

One call puts you in touch with Team Camera Mart: our team of sales pros, trained broadcast engineers and customer-service specialists—all working together and supported by one of the largest inventories of *video* equipment in the country.

Our team keeps up with the latest technology by attending manufacturers' seminars every chance it gets. And, our engineers constantly inspect and check equipment before it goes out to you.

At Camera Mart, we represent all the major manufacturers in the business on both coasts and around the world.

So, if you're looking for video equipment, come to the people who know that *equipment*, not just the *box* it comes in.

Call Team Camera Mart today. See how good we really are.

**The Camera Mart, Inc.**

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456 West 55th Street, New York 10019  
(212) 757-6977 FAX: (212) 582-2498



**Regional Offices:**

Liverpool, New York 13088  
(315) 457-3703  
FAX (315) 457-3795

Evansville, In. 47715  
(815) 476-6327

Miami, Florida 33172  
(305) 227-2975  
FAX: (305) 227-0531

Burbank, Calif. 91506  
(818) 843-6644  
FAX: (818) 843-2478

Las Vegas, Nv 89121  
(702) 435-9234  
FAX: (702) 451-3229

Circle 122 on Reader Service Card.

**BROADCAST VIDEO SYSTEMS**

40 W. Wilmot St., Richmond Hills, ON L4B 1H8 Canada  
416 764-1584

NTSC encoders/decoders; linear keyers; video sweep generators; safe area gens; time/date/ID gens; video delays, filters; hum buckers; attenuators.

**BROWNING LABS**

8151 N.W. 74 Av., Miami, FL 33166

305 885-3356

Radio transmitters; TV transmitters.

**BRUEL & KJAER, PRO AUDIO GROUP**

185 Forest St., Marlborough, MA 01752-3093

508 481-7000

Mics, accessories.

**BRYSTON LTD.**

57 Westmore Dr., Rexdale, ON M9V 3Y6 Canada

416 746-1800

Preamps, line amps, monitor/power amps.

**BSM SYSTEMS**

Box 19007, Spokane, WA 99219

509 838-0110

MC switchers; video routing switchers, DAs; audio routing switchers.

**BTS/BROADCAST TELEVISION SYSTEMS**

2300 S. 2300 W., Salt Lake City, UT 84119

801 972-8000/800 562-1136

Studio cameras; ENG/EFP cameras camcorders; HDTV production equip.; digital VTRs; 3/4-, 1/2-inch VTRs; telecines; electronic still stores; character generators; 2D graphics systems; 3D modeling, animation; MC switchers; switching automation; video routing switchers, DAs; election reporting systems; audio routing switchers; mobile production units.

See ad pg. 22, 34, inside back cover

Circle #109, 115, 150

**BURK TECHNOLOGY**

7 Lomar Dr., Pepperell, MA 01463

508 433-8877

Transmitter remote control.

**BURLE INDS.,****TUBE PRODUCTS DIV.**

1000 New Holland Av., Lancaster, PA 17601-5688

717 295-6000

Transmitter, power tubes; cavities for TV & FM svces.

**BUSH & MILLIMAKI**

800 C Arcadia Dr., Huntsville, AL 35801

205 533-9274

Repair & modification of cameras, lenses, monitors, VTRs.

**CABLEWAVE SYSTEMS**

60 Dodge Av., North Haven, CT

06473

203 239-3311

Antennas, towers; transmission line.

**CAL SWITCH & SIGNAL**

13717 S. Normandle Av.,

Gardena, CA 90249

213 770-2330

Connectors, jackfields.

**CALAWAY ENGINEERING**

See Quanta Editing

**CALHOUN SATELLITE COMMUNICATIONS**

14871 N.E. 20 Av., N. Miami, FL 33181

305 945-3737

SNG systems.

**CALZONE CASE CO.**

225 Black Rock Av., Bridgeport, CT 06605

203 367-5766/800 243-5152

Transportation cases.

**CAM-LOK**

10540 Chester Rd., Cincinnati, OH 45215-0888

513 771-3171

Wire, cable; connectors, jackfields.

**CAMBRIDGE PRODUCTS**

244 Woodland Av., Bloomfield, CT 06002

203 243-1761/800 243-8814

Connectors, jackfields.

**CAMERA MART**

456 W. 55 St., New York, NY 10019

212 757-6977

Equipment distributor.

See ad pg. 56 Circle #122

**CANARE CABLE**

511 Fifth St., #G, San Fernando, CA 91340

818 365-2446

Wire, cable; connectors, jackfields; tools.

**CANON USA, OPTICS DIV.**

1 Jericho Plaza, Jericho, NY

11753-1679

516 933-6300

Lenses; camera support equip.

**CARPEL VIDEO**

429 E. Patrick St., Frederick, MD 21701

800 238-4300

Videotape.

**CARVIN CORP.**

1155 Industrial Av., Escondido, CA 92025

619 747-1710/800 854-2235

On-air consoles, mixers; mics, accessories; studio monitors.

**CASCOM**

707 18 Av. S., Nashville, TN 37203

615 329-4112

Graphics/special effects facility.

**CAT SYSTEMS**

401 E. 74 St., New York, NY 10021

212 988-0110

Remote monitoring systems; transmitter remote control.

**CATEL****TELECOMMUNICATIONS**

4050 Technology Pl., Fremont, CA 94537-5122

415 659-8988

STLs, TSLs; MTS equip.; stereo generators; RF switches.

**DWIGHT CAVENDISH**

2117 Chestnut Av., Willmette, IL 60091

312 256-0937

Videocassette duplication equip.

**CBSI/CUSTOM BUSINESS SYSTEMS**

Box 67, Reedsport, OR 97467

503 271-3681/800 547-3930

Business automation.

**CCA ELECTRONICS**

360 Bohannon Rd., Box 426, Fairburn, GA 30213

404 946-3530

Radio transmitters.

**CCI**

2001-C Hickory Valley Rd., Chatanooga, TN 37421

615 894-2580

MC switchers; switching automation; video routing switchers, DAs; sync & pulse gens/procs.

**CEL ELECTRONICS**

Chroma House, Shire Hill, Saffron Walden, Essex, CB11 3AQ UK

07 992 3817

TBCs; frame synchronizers; standards converters; electronic still stores; digital video efx; VTR editor/controllers; video routing switchers, DAs.

**CENTRAL DYNAMICS LTD.**

147 Hymus Blvd., Pointe Claire, QU H9R 1G1 Canada

514 697-0810

NTSC encoders/decoders; production switchers; video routing switchers, DAs.

**CENTRAL TOWER**

Box 530, Newburgh, IN 47630

812 853-0595

Antennas, towers; equipment distributor; technical/engineering consultant.

**CENTURY PRECISION OPTICS**

10713 Burbank Blvd., N.

Hollywood, CA 91601

818 766-3715

Lenses.

**CETEC GAUSS**

9130 Glen Oaks Blvd., Sun Valley, CA 91352

213 875-1900

Studio monitors; audio tape duplicators.

**CETEC IVIE**

1366 W. Center, Orem, UT 84057

801 224-1800

Audio processing; portable audio mixers; mics, accessories; studio monitors.

**CHANNELMATIC**

821 Tavern Rd., Alpine, CA 92001

619 445-2691

Cart automation/MERPS; switching automation; video routing switchers, DAs; clocks, timers.

**CHAPMAN/LEONARD STUDIO EQUIP.**

12950 Raymer St., N.

Hollywood, CA 91605

213 877-5309

Camera support equip.

**CHESTER CABLE,  
DIV. ALCATEL**  
15 Oakland Av., Chester, NY  
10918  
914 469-2141  
Wire, cable.

**CHICAGO CONDENSER  
CORP.**  
2900 W. Chicago Av., Chicago,  
IL 60622  
312 227-7070  
PCB-free replacement capaci-  
tors.

**CHRISTIE ELECTRIC CORP.**  
18120 S. Broadway, Gardena,  
CA 90248  
213 715-1402  
Power supplies, batteries.

**CHYRON CORP.**  
265 Spagnoli Rd., Melville, NY  
11747  
516 845-2000  
Character generators; 2D graph-  
ics systems.

**CINE 60**  
630 Ninth Av., New York, NY  
10036  
212 586-8782  
Power supplies, batteries; light-  
ing equip.

**CINEDCO**  
1225 Grand Central Av.,  
Glendale, CA 91201-2425  
818 502-9100  
Random access video editors;  
electronic audio editors.

**CINEMA PRODUCTS CORP.**  
3211 S. La Cienega Blvd., Los  
Angeles, CA 90016  
213 836-7991  
Cine cameras & accessories;  
camera support equip.; tele-  
prompters.

**CINEMILLS CORP.**  
3500 W. Magnolia Blvd.,  
Burbank, CA 91505  
818 843-4560/800 325-7674  
Lighting equip.

**CIPHER DIGITAL**  
Box 170, Frederick, MD 21701  
301 695-0200/800 331-9066  
Tape synchronizers; time code  
equip.; electronic audio editors;  
ATR synchronizers.

**CIRCUIT STUDIOS**  
5420 Butler Rd., Bethesda, MD  
20816  
301 656-5918  
3D modeling, animation.

**CLEAR-COM**  
945 Camella St., Berkeley, CA  
94710  
415 527-6666  
Intercoms.

**CMC TECHNOLOGY**  
2650 Lafayette St., Santa Clara,  
CA 95050  
408 980-9800  
VTR heads, electronics; tape  
erasers, degaussers; BVH drum  
refurbishing; audio heads, ac-  
cessories.

**CMX CORP.**  
2130 Martin Av., Santa Clara,  
CA 95050  
408 988-2000  
VTR editor/controllers; multi-  
source video editors; random ac-  
cess video editors; electronic au-  
dio editors.

**COARK VIDEO**  
Box 2, Rt. 217, Mellenville, NY  
518 672-4451  
Cassette reloading service  
See ad pg. 63 Circle #125

**COAXIAL DYNAMICS**  
15210 Industrial Blvd.,  
Cleveland, OH 44135  
216 267-2233/800 COAXIAL  
RF test & measurement equip.

**COHERENT  
COMMUNICATIONS**  
13756 Glenoaks Blvd., Sylmar,  
CA 91342  
818 362-9393  
Portable audio mixers; mics, ac-  
cessories; time code equip.

**COLORADO VIDEO**  
Box 928, Boulder, CO 80306  
303 530-9580  
Portable slow-scan video trans-  
mitters.

**COLORGRAPHICS SYSTEMS**  
6400 Enterprise Ln., Madison,  
WI 53719  
608 274-5786/800 248-1050  
Color correctors; 2D graphics  
systems; 3D modeling, anima-  
tion; weather graphics/radar.

**COLUMBINE SYSTEMS**  
1707 Cole Blvd., Golden, CO  
80401  
303 237-4000  
Business automation; newsroom  
computers.

**COMAD COMMUNICATIONS**  
1435 Bonhill Rd., Unit 34,  
Mississauga, ON L5T 1M1 Cana-  
da  
416 670-9171  
Antennas, towers; tape erasers,  
degaussers.

**COMARK COMMUNICATIONS**  
Rt. 309 & Advance Ln., Box 506,  
Colmar, PA 18915  
215 822-0777  
TV transmitters; coax & wave-  
guide transmission systems &  
components.

**COMLUX**  
453 Ravendale Dr., Ste. F,  
Mountain View, CA 94043-5200  
415 964-9628  
Fiberoptic systems.

**COMPREHENSIVE VIDEO  
SUPPLY**  
148 Veterans Dr., Northvale, NJ  
07647  
201 767-7990/800 526-0242  
Lenses; NTSC encoders/decod-  
ers; video processing equip.;  
color correctors; character gen-  
erators; VTR editor/controllers;  
multisource video editors; pro-  
duction switchers; video routing  
switchers, DAs; lighting equip.;  
camera support equip.; tele-  
prompters; tape erasers, de-  
gaussers; time code equip.; fi-  
beroptic systems; power  
supplies, batteries; wire, cable;  
connectors, jackfields; tools;  
music/sound efx libraries.

**COMPROMPTER**  
141 S. 6 St., La Crosse, WI  
54601  
608 785-7766  
Teleprompters; newsroom com-  
puters.

**COMPU = PROMPT**  
746 N. Cahuenga Blvd., Los  
Angeles, CA 90038  
213 465-9441  
Teleprompters.

**COMPUTER CONCEPTS  
CORP.**  
8375 Melrose Dr., Lenexa, KS  
66214  
913 541-0900/800 255-6350  
Business automation.

**COMPUTER GRAPHICS LABS**  
4 Expressway Plaza, Roslyn  
Heights, NY 11577  
516 484-1944  
Character generators; 2D graph-  
ics systems.

**COMPUTER PROMPTING  
CORP.**  
3408 Wisconsin Ave N.W.,  
#201, Washington, DC 20016  
202 966-0980  
Teleprompters.

**COMREX CORP.**  
65 Nonset Path, Acton, MA  
01720  
508 263-1800/800 237-1776  
Portable audio mixers; telco in-  
terface equip.; RF IFB systems;  
pocket TV aural monitors.

**COMSAT WORLD SYSTEMS  
DIV.**  
950 L'Enfant Plaza S.W.,  
Washington, DC 20024  
202 863-6283  
Video monitors; video test  
equip.; video codecs.

**COMTECH ANTENNA**  
3100 Communications Rd., St.  
Cloud, FL 32769  
407 892-6111  
Antennas, towers; satellite earth  
stations.

**COMTEK**  
357 W. 2700 South, Salt Lake  
City, UT 84115  
801 466-3463  
RF mics; IFB systems.

**COMWAVE**  
Box 69, Mountaintop, PA 18707  
717 474-6751  
TV transmitters; antennas,  
towers; MDS, SMATV systems.

**CONCEPT PRODUCTIONS**  
1224 Coloma Way, Roseville, CA  
95661  
916 782-7754/800 348-4800  
Radio studio automation.

**CONIFER CORP.**  
Box 1025, Burlington, IA 52601  
319 752-3607/800 843-5419  
Antennas, towers; MDS, SMATV  
systems; ENG microwave; ITFS  
equip.

**CONNECTRONICS CORP.**  
652 Glenbrook Rd., Stamford,  
CT 06906  
203 324-2889/800 322-2537  
Audio patch bays; wire, cable.

**CONNOLLY SYSTEMS**  
Unit 7, Intec, 2 Wade Rd.,  
Basingstoke, Hants, RG24 ONE  
England  
256-470474  
Switching automation.

**CONRAC DISPLAY PRODS.**  
1724 S. Mountain Av., Duarte,  
CA 91010  
818 303-0095  
NTSC encoders/decoders; video  
monitors.

**CONTINENTAL ELECTRONICS,  
DIV. VARIAN**  
4212 S. Buckner Blvd., Box  
270879, Dallas, TX 75227  
214 381-7161  
Radio transmitters; SW transmit-  
ters.

**CONTROL CONCEPTS**  
328 Water St., Box 1380,  
Binghamton, NY 13902-1380  
607 724-2484  
Power conditioners; surge sup-  
pressors.

**CONUS COMMUNICATIONS**  
3415 University Av.,  
Minneapolis, MN 55414  
612 642-4645  
Satellite earth stations.

**CONVERGENCE CORP.**  
2752 Walnut Av., Tustin, CA  
92680  
714 731-3300  
VTR editor/controllers; multi-  
source video editors.

**COOL-LUX LIGHTING**  
5723 Auckland Av., N.  
Hollywood, CA 91601  
818 761-8181  
Lighting equip.

**CORPORATE  
COMMUNICATIONS  
CONSULTANTS**  
64 Clinton Rd., Fairfield, NJ  
07006  
201 226-5938  
Color correctors.

**CORTANA CORP.**  
Box 2548, Farmington, NM  
87499-2548  
505 325-5336  
Antennas, towers; lightning pre-  
vention system.

**COUNTRYMAN ASSOC.**  
417 Stanford Av., Redwood City,  
CA 94063  
415 364-9988  
Mics, accessories.

**CRL/CIRCUIT RESEARCH  
LABS**  
2522 W. Geneva Dr., Tempe, AZ  
85282  
602 438-0888/800 535-7648  
Audio processing; mics, acces-  
sories; noise reduction systems;  
MTS equip.; AM stereo equip.;  
SCA equip.

**CROSSPOINT LATCH CORP.**  
95 Progress St., Union, NJ  
07083  
201 688-1510  
TBCs; production switchers.

**JOHN CROWE PRODUCTIONS**  
10 Greenway Plaza, Houston, TX  
77046  
713 627-9270  
Remote studio construction

**CROWN INTERNATIONAL**  
1718 W. Mishawaka Rd.,  
Elkhart, IN 46517  
219 294-8000  
Mics, accessories; monitor &  
power amps.

**CUBICOMP**  
21325 Cabot Blvd., Hayward, CA  
94545  
415 887-1300  
2D graphics systems; 3D model-  
ing, animation.

**CURRENT TECHNOLOGY**  
1400 S. Sherman, #202,  
Richardson, TX 75801  
214 238-5300  
Surge protectors.

**CV TECHNOLOGIES**  
148 Veterans Dr., Northvale, NJ  
07647  
201 767-7990  
VTR editor/controllers; multi-  
source video editors; character  
generators.

# novasync™ Frame Synchronizer

Extraordinary Features At An Unbelievable Price



- Full Bandwidth, 8 bit, 4 x fsc sampling for maximum transparency.
- A/B Inputs plus synchronous alternate input.
- Auto default to alternate input, black or color bars.
- Auto Gain Control to maintain proper video level.
- Ideal for all remote feeds, studio backtiming and master control.

**NOVASync™ / \$4,490**

Available now at your professional video dealer.  
Nova Systems . . . the clear leader in video technology.

**nova**

Nova Systems, Inc., 50 Albany Turnpike, Canton, CT 06019  
Tel: (203) 693-0238 Fax: (203) 693-1497

**CYCLE SAT**

Box 309, 119 Willowglen Dr.,  
Forest City, IA 50436  
515 582-6999

Spot delivery by satellite.

See ad pg. 37 Circle #116

**D****DABURN ELECTRONICS & CABLE CORP.**

70 Oak St., Norwood, NJ 07648  
201 768-5400

Wire, cable; connectors, jack-  
fields.

**PETER W. DAHL**

5869 Waycross Av., El Paso, TX  
79924

915 751-2300

Surge protectors; rectifiers,  
transformers.

**DALSAT**

1701 Summit Av., Plano, TX  
75074

214 578-7561

SNG systems; satellite earth sta-  
tions.

**DATA CENTER MANAGEMENT**

1017 Kenilworth Av., Charlotte,  
NC 28204

704 377-1496

Newsroom computers.

**DATACOUNT**

Box 3078, Opellika, AL  
36803-3078

205 749-5641

Business automation.

**DATATEK CORP.**

1121 Bristol Rd., Mountainside,  
NJ 07092

201 654-8100/800 882-9100

Video routing switchers, DAs; au-  
dio routing switchers.

**DATAWORLD**

Box 30730, 4827 Rugby Av.,  
#200, Bethesda, MD 20814

301 652-8822/800 368-5754

Technical databases & computa-  
tional programs.

**DATUM**

1363 S. State College Blvd.,  
Anaheim, CA 92806

714 533-6333

Time code equip.; clocks, tim-  
ers.

**DBX**

See AKG

**DECISION**

402 S. Ragsdale, Jacksonville,  
TX 75766

800 251-6677

Business automation; newsroom  
computers.

**DEDOTEC USA**

210 Westlake Dr., Valhalla, NY  
10595

914 761-5608

Lighting equip.

**DELCOM USA**

2344 Perot St., Philadelphia, PA  
19130

215 765-8811

Studio design & construction;  
mobile vehicle construction;  
technical/engineering consul-  
tant; studio furniture.

**DELTA ELECTRONICS**

5730 Gen. Washington Dr., Box  
11268, Alexandria, VA 22312

703 354-3350

Audio processing; antennas,  
towers; AM stereo equip.; studio  
monitors; audio test equip.; RF  
test equip.

See ad pg. 97 Circle #139

**DESISTI LIGHTING/DESMAR**

1109 Grand Av., N. Bergen, NJ  
07047

201 319-1100

Lighting equip.

**DEWOLF MUSIC LIBRARY**

25 W. 45 St., New York, NY  
10036

212 382-0220

Music/sound efx libraries.

**DI-TECH**

48 Jefryn Blvd., Deer Park, NY  
11729

516 667-6300/800 595-1012

Video routing switchers, DAs; au-  
dio routing switchers.

**DIALIGHT CORP.**

1913 Atlantic Av., Manasquan,  
NJ 08736

201 223-9400

Connectors, jackfields.

**DICTAPHONE CORP.**

4 New King St., White Plains, NY  
10604

914 946-4240

Tape-based loggers.

**DIELECTRIC****COMMUNICATIONS**

Tower Hill Rd., Raymond, ME  
04071

207 655-4555

Antennas, towers; remote moni-  
toring systems.

**DIGITAL ARTS**

7370-Q Opportunity Rd., San  
Diego, CA 92111-2225

619 541-2055

Character generators; 2D graph-  
ics systems; 3D modeling, ani-  
mation.

**DIGITAL AUDIO RESEARCH**

6363 Sunset Blvd., Hollywood,  
CA 90028

213 466-9151

Digital audio workstations.

**DIGITAL CREATIONS**

79 Express St., Plainview, NY  
11803

516 932-7140

Radio studio automation.

**DIGITAL EQUIPMENT CORP.**

6 Tech Dr., Andover, MA 01810  
508 474-6273

Business automation.

**DIGITAL F/X**

755 Ravendale Dr., Mountain  
View, CA 94043

415 961-2800

Character generators; 2D graph-  
ics systems; 3D modeling, ani-  
mation; digital video efx.

**DIGITAL PROCESSING SYSTEMS**

55 Nugget Av., Scarborough, ON  
M1S 3L2 Canada

416 754-8090

TBCs; frame synchronizers; video  
test equip.; sync & pulse gens/  
procs.

**DKW SYSTEMS**

730, 9919 - 105 St., Edmonton,  
AB T5K 1B1 Canada

403 426-1551/800 661-6453

Live assist systems.

**DOLBY LABORATORIES**

100 Potrero Av., San Francisco,  
CA 94103-4813

415 558-0200

Audio processing; noise reduc-  
tion systems.

**DORROUGH ELECTRONICS**

5221 Collier Pl., Woodland Hills,  
CA 91364

818 999-1132

Audio processing; audio test  
equip.; audio level meters.

**DSC/DIGITAL SERVICES CORP.**

3622 N.E. 4 St., Gainesville, FL  
32609

904 377-8013

Digital video efx; digital disk re-  
corders.

**DSI COMMUNICATIONS**

627 Boulevard, Kenilworth, NJ  
07033

201 245-4833

Remote monitoring systems;  
transmitter status system; pro-  
gram logging system; studio fur-  
niture; studio design & construc-  
tion; technical/engineering  
consultant.

**DUBNER COMPUTER SYSTEMS**

6 Forest Av., Paramus, NJ  
07652-5214

201 845-8900

Electronic still stores; character  
generators; 2D graphics sys-  
tems; 3D modeling, animation;  
weather graphics/radar; election  
reporting systems; business  
automation.

**DUGGAN MFG.**

2570 E. Mira Loma Way,  
Anaheim, CA 92806

714 630-6611

Transportation cases.

**DX COMMUNICATIONS**

10 Skyline Dr., Hawthorne, NY  
10532

914 347-4040

Satellite earth stations.

**DYNAIR ELECTRONICS**

5275 Market St., San Diego, CA  
92114

619 263-7711

Video routing switchers, DAs; au-  
dio routing switchers; fiberoptic  
systems.

**DYNAMIC TECHNOLOGY**

13 Cumberland Av., Park Royal,  
London, NW10 7RH England

01 961 4986

Switching automation; video  
routing switchers, DAs.

**DYNATECH CORP.**

See ALTA GROUP, COLORGRA-  
PHICS, DYNATECH NEWSTAR,  
QUANTA, UTAH SCIENTIFIC

# SURGE PROTECTORS



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MCG Surge-Master™ protectors are heavy-duty, bipolar clamping devices that limit AC overvoltage spikes to safe levels. Available as service panel protectors, plug-in devices and power strips, they guard everything from individual pieces of equipment to complete buildings. A variety of models handle the full range of AC voltage and current levels.

#### MCG Electronics Inc.

12 Burt Drive, Deer Park, NY 11729

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Company \_\_\_\_\_

Address \_\_\_\_\_

City/State/Zip \_\_\_\_\_

Telephone \_\_\_\_\_

# MCG

ELECTRONICS INC.

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In N.Y.: 516-586-5125 Telex: 645518

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6400 Enterprise Ln., Madison, WI 53719

608 274-8686

Newsroom computers; election reporting systems; teleprompters.

**E****EASTMAN KODAK**

343 State St., Rochester, NY 14650

716 724-3313

Motion picture film; still video products.

**ECHOLAB**

175 Bedford St., Burlington, MA 01803

617 273-1512

Digital video efx; production switchers.

**ECONCO BROADCAST SVCE.**

1318 Commerce Av., Woodland, CA 95695

916 662-7553/800 532-6626

Transmitter, power tubes; rebuilt power tubes.

**EDCOR**

1948 E. Pomona, Santa Ana, CA 90804

714 648-0292

RF mics; audio preamps, line amps; transformers, hum bucking coils.

**EDITRON USA**

748 N. Seward St., Hollywood, CA 90038

213 464-8723

VTR editor/controllers; multi-source video editors; tape synchronizers; ATR synchronizers.

**EEG ENTERPRISES**

1 Rome St., Farmingdale, NY 11735

516 293-7472

Teletext equip.; VBI data transmission; closed-captioning equip.

**EEV**

4 Westchester Plaza, Elmsford, NY 10523

914 592-6050/800 431-1230

Pickup tubes; transmitter, power tubes.

See ad pg. 71 Circle #128

**EG&G**

35 Congress St., Salem, MA 01970

617 745-3200

Tower lighting.

**EIGEN VIDEO**

Box 848, Nevada City, CA 95959

916 265-2020

Standards converters; videodisc recorders.

**ELCOM BAUER**

6199 Warehouse Way, Sacramento, CA 95826

916 381-3750

Audio processing; radio transmitters; FM exciters; antenna tuning units; AM diplexers.

**ELECTRO IMPULSE LAB**

116 Chestnut St., Box 870, Red Bank, NJ 07701

201 741-0404

RF loads, dry, high power.

**ELECTRO-VOICE**

600 Cecil St., Buchanan, MI 49107

616 695-6831

Portable audio mixers; mics, accessories; studio monitors; audio test equip.

**ELECTROHOME**

809 Wellington St. N., Kitchener, ON N2G 4J6 Canada

519 744-7111

Video monitors.

**ELECTRONIC RESEARCH**

108 Market St., Newburgh, IN 47630

812 853-3318

Antennas, towers; notch filters; diplexers, multiplexers.

**ELECTRONIC SCRIPT****PROMPTING**

6129 Western, Clarendon Hills, IL 60514

312 887-0346

Teleprompters.

**ELECTRONICS DIVERSIFIED**

1675 N.W. 216 Av., Hillsboro, OR 97124

503 645-5533

Lighting equip.

**ELICON**

940 S. Leslie St., La Habra, CA 90631

714 870-6647

Remote motion control; camera support equip.

**ELLIS TOWER CO.**

Box 23217, Ft. Lauderdale, FL 33307

305 566-6432

Antennas, towers.

**EMCEE BROADCAST****PRODUCTS**

Box 68, White Haven, PA 18661

717 443-9575/800 233-6193

TV transmitters; translators; transmitter system design.

**EMCOR/CRENLO**

1600 Fourth Av. N.W., Rochester, MN 55901

507 287-3409

Studio furniture; equipment enclosures.

**EMERGENCY ALERT****RECEIVER**

Box 20629, New York, NY 10028

212 695-4767

SCA equip.; EBS systems.

**E-MU SYSTEMS**

1600 Green Hills Rd., Scotts Valley, CA 95066

408 438-1921

Digital audio workstations.

**ENERGEX SYSTEMS**

77-79 E. Main St., Elmsford, NY 10523

914 347-5776

Power supplies, batteries.

**ENERGY-ONIX BROADCAST EQUIP.**

752 Warren St., Hudson, NY 12534

518 828-1690

Radio transmitters.

**E-N-G MOBILE SYSTEMS**

2930 Cloverdale Av., Concord, CA 94518

415 798-4060

ENG/EFP vehicles.

**ENTERPRISE ELECTRONICS**

Box 1216, Industrial Blvd., Enterprise, AL 36331

205 347-3478

Weather graphics/radar.

**ENVIRONMENTAL****TECHNOLOGY**

1302 High St., South Bend, IN 46618

219 233-1202

Tower ice sensors; air dehydrators.

**ERGO-90**

3076 E. Mira Loma Av., Anaheim, CA 92806

714 632-7045

Studio furniture.

**ESD**

5200 Auth Rd., World Weather Bldg., Suitland, MD 20746

301 423-2113

Weather graphics/radar.

**ESE**

142 Sierra St., El Segundo, CA 90245

213 322-2136

Character generators; video routing switchers, DAs; time code equip.; clocks, timers; telco interface equip.

**EVENTIDE**

1 Alsan Way, Little Ferry, NJ 07643

201 641-1200

Audio processing; noise reduction systems; audio reverb, special efx; obscenity delay.

**EVERTZ MICROSYSTEMS**

3465 Mainway, Burlington, ON L7M 1A9 Canada

416 335-3700

Character generators; VTR editor/controllers; tape synchronizers; time code equip.; clocks, timers; video editor interfaces; 3D modeling, animation.

**EXCALIBUR INDUSTRIES**

12427 Foothill Blvd., Lake View Terrace, CA 91342

818 899-2547

Transportation cases.

**EXPRESS TOWER**

Box 37, Star Rte. East, Locust Grove, OK 74352

918 479-6484

Antennas, towers.

**F****FAROUDJA LABS**

946 Benicia Av., Sunnyvale, CA 94086

408 245-1492

HDTV production equip.; NTSC encoders/decoders; component video transcoder.

**FARRTRONICS**

45 Campbell Av., Kitchener, ON N2H 4X8 Canada

519 741-1010/800 265-2713

IFB systems; telco interface equip.; stereo DAs; video patchfields; audio punchblocks.

See ad pg. 113 Circle #146

**FAST FORWARD VIDEO**

17955-A Skypark Cir., Irvine, CA  
92414

714 852-8404

Time code equip.

**FERNO WASHINGTON**

70 Well Way, Wilmington, OH  
45177

513 382-1451

Equipment carts.

**FGV PANTHER CORP.****OF AMERICA**

3360 Adina Dr., Los Angeles, CA  
90068

213 850-0246

Lighting equip.; camera support  
equip.

**FIBERBILT CASES**

601 W. 26 St., New York, NY  
10001

212 675-5820/800 847-4176

Transportation cases.

**FIDELIPAC**

Box 808, Moorestown, NJ  
08057

609 235-3900/800 HOT TAPE

Cart decks; audio tape, carts;  
tape storage systems.

See ad pg. 3 Circle #101

**FIELD ENGINEERING**

Box 663, Malibu, CA 90265  
213 457-4511

Safe action/safe title generator.

**FILM/VIDEO EQUIPMENT****SVCE.**

800 S. Jason St., Denver, CO  
80223

303 778-8616

Lens extenders.

**FLASH TECHNOLOGY**

55 Lake St., Nashua, NH 03060  
603 883-6500

Tower lighting.

**FLORICAL SYSTEMS**

2201 N.W. 24 Av., Gainesville,  
FL 32605

904 372-8326

RGB compositor; switching auto-  
mation; tape delay system.

**JOHN FLUKE MFG. CO.**

Box C9090, Everett, WA 98296  
206 347-6100/800 426-0361

Video test equip.; sync & pulse  
gens/procs; time code equip.;  
frequency counters; RF T&M  
equip.

**FM TUBECRAFT**

1121-26 Lincoln Av., Holbrook,  
NY 11741

516 567-8588

Sound insulating material.

**FOCUSRITE AUDIO****ENGINEERING**

Unit 2, Bourne End Business  
Centre, Cores End Rd., Bourne  
End, Bucks, SL8 5AS England  
62 881 9456

Post-production consoles; audio  
processing.

**FOR-A CORP. OF AMERICA**

320 Nevada St., Newton, MA  
02160

617 244-3223

TBCs; frame synchronizers; NTSC  
encoders/decoders; color correc-  
tors; character generators; digital  
video efx; VTR editor/control-  
lers; multisource video editors;  
production switchers; video rout-  
ing switchers, DAs; time code  
equip.; clocks, timers; post-pro-  
duction consoles.

**FOROX CORP.**

393 West Av., Stamford, CT  
06902

203 324-7400

Video animation controllers.

**FORT WORTH TOWER**

1901 E. Loop 820 S., Ft. Worth,  
TX 76112

817 457-3060

Antennas, towers.

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for a great cause and makes cents?**

OVER 90 BROADCAST ENGINEERS AND MANAGERS  
AND 100'S OF OTHER VIDEO USERS KNOW!

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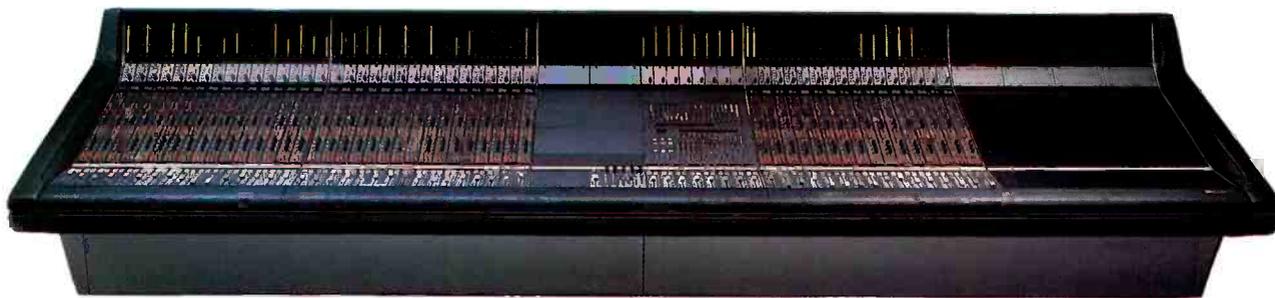
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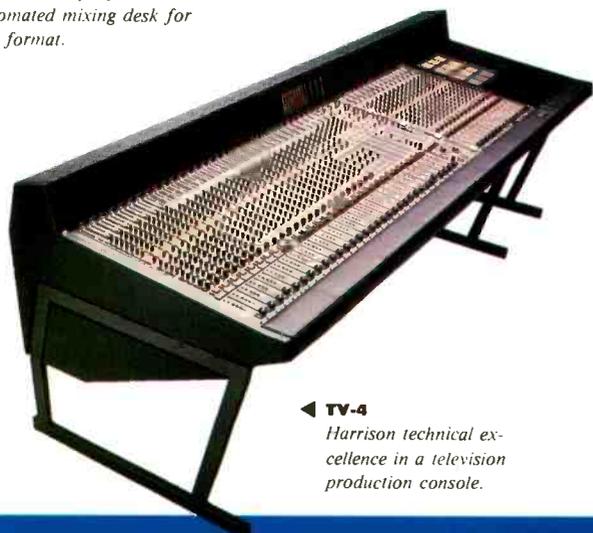
ALL NEW TAPE•ALL MAJOR BRANDS•VHS STOCK•GREAT PRICES•SUPER PROFESSIONALS

# HARRISON MEANS CONSOLES



▲ **SERIES 10**

*The ultimate fully automated mixing desk for any format.*



◀ **TV-4**

*Harrison technical excellence in a television production console.*

**AIR 790/PRO 790 ▶**

*The most advanced Harrison sound reproduction and editing technology in flexible high-performance on-air production console.*



◀ **AP100**

*Practical elegance in an on-air console.*

# SOUNDS GOOD.

The Harrison name is synonymous with consoles. There are thirteen models of Harrison console products for applications ranging from music recording, film, post-production, theatre and touring to radio and television broadcast, with six products relating to broadcast alone. These are:

The SeriesTen is even more revolutionary today than when it was introduced. . . the world's one and only *totally* automated mixing console and the world's best sounding console—now has Macintosh II-based hard disk automation. Update time is reduced to less than one second. With unlimited save/recall settings, snapshot automation and total dynamic automation, the SeriesTen in flexibility and usefulness in all audio applications is unsurpassed. The Harrison SeriesTen puts more audio console power in the hands of an operator than any other console available anywhere, at any price.

The TV-4 console utilizes sophisticated Harrison electronics in a broadcast production console designed specifically for stereo television. Created to minimize operational hassles, the TV-4 is available in a variety of mainframe sizes and module complements. The console can be configured to the operator's specifications with optional accessories including: video switcher/editor interface, machine control panels, several different mixdown automation systems, clock/timer display, and other built-in options and accessories unavailable from other console manufacturers.

The PRO-790 is a second generation production console designed from the feedback of the owners and users of its predecessor, the PRO-7. It has become the most popular Harrison product ever. This

highly successful, versatile console is available in configurations with serial link to video editors as well as configurations for OB Vans (remote broadcast) or station level production studios.

The AIR-790 is in the control rooms of the top radio stations in America and private stations in Europe. Its standard features far out-distance those offered by other companies as options: dual stereo and dual mono program, clean feed for mix-minus, auxiliary send, clock, up/down timer, test oscillator with pink noise generator, and muting of monitor feeds with tally. Its unique on-off-audition pushbutton system reduces talent/operator errors. The AIR-790—the undeniable leader in high quality on-air consoles.

The AP-100 reflects the first application of Harrison's digitally-controlled attenuator in a small broadcast console. The AP-100's logic control system allows the operator to program the console to accommodate the remote control of virtually any playback device, as well as to set any input for use as either a microphone or line level input. These features are only a few of the revolutionary features of the new AP-100—yet the AP-100 is available at a very affordable price.

The TV-3 (not pictured) is one of the most comprehensive stereo teleproduction consoles in the world. Designed for world class facilities, the TV-3 has full 24-track routing and monitoring and eight stereo audio subgroups. A flexible stereo and mono program output matrix allows the TV-3 to tackle the most complex tasks with "push of a button" ease.

We're committed to manufacturing, servicing and support of Harrison broadcast console products.

GLW ENTERPRISES, INC. • Manufacturers of Harrison Consoles • 437 Atlas Drive, Nashville, Tennessee 37211 USA • Telephone (615) 331-8800 • Facsimile (615) 331-8883 • Telex 413838 (GLW.NASH)

Circle 126 on Reader Service Card.

 **Harrison**  
by GLW

**FORTEL**

6420 Atlantic Blvd., #100,  
Norcross, GA 30071  
404 449-4343/800 241-5046  
TBCs; standards converters; col-  
or correctors.

**FOSTEX**

15431 Blackburn Av., Norwalk,  
CA 90650  
213 921-1112  
Digital ATRs; ATR synchronizers;  
portable audio mixers; post-pro-  
duction consoles; studio moni-  
tors; electronic audio editors;  
time code equip.

**FREELAND PRODUCTS CO.**

Rt. 7, Box 628, Covington, LA  
70433  
504 893-1243/800 624-7626  
Rebuilt RF tubes.

**FREZZOLINI ELECTRONICS**

5 Valley St., Hawthorne, NJ  
07506  
201 427-1160  
Lighting equip.; power supplies,  
batteries.

**FRIES ENGINEERING**

12032 Vose St., N. Hollywood,  
CA 91605  
818 765-3600  
Lens filters.

**FUJI PHOTO FILM U.S.A.**

555 Taxter Rd., Elmsford, NY  
10523  
914 789-8100  
Videotape; audio tape, carts.

**FUJINON**

10 Highpoint Dr., Wayne, NJ  
07470  
201 633-5600  
Lenses; HDTV production equip.

**FUTURE PRODUCTIONS**

630 Ninth Av., #403, New York,  
NY 10036  
212 333-3606  
Camera control unit.

**G****GABRIEL ELECTRONICS**

Box 70, Libby Rd., Scarborough,  
ME 04074  
207 883-5161  
Antennas, towers; transmission  
line.

**GARNER INDUSTRIES**

4200 N. 48 St., Lincoln, NE  
68504  
402 464-5911  
Tape erasers, degaussers.

**GDI**

1111 W. El Camino Real, Ste.  
109, Sunnyvale, CA 94087  
408 967-6675  
Time code equip.; serial-to-par-  
allel VTR interfaces.

**GE AMERICAN COMMUNICATIONS**

4 Research Way, Princeton, NJ  
08540  
609 987-4000  
Program distributor; digital audio  
transmission svce.; transponder  
leasing svce.

**GE BROADCAST SYSTEMS INTEGRATION**

701 Ashland Av., Folcroft, PA  
19032  
215 583-6800  
TV transmitters; transmitter re-  
mote control.  
See ad pg. 31 Circle #113

**GE LIGHTING**

Nela Park, Noble Rd., Bldg. 307,  
Dept. 4154, Cleveland, OH  
44112  
216 266-2187/800 626-2000  
Lighting equip.

**GE, PROJECTION DISPLAY PRODUCTS**

Electronics Park 6-206,  
Syracuse, NY 13221  
315 456-2152  
Video projectors.

**GEFEN SYSTEMS**

5068 San Feliciano Dr.,  
Woodland Hills, CA 91364  
818 884-6294  
Radio studio automation.

**GENERIC COMPUTER SYSTEMS**

357 N. Main St., Butler, PA  
16001  
412 283-1500  
Radio studio automation.

**GENEVA GROUP**

9909 S. Shore Dr., Plymouth,  
MN 55441  
612 546-5620  
Tape erasers, degaussers; head  
cleaners, degaussers; tension &  
alignment gauges.

**GENTNER ELECTRONICS CORP.**

1825 Research Way, Salt Lake  
City, UT 84119  
801 975-7200  
Telco interface equip.; audio  
processing; portable audio mix-  
ers; routing DA; frequency ex-  
tenders; transmitter remote con-  
trol.

**GEOCAM**

Box 704, Orange, NJ 07050  
201 672-2223  
Production matte box; follow fo-  
cus module.

**G&M POWER PRODUCTS**

943 N. Orange Dr., Los Angeles,  
CA 90038  
213 850-6800/800 621-0849  
Power supplies, batteries.

**GML**

7821 Bumet Av., Van Nuys, CA  
91405  
818 781-1022  
Audio processing; mic preamps;  
console automation; parametric  
EQ.

**ALAN GORDON ENTERPRISES**

1430 Chahuenga Blvd.,  
Hollywood, CA 90078  
213 466-3561  
Audio processing; mics, acces-  
sories; studio monitors; digital  
ATR; cart decks; turntables; au-  
dio routing switchers.

**GORMAN REDLICH MFG.**

257 W. Union St., Athens, OH  
45701  
614 593-3150  
EBS systems; digital antenna  
monitors; weather radios.

**GOTHAM AUDIO CORP.**

1790 Broadway, New York, NY  
10019-1412  
212 765-3410  
Audio processing; mics, acces-  
sories; studio monitors; digital  
ATR; digital audio workstations;  
cassette decks; CD equip.; turn-  
tables; audio reverb, special efx.

**GRAHAM-PATTEN SYSTEMS**

Box 1960, Grass Valley, CA  
95945  
916 273-8412  
Video keying systems; post-pro-  
duction consoles; subcarrier for  
digital audio transmission.

**THE GRASS VALLEY GROUP**

Box 1114, Grass Valley, CA  
95945  
916 478-3000/800 825-5127  
HDTV production equip.; charac-  
ter generators; 2D graphics sys-  
tems; 3D modeling, animation;  
video processing equip.; VTR  
editor/controllers; multisource  
video editors; random access  
video editors; production switch-  
ers; MC switchers; switching  
automation; video routing  
switchers, DAs; weather graph-  
ics/radar; election reporting sys-  
tems; sync & pulse gens/procs;  
post-production consoles; fiber-  
optic systems.

**GRAY COMMUNICATIONS CONSULTANTS**

Box 3229, Albany, GA 31708  
912 883-2121/800 472-9266  
ENG/EFP vehicles; SNG systems;  
mobile production units.

**GRAY ENGINEERING LABS**

504 W. Chapman Av., Ste. P,  
Orange, CA 92668  
714 997-4151  
Time code equip.

**THE GREAT AMERICAN MARKET**

826 N. Cole Av., Hollywood, CA  
90038  
213 461-0200  
Lighting equip.

**LYNN GREENBERG ELECTRONIC TELEPROMPTING**

24506 Thistle Ct., Newhall, CA  
91321  
805 253-1987  
Teleprompters.

**GRINNAN FIXTURE CO.**

16041 Georgetown St. NE,  
Minerva, OH 44657  
216 862-2799  
Studio furniture; tape storage  
systems; TV transmitters; trans-  
mitter remote control.

**GRUMMAN ELECTRONICS  
SYSTEMS**

Sunrise Hwy., Great River, NY  
11714  
516 224-6001  
Switching automation.

**JAMES GRUNDER  
ASSOCIATES**

5925 Beverly, Mission, KS  
66202  
913 831-0188  
Color correctors; digital video  
efx.

**GTE LIGHTING DIV.**

100 Endicott St., Danvers, MA  
01923  
508 777-1900  
Lighting equip.

**GTE SPACENET**

1700 Old Meadow Rd., McLean,  
VA 22102  
703 848-0100  
SNG systems; SNG voice com-  
munication service.

**H**

**HALLIKAINEN & FRIENDS**

141 Suburban Rd., Bldg. E4,  
San Luis Obispo,  
CA 93401-7590  
805 541-0200  
On-air consoles, mixers; remote  
monitoring systems; transmitter  
remote control.

**HARDIGG INDUSTRIES**

393 N. Main St., S. Deerfield,  
MA 01373  
413 665-2163  
Transportation cases.

**HARRIS CORP.,  
BROADCAST DIV.**

Box 4290, 3200 Wismann Ln.,  
Quincy, IL 62305-4290  
217 222-8200  
TBCs; frame synchronizers; elec-  
tronic still stores; character gen-  
erators; 2D graphics systems;  
3D modeling, animation; on-air  
consoles, mixers; digital ATRs;  
radio transmitters; TV transmit-  
ters; Antennas, towers; trans-  
mitter remote control.

**HARRIS CORP.,**

**BROADCAST MICROWAVE**  
960 Linda Vista, Mountain View,  
CA 94043  
415 969-9100  
ENG microwaves; intercity micro-  
wave; satellite earth stations;  
STLs, TSLs.

**HARRIS VIDEO SYSTEMS**

960 Linda Vista Av., Mountain  
View, CA 94043  
415 969-9100  
TBCs; frame synchronizers; elec-  
tronic still stores; character gen-  
erators; 2D graphics systems;  
3D modeling, animation.

**HARRISON SYSTEMS**

Box 290157, Nashville, TN  
37229-0157  
615 834-1184  
On-air consoles, mixers; post-  
production consoles; radio stu-  
dio automation.  
*See ad pg. 64 Circle #126*

**HARRISON CONSOLES**

437 Atlas Dr., Nashville, TN  
37211  
615 331-8800  
On-air mixers; post-production  
consoles; intercoms.

**H&E MICRO-TRAK CORP.**

165 Front St., Chicopee, MA  
01013  
413 733-8743/800 358-8729  
Portable audio mixers; on-air  
consoles, mixers; audio DAs;  
studio furniture; tape storage  
systems.

**HEDCO**

Box 1985, Grass Valley, CA  
95945  
916 273-9524  
Video routing switchers, DAs;  
sync & pulse gens/procs; audio  
routing switchers.

**KARL HEITZ, INC.**

34-11 62 St., Woodside, NY  
11377  
718 565-0004  
Camera support equip.; mic fish-  
poles.

**HEWLETT-PACKARD CO.**

1620 Signal Dr., TAFC-34,  
Spokane, WA 99220  
509 927-3893/800 752-0900  
Video test equip.; audio test  
equip.

**HIGH RESOLUTION SCIENCES**

726 N. Cahuenga Blvd., Los  
Angeles, CA 90038-3702  
213 463-9000  
Improved-NTSC encoding sys-  
tem.

**HIPOTRONICS, POWER  
PRODUCTS DIV.**

Rtes. 22 & 199, Drawer W,  
Millerton, NY 12546  
518 789-6464  
Automatic voltage regulators.

**RICHARD HIRSCHMANN OF  
AMERICA**

Industrial Row, Box 229,  
Riverdale, NJ 07457  
201 835-5002  
Connectors, jackfields; probes.

**HITACHI DENSHI AMERICA**

175 Crossways Park W.,  
Woodbury, NY 11797  
516 921-7200  
Studio cameras; ENG/EFP cam-  
eras HDTV production equip.;  
digital VTRs; 3/4-, 1/2-inch VTRs;  
video monitors; video projectors.  
*See ad pg. 40 Circle #117*

**HM ELECTRONICS**

6675 Mesa Ridge Rd., San  
Diego, CA 92121  
619 535-6060  
Mics, accessories; intercoms;  
telco interface equip.

**HMI LIGHTING**

8040 Remmet Av., Canoga Park,  
CA 91304  
818 703-5985  
Lighting equip.

**HOFFEND & SONS**

34 E. Main St., Honeoye, NY  
14471  
716 229-5998  
Lighting equip.; camera support  
equip.

**HOLADAY INDUSTRIES**

14825 Martin Drive., Eden  
Prairie, MN 55344  
612 934-4920  
RF radiation measurement equip.  
equip.

**HOODMAN CORP.**

Box 816, Hermosa Beach, CA  
90254  
213 379-6391  
Monitor sun shades.

**HOTRONIC**

1875 S. Winchester Blvd.,  
Campbell, CA 95008  
408 378-3883  
TBCs; frame synchronizers; digi-  
tal video efx; audio routing  
switchers.  
*See ad pg. 115 Circle #149*

**HOWE TECHNOLOGIES**

2300 Central Av., Boulder, CO  
80301  
303 444-4693/800 525-7520  
On-air consoles, mixers; audio  
TBC; studio furniture.

**HUBBARD**

**COMMUNICATIONS CORP./  
HUBCOM**  
12495 34 St. N., St. Petersburg,  
FL 33716  
813 572-7759/800 523-2397  
SNG systems; satellite earth sta-  
tions.

**HUGHEY & PHILLIPS**

2162 Union Pl., Simi Valley, CA  
93065  
805 581-5591  
Remote monitoring systems;  
tower lighting.

**HYBRID ARTS**

11920 W. Olympic Blvd., Los  
Angeles, CA 90064  
213 826-3777  
Audio heads, accessories.

**I**

**IDB COMMUNICATIONS  
GROUP**

10525 W. Washington Blvd.,  
Culver City, CA 90232  
213 870-9000  
Satellite transmission facilities;  
program distribution svcs.

**I-DEN VIDEOTRONICS**

9620 Chesapeake Dr., Ste. 204,  
San Diego, CA 92123  
619 492-9239  
TBCs; frame synchronizers.

**IGM COMMUNICATIONS**

4041 Home Rd., Bellingham,  
WA 98226  
206 733-4577  
Cart decks; radio studio automa-  
tion.

**IKEGAMI ELECTRONICS**

37 Brook Av., Maywood, NJ 07607  
201 368-9171/800 526-5368  
Studio cameras; ENG/EFP cameras camcorders; HDTV production equip.; telecines; video monitors; video projectors; ENG microwave.

**ILC TECHNOLOGY**

39 Java Dr., Sunnyvale, CA 94089  
408 745-7900  
Lighting equip.

**IMAGE VIDEO**

705 Progress Av., Unit 46, Scarborough, ON M1H 2X1 Canada  
416 438-3940  
MC switchers; video routing switchers, DAs; audio routing switchers.

**INDUSTRIAL ACOUSTICS**

1160 Commerce Av., Bronx, NY 10462  
212 931-8000  
Studio design & construction.

**INDUSTRIAL PROCESSOR CONTROLS**

2208 Gorman St., Camarillo, CA 93010  
805 484-8260  
Audio tape, carts.

**INDUSTRIAL RESEARCH PRODUCTS**

321 Bond St., Elk Grove Village, IL 60007  
312 439-3600/800 255-6993  
Audio processing; portable audio mixers; digital delays; power amps.

**INFORMATION DISPLAY SYSTEMS/SAIC**

100-C W. Forest Av., Englewood, NJ 07631  
201 567-2010  
HDTV projectors; equipment distributor; studio design & construction; technical/engineering consultant.

**INNOVATIVE AUTOMATION**

3316 19 Av. S.E., Rio Rancho, NM 87124  
505 891-0501  
Radio studio automation; cart decks; audio tape, carts; equipment distributor.

**INNOVISION OPTICS**

1318 Second St., Ste. 31, Santa Monica, CA 90401  
213 394-5510  
Lenses.

**INOVONICS**

ITI/Weather Network, 1305 Fair Av., Santa Cruz, CA 95060  
408 458-0552  
Audio processing; audio preamps; stereo generators.

**INTEGRATED MEDIA SYSTEMS/IMS**

1370 Willow Rd., #201, Menlo Park, CA 94025  
415 326-7030  
Digital audio workstations.

**INTELLIGENT LIGHT**

Box 65, Fairlawn, NJ 07410  
201 794-7550  
3D modeling, animation.

**INTELVIDEO**

42 Arrow Head Dr., Stamford, CT 06903  
203 322-1609  
NTSC encoders/decoders; video gating system for NTSC or PC video.

**INTERACTIVE MOTION CONTROL**

8671 Hayden Pl., Culver City, CA 90232  
213 559-6146  
Remote motion control.

**INTERGROUP TECHNOLOGIES**

2040 N.W. 67 Pl., Gainesville, FL 32606  
904 335-0901  
Production switchers; video routing switchers, DAs.

**INTERNATIONAL MICROWAVE CORP.**

65 Commerce Rd., Stamford, CT 06902  
203 323-5599

Telco interface equip.; radio transmitters; STLs, TSLs; transmitter remote control; ENG microwave; intercity microwave; business automation.

**INTERNATIONAL MUSIC/AKAI PROFESSIONAL**

1316 E. Lancaster, Ft. Worth, TX 76102  
817 336-5114  
Post-production consoles; studio monitors; studio ATRs; digital ATRs; cassette decks; audio routing switchers; digital samplers.

**INTERNATIONAL**

**TAPETRONICS/3M**  
2425 S. Main St., Bloomington, IL 61704

309 828-1381/800 447-0414  
Cart decks; audio tape, carts; audio routing switchers.  
See ad pg. 45 Circle #118

**INTERNATIONAL TELETRONICS**

Box 738, 1 Airport Dr., Williamstown, NJ 08094  
609 728-5152  
Radio transmitters; transmitter remote control; SCA equip.

**INTRAPLEX**

Box 2427, Littleton, MA 01460-3427  
508 486-3722  
STLs, TSLs.

**ISS ENGINEERING**

104 Constitution Dr., Ste. 4, Menlo Park, CA 94025  
415 853-0833/800 227-6288  
Weather graphics/radar; switching automation; TV transmitters; intercity microwave; SCA equip.; RF amps; FM & TV exciters; stereo generators.

**ITE/INNOVATIVE TELEVISION EQUIP.**

2550 Azurite Cir., Newbury Park, CA 91320  
805 498-8161  
Camera support equip.

**ITELCO U.S.A.**

1620 W. 32 Pl., Hialeah, FL 33012  
305 822-1421  
Radio transmitters; TV transmitters; STLs, TSLs; ENG microwave; cavities for TV, FM.

**ITI ELECTRONICS**

12 Kulick Rd., Fairfield, NJ 07006  
201 882-6405  
Audio amps, preamps; telco interface equip.; connectors, jackfields.

**ITS CORP.**

375 Valley Brook Rd., McMur-ray, PA 15317  
412 941-1500  
TV transmitters; MDS, SMATV systems; UHF & VHF exciters.

**ITT JENNINGS**

970 McLaughlin Av., San Jose, CA 95122  
408 292-4025/800 227-8452  
RF switches, capacitors.

**J****JAMPRO ANTENNAS**

6939 Power Inn Rd., Sacramento, CA 95828  
916 383-1177  
Antennas, towers.

**JASONI ELECTRONICS**

2900 E. Charleston Bldg., #197, Las Vegas, NV 89104  
702 384-0081  
Audio test equip.; audio tape analyzers.

**JBL PROFESSIONAL**

8500 Balboa Blvd., Northridge, CA 91307  
818 893-8411  
Studio monitors; audio amplifiers.

**JEFFERSON PILOT DATA SVCS.**

301 S. McDowell St., Ste. 500, Charlotte, NC 28204  
704 347-8081  
Business automation; newsroom computers.

**JENSEN TOOLS**

7815 S. 46 St., Phoenix, AZ 85004  
602 968-6241  
Power supplies, batteries; wire, cable; connectors, jackfields; tools; transportation cases.

**JENSEN TRANSFORMERS**

10735 Burbank Blvd., N. Hollywood, CA 91601  
213 876-0059  
Mic preamps; opamps, power amps; audio transformers.

**THE J-LAB CO.**

Box 6530, Malibu, CA 90264  
213 457-4090  
Standalone CCUs; safe title area gens; transcoders; Beta playback modification.

**JOHNSON ELECTRONICS**

Box 4728, 4301 Metric Dr., Winter Park, FL 32793-4728  
305 677-4030  
Antennas, towers; SCA equip.

**JVC PROFESSIONAL PRODUCTS CO.**

41 Slater Dr., Elmwood Park, NJ 07407

201 794-3900/800 582-5825

Studio cameras; ENG/EFP cameras camcorders; 3/4-, 1/2-inch VTRs; TBCs; frame synchronizers; video monitors; VTR editor/controllers; video routing switchers, DAs.

See ad pg. 29 Circle #111

**K**

**KAHN COMMUNICATIONS**

425 Merrick Av., Westbury, NY 11590

516 222-2221

Audio processing; telco interface equip.; AM stereo receiver; AM stereo equip.

**KAITRONICS CORP.**

890 Cowan Rd., Burlingame, CA 94010

415 697-9102

Portable audio mixers; on-air consoles, mixers; production switchers; MC switchers; video routing switchers, DAs.

**KAMAN SCIENCES**

1500 Garden of the Gods Rd., Colorado Springs, CO 89007

719 599-1523

Business automation.

**KANGAROO VIDEO PRODUCTS**

10845 Wheatlands Av., Ste. C, Santee, CA 92071

619 562-9696

Transportation cases.

**KAVOURAS**

6301 34 Av. S., Minneapolis, MN 55450

612 726-9515/800 328-2278

Weather graphics/radar.

**KAY ELEMETRICS CORP.**

12 Maple Av., Pine Brook, NJ 07058

201 227-2000

Audio test equip.; rotary attenuators.

**KAY INDUSTRIES**

604 N. Hill St., South Bend, IN 46617

219 234-0171/800 348-5257

Rotary phase converter for radio & TV transmitters.

**KELTEC FLORIDA**

50 Second St., Box 862, Shalimar, FL 32579

904 651-9749

Satellite earth stations; RF amps.

**K&H PRODUCTS/PORTABRACE**

Box 246, N. Bennington, VT 05257

802 442-8171

Transportation cases.

**KINEMATRICS/TRUETIME**

3243 Santa Rose Av., Santa Rosa, CA 95407

707 528-1230

Time code equip.

**KINGS ELECTRONICS CO.**

40 Marbledale Rd., Tuckahoe, NY 10707

914 793-5000

Connectors, jackfields.

**KINTEK**

224 Calvary St., Box 9143, Waltham, MA 02254-9143

617 894-6111

Stereo synthesizers, polarity correctors.

**KINTRONIC LABS**

Box 845, Bristol, TN 37621-0845

615 878-3141

Equipment enclosures; RF components.

**KLARK-TEKNIK**

30B Banfi Plaza N., Farmingdale, NY 11735

516 249-3660

Post-production consoles; audio processing.

**KLIEGL BROS.**

5 Aerial Way, Syosset, NY 11791

516 937-3900

Lighting equip.

**KLINE TOWERS**

1225 Huger St., Box 1013, Columbia, SC 29201

803 251-8000

Antennas, towers.

**KNOX VIDEO**

8547 Grovemont Cir., Galthersburg, MD 20877

301 840-5805

Character generators; 2D graphics systems.

**L**

**LAIRD TELEMEDIA**

2424 S. 2570 West, Salt Lake City, UT 84119

801 972-5900

Color correctors; telecines; character generators; video routing switchers, DAs.

**LAKE SYSTEMS CORP.**

287 Grove St., Newton, MA 02116

617 244-6881/800 848-4840

Cart automation/MERPS; studio design & construction.

**LANDY ASSOCIATES**

1890 E. Marlon Pike, Cherry Hill, NJ 08003

609 424-4660

Equipment distributor; studio design & construction; mobile vehicle construction; technical/engineering consultant.

**LDL COMMUNICATIONS/LARCAN**

14440 Cherry Lane Ct., #201, Laurel, MD 20707

301 498-2200

TV transmitters; Antennas, towers.

**LEA DYNATECH**

12516 Lakeland Rd., Santa Fe Springs, CA 90670

213 944-0916/800 654-8087

Surge suppressors.

**LEADER INSTRUMENTS**

380 Oser Av., Hauppauge, NY 11788

516 231-6900/800 645-5140

Video test equip.; audio test equip.

**LECTROSONICS**

581 Laser Rd. N.E., Rio Rancho, NM 87124

505 892-4501

RF mics.

**LEE COLORTAN**

1015 Chestnut St., Burbank, CA 91506

818 843-1200

Lighting equip.

**LEITCH VIDEO**

825K Greenbrier Cir.,

Chesapeake, VA 22320

804 424-7920/800 231-9673

10 Dyas Rd., Don Mills, ON M3B 1V5 Canada

416 445-9640/800 387-0233

Frame synchronizers; video processing equip.; video test equip.; electronic still stores;

video routing switchers, DAs;

sync & pulse gens/procs; clocks,

timers.

See ad pg. 69 Circle #127

**LEMO USA**

335 Tesconi Cir., Santa Rosa, CA 95401

707 578-8811

Connectors, jackfields.

**LENCO ELECTRONICS**

300 N. Maryland St., Jackson, MO 63755

314 243-3147/800 325-8494

TBCs; NTSC encoders/decoders; video delay lines; video monitors; video test equip.; sync &

pulse gens/procs; video routing switchers, DAs; audio routing

switchers.

**LEONETTI CO.**

5609 Sunset Blvd., Hollywood, CA 90028

213 469-2987

Lighting equip.

**LERRO ELECTRICAL CORP.**

3125 N. Broad St., Philadelphia, PA 19132

215 223-8200

Studio design & construction; mobile vehicle construction.

**LEXICON**

100 Beaver St., Waltham, MA 02154

617 891-6790

Digital audio workstations; audio processing; audio reverb, special efx.

**LIGHTING METHODS**

1099 Jay St., Rochester, NY 14611

716 328-1020

Lighting equip.

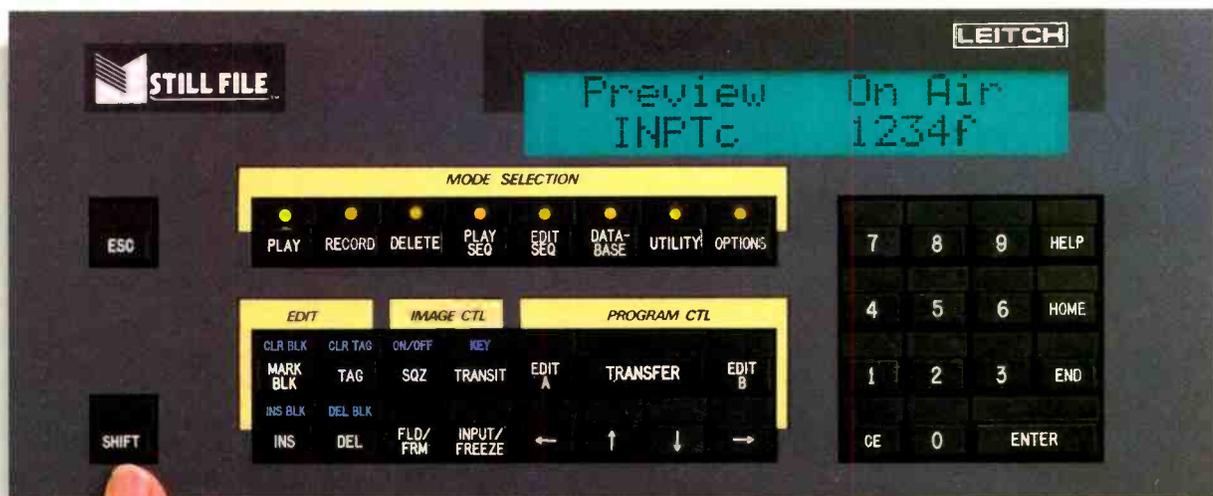
**LIGHTNING ELIMINATORS & CONSULTANTS**

6687 Arapahoe Rd., Boulder, CO 80303

303 447-2828

Lightning dissipation systems.

# ONE TOUCH... AND YOU'LL SHIFT TO LEITCH



Once you get your hands on a STILL FILE by Leitch, you won't want to let go. The reason is simple ... the STILL FILE is the best designed still store on the market ... fully integrated and with a host of features that are as easy as the touch of a button.

Call Leitch today for a hands-on demonstration, and we'll even leave a STILL FILE at your studio for a while.

We're confident we won't have to pick it up again.

Don't just reach for the nearest brand name ... reach for the best. STILL FILE by Leitch.

**LEITCH**

**D-2**

Leitch Video of America, Inc., 825K Greenbrier Circle, Chesapeake, VA 23320 - Tel: (804) 424-7920 or (800) 231-9673 Fax: (804) 424-0639  
Leitch Video International Inc., 10 Dyas Rd., Don Mills, Ont., Canada M3B 1V5 - Tel: (800) 387-0233 Fax: (416) 445-0595 Telex: 06-986241

Circle 127 on Reader Service Card.

**LIGHTNING MASTER CORP.**

Box 10597, Brooksville, FL  
34601-0597  
904 799-6800

Lightning dissipation equip.

**LIPSNER-SMITH CO.**

4700 Chase Av., Lincolnwood, IL  
60646

312 677-3000/800 323-7520

Ultrasonic film cleaning equip.

**LISTEC VIDEO CORP.**

30 Oser Av., Hauppauge, NY  
11788

516 273-3020

Teleprompters.

**LNR COMMUNICATIONS**

180 Marcus Blvd., Hauppauge,  
NY 11788

516 273-7111

FM exciters, modulators; upcon-  
verters, downconverters; LNAs.

**LOGITEK**

3320 Bering Dr., Houston, TX  
77057

713 782-4592/800 231-5870

On-air consoles, mixers; post-  
production consoles; console  
automation; studio monitors; au-  
dio DAs; preamps, line amps,  
power amps; LED displays.

See ad pg. 110 Circle #142

**LOWEL-LIGHT MFG.**

140 58 St., Brooklyn, NY 11220-  
2516

718 921-0600

Lighting equip.

**LPB**

28 Bacton Hill Rd., Frazer, PA  
19355

215 644-1123

Audio processing; on-air con-  
soles, mixers; turntable  
preamps; audio DAs; radio trans-  
mitters.

**L&R COMMUNICATIONS LTD.**

Box 3807, Sioux City, IA 51102

712 252-4101/800 831-0974

Antennas, towers.

**LTM CORP. OF AMERICA**

11643 Pendleton St., Sun  
Valley, CA 91352

818 767-1313

Lighting equip.

**LUXOR**

2245 Delaney Rd., Waukegan,  
IL 60085

312 244-1800

Lighting equip.

**L-W ATHENA**

255 Easy St., Unit C, Simi Valley,  
CA 93065

805 522-3284

Telecines

**LYON LAMB VAS**

4531 Empire Av., Burbank, CA  
91505

818 843-4831

Video animation controllers;  
NTSC encoders/decoders; sync &  
pulse gens/procs.

**MACKENZIE LABORATORIES**

5507 N. Peck Rd., Arcadia, CA  
91006

818 579-0440

Cart decks.

**MACKIE DESIGNS**

7512 218 S.W., #5, Edmonds,  
WA 98020

206 771-4927

Post-production consoles.

**M/A-COM MAC**

5 Omni Way, Chelmsford, MA  
01824

617 272-3100

ENG microwave; intercity micro-  
wave.

**MAGNA-TECH  
ELECTRONIC CO.**

630 Ninth Av., New York, NY  
10036

212 586-7240

Telecines; time code equip.;  
sprocketed mag film transports.

See ad pg. 53 Circle #120

**MAGNETIC REFERENCE LAB**

229 Polaris Av. #4, Mountain  
View, CA 94043

415 965-8187

Audio test equip.

**MAGNI SYSTEMS**

9500 SW Gemini Dr., Beaverton,  
OR 97005

503 626-8400/800 237-5964

Video test equip.

See ad pg. 72 Circle #129

**MAGNUM TOWERS**

9370 Elder Creek Rd.,  
Sacramento, CA 95829

916 381-5053

Antennas, towers.

**MARATHON PRODUCTS**

334 W. Boylston St., W.  
Boylston, MA 01583

508 853-0988

Audio tape, carts; ATR head  
cleaners, degaussers; alignment  
& tension gauges.

**MARCOM**

Box 66507, Scotts Valley, CA  
95066

408 438-4273

Radio transmitters; antennas,  
towers; SCA equip.; RF test  
equip.; FM compressor/limiters.

**MARCONI COMMUNICATION  
SYSTEMS**

Marconi House, New Street,  
Chelmsford, Essex, CM1 1PL

England

24 535 3221

TV transmitters; radio transmit-  
ters; telecines; SNG systems.

**MARCONI INSTRUMENTS**

3 Pearl Ct., Allendale, NJ 07401

201 934-9050/800 233-2955

Video test equip.

**MARK ANTENNA PRODUCTS**

2180 S. Wolf Rd., Des Plaines,  
IL 60018

312 694-3279

Satellite earth stations; trans-  
mission line; RF connectors.

**MARTI ELECTRONICS**

1501 N. Main St., Cleburne, TX  
76031

817 645-9163

Remote pickup, RENG; ENG mi-  
crowave; intercity microwave;  
SCA equip.; STLs, TSLs; trans-  
mitter remote control; antennas,  
towers; transmission line.

**MATCO**

427 Perrymont Av., San Jose, CA  
95125

408 998-1655

Cart automation, MERPS (se-  
quencing & commercial inser-  
tion); routing switchers, DAs;  
tape duplication control sys-  
tems.

**MATRIX SYSTEMS CORP.**

5177 N. Douglas Fir Rd.,  
Calabasas, CA 91302

818 992-6776

Production switchers; routing  
switchers, DAs.

**MATTHEWS STUDIO****EQUIPMENT**

2405 Empire Av., Burbank, CA  
91504

818 843-6715

Lighting equip.; camera support  
equip.

**MAXELL CORP. OF AMERICA**

22-08 Rt. 208, Fairlawn, NJ  
07410

201 794-5900/800 533-2836

Videotape; audio tape, carts.

See ad pg. 86-87

Circle #135

**MAZE BROADCAST**

Box 100186, Birmingham, AL  
35210

205 956-2227

Used equipment distributor.

**McCURDY RADIO INDS.**

108 Camforth Rd., Toronto, ON  
M4A 2L4 Canada

416 751-6262

Intercoms; telco interface  
equip.; on-air consoles, mixers;

audio test equip.; audio DAs;

audio delay systems.

See ad pg. 109 Circle #141

**MCG ELECTRONICS**

12 Burt Dr., Deer Park, NY  
11729

516 586-5125/800 851-1508

Surge protectors.

See ad pg. 61 Circle #124

**MCI/MICRO****COMMUNICATIONS**

Box 4365, Manchester, NH  
03108

603 624-4351

Antennas, towers; MDS, SMATV  
systems; waveguide, transmis-  
sion line; technical/engineering

consultant

**MCL**

501 S. Woodcreek Rd.,  
Bolingbrook, IL 60439-4999

312 759-9500

C-band, Ku-band TWT amplifier  
systems.

**McMARTIN INDUSTRIES**

201 35 Av., Council Bluffs, IA  
51501

712 366-1300

Audio processors; field portable  
mixers; intercoms; turntables;

preamps, line amps, power  
amps; EBS systems; radio trans-  
mitters; TV transmitters; MTS

equip.; SCA equip.; RF test  
equip.; exciters; stereo genera-  
tors; RF amps, filters.

Newsroom computers; switching  
automation.

**MEDIA COMPUTING**

3506 E. Meadow Dr., Phoenix,  
AZ 85032

602 482-9131

Newsroom computers; switching  
automation.

# EEV's TOTAL COMMITMENT

## ... what's in it for you?

The most comprehensive range of wideband klystrons

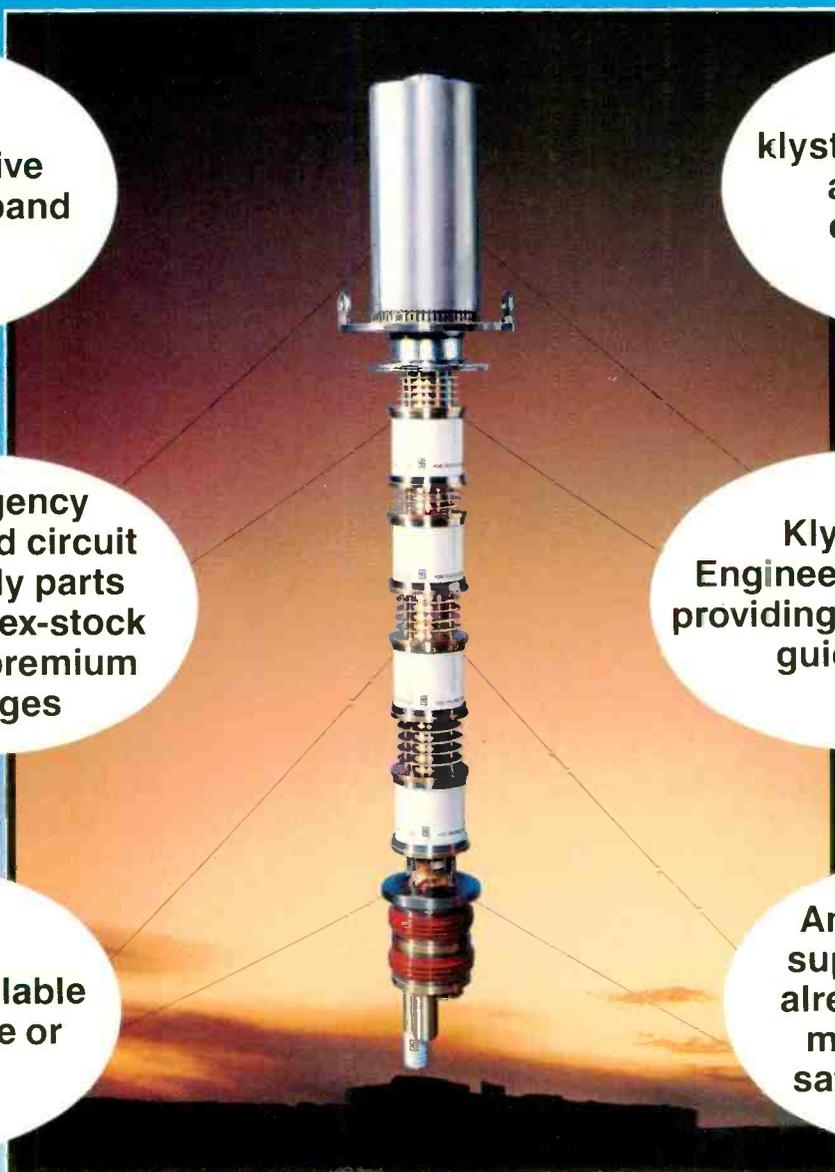
Today's klystron technology available on established products

Emergency tubes and circuit assembly parts available ex-stock with no premium charges

Klystron Engineering Notes providing application guidance

Technical assistance available over the phone or on-site

An established support scheme already servicing more than 200 satisfied clients



This adds up to the most cost effective package for you, the UHF TV Broadcaster.

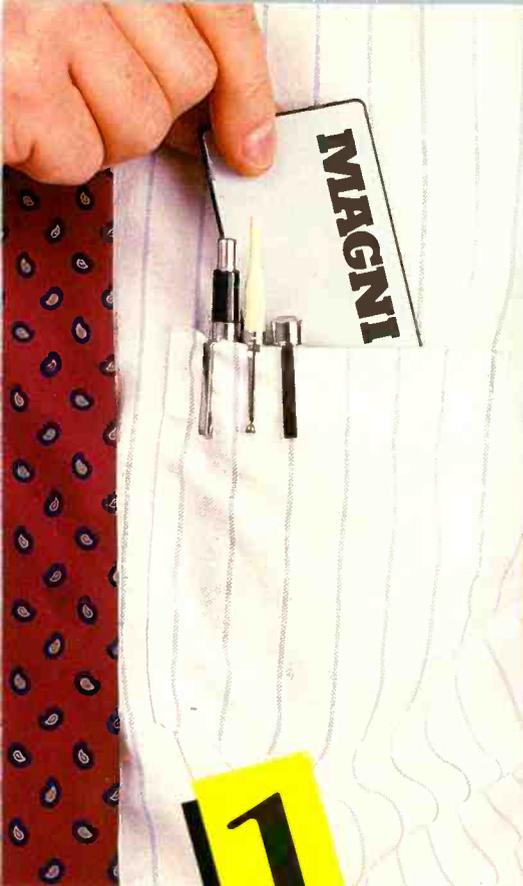
For more information please call:  
1-800-DIAL-EEV

# EEV Klystrons

USA: EEV Inc, 4 Westchester Plaza, Elmsford, NY 10523 Telephone: (914) 592 6050 Telex: 6818096 Fax: (914) 682 8922

CANADA: EEV Canada Ltd, 67 Westmore Drive, Rexdale, Ontario M9V 3Y6 Telephone: (416) 745 9494 Telex: 06 989363 Fax: (416) 745 0618

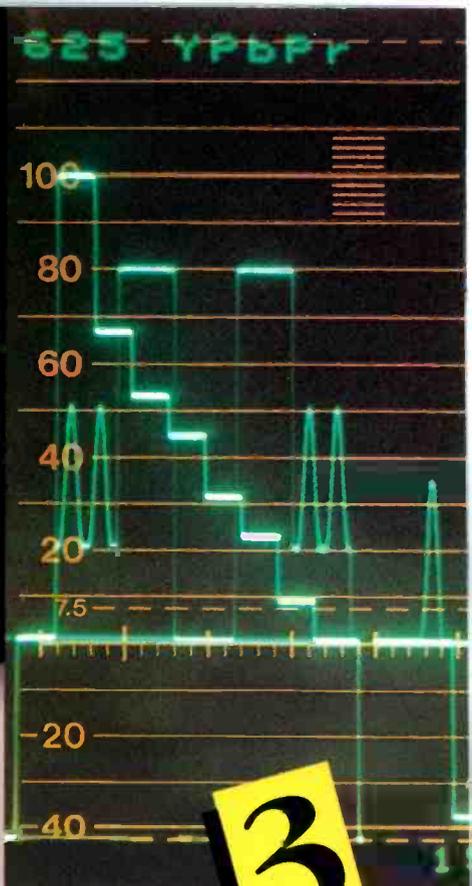
UK: EEV, Waterhouse Lane, Chelmsford, Essex CM1 2QU, England Telephone: (0245) 493493 Telex: 99103 Fax: (0245) 492492



1



2



3

Figuring out what test signals you need to test all the video formats you use — that's the *easy* part. What's complicated is getting them where you need them to go. Who has room for two or three different signal generators for every rack of equipment?

MAGNI knows that space is as important to you as function. And the new Signal Creator™ brings you the best of both worlds: all the flexibility of a fixed-format/programmable generator in one go-anywhere package.

Inside the unit, precision hardware provides you

with full 10-bit digital signal generation. Outside Signal Creator™, signals are stored on a memory card that fits in your wallet. Testing NTSC equipment? Insert the card, and a full NTSC signal set is automatically downloaded and stored: just make your choice from the display menu. Need to switch to component signals? D1 or D2? PAL? Choose another



memory card, and the new format is there at your fingertips — you can even load Signal Creator™ with custom signals tailored to your needs.

No duplicate instruments or complicated programming: just multi-format testing where you need it, when you need it.

An idea that's as easy as...

## **MAGNI®**

MAGNI SYSTEMS, INC.  
9500 SW Gemini Drive  
Beaverton, OR 97005 USA  
(503) 626-8400  
(800) 237-5964  
FAX (503) 626-6225  
TLX 650-2769743MCI

Magni is a registered trademark of Magni Systems, Inc. Magni Systems and Signal Creator are trademarks of Magni Systems, Inc.

**MEDIA CONCEPTS**

Box 7037, Rocky Mountain, NC  
27804

919 977-3600

Used broadcast equip. sales.

**MEDIA TOUCH SYSTEMS**

4012 Mendenhall Dr., Dallas, TX  
75244

214 484-5104/800 321-5104

Radio studio automation equip.

**MERET**

1815 24 St., Santa Monica, CA  
90404

919 828-7496

Fiberoptic systems.

**MERLIN SNELL & WILCOX**

1890 Embarcadero Rd., Palo  
Alto, CA 94303

415 856-0900

Standards converters.

**MICRO CONTROLS**

Box 728, Burleson, TX 76028  
817 295-0965

Transmitter remote control;  
STLs, TSLs; FM SCA equip.

**MICRODYNE CORP.**

491 Oak Rd., Ocala, FL 32672  
904 687-4633

Satellite earth stations.

**MICROFLECT CO.**

Box 12985, 3575 25 St. S.E.,  
Salem, OR 97309

503 363-9267

Towers.

**MICRON AUDIO PRODUCTS**

210 Westlake Dr., Valhalla, NY  
10595

914 761-6520

RF mics.

**MICROSONICS**

60 Winter St., Weymouth, MA  
02188-3336

617 337-4200

Video delay lines.

**MICROTIME**

1280 Blue Hills Av., Bloomfield,  
CT

203 242-4242/800 243-1570

TBCs; frame synchronizers; video  
processing equip.; 2D graphics  
systems; 3D modeling, anima-  
tion; digital video efx.

**MICROTRAN CO.**

145 E. Milneola Av., Box 236,  
Valley Stream, NY 11582

516 561-6050

Tape erasers, degaussers; audio  
& video head cleaners, degauss-  
ers.

**MICROWAVE FILTER CO.**

6743 Kinne St., E. Syracuse, NY  
13057

315 437-3953/800 448-1666

Passive electronic filters.

**MICROWAVE RADIO CORP.**

847 Rogers St., Lowell, MA  
01852

508 459-7655

ENG microwave; intercity micro-  
wave.

**MIDWEST COMMUNICATIONS  
CORP.**

1 Sperti Dr., Edgewood, KY  
41017

606 331-8990/800 543-1584

Equipment distributor; TV trans-  
mitters; ENG/EFP vehicles; SNG  
systems; mobile production  
units; mobile vehicle construc-  
tion.

See ad pg. 6 Circle #102

**MIKROLAB**

4121 Redwood Av., Los  
Angeles, CA 90066

213 306-0120

Studio monitors; line amps; VU  
meters.

**MILLER FLUID HEADS**

410 Garibaldi Av., Lodi, NJ  
07650

201 473-9592

Camera support equip.

**MILLER PROFESSIONAL  
EQUIPMENT**

10816 Burbank Blvd., N.  
Hollywood, CA 91601

818 766-9451

Lighting equip.

**MINOLTA CORP.**

101 Williams Dr., Ramsey, NJ  
07446

201 825-4000

Colorimeters.

**MIRALITE COMMUNICATIONS**

4350 Von Karman Av., Ste. 430,  
Newport Beach, CA 92660

714 474-1900

Satellite earth stations.

**MITCHELL CAMERA CORP.**

18750 Oxnard St., Tarzana, CA  
91356

818 609-7733

Camera support equip.; power  
supplies, batteries.

**MITSUBISHI PRO AUDIO**

225 Parkside Dr., San Fernando,  
CA 91340

818 898-2341

Field portable mixers; on-air con-  
soles, mixers; field ATRs; digital  
ATR; cart decks.

**MITSUBISHI PROFESSIONAL  
ELECTRONICS DIV.**

110 New England Av. W.,  
Piscataway, NJ 08854

201 981-1414

Video monitors; video projectors.

**MOBILE-CAM PRODUCTS**

340-F Vemon Way, San Diego,  
CA 92020

619 441-1295

ENG/EFP vehicles; mobile vehicle  
construction.

**MODULAR AUDIO PRODUCTS**

1 Roned Rd., Shirley, NY 11967  
516 345-3100

Audio processors; audio test  
equip.; audio routing switchers;  
audio DAS; preamps, line amps,  
power amps.

**MODULATION ASSOCIATES**

897 Independence Av.,  
Mountain View, CA 94043

415 962-8000

Satellite earth stations; di-  
plexers, multiplexers, modula-  
tors.

**MODULATION SCIENCES**

115 Myrtle Av., Brooklyn, NY  
11201

718 625-7333

MTS equip.; stereo generators;  
SAP generators; spatial image  
enhancer; interface between  
Tektronix VM 700 and broadcast  
remote control systems.

**MODULITE/BARDWELL &  
MCALISTER**

2601 Emplre Av., Burbank, CA  
91504

818 843-6811

Lighting equip.

**MOLE-RICHARDSON**

937 N. Sycamore Av.,  
Hollywood, CA 90038-2384

213 851-0111

Lighting equip.

**MONROE ELECTRONICS**

100 Housel Av., Lyndonville, NY  
14098

716 765-2254

Transmitter remote control; telco  
interface equip.

**MONTAGE GROUP**

1 W. 85 St., New York, NY  
10024

212 362-0892

Random-access video editors.

**MORTON HI-TECH  
FURNISHINGS**

298 N. Smith Av., Corona, CA  
91720

714 279-5770/800 255-4007

Studio design & construction;  
mobile vehicle construction.

**MOSELEY ASSOCIATES**

111 Castilian Dr., Santa  
Barbara, CA 93117-9093

805 968-9621

Radio transmitters; TV transmit-  
ters; remote monitoring sys-  
tems; transmitter remote con-  
trol; remote pickup, RENG.

**MOTOROLA AM STEREO**

1216 Remington Rd.,  
Schaumburg, IL 60173

312 576-0554

STLs, TSLs; AM stereo equip.

**MOTOROLA COMMUNICA-  
TIONS & ELECTRONICS**

17-22 Whitestone Expy.,  
Whitestone, NY 11357

718 746-1100

Intercoms; VU & LED audio level  
displays; intercity microwave;  
antennas, towers; two-way radio  
communications; transmission  
line; RF amps; transmitter, pow-  
er tubes; STLs, TSLs; power sup-  
plies, batteries.

**MPB TECHNOLOGIES**

1725 N. Service Rd., Transcan  
Hwy., Dorval, QU H9P 1J1

Canada

514 683-1490

Character generators.

**M&R DATA SERVICES**

2205 First St., Unit 111, Simi  
Valley, CA 93065

805 582-1298

VTR editor/controllers; newsroom  
computers.

**MU-DEL ELECTRONICS**

2426 Linden Ln., Silver Spring,  
MD 20910

301 587-6087

RF amps, attenuators, filters;  
satellite upconverters, downcon-  
verters; LNAs.

**MULTI-TRACK MAGNETICS,  
DIV. MATRIX CORP.**  
115 Roosevelt Av., Belleville, NJ  
07109  
201 751-6833  
Telecines; tape synchronizers;  
mag film dubbers.

**MULTIDYNE ELECTRONICS**  
Box 528, Locust Valley, NY  
11560  
516 671-7278  
Time code equip.; sync & pulse  
gens/procs; character genera-  
tors; routing switchers, DAs; vid-  
eo test equip.; audio DAs.

**MUSCO MOBILE LIGHTING**  
Box 73, Oskaloosa, IA 52577  
515 673-0491  
Mobile lighting rentals.

**MYCOMP TECHNOLOGIES  
CORP.**  
921 Calle Amanecer, Ste. L, San  
Clemente, CA 92672  
714 498-2038  
Routing switchers, DAs; audio  
DAs; studio design & construc-  
tion.

**MZB/GRAY**  
6221 N. O'Connor, #110, Irving,  
TX 75039  
214 869-4500  
ENG/EFP vehicles.



**NADY SYSTEMS**  
1145 65 St., Oakland, CA  
94608  
415 652-2411  
RF microphones; portable two-  
way radios.

**NAGRA MAGNETIC  
RECORDERS**  
19 W. 44 St., #715, New York,  
NY 10036  
212 840-0999  
Field ATRs.

**NAKAMICHI AMERICA CORP.**  
19701 S. Vermont Av., Torrance,  
CA 90502  
213 538-8150/800 421-2313  
Cassette decks; digital ATRs;  
headphones.

**NALPAK VIDEO SALES**  
1937C Friendship Dr., El Cajon,  
CA 92020  
619 258-1200  
Transportation cases; test  
charts.

**NARDA MICROWAVE**  
435 Moreland Rd., Hauppauge,  
NY 11788-3994  
516 231-1700  
ENG microwave.

**NAUTEL**  
201 Target Ind. Cir., Bangor, ME  
04401  
207 947-8200  
Radio transmitters.

**NEC AMERICA, BROADCAST  
EQUIPMENT DIV.**  
383 Omni Dr., Richardson, TX  
75080-3545  
214 907-4710/800 323-6656  
TV transmitters; studio cameras;  
ENG/EFP cameras; solid state re-  
corders; digital video efx; frame  
synchronizers.

**NEOTEK CORP.**  
1154 W. Belmont Av., Chicago,  
IL 60657  
312 929-6699  
Post-production consoles.

**NEUMADE PRODUCTS CORP.**  
Box 5001, Norwalk, CT 06856  
203 866-7600  
Empty audio reels, carts; tape  
storage systems; film cleaners.

**NEUTRIK USA**  
1600 Malone St., Millville, NJ  
08332  
609 327-3113  
Connectors, jackfields; audio  
test equip.

**RUPERT NEVE INC.**  
Berkshire Industrial Park,  
Bethel, CT 06801  
203 744-6230  
Field portable mixers; on-air con-  
soles, mixers; post-production  
consoles.

**NEW ENGLAND DIGITAL**  
49 N. Main St., White River  
Junction, VT 05001  
802 295-5800  
Digital audio workstations.

**NIKON**  
623 Stewart Av., Garden City, NY  
11530  
516 222-0200  
Lenses.  
*See ad pg. 18, 90*  
*Circle #108, 136*

**NORPAK CORP.**  
10 Hearst Way, Kanata, ON K2L  
2P4 Canada  
613 592-4164  
Teletext equip.

**NORTH HILLS ELECTRONICS**  
1 Alexander Pl., Glen Cove, NY  
11542-3796  
516 671-5700  
Transformers, electronic compo-  
nents.

**NORTHERN MAGNETICS**  
Box 16409, Minneapolis, MN  
55416  
612 333-3071  
Replacement & rebuilt audio  
heads; head cleaners & de-  
gaussers; alignment & tension  
gauges.

**NORTRONICS**  
8101 10 Av. N., Minneapolis,  
MN 55427  
612 545-0401/800 228-5640  
Replacement audio heads.

**NOVA SYSTEMS**  
50 Albany Tpke., Canton, CT  
06019  
203 693-0238  
TBCs; frame synchronizers.  
*See ad pg. 59* *Circle #123*

**NPR SATELLITE SVCS.**  
2025 M St. N.W., Washington,  
DC 20036  
202 822-2000  
Satellite distribution svcs.

**FRED A. NUDD CORP.**  
1743 Rt. 104, Box 577, Ontario,  
NY 14519  
315 524-2531  
Towers.

**NUMARK ELECTRONICS**  
503 Newfield Av., Edison, NJ  
08837  
201 225-3222  
Compact disc equipment; audio  
processors; field portable mix-  
ers; turntables.

**NURAD**  
2165 Druid Park Dr., Baltimore,  
MD 21211  
301 462-1700  
STLs, TSLs; ENG microwave; in-  
tercity microwave.

**NYTONE ELECTRONICS**  
2424 S. 900 West, Salt Lake  
City, UT 84119  
801 973-4090  
Telecines; color correctors.



**O'CONNOR ENGINEERING  
LABS**  
100 Kalmus Dr., Costa Mesa, CA  
92626  
714 979-3993  
Camera support equip.

**ODETICS BROADCAST**  
1515 S. Manchester Av.,  
Anaheim, CA 92802  
714 774-2200/800 243-2001  
Cart automation, MERPS.  
*See ad pg. 105* *Circle #140*

**OKI ELECTRIC INDUSTRY CO.**  
C/o SAECO Intl., 11122 E. Chey  
Chase Dr., Glendale, CA 91205  
213 245-7708  
Standards converters.

**OKTEL CORP.**  
1220 Page Av., Fremont, CA  
94538  
415 490-3100  
TBCs; weather graphics/radar;  
electronic still stores.

**OLD DOMINION BROADCAST  
ENGINEERING SVCE.**  
1101 Front St., Richmond, VA  
23222  
804 321-4506  
Telco interface equip.; cassette  
decks; rebuilt audio heads; inter-  
coms; transmitter remote con-  
trol; remote pickup, RENG.

**OLESEN**  
1535 Ivar Av., Hollywood, CA  
90028  
213 461-4631  
Lighting equip.

**OMICRON VIDEO**  
21822 Lassen St., #L,  
Chatsworth, CA 91311-3680  
818 700-0742  
NTSC encoders/decoders; MC  
switchers; routing switchers,  
DAs; sync & pulse gens/procs;  
NTSC genlock for Amiga comput-  
er.

**OMNIMOUNT SYSTEMS**  
10850 Vanowen St., N.  
Hollywood, CA 91605-6470  
818 766-9000  
Monitor mounting brackets.

#### OMNIMUSIC

52 Main St., Port Washington,  
NY 11050

516 883-0121/800 828-6664

Music/sound efx libraries.

#### ONAN CORP.

1400 73 Av. N.E., Minneapolis,  
MN 55432

612 574-5000/800 888-6626

Power generators, inverters.

#### OPAMP LABS

1033 N. Sycamore Av., Los  
Angeles, CA 90038

213 934-3566

Field portable mixers; on-air  
consoles, mixers; post-production  
consoles; noise reduction sys-  
tems; audio & video DAs, audio  
routing switchers; video pulse  
amps.

#### OPTICAL DISC CORP.

17517-H Fabrica Way, Cerritos,  
CA 90701

714 522-2370

Video processing equip.; video-  
disc recording system; playback  
system.

See ad pg. 24 Circle #110

#### ORBAN ASSOCIATES

645 Bryant St., San Francisco,  
CA 94107

415 957-1067/800 227-4498

Audio processors; AM stereo  
equip.

#### ORION RESEARCH

4650 W. 160 St., Cleveland, OH  
44135

216 267-7700/800 822-8346

On-air consoles, mixers; post-  
production consoles.

#### ALLEN OSBORNE ASSOCIATES

756 Lakefield Rd., Bldg. J,  
Westlake Village, CA 91361

805 495-8420

Antennas, towers.

#### OSRAM CORP.

110 Bracken Rd., Montgomery,  
NY 12549

914 457-4040/800 431-9980

Lighting equip.

#### OTARI CORP.

378 Vintage Park Dr., Foster  
City, CA 94004

415 341-5900

Studio ATRs; field ATRs; digital  
ATR; audio heads, accessories;  
cart decks; ATR synchronizers;  
3/4-, 1/2-inch VTRs; time code  
equip.; high-speed duplicator.



#### PACIFIC RADIO ELECTRONICS

1351 Cahuenga Blvd.,  
Hollywood, CA 90028

213 462-1392

Equipment distributor.

#### PACIFIC RECORDERS & ENGINEERING

2070 Las Palmas Dr., Carlsbad,  
CA 92007

619 438-3911

Post-production consoles; on-air  
consoles, mixers; field portable  
mixers; cart decks; noise reduc-  
tion systems; audio routing  
switchers; audio DAs; phono  
preamps; studio furniture; studio  
design & construction.

#### PACKAGED LIGHTING SYSTEMS

Box 285, 29-41 Grant St.,  
Walden, NY 12586

914 778-3515

Lighting equip.

#### PACO ELECTRONICS USA

1824-B W. 169 St., Gardena, CA  
90247

213 639-1753

Power supplies, batteries.

## When the VIDEO AGE was born . . . ANVIL CASES WERE THERE

- 6 distinct product lines -  
A.T.A. heavy-duty shipping to  
lightweight carrying cases



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4128 Temple City Blvd. • Rosemead, CA 91770 • (800) 423-4279 • CA: (800) 242-4466, or (818) 575-8614

Circle 130 on Reader Service Card

## NEW

### AVCOM PSA-65A Portable Spectrum Analyzer



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 counter-measures, cable TV maintenance, cellular and production use.

\$2,675.00



AVCOM introduces a fully agile single channel per carrier demodulator, the SCPC-3000E, for versatile and economical reception of SCPC signals. The SCPC-3000E Demodulator features a high-performance synthesized 50-90 MHz tuning module for maximum system versatility. Frequencies are tunable in 800 steps of 50 KHz each. Standard expansions are 3:1 and 2:1. Deemphasis is switchable between 0, 25, 50, and 75 micro-seconds. Selectable low-pass 15, 7.5 and 5 KHz audio filters are standard.

\$1,378.00

**AVCOM** 500 SOUTHLAKE BOULEVARD  
RICHMOND, VIRGINIA 23236  
804-794-2500, TLX: 701-545  
FAX: 804-794-8284

Circle 131 on Reader Service Card

BME August 1989 75

**PALTEX**

2752 Walnut Av., Tustin, CA  
92680

714 838-8833

VTR editor/controllers; multi-source video editors; electronic audio editors.

**PANASONIC BROADCAST SYSTEMS**

1 Panasonic Way, Secaucus, NJ  
07094

201 392-6139

ENG/EFP cameras; camcorders; digital VTRs; 3/4-, 1/2-inch VTRs; cart automation, MERPS; TBCs; NTSC encoders/decoders.

**PANASONIC INDUSTRIAL CO.**

1 Panasonic Way, Secaucus, NJ  
07094

201 348-7000

ENG/EFP cameras; camcorders; 3/4-, 1/2-inch VTRs; video monitors; video test equip.; digital ATRs; post-production consoles; studio monitors; power amps.

See ad pg. 10, 11, 13  
Circle #104, 105

**PANASONIC PRO AUDIO/RAMSA**

6550 Katella Av., Cypress, CA  
90630

714 373-7277

Field portable mixers; post-production consoles; mics, accessories; studio monitors; studio ATRs; field ATRs; digital ATRs; compact disc equipment; 3/4-, 1/2-inch VTRs.

**PATCH BAY DESIGNATION CO.**

4742 San Fernando Rd.,  
Glendale, CA 91204

818 241-5585

Patch bay labels.

**PCO, INC.**

20200 Sunburst St., Chatsworth, CA 91311

818 700-1233/800 852-1233

Optical interface products, optoelectronic components.

**PEERLESS SALES**

1950 Hawthorne Av., Melrose Park, IL 60160

312 865-8870

Monitor mounting brackets; speaker mounts.

**PEIRCE-PHELPS**

2000 N. 59 St., Philadelphia, PA  
19131

215 879-7171/800 862-6800

Studio design & construction; mobile vehicle construction.

**PENNY & GILES**

2716 Ocean Park Blvd., #1005,  
Santa Monica, CA 90405

213 452-4995

Audio faders; connectors, jack-fields.

**PEP**

25 W. 54 St., New York, NY  
10019

212 246-2490

Shotlister edit management system; power supplies, batteries.

**PERROTT ENGINEERING LABS**

7201 Lee Hwy., Falls Church, VA  
22046

703 532-0700

Power supplies, batteries; lighting equip.; camera support equip.

**PESA ELECTRONICA S.A.**

6073 N.W. 167 St., #C-4,  
Miami, FL 33015

305 556-9638/800 USA PESA

TV transmitters; satellite earth stations; burst phase meters, SCH phase meters; intercoms; audio DAs; mobile vehicle construction.

**PHILIPS LIGHTING CO.**

200 Franklin Sq. Dr., Somerset, NJ 08875

201 563-3694

Lighting equip.

**PINNACLE SYSTEMS**

2380 Walsh Av., Santa Clara, CA  
95051

408 970-9787

Electronic still stores; 2D graphics systems; 3D modeling, animation; digital video efx.

**PINZONE COMMUNICATIONS**

14850 Cross Creek Park,  
Newbury, OH 44065

216 564-9093

Satellite earth stations; LNAs; transmission line; TCR-100 refurbishing.

**PLASTIC REEL CORP. OF AMERICA**

Brislin Av., Lyndhurst, NJ 07071

201 933-5100/800 772-4748

Tape storage systems; empty video & audio reels & cassettes.

**POLAROID CORP.**

575 Technology Sq., Cambridge, MA 02139

617 577-2000/800 343-5000

Still video recorders.

**POLYLINE CORP.**

1233 Rand Rd., Des Plaines, IL  
60016

312 298-5300

Empty reels, boxes for audio and video tape.

**POTOMAC INSTRUMENTS**

932 Philadelphia Av., Silver Spring, MD 20910

301 589-2662

Audio test equip.; remote monitoring systems; transmitter remote control; AM stereo equip.

**PRECISION DESIGN**

27106 46 Av. S., Kent, WA  
98032

206 852-5070

Field portable mixers.

**PRIME IMAGE**

19943 Via Escuela, Saratoga, CA 95070

408 867-6519

TBCs; frame synchronizers.

**PRO BATTERY**

3941 Oakcliff Ind. Ct., Atlanta, GA 30340

404 449-5900/800 451-7171

Power supplies, batteries.

**PROGRESSIVE IMAGE TECHNOLOGY**

120 Blue Ravine Rd., Folsom, CA 95634

916 985-7501

TBCs; frame synchronizers; NTSC encoders/decoders; PC genlocks; character generators; digital video efx; sync & pulse gens/procs.

**PROTECH AUDIO CORP.**

Flowerfield Bldg. #1, St. James, NY 11780

516 584-5855

Field portable mixers; audio processors; intercoms; audio routing switchers; audio DAs; audio head cleaners, degaussers; preamps, line amps, power amps; slide attenuators; LED level displays.

**Q**

**QEI CORP.**

Box D, Williamstown, NJ 08094  
609 728-2020/800 334-9154

Radio transmitters; FM exciters; stereo generators; modulation monitors; RF amps.

**QSC AUDIO PRODUCTS**

1926 Placentia Av., Costa Mesa, CA 92627

714 645-2540/800 854-4079

Monitor/power amps.

**QSI SYSTEMS**

12 Linscott Rd., Woburn, MA  
01801

617 938-1403

Sync & pulse gens/procs; color-bar gens; SID; video auto switch-over.

**QUALITY VIDEO SUPPLY**

76 Frederick St., Box 1007,  
Hackensack, NJ 07602

201 488-8336

NTSC encoders/decoders; color correctors; multisource video editors; routing switchers, DAs; wire, cable; connectors, jack-fields; tools; transportation cases.

**QUANTA CORP.**

2440 S. Progress Dr., Salt Lake City, UT 84119

801 974-0992

Character generators; 2D graphics systems; VTR editor/controllers; multisource video editors.

**QUANTA EDITING PRODUCTS BY CALAWAY ENGINEERING**

535 Race St., San Jose, CA  
95126

408 295-8814

VTR editor/controllers; multi-source video editors.

**QUANTEL**

655 Washington Blvd.,  
Stamford, CT 06901

203 348-4104

2D graphics systems; character generators; digital video efx; electronic still stores; digital disk recorders; random-access video editors; standards converters; color correctors; digital audio workstations.

**QUANTUM AUDIO LABS**

2752 Walnut Av., Tustin, CA  
91752

714 838-8833

On-air consoles, mixers.

#### QUICK-SET

3650 Woodhead Dr.,  
Northbrook, IL 60062  
312 498-0700

Camera support equip.

#### Q-TV

104 E. 25 St., New York, NY  
10010

212 460-9050

Teleprompters.

## R

#### RADIATION SYSTEMS

4825 River Green Pkwy., Duluth,  
GA 30136

404 497-8800

Satellite earth stations.

#### RADIO COMPUTING SVCS.

1 Chase Rd., Ste. 206,  
Scarsdale, NY 10583

914 723-8567

Radio studio automation equip.

#### RADIO DESIGN LABS

5025 Eighth St., Carpinera, CA  
93013

805 684-5415

On-air consoles, mixers; studio  
monitors; audio amps.

#### RADIO SYSTEMS

110 High Hill Rd., Bridgeport, NJ  
08014-0458

609 467-8000

On-air consoles, mixers; digital  
ATRs; studio furniture; tape stor-  
age systems; equipment distrib-  
utor; studio design & construc-  
tion; technical/engineering  
consultant.

#### RAM BROADCAST SYSTEMS

346 W. Colfax St., Palatine, IL  
60067

312 358-3330

Audio equip. distributor.

#### RAMKO RESEARCH

3501 #4 Sunrise Blvd., Rancho  
Cordova, CA 95670  
916 635-3600

Field portable mixers; on-air con-  
soles, mixers; cart decks; audio  
processors; audio routing switch-  
ers; noise reduction systems;  
power amps; preamps, line  
amps; VU, LED audio level dis-  
plays.

#### RANGERTONE RESEARCH

6550 Roosevelt Av., Belleville,  
NJ 07109

201 751-6833

Telecines; magnetic recorders &  
reproducers.

#### RANK CINTEL

704 Executive Blvd., Valley  
Cottage, NY 10989-9998

914 268-8911

Color correctors; telecines; elec-  
tronic still stores.

#### RAPID DEPLOYMENT

##### TOWERS

625 Proffit St., Azle, TX 76020

817 444-4070

Transportable towers.

#### RATIONAL BROADCAST

##### SYSTEMS

2306 Church Rd., Cherry Hill, NJ

08002

609 667-7300

Business automation.

#### R-COLUMBIA PRODUCTS

2008 St. Johns Av., Highland  
Park, IL 60035

312 432-7915

Mics, accessories; intercoms;  
telco interface equip.

#### RE INSTRUMENTS CORP.

31029 Center Ridge Rd.,

Westlake, OH 44145

216 871-7617

Fiber optic systems; video test  
equip.; audio test equip.; RF test  
equip.

#### REACH ELECTRONICS

Box 308, Lexington, NE 68850-  
0308

308 324-6661/800 445-0007

Radio paging systems.

#### REBO RESEARCH

530 W. 25 St., New York, NY  
10001

212 989-9466

HDTV production equip.; fiberop-  
tic systems.

#### RECORTEC

275 Santa Ana Ct., Sunnyvale,  
CA 94086

408 737-8441

Tape erasers, degaussers; vid-  
eotape loaders, winders, evalua-  
tors.

#### REES ASSOCIATES

4200 Perimeter Ctr. Dr., #245,  
Oklahoma City, OK 73112

405 942-7337/800 525-REES

Studio design & construction.

#### REGISTER DATA SYSTEMS

Box 1246, Perry, GA 31069

912 987-2501/800 521-5222

Business automation.

#### RESEARCH TECHNOLOGY

##### INTERNATIONAL/RTI

4700 Chase Av., Lincolnwood, IL

60646-1689

312 677-3000/800 323-7520

Tape cleaners & evaluators; tape  
storage systems.

#### RF TECHNOLOGY

16 Testa Place., S. Norwalk, CT  
06854

203 866-5393

Antennas, towers; STLs, TSLs;  
ENG microwave; intercity micro-  
wave; fiberoptic systems; GaAs  
FET power amps.

#### RICHARDSON ELECTRONICS

40W 267 Keslinger Rd., LaFox,  
IL 60147

312 232-6400/800 323-1770

Pickup tubes; CRTs; VTR editor/  
controllers; RF transistors; TV lin-  
ear devices.

#### RICHMOND SOUND DESIGN

1234 W. Sixth Av., Vancouver,  
BC V6H 1A5 Canada

604 734-1217

Field portable mixers; on-air con-  
soles, mixers; post-production  
consoles; audio routing switch-  
ers; audio DAs; audio proces-  
sors; preamps, line amps, moni-  
tor/power amps.

#### ROCKWELL INTERNATIONAL

1225 N. Alma Rd., 406-110,  
Richardson, TX 75081

214 996-5000

STLs, TSLs; fiberoptic systems.

#### ROH/DIV. ANCHOR AUDIO

913 W. 223 St., Torrance, CA  
90502

213 533-1498/800 262-4671

Studio monitors; audio test  
equip.; intercoms; audio routing  
switchers.

#### ROHDE & SCHWARZ

4425 Nicole Dr., Lanham, MD  
20706

301 459-8800

Video test equip.; audio test  
equip.; RF test equip.

#### ROHN

6718 W. Plank Rd., Box 2000,  
Peoria, IL 61656

309 697-4400

Antennas, towers.

#### ROSCO LABORATORIES

36 Bush Av., Port Chester, NY  
10573

914 937-1300/800 431-2338

Connectors, jackfields; lighting  
filters, gels; chromakey paints &  
fabrics.

#### ROSCOR

1061 Feehanville Dr., Mt.  
Prospect, IL 60056

312 539-7770

SNG systems; equipment distrib-  
utor; studio design & construc-  
tion; mobile vehicle construc-  
tion; mobile facilities rental;  
technical/engineering consul-  
tant.

#### ROSNER TELEVISION SYSTEMS

250 W. 57 St., New York, NY  
10107

212 246-2850

Studio design & construction;  
mobile vehicle construction;  
technical/engineering consul-  
tant.

#### ROSS VIDEO

500 John St., Box 220, Iroquois,  
ON KOE 1K0 Canada

613 652-4886

Production switchers; down-  
stream multi-keyer.

#### RPG DIFFUSOR SYSTEMS

12003 Wimbleton St., Largo,  
MD 20772

301 249-5647

Sound insulation materials.

#### R\*SCAN CORP.

Minnesota Supercomputer  
Center, 1200 Washington Av.

S., Minneapolis, MN 55415

612 333-1424

Weather graphics/radar.

#### RTS SYSTEMS

1100 W. Chestnut St., Burbank,  
CA 91506

818 566-6700

Intercoms; telco interface  
equip.; audio test equip.

#### RUSLANG CORP.

320 Dewey St., Bridgeport, CT  
06605

203 384-1266

Studio furniture; tape storage  
systems.

**RUSSCO ELECTRONICS MFG.**  
5690 E. Shields Av., Fresno, CA  
93727

209 291-5591

Turntables; audio DAs; on-air  
consoles, mixers; telco interface  
equip.; preamps, power amps.

**S**

**SACHTLER CORP.  
OF AMERICA**

55 N. Main St., Freeport, NY  
11520

516 867-4900

Camera support equip.; lighting  
equip.

See ad pg. 14, 16

Circle #106, 107

**SAKI MAGNETICS**

26600 Agoura Rd., Calabasas,  
CA 91302

818 880-4054

VTR heads, electronics; audio  
heads.

**SAMSON TECHNOLOGIES**

485-19 S. Broadway, Hicksville,  
NY 11801

516 932-3810

Post-production consoles; RF  
mics.

**SANKEN MICROPHONES**

Ste. 607, 1-5-10 Roppongi,  
Minato-ku, Tokyo, 106 Japan  
8103505-5463

Mics, accessories.

**SATCOM TECHNOLOGIES**

4825 River Green Pkwy.,  
Norcross, GA 30071

404 497-8800

Satellite earth stations.

**SCALA ELECTRONICS**

Box 4580, Medford, OR 97501  
503 779-6500

Antennas, towers; connectors,  
jackfields; lightning protection  
devices; RF power dividers.

**SCANTEX LABORATORIES**

Box 338, Pierrefonds, QU H9H  
4L1 Canada

514 626-8943

Audio level meters.

**SCHAFFER WORLD  
COMMUNICATIONS**

Box 31, Marion, VA 24354  
703 783-2000

Portable mixers; on-air consoles,  
mixers; digital ATRs; cart decks;  
compact disc equip.; radio stu-  
dio automation equip.; remote  
monitoring systems.

**SCHMID TELECOM**

Reiterstrasse 6, Zurich,  
CH-8002 Switzerland

001 206-1111

Routing switchers, DAs.

**SCHNEIDER CORP.  
OF AMERICA**

400 Crossways Park Dr.,  
Woodbury, NY 11797

516 496-8500

Lenses; lens accessories.

**SCHWEM TECHNOLOGY**

3305 Vincent Rd., Pleasant Hill,  
CA 94523

415 935-1226

Image-stabilizing lenses.

**SCIENTIFIC SYSTEMS**

633 Hallrd Av., Beachwood, NJ  
08722

201 505-9585

Audio DAs; preamps, line amps,  
power amps.

**SCIENTIFIC-ATLANTA**

4356 Communications Dr.,  
Norcross, GA 30093

404 925-5000

Satellite earth stations.

**SECK**

8500 Balboa Blvd., Northridge,  
CA 91329

818 893-8411

Post-production consoles.

**SELCO/SIFAM**

7580 Stage Rd., Buena Park, CA  
90621

213 921-0681

Audio level indicators.

**SENNHEISER ELECTRONIC  
CORP.**

6 Vista Dr., Box 987, Old Lyme,  
CT 06371

203 434-9190

Mics, accessories; headphones.

**SENTRY SYSTEMS**

2211 Fifth Av., Seattle, WA

98121

206 728-8651

Radio studio automation equip.

**SESCOM**

2100 Ward Dr., Henderson, NV  
89015

702 565-3400/800 634-3457

Audio processors; audio test  
equip.

**SG COMMUNICATIONS**

3444 N. Dodge Av., Tucson, AZ  
85716

/800 824-7865

Antennas, towers; technical/en-  
gineering consultant.

**SHARP ELECTRONICS CORP.,  
PROFESSIONAL PRODS.**

Sharp Plaza, Mahwah, NJ 07430  
201 529-8728/800 526-0264

Studio cameras; ENG/EFP cam-  
eras; camcorders; 3/4-, 1/2-inch  
VTRs; video monitors.

**SHIMA SEIKI U.S.A.**

22 Abeel Rd., Cranbury, NJ

08512

609 655-4788

2D graphics systems; 3D model-  
ing, animation; digital video efx.

**SHINTRON CO.**

144 Rogers St., Cambridge, MA  
02142

617 491-8700/800 358-NTSC

TBCs; frame synchronizers; NTSC  
encoders/decoders; standards  
converters; video processors;  
electronic still stores; digital vid-  
eo efx; production switchers;  
routing switchers, DAs; time  
code equip.; audio routing  
switchers.

**SHIVELY LABS**

85 Harrison Rd., Bridgton, ME  
04009

207 647-3327

Antennas, towers; coaxial trans-  
mission line; RF combiners.

**SHOOK ELECTRONICS USA**

6630 Topper Pkwy., San  
Antonio, TX 78233

512 653-6761

ENG/EFP vehicles; mobile pro-  
duction units.

**SHURE BROTHERS**

222 Hartrey Av., Evanston, IL  
60202-3696

312 866-2553

Audio processors; portable mix-  
ers; on-air consoles, mixers;  
mics, accessories; phono car-  
tridges.

**SIECOR**

489 Siecork Park, Hickory, NC

28603

704 327-5000

Fiberoptic systems.

**SIERRA VIDEO SYSTEMS**

Box 2462, Grass Valley, CA  
95945

916 273-9331

HDTV keyer; color correctors;  
production switchers; routing  
switchers, DAs; sync & pulse  
gens/procs; time code equip.

**SIGMA ELECTRONICS**

1184 Enterprise Rd., E.  
Petersburg, PA 17520

717 569-2681

NTSC encoders/decoders; video  
test equip; routing switchers,  
DAs; sync & pulse gens/procs;  
clocks, timers; audio routing  
switchers.

**SIRA/DATA SECURITY/  
COMAD COMMUNICATIONS**

1435 Bonhill Rd., Unit 34,  
Mississauga, ON L5T 1M1 Cana-  
da

416 676-9171/800 387-4991

Antennas, towers; tape erasers,  
degaussers.

**SISCOM**

100 Arapahoe Av., Boulder, CO  
80302

303 449-0442

Teleprompters.

**SKOTEL**

3730 Matte, Brossard, QU J4Y  
2Z2

514 444-2088/800 361-4999

Time code equip.

**SOLA**

1717 Busse Rd., Elk Grove  
Village, IL 60007-5666

312 439-2800

Power supplies, batteries.

**SOLID ELECTRONICS LABS**

220 Brookthorpe Cir., Broomall,  
PA 19008

215 353-9448

Two-way radio communications.

**SOLID STATE LOGIC**

Begbroke, Oxford, OX5 1RU  
England

86 584 2300

On-air consoles, mixers; post-  
production consoles; digital au-  
dio workstations; electronic au-  
dio editors.

**SOLL, INC.**  
401 E. 74 St., New York, NY  
10021  
212 988-0290  
Transmitter remote control; technical/engineering consultant.

**SOLUTEC**  
4360 d'Iberville St., Montreal,  
QU H2H 2L8 Canada  
514 522-8960  
Cart automation/MERPS; routing  
switchers, DAs; stereo DAs.

**SONO-MAG CORP.**  
1833 W. Hovey Av., Normal, IL  
33021  
309 452-5313  
Cart decks; compact disc equip.;  
radio studio automation equip.;  
audio routing switchers.

**SONY COMMUNICATIONS  
PRODUCTS CO., BROADCAST  
PRODUCTS DIV.**  
1600 Queen Anne Rd., Teaneck,  
NJ 07666  
201 833-5200  
Studio cameras; ENG/EFP cam-

eras; camcorders; A5; HDTV pro-  
duction equip.; digital VTRs;  
one-inch VTRs; 3/4-, 1/2-inch  
VTRs; A10; video monitors; video  
projectors; electronic still stores;  
digital video efx; solid state re-  
corders; VTR editor/controllers;  
multisource video editors; pro-  
duction switchers.  
*See ad pg. 4, 5*

**SONY COMMUNICATIONS  
PRODUCTS CO., PRO AUDIO  
DIV.**  
1600 Queen Anne Rd., Teaneck,  
NJ 07666  
201 833-5200  
Audio processors; portable mix-  
ers; on-air consoles, mixers;  
post-production consoles; mics,  
accessories; audio test equip;  
studio ATRs; digital ATRs; com-  
pact disc equip.; audio tape,  
carts; ATR synchronizers.

**SONY COMMUNICATIONS  
PRODUCTS CO., PRO VIDEO  
DIV.**  
1600 Queen Anne Rd., Teaneck,  
NJ 07666  
201 833-5200  
ENG/EFP cameras; camcorders;  
3/4-inch, 8 mm VTRs; video moni-  
tors.

**SONY INFORMATION  
SYSTEMS DIV.**  
1 Sony Dr., Park Ridge, NJ  
07656  
201 930-1000  
Still video recording systems;  
downconverters.

**SONY MAGNETIC  
PRODUCTS CO.**  
1 Sony Dr., Park Ridge, NJ  
07656-8038  
201 930-6080  
Videotape; audio tape, carts.

**SOUND TECHNOLOGY**  
1400 Dell Av., Campbell, CA  
95008  
408 378-6540  
Audio test equip.

**SOUNDCRAFT**  
8500 Balboa Blvd., Northridge,  
CA 91329  
818 893-4351/800 852-5776  
On-air consoles, mixers.

**SOUNDMASTER USA**  
1124 Stoneshead Ct., Westlake  
Village, CA 91361  
805 494-4545  
Electronic audio editors; ATR  
synchronizers.

**SPECIALTY VEHICLES**  
450 N. Somerset Av.,  
Indianapolis, IN 46222  
317 638-5037  
Mobile vehicle construction.

# One More Time...



Videotek's new, compact VSG-21 sync generator provides four test signals, balanced audio tone and continuous blackburst.

Videotek's done it again—packed more features for less money into a single product—our new VSG-21. It's equipped with four selectable NTSC test signals, SMPTE color bars, Multiburst and 10-step modulated stairstep or 10-step unmodulated stairstep.

That's just one example. Look at our full line of feature-rich sync generators, all engineered for zero defects. The VSG-201 has 6 blackburst outputs, audio test tone and "textbook" accurate SMPTE color bars and can be genlocked with guaranteed SC/H Phase regardless of input phase. With our Times Six Plus, at the touch of a button, you can synchronize and automatically time six devices regardless of various cable lengths or equipment drift. And our Times Six allows manual centralized control of six devices.

Get them all at a price that's in sync with your budget



**VIDEOTEK INC.**  
American made technology.  
And value.

243 Shoemaker Road • Pottstown, Pennsylvania 19464  
(215)327-2292 • TWX: 710-653-0125 • FAX: (215)327-9295

# VICON INTRODUCES

Vicon Industries, a leading source of video accessories and systems for more than 25 years, has formed a "Professional Products Division." That's good news for the broadcast as well as the non-broadcast video user.

Quite simply, you now have a better resource for camera positioning equipment...from a company that's committed to the highest quality standards and the best value available.

Take the new Vicon 6000 series. It delivers the most desirable features for all video applications:

- High speed
- Precise positioning
- Silent operation
- Compact & rugged

Vicon offers three models, attractively priced, with outstanding performance built on decades of engineering excellence.

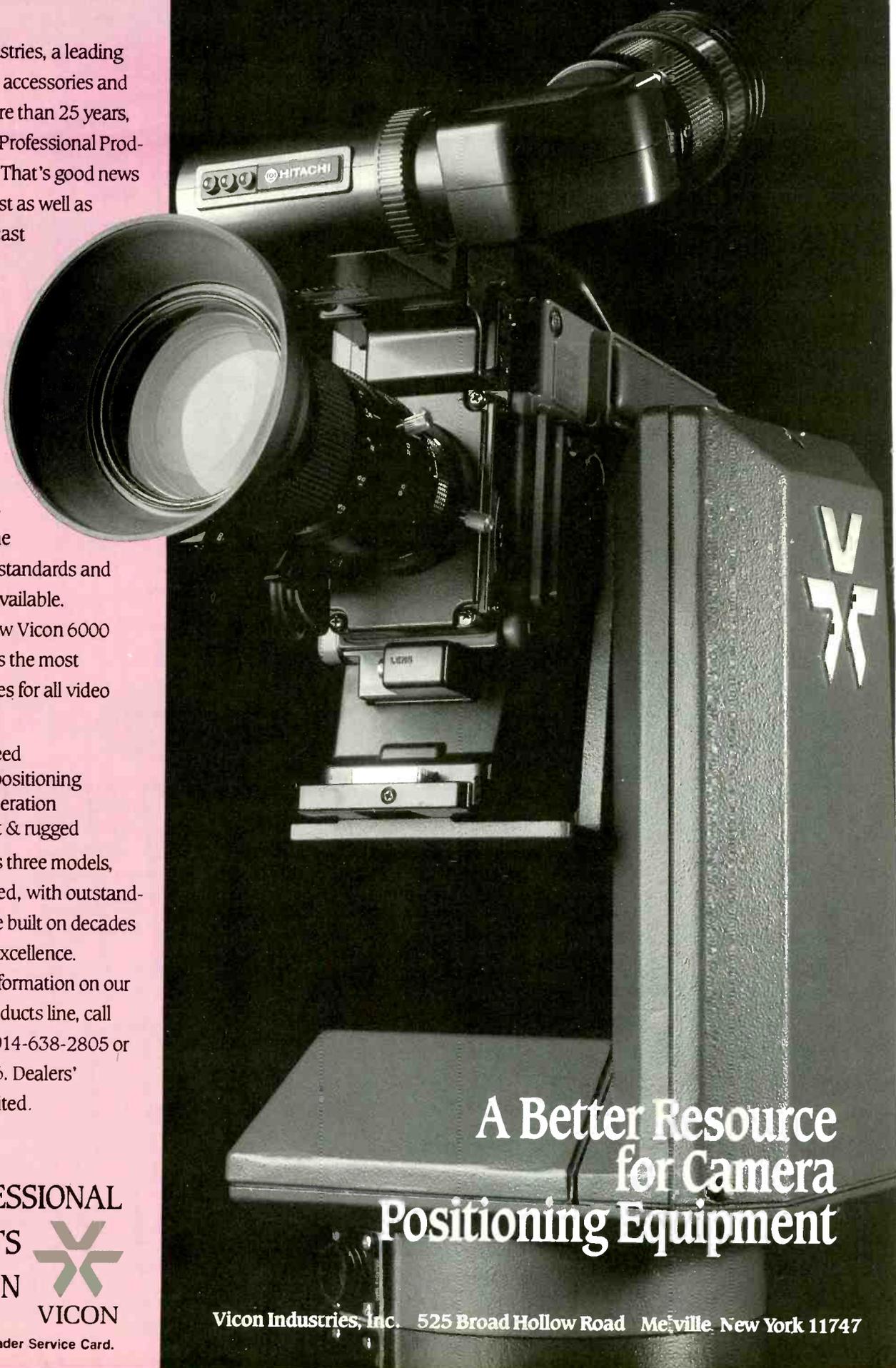
For more information on our professional products line, call Mort Russin at 914-638-2805 or 1-800-645-9116. Dealers' inquiries are invited.

PROFESSIONAL  
PRODUCTS  
DIVISION



VICON

Circle 133 on Reader Service Card.



A Better Resource  
for Camera  
Positioning Equipment

Vicon Industries, Inc. 525 Broad Hollow Road Melville, New York 11747

**SPECTRA SONICS**

3750 Airport Rd., Ogden, UT  
84405

801 392-7531

Audio processors; portable mixers; on-air consoles, mixers; post-production consoles; mics, accessories; studio monitors; reverb, special efx; audio DAs; preamps, line amps, monitor/power amps; audio cable.

**SPECTRA SYSTEMS**

2040 N. Lincoln St., Burbank, CA 91504

818 842-1111

Random-access video editors.

**SPRAGUE MAGNETICS**

15720 Stagg St., Van Nuys, CA 91406

818 994-6602/800 553-8712

Audio heads.

**STAINLESS**

Third St., N. Wales, PA 19454

215 699-4871

Antennas, towers.

**STANDARD COMMUNICATIONS CORP.**

Box 9251, Los Angeles, CA 90009

213 532-5300/800 243-1357

Satellite earth stations; stereo generators; LNAs; downconverters; audio demodulators.

**STANTON MAGNETICS**

101 Sunnyside Blvd., Plainview, NY 11803

516 349-0235

Turntable preamps, styli, cartridges.

**STANTRON**

6900 Beck Av., N. Hollywood, CA 91605

818 841-1825/800 821-0020

Studio furniture.

**STAR CASE MFG.**

648 Superior, Munster, IN 46321

219 922-4440/800 822-STAR

Transportation cases.

**STATUS CABINETRY**

615 S. State College Blvd., Fullerton, CA 92631

714 525-4400

Studio furniture.

**STEADI-FILM**

705 18 Av. S., Nashville, TN 37203

615 329-2073

Pin-registered telecine film gates; telecine accessories.

**STEENBECK**

9554 Vassar Av., Chatsworth, CA 91311

818 998-4033

Telecines.

**STOREEL CORP.**

3337 W. Hospital Av., Atlanta, GA 30341

404 458-3280

Tape storage systems.

**STRAND ELECTRO CONTROLS**

2975 S. 300 W., Salt Lake City, UT 84115

801 487-6111/800 453-7435

Lighting equip.

**STRAND LIGHTING**

18111 S. Santa Fe Av., Rancho Dominguez, CA 90221

213 637-7500

Lighting equip.

**STUDER REVOX AMERICA**

1425 Elm Hill Pike, Nashville, TN 37210

615 254-5651

Portable mixers; on-air consoles, mixers; post-production consoles; studio monitors; studio ATRs; digital ATRs; cassette decks; telco interface equip.; ATR synchronizers.

**STUDIO TECHNOLOGIES**

5520 W. Touhy Av., Skokie, IL 60077

312 676-9177

Mics, accessories; MTS equip.

**SUNDANCE TECHNOLOGY GROUP**

6431 Campus Circle Dr., Ste. 100, Irving, TX 75063

214 550-8338

Random-access video editors; slide management software.

**SUPERIOR ELECTRIC CO.**

383 Middle St., Bristol, CT 06010

203 582-9561

Voltage relators; surge suppressors.

**SURE SHOT SATELLITE NETWORK**

12450 Harman Rd., New

Springfield, OH 44443

216 542-3686

Mobile production facilities rental.

**SWIDERSKI ELECTRONICS**

1200 Greenleaf Av., Elk Grove Village, IL 60007-9944

312 364-1900

Equipment distributor; studio design & construction.

**SWINTEK ENTERPRISES**

965 Schulman, Santa Clara, CA 95050

408 727-4889

Intercoms.

**SWITCHCRAFT**

5555 N. Elston Av., Chicago, IL 60630

312 792-2700

Connectors, jackfields.

**SWR**

Box 215, Goffstown, NJ 03045

609 529-2500

Antennas, towers; transmission line; RF switches; technical/engineering consultant.

**SYMBOLICS**

1401 Westwood Blvd., Los Angeles, CA 90024

213 478-0681

3D modeling, animation; 2D graphics systems; HDTV production equip.

**SYMETRIX**

4211 24 Av. W., Seattle, WA 98199

206 282-2555

Audio processors; digital processing recorder; noise reduction equip.; precision level indicators.

**SYNERGYSTIC BATTERIES**

3760 Longer Roswell Rd.,

Marietta, GA 30368

404 973-2220

Power supplies, batteries.

**SYSTEM ASSOCIATES**

10375 Jefferson Av., Culver City, CA 90232

213 836-1111

Used equipment broker.

**SYSTEMATION**

337 N. Water St., Decatur, IL 62523

217 428-7101

Radio studio automation equip.; digital ATRs.

**T**

**TABER**

1880 Embarcadero Rd., Palo Alto, CA 94303

415 493-3814

Tape erasers, degaussers.

**TAMRON INDUSTRIES**

99 Seaview Blvd., Port Washington, NY 11050

516 484-8880

Lenses.

**TANNOY NORTH AMERICA**

300 Gage Av., Unit 1, Kitchener, ON N2M 2C8 Canada

519 745-1158

Studio monitors.

**TAPSCAN**

3000 Riverchase Galleria Tower, Ste. 111, Birmingham, AL 33244

205 987-7456

Business automation.

**TASCAM**

7733 Telegraph Rd., Montebello, CA 90640

213 726-0303

Portable mixers; on-air consoles, mixers; studio ATRs; field ATRs; digital ATRs; cassette decks; compact disc equip.

**TEATRONICS**

3100 McMillan Rd., San Luis Obispo, CA 93401

805 544-3555

Lighting equip.

**TECCOM**

265 Otis St., W. Newton, MA 02165

617 527-7335

VTR editor/controllers; video processors; VTR upgrade kits; stand-alone keyers; PC-based off-line EDL system.

**TECHNICAL PROJECTS**

Box 1449, Barrington, IL 60011

312 381-5350/800 562-5872

Intercoms; audio test equip.

**TECHNISPHERE CORP.**

29 E. 19 St., New York, NY 10003

212 777-5100

Equipment distributor.

**TECTAN**

1900 Bates Av., Box 271872,  
Concord, CA 94527  
415 798-2222

Noise reduction equip.; cart  
automation/MERPS; satellite  
earth stations; diplexers, multi-  
plexers.

**TEKNO**

100 W. Erie St., Chicago, IL  
60610

312 787-8922

Lighting equip.

**TEKSKIL INDUSTRIES**

#108 15290 103A Av., Surrey,  
BC V3R 7A2 Canada  
604 589-1100

Teleprompters.

**TEKTRONIX**

Box 500, Beaverton, OR 97077  
503 627-7111

Video test equip.; BTSC aural  
modulation monitor.

**TELCOM RESEARCH**

1163 King Rd., Unit 1,  
Burlington, ON L7R 3X5 Canada  
416 681-2450

Time code equip.

**TELECTRO SYSTEMS**

96-18 43 Av., Corona, NY  
11368

718 651-8900

Cassette decks; field ATRs; stu-  
dio monitors; intercoms.

**TELEDYNE ENERGY SYSTEMS**

110 W. Timonium Rd.,  
Timonium, MD 21093

301 252-8220

Power generators.

**TELEMET, DIV. GEOTEL**

25 Davids Dr., Hauppauge, NY  
11788

516 436-7260

NTSC encoders/decoders; video  
processors; video test equip;  
routing switchers, DAs; fiberoptic  
systems; broadcast demodula-  
tor.

**TELEMETRICS**

7 Valley St., Hawthorne, NJ  
07506

201 423-0347

Robotic camera systems.

**TELEPAK SAN DIEGO**

4783 Ruffner St., San Diego, CA  
92111

619 268-8559

Transportation cases.

**TELESCRIPT**

445 Livingston St., Norwood, NJ  
07648

201 767-6733

Teleprompters.

**TELETTRA U.S.A.**

375 Park Av., Ste. 2703, New  
York, NY 10152

212 355-2600

DS3 digital transmission sys-  
tems.

**TELEVISION ENGINEERING  
CORP.**

580 Goddard Av., Chesterfield,  
MO 63005

314 532-4700

ENG/EFP vehicles; mobile pro-  
duction units.

**TELEVISION EQUIPMENT****ASSOC.**

Box 393, S. Salem, NY 10590

914 763-8893

Video filters & delays.

**TELEX COMMUNICATIONS**

9600 Aldrich Av. S.,  
Minneapolis, MN 55420

612 887-5550

RF mics; intercoms; telco inter-  
face equip.; high-speed audio  
tape duplicators.

See ad pg. 95 Circle #137

**TELMAK**

1101A Airway, Glendale, CA  
91201

818 500-0137

Genlock for Commodore Amiga  
PC.

**TELNOX**

55 Montpellier Blvd., St.-

aurent, QU H4N 2G3 Canada

514 744-1785/800 361-3126

Telco interface equip.; telephone  
switches.

**TELOS SYSTEMS**

1729 Superior Av., Cleveland,  
OH 44114

216 241-7225

Telco interface equip.

**TENNAPLEX SYSTEMS**

21 Concourse Gate, Nepean, ON  
K2E 7F4 Canada

613 226-5870

Antennas, towers; compact disc  
equip.

**TENTEL CORP.**

1506 Dell Av., Campbell, CA  
95008

408 379-1881

Tape tension gauges.

**TEPCO CORP.**

Box 680, Rapid City, SD 57709

605 343-7200

Radio transmitters; FM & TV  
translators; microwave subcar-  
rier filter; RF amps, filters.

**TEXAR**

616 Beatty Rd., Monroeville, PA  
15146

412 856-4276

Audio processors; noise reduc-  
tion equip.

**TEXAS ELECTRONICS**

Box 7225, Dallas, TX 75209

214 631-2490

Weather graphics/radar.

**TFT**

3090 Oakmead Village Dr.,  
Santa Clara, CA 95052-8088

408 727-7272

Remote pickup, RENG; FM modu-  
lation monitors.

**THEATRE SERVICE & SUPPLY**

1792 Union Av., Baltimore, MD  
21211

301 467-1225

Lighting equip.; cycloramas.

**THERMODYNE INTL.**

20850 S. Alameda St., Long  
Beach, CA 90810

213 603-1976

Transportation cases.

**THOMSON CSF/ELECTRON****TUBE DIV.**

C/o Comark Communications,  
Box 506, Colmar, PA 18915

215 822-0777

Transmitter, power tubes.

**THOMSON ELECTRON TUBES  
& DEVICES**

Box 540, 40G Commercial Way,  
Totowa, NJ 05711

201 812-9000

Transmitter, power tubes.

**THOMSON VIDEO EQUIP-  
MENT**

17 Rue de Petit Albi, Cergy St.  
Christophe/B.P. 8244, Clergy

Pontoise Cedex, 95801 France  
34-20-7072

Studio cameras; ENG/EFP cam-  
eras; camcorders; digital VTRs;  
NTSC encoders/decoders; stan-  
dards converters; color correc-  
tors; digital video efx; production  
switchers; routing switchers,  
DAs.

**THOMSON-CSF**

See Comark, Thomson-LGT,  
Thomson Video

**THOMSON-LGT**

1 Rue De l'Hautill, BP 150,  
Confians Ste. Honorine, 78700

France

34-90-3100

TV transmitters; antennas,  
towers; remote monitoring sys-  
tems; MTS equip.; technical/en-  
gineering consultant.

**TIFFEN MFG. CORP.**

90 Oser Av., Hauppauge, NY  
11788

516 273-2500/800 645-2225

Lens filters.

**TIMELINE**

270 Lafayette St., New York, NY  
10012

212 431-0330

ATR synchronizers; time code  
equip.

**TIMES SQUARE LIGHTING**

Industrial Park, Rt. 9W, Stony  
Point, NY 10980

914 947-3034

Lighting equip.

**TOKO AMERICA**

1250 Feehanville Dr., Mt.  
Prospect, IL 60056

312 297-0070

Frame synchronizers; standards  
converters; HDTV framestore.

**TORPEY CONTROLS/  
KEY VIDEO**

98-2220 Midland Av., Scarborough, ON M1P 3E6 Canada  
416 298-7788

MC switchers; switching automation; routing switchers, DAs; clocks, timers.

**TOSHIBA AMERICA**

9740 Irvine Blvd., Irvine, CA 92718

714 583-3181

Studio cameras; ENG/EFP cameras; 3/4-, 1/2-inch VTRs; frame synchronizers; digital video efx; production switchers.

**TOWNSEND ELECTRONICS  
CORP.**

5301 Departure Dr., Raleigh, NC 27604  
919 790-3100

TV transmitters; antennas, towers; transmitter remote control; intercity microwave; solid state amps; transmission line; exciters; wire, cable; RF test equip.

**TRANSMISSION  
STRUCTURES LTD.**

Box 907, 227 S. Vann, Vinlta, OK 74301

918 256-7883

Antennas, towers.

**TRIDENT AUDIO**

2720 Monterey St., #403, Torrance, CA 90503

213 533-8900

On-air consoles, mixers.

**TRIMM**

400 W. Lake St., Libertyville, IL 60048

312 362-3700

Connectors, jackfields.

**TROMPETER ELECTRONICS**

31186 La Baya Dr., Box 5069, Westlake Village, CA 91359-5069

818 707-2020

Telco interface equip.; wire, cable; connectors, jackfields; tools.

**TRUEVISION**

7351 Shadeland Station, Ste. 100, Indianapolis, IN 46256-3921

317 841-0332

NTSC encoders/decoders.

**TSM/TOTAL SPECTRUM MFG.**

709 Executive Blvd., Bldg. A, Valley Cottage, NY 10989

914 268-0100

Robotic camera systems; camera support equip.

**TTC/TELEVISION  
TECHNOLOGY CORP.**

650 S. Taylor Av., Louisville, CO 80020-8385

303 665-8000

Radio transmitters; TV transmitters; translators.

**TTE**

11652 W. Olympic Blvd., W. Los Angeles, CA 90064

213 478-8224

NTSC encoders/decoders; video filters; transformers; hum bucking coils.

**TUI COMPUTER SVCS.**

Trademark Square 111, Metro Center, 240 Great Circle Dr., Nashville, TN

615 242-4477/800 732-6677

Newsroom computers.

**TVI/THEATRE VISION**

5426 Fair Av., N. Hollywood, CA 91601

818 769-0928

Lighting equip.; equipment distributor.

**TWENTIER SYSTEMS**

2200 Powell St., Ste. 625, Emeryville, CA 94608

415 654-1168

Business automation; newsroom computers.

**TWR LIGHTING**

1630 Elmview, Houston, TX 77080

713 973-6904

Lighting equip.

**TYLER CAMERA SYSTEMS**

14218 Aetna St., Van Nuys, CA 91401

818 989-4420

Camera stabilizing systems.



**U.S. AUDIO/DIV. WHIRLWIND**

100 Boxart St., Rochester, NY 14612

716 663-8820

Audio processors; portable mixers; headphone monitor system; power amps.

**UHER OF AMERICA**

7067 Vineland Av., N. Hollywood, CA 91605

818 764-1120

Cassette decks; field ATRs.

**ULTIMATE SUPPORT  
SYSTEMS**

2506 Zurich Dr., Box 470, Ft. Collins, CO 80524

303 493-4488/800 525-5628

Lighting equip.; mic stands & booms; studio furniture.

**ULTIMATTE CORP.**

18607 Topham St., Reseda, CA 91335

818 345-5525

Video compositing devices; Ultimatte Memory Head.

**UNI-SET CORP.**

449 Av. A, Rochester, NY 14621

716 544-3820

Studio furniture.

**UNION CONNECTOR**

300 Babylon Tpk., Roosevelt, NY 11575

516 623-7641

Lighting equip.; wire, cable; connectors, jackfields.

**UNIQUE BUSINESS SYSTEMS**

2901 Ocean Park Blvd., Ste. 215, Santa Monica, CA 90405

213 396-3929

Business automation.

**UNITED MEDIA**

4771 E. Hunter, Anaheim, CA 92807

714 777-4510

VTR editor/controllers; multi-source video editors; random-access video editors; tape synchronizers.

**UNITED ROPEWORKS U.S.A.**

151 Commerce Dr., Montgomeryville, PA 18936

215 368-6611

Tower guys.

**UNIVERSE STAGE LIGHTING**

326 W. 47 St., New York, NY 10036

212 246-0597

Lighting equip.

**UREI**

8500 Balboa Blvd., Northridge, CA 91307

818 893-8411

On-air consoles, mixers; studio monitors.

**USHIO AMERICA**

20101 S. Vermont Av., Torrance, CA 90502

213 329-1960/800 841-0308

Lighting equip.

**UTAH SCIENTIFIC**

1685 W. 2200 South, Salt Lake City, UT 84119

801 973-6840/800 453-8782

MC switchers; switching automation; routing switchers, DAs; audio routing switchers.

See ad pg. 32 Circle #114

**UTILITY TOWER CO.**

Box 12369, Oklahoma City, OK 73157

405 946-5551

Antennas, towers.



**VACUUM TUBE INDUSTRIES**

506 N. Warren Av., Brockton, MA 02403

508 584-4500

Transmitter, power tubes.

See ad pg. 111 Circle #144

**VALENTINO**

151 W. 46 St., New York, NY 10036

212 869-5210/800 223-6278

Music/sound efx libraries.

**VALLEY INTERNATIONAL**

Box 40306, 2817 Erica Pl., Nashville, TN 37204

615 383-4737

Audio processors; mic processors; noise reduction equip.

**VALMONT INDUSTRIES**

Highway 275, Valley, NE 68064  
402 359-2201  
Antennas, towers.

**VARIAN ASSOCIATES**

611 Hansen Way, Palo Alto, CA 94303  
415 424-6287  
Radio transmitters; TV transmitters; transmitter, power tubes; satellite earth stations.

**VCI/VIDEO COMMUNICATIONS**

1325 Springfield St., Feeding Hills, MA 01030  
413 786-7955  
Business automation; newsroom computers.

**VEAM, DIV. LITTON SYSTEMS**

100 New Wood Rd., Watertown, CT 06795  
203 274-9681  
Fiberoptic systems; connectors, jackfields.

**VECTOR TECHNOLOGY**

203 Airport Rd., Doylestown, PA 18901  
215 348-4100  
FM exciters.

**VEGA**

9900 Baldwin Pl., El Monte, CA 91731-2204  
818 442-0782  
RF mics; intercoms.

**VERTEX COMMUNICATIONS**

2600 Longview St., Box 1277, Kilgore, TX 75662  
214 984-0555  
Satellite earth stations.

**VICON INDUSTRIES INC.**

525 Broad Hollow Rd., Melville, NY 11747  
516 293-2200  
Remote camera controls.  
*See ad pg. 80 Circle #133*

**VID VIDEO**

3919A W. Magnolia Blvd., Burbank, CA 91505  
818 845-1515/800 826-2305  
Time code equip.

**VIDEO ACCESSORY CORP.**

2450 Central Av., Ste. H, Boulder, CO 80301  
303 443-4950/800 821-0426  
Sync & pulse gens/procs; audio & video DAs; audio routing switchers; video test equip; video noise reducers.

**VIDEO ASSOCIATES LABS**

4926 Spicewood Springs Rd., Austin, TX 78759  
512 346-7581  
NTSC encoders/decoders; PC genlock board.

**VIDEO BROKERS**

5205 S. Orange Av., Orlando, FL 32809  
407 851-4595  
Turbo telecine; used equipment broker.

**VIDEO DATA SYSTEMS**

205 Oser Av., Hauppauge, NY 11788  
516 231-4400  
Character generators; switching automation.

**VIDEO DESIGN PRO**

749 Carver Rd., Las Cruces, NM 88005  
505 524-8959  
CAD system for designing video facilities.

**VIDEO DISPLAY CORP.**

1868 Tucker Industrial Dr., Tucker, GA 30084  
404 938-2080  
High-resolution color & monochrome CRTs.  
*See ad pg. 85 Circle #134*

**VIDEO FINANCIAL**

7400 Center Av., #102, Huntington Beach, CA 92647  
714 898-4250/800 345-6089  
Financial services.

**VIDEO INTERNATIONAL**

1280 Sunrise Hwy., Copiague, NY 11726  
516 842-1815  
Standards converters.

**VIDEO LAB**

19788 Del Amo Blvd., Torrance, CA 90501  
213 618-9046/800 548-4466  
VTR heads, electronics; time code equip.

**VIDEO MAGNETICS**

920 Hatch Rd., Modesto, CA 95351  
209 847-8128  
Tape erasers, degaussers; re-built klystrons.

**VIDEO SERVICES UNLIMITED**

2720 E. Thomas Rd., Bldg. A, Phoenix, AZ 85016  
602 224-6162  
Lighting equip.

**VIDEO STORAGE CONCEPTS**

275 79 St., Brooklyn, NY 11209  
718 238-1008  
Tape storage systems.

**VIDEOMEDIA**

211 Weddell Dr., Sunnyvale, CA 94089  
408 745-1700  
VTR editor/controllers; multi-source video editors.

**VIDEOPLEX**

2 World's Fair Dr., Somerset, NJ 08873  
201 469-9038  
Video multiplexers.

**VIDEOTEK**

243 Shoemaker Rd., Pottstown, PA 19464  
215 327-2292  
Frame synchronizers; video processors; video test equip; production switchers; routing switchers, DAs; sync & pulse gens/procs; audio test equip.  
*See ad pg. 79 Circle #132*

**VIKING CASES**

10480 Oak St. N.E., St. Petersburg, FL 33716  
813 577-1216/800 237-8750  
Transportation cases.

**VINTEN BROADCAST**

275-C Marcus Blvd., Hauppauge, NY 11788  
516 273-9750  
Robotic camera systems; camera support equip.

**VISTEK**

Unit C, Wessex Rd., Boume End, Bucks, SL8 5AT England  
44 628531221  
NTSC encoders/decoders; video monitors.

**VISUAL INFORMATION INSTITUTE**

719 Lower Bellbrook Rd., Box 33, Xenia, OH 45385-0033  
513 376-4361  
Video test equip.

**VITAL INDUSTRIES**

3700 N.E. 53 Av., Gainesville, FL 32609  
904 378-1581  
Production switchers; switching automation; routing switchers, DAs.

**VORTEX COMMUNICATIONS**

65 Nonset Path, Acton, MA 01720  
508 264-4415  
VTR heads, electronics; NTSC encoders/decoders; standards converters; video test equip; routing switchers, DAs; sync & pulse gens/procs; time code equip.; clocks, timers; audio processors; intercoms; audio routing switchers; modular broadcast cards.

**W****WARD-BECK SYSTEMS LTD.**

841 Progress Av., Scarborough, ON M1H 2X4 Canada  
416 438-6550  
Portable mixers; on-air consoles, mixers; post-production consoles; audio test equip; intercoms; telco interface equip.; audio routing switchers; connectors, jackfields.  
*See ad back cover*

**WATCO**

315 Racetrack Rd. NE, Ft. Walton Beach, FL 32547  
904 863-2247  
TV transmitters; transmitter, power tubes.

**WAVEFRAME CORP.**

2511 55 St., Boulder, CO 80301  
303 447-1572  
Digital audio workstations.

**WAVEFRONT TECHNOLOGIES**

530 E. Montecito St., Santa Barbara, CA 93103  
805 962-8117/800 423-1434  
3D modeling, animation.

**WAVETEK**

9145 Balboa Av., San Diego, CA 92123  
619 450-9971  
RF test & measuring equip.; microwave filters.

# HIGH RESOLUTION COLOR TUBES



YOUR SOLUTION TO HIGH RESOLUTION COLOR TUBE REPLACEMENT...

## VIDEO DISPLAY CORPORATION

VDC inventories new high resolution color tubes for off-the-shelf delivery. Overnight, if necessary! These tubes carry the manufacturer's warranty and are exact replacement parts.

If your hi-res color type has been discontinued by the OEM, VDC will remanufacture using your glass. Remanufactured types carry the same warranty as new tubes and the savings are substantial!

VDC also stocks over 4,000 different types of monochrome tubes! Tubes for every application!

OUR ONLY BUSINESS IS CATHODE RAY TUBES!

Call: 800-241-5005, 404-938-2080, Fax 404-493-3903

OR SEE YOUR LOCAL AUTHORIZED VDC DISTRIBUTOR.

## VIDEO DISPLAY CORPORATION

1868 Tucker Industrial Dr.  
Tucker, GA 30084



Circle 134 on Reader Service Card.

**WEATHER NETWORK**

3760 Morrow Ln., Ste. F, Chico,  
CA 95928

916 893-0308

Weather graphics/radar.

**WEATHER SERVICES CORP.**

131 A Great Rd., Bedford, MA  
01730

617 275-8860

Weather graphics/radar.

**WEATHERBANK**

2185 S. 3600 W., Salt Lake  
City, UT 84119

801 973-3131

Weather graphics/radar.

**WEGENER****COMMUNICATIONS**

11350 Technology Cir., Duluth,  
GA 30136

404 623-0096

STLs, TSLs; satellite earth stations;  
digital audio transmission system.

**WEIRCLIFFE**

2752 Walnut, Tustin, CA 92680  
714 838-8833

Tape erasers, degaussers.

**WESTERN INTL. COMM./  
ARISTOCART DIV.**

17-825 McBride Blvd., New  
Westminster, BC V3L 5B5  
Canada

604 526-3214

Audio tape, carts; tape storage  
systems.

**WESTLAKE AUDIO**

2690 Lavery Ct., #18, Newbury  
Park, CA 91320

805 499-3686

Studio monitors.

**WHEATSTONE CORP.**

6720 VIP Pkwy., Syracuse, NY  
13211

315 455-7740

Audio processors; on-air consoles,  
mixers; post-production consoles;  
audio routing switchers.

See ad inside front cover

Circle #100

**WHEELIT**

Box 7350, Toledo, OH 43615

419 531-4900

Equipment carts.

**WHITE INSTRUMENTS**

Box 698, Austin, TX 78767

512 892-0752

Audio processors; audio test  
equip.

**WIDE BAND ENGINEERING**

Box 21652, 1838 E. University  
Dr., Phoenix, AZ 85034

602 254-1570

RF amps, terminations, splitters,  
couplers, impedance bridges.

**THE WILL-BURT CO./TMD**

Box 900, 401 Collins Blvd.,  
Orville, OH 44667

216 682-7015

Telescoping masts.

**WINSTED CORP.**

10901 Hampshire Av. S.,

Minneapolis, MN 55438

612 944-8556/800 447-2257

Studio furniture.

**WIREWORKS CORP.**

380 Hillside Av., Hillside, NJ  
07205

201 686-7400/800 624-0061

Wire, cable.

**WOLD COMMUNICATIONS**

3415 S. Sepulveda Blvd., #500,  
Los Angeles, CA 90034-6065

213 398-4657

Satellite distribution svcs.

# Maxell has the classics.



**WOLF COACH**

7 B St., Auburn, MA 01501  
508 791-1950

ENG/EFP vehicles; mobile production units; mobile vehicle construction.

**WORLD TOWER CO.**

Box 405, Paducah Rd., Mayfield, KY 42066  
502 247-3642

Towers.

**WSI CORP.**

41 North Rd., Bedford, MA 01730

617 275-5300

Weather graphics/radar.

**Y****YAMAHA MUSIC CORP.**

6600 Orangethorpe Av., Buena Park, CA 90622  
714 522-9312

Audio processors; portable mixers; on-air consoles, mixers; post-production consoles; mics, accessories; studio monitors; reverb, special efx; synthesizers; monitor/power amps.

**YAMASHITA ENGINEERING MANUFACTURE**

559-1 Funako, Atsugi-shi, Kanagawa, 243 Japan  
0462-28-8692

NTSC encoders/decoders; standards converters; sync & pulse gens/procs.

**Z****ZAXCOM VIDEO**

20 Passaic St., Garfield, NJ 07026  
201 472-2212

TBC digital remote control.

**ZONAL**

Holmethorpe Av., Redhill, Surrey, RH1 2NX England  
0737 767171

Audio tape, carts; magnetic sound recording film.



# And now, heavy metal.



D2 Composite Digital Video Cassettes

1/2 inch Betacam SP

Whatever you're into, Maxell makes a full line of superior media. Like new BQ betacam tape. And, after a decade of making innovations in metal, we offer new SP metal betacam and D-2 tapes.

These new metal tapes have a ceramic surface coating to inhibit corrosion, not output. A conductive backcoating to resist dust, static,

and instability. With an ultra-smooth binder system to make our oxide coatings invincible, even to relentless shuttling white editing.

Of course, all our video and audiotapes, and video floppy disks share this level of durability. And technology. But most of all, Maxell shares your taste—for the very best.

## maxell

22-08, Route 208, Fair Lawn, NJ 07410  
1989 Maxell Corporation of America

# NEW LITERATURE



## A.F. ASSOCIATES INC.

A.F. Associates offers brochures and sales sheets on design and fabrication of professional and corporate video systems, as well as on the Radamec EPO robotic camera control systems and the AVS ADAC and ISIS standards converters.

**Reader Service #241**



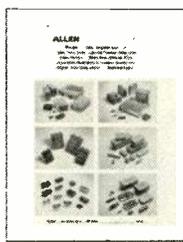
Audio Technologies Inc. presents a full-line catalog describing its line of Problem Solver products, including consoles; amplifiers; IHF to PRO interfaces; studio metering systems; and low-cost distribution, turntable and multiple amplifier arrays.

**Reader Service #245**



BTS also has a "Vidifont Viditext II" brochure with complete product information and specifications on the Vidifont character generator and a description of the Vidifont's flexibility in creating and manipulating displays.

**Reader Service #250**



Allen Avionics' "Precision LC Filters" catalog includes an illustrated "Filter Facts" section that provides a useful refresher on performance, applications and selection criteria for lowpass, highpass, bandpass and band reject filters.

**Reader Service #242**



Broadcast Audio Corp. has a new color brochure describing its latest product line. Included in the brochure are the Series VI Broadcast Audio consoles.

**Reader Service #246**



Broadcast Electronics features its complete line of FM transmitters in its new 12-page brochure. The brochure covers the transmitters' performance, reliability and cost.

**Reader Service #247**



Ampex's new brochure describes its ADO 100 digital effects system, designed for smaller broadcast, post-production and corporate facilities. The system provides traditional ADO picture quality, extensive effects and full 3D upgradability.

**Reader Service #243**



The "Family of Products" catalog from Broadcast Television Systems offers descriptions of all BTS products, sales and service information, and a description of how BTS can design and install a complete studio.

**Reader Service #248**



Also available from Ampex is a brochure about the ACR-225 Automated Cassette System, a D-2 format system that can simultaneously perform play, record and list management activities.

**Reader Service #244**



BTS offers a "Master Control and Automation Systems" brochure, containing complete technical information and product specifications about the MCS-2000 and BTA-2300.

**Reader Service #249**

## The Camera Mart, Inc.

The 1989 sales catalog features Camera Mart's complete line of products ready for distribution. Also available from Camera Mart is a large 1988-1989 rental catalog.

**Reader Service #251**

## DELTA ELECTRONICS

Delta Electronics offers a broadcast product catalog with application bulletins that describe how Delta's products and applications can make the job of planning an AM, FM or TV construction project easier. Delta will also send a wall chart of formulas.

**Reader Service #252**



Fidelipac presents several full-color brochures which feature its recorders and reproducers, cartridge machines, an eraser/splice detector and cobalt tape broadcast cartridges.

**Reader Service #253**



A free brochure from GE Broadcast Systems, formerly RCA Broadcast Systems Project Management and Systems Implementation Groups, details the organization's services. The company designs, installs, expands and relocates broadcast systems.

**Reader Service #254**

## Harrison by GLW

A brochure is available from Harrison by GLW, describing its AP-100 full-featured economical on-air console.

**Reader Service #255**

## HITACHI

Hitachi Denshi America, Ltd.

Hitachi Denshi America, Ltd. presents a new four-page brochure with specs for the SK-F Series of chip cameras and the D-2 Digital Recorder, and a helpful configuration drawing of camera operating systems.

**Reader Service #256**

## JCP

JOHN CROWE PRODUCTIONS

John Crowe Productions offers full-color brochures featuring products for use in remote television production, including cameras, VTRs, switchers, mixers, still stores and more.

**Reader Service #257**

## JVC PROFESSIONAL

JVC's six-page brochure provides a detailed explanation of the S-VHS format, including its features and recent technological advancements to enhance picture quality for the broadcast and professional user.

**Reader Service #258**

## LEITCH

Product catalogs from Leitch feature its full line of television production equipment. A short-form catalog is also available.

**Reader Service #259**

## Logitek

Logitek's 1989 short-form catalog includes descriptions and prices for its complete line of audio products, including on-air and rack-mountable consoles, DAs, power amplifiers, LED bar graph meters and small switchers.

**Reader Service #260**



Magna-Tech has compiled its product literature into a notebook. The products described include recorders, reproducers, interlock systems and footage counters.

**Reader Service #261**



A technical brochure from Magni explains the new Magni Signal Creator in full detail—how the generator can bring programmability within the reach of any facility.

**Reader Service #262**



Maxell's literature packages offer technical specs and compatibility information on the BQ Series for Betacam, Professional Digital Audio Master DA Series 3/4-inch digital audio cassettes, and more.

**Reader Service #263**

## McCurdy

McCurdy's color brochure about its new CS9500 Digital Intercom System describes the system's functions, including pt-to-pt, dynamic party lines, IFB's, group calls and relay control.

**Reader Service #264**



A new 40-page, full-color Surge Protection catalog from MCG Electronics includes an easy selection guide, applications ideas and full technical specs for the company's line of both ac and data line lightning protection devices.

**Reader Service #265**

## MIDWEST Communications Corp.

Midwest has complete information available on its satellite systems and turnkey video production installations. In late fall '89, Midwest will release a new complete product catalog.

**Reader Service #266**

## NOVA SYSTEMS, INC.

Nova offers several full-color pieces of literature about its new equipment. The equipment featured includes the Nova 900S Super TBC, the Novasync Frame Synchronizer and the 710S-Wide Band TBC with S-VHS processing.

**Reader Service #267**



## OPTICAL DISC CORPORATION

Optical Disc Corp. has a new four-page, four-color product brochure covering its LaserVision standard RLV Recordable Laser Videodisc. ODC also covers the ODC 610A Recordable Laser Videodisc Recording System.

**Reader Service #268**



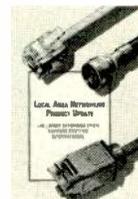
Odetics has spec sheets, including application, for five new products: the News Control Terminal, the External VTR Controller, the Library Expansion Module, the PAL library management cart system and the D-2 digital library management cart system.

**Reader Service #269**

## sachtler.

A full line of lighting products is shown in Sachtler's new catalog. The catalog includes the 100H and 650H lighting systems and the Video 30 II Fluid Head Camera Support System.

**Reader Service #270**



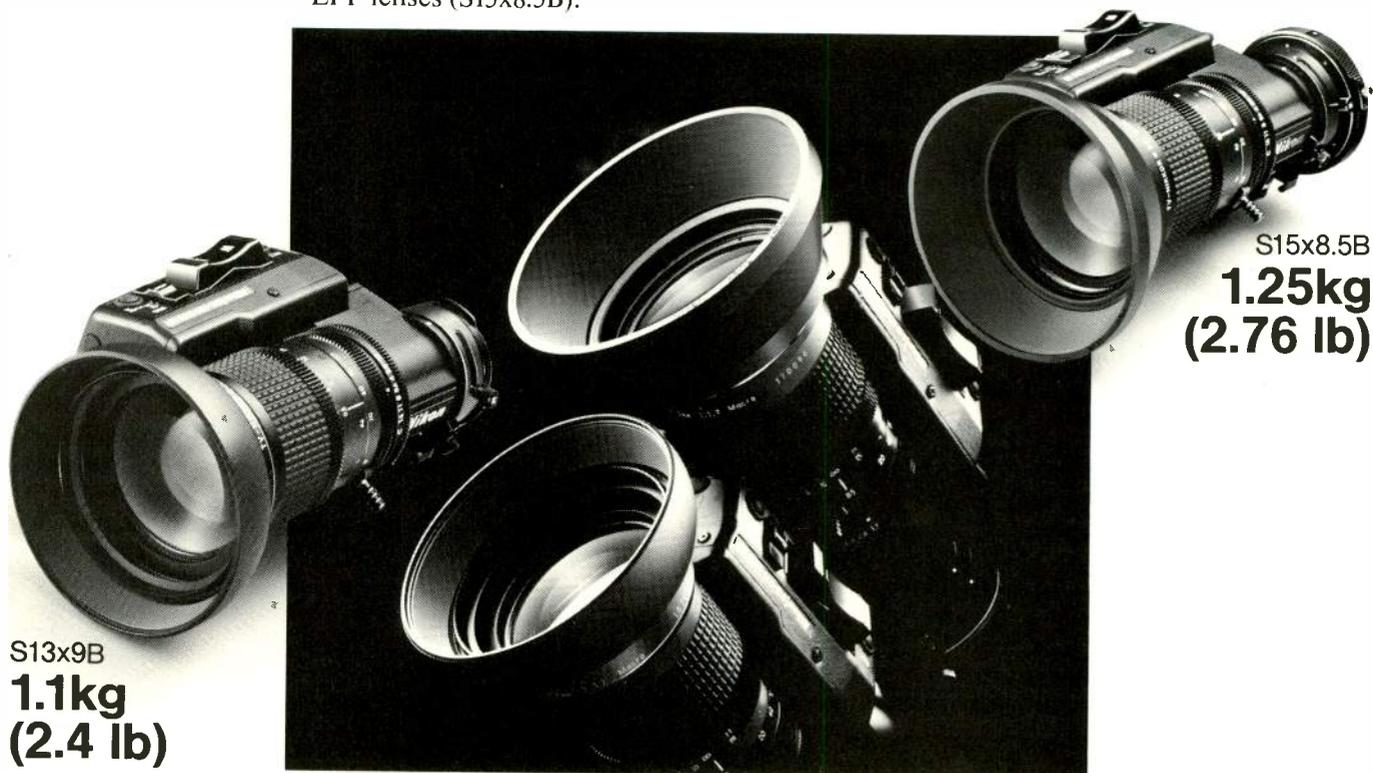
Support Systems International's catalog of local area network products features information on IBM, Ethernet and modular twisted pair LAN products, including cable assemblies, bulk cable and connectors, and patch and distribution panels.

**Reader Service #271**

# **TV-Nikkor S15X8.5B** ENG/EFP Lens for 2/3-inch TV Cameras **S13X9B**

## **Nikon improves TV lens technology**

- Compact, lightweight lenses for 3-CCD cameras, with the flexibility to meet any shooting requirement.
- Nikon ED (Extra-low Dispersion) glass for faithful color rendition and minimal tracking/registration errors.
- New anti-reflection coating improves spectrum transmission ratio.
- Highly advanced optical design via CAD for improved corner resolution and high, flat MTF curve.
- 15x zooming ratio – highest among standard ENG/EFP lenses (S15x8.5B).
- Minimum focal length of 8.5mm – widest among standard ENG/EFP lenses (S15x8.5B).



S13x9B  
**1.1kg**  
**(2.4 lb)**

S15x8.5B  
**1.25kg**  
**(2.76 lb)**

## **Nikon**

### **NIKON CORPORATION**

Fuji Bldg., 2-3, Marunouchi 3-chome, Chiyoda-ku, Tokyo 100 Japan

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Europe ———— Nikon UK Ltd.

380 Richmond Road Kingston, Surrey KT2 5PR, UK

West Germany — Nikon GmbH

Tiefenbroicher Weg 25, 4000 Düsseldorf 30, West Germany

Australia ——— Maxwell Optical Industries Pty Limited

Unit 5, Level B, 100 Harris Street, Pyrmont, N.S.W. 2009, Australia

# RADIO ENGINEERING

NUMBER ELEVEN

SPECIAL SECTION

AUGUST 1989

## FM Multipath Study Generates Cooperation

**P**reviously announced tests of FM multipath at WAEB-FM in Allentown, PA, have generated an unusual alliance. Technical equipment and personnel are being provided to the project from both Delco (General Motors' car radio manufacturer) and Ford's audio division. The two automotive giants join broadcast equipment manufacturers Continental Electronics, TFT, and Electronics Research, Inc. (ERI) in establishing the hardware complement for the tests, which began last month and will continue into early 1990. Eleven separate parameters will be tested, with results delivered to the National Radio Systems Committee (NRSC) FM subgroup, and to the FCC.

Edward Schoeber, author of previous research on the subject and a well-known RF engineer, is technical consultant to the tests, with Harry Simons, CE of WAEB-FM, coordinating the entire project. Joel Bump, another respected multipath specialist, will also consult on the project.

The bulk of the study will involve field measurements along predetermined paths in the WAEB-FM listening area, during which adjustments will be made to the station's transmitter, and pre- and post-adjustment data

will be compared by computer analysis. Digital recordings of the field reception will also be made, for further study.

The FCC has been invited to participate in the tests, with specific exhortation to study the multipath effects of cochannel and adjacent channel interference. However, the multipath effects on the FMX system, a subject of much recent debate, will not be included in the test, according to Simons.

For purposes of the study, WAEB-FM—normally a 24-hour operation—will occasionally suspend regular programming to broadcast test signals. It expects to dedicate a total of around 25 hours of airtime to such testing during the course of the six-month analysis.

Both field and laboratory tests are planned. The field analysis will take place using both regular WAEB-FM programming and special test signals, the latter between the hours of 10:00 a.m. and 5:00 p.m. Field reception test vans will travel with police escort during these hours, collecting signal data along their preplanned routes. The laboratory tests will take place at the Delco Multipath Simulator facility in Kokomo, IN, using data collected in the initial round of field tests.

The study hopes to provide information useful to broadcasters and equipment manufacturers in reducing the audible effects of multipath, through improvements in both the transmission and reception of FM signals. Final results are expected to be available in January 1990.

—Skip Pizzi ■

## NAB Antenna Project Moves Forward

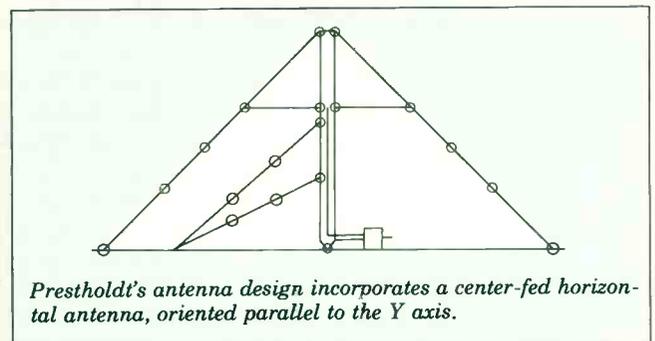
The Science and Technology Department of NAB has begun construction on a new experimental antenna for AM broadcast, the latest step in the association's AM Improvement efforts.

Located in Beltsville, MD, on land leased from Howard University, the antenna is designed by Ogden Prestholdt, a consulting engineer. The antenna will have separately fed vertical and/or diagonal

radiators to gain maximum control over sky- and groundwave radiation. Prestholdt contends that with separate control of sky- and groundwave, a narrow null can be created in the skywave pattern. This would allow a station to broadcast with more power and better serve its city of license while still protecting a distant station.

Manufacturing was by L&R Antennas and construction of the facility was handled by LDL Communications of Laurel, MD.

The NAB AM Antenna Project facility has a



*Prestholdt's antenna design incorporates a center-fed horizontal antenna, oriented parallel to the Y axis.*

295.5-foot T-shaped antenna. Guy wires will support the ends of the horizontal as well as the vertical radiator. The center-fed horizontal element will originate from a balanced feed network located in the tower. Separate matching and

phase controls will be used for both elements with a typical combining network.

The NAB AM Antenna Project was initiated three years ago. NAB will operate the facility on 1660 kHz, with a 400 W transmitter by Nautel.—David Bialek ■

# DIGITAL INTERCONNECTION: TROUBLE IN PARADISE?

In the beginning, there was digital recording, and audio engineers saw that it was good. These recorders stood as "black boxes," digital islands in an analog sea, and they outperformed their predecessors to such an extent that everyone who used them lived happily ever after. Well, for a while, anyway.

It didn't take long for users to realize that once audio was sampled and quantized into digital form ("digitized"), it seemed foolish to convert it back to analog just to send it to another digital recorder for a dub, where it would immediately be redigitized. As digital recorders began to be joined by other digital components in the signal path, such as signal processors, mixers and workstations, this process of conversion between each device seemed even more unnecessary. The converters are the limiting factor in the audio quality of today's digital hardware; the more a signal is passed through them, the more degradation it will suffer. What's more, equipment could be less costly without all those analog-to-digital (A/D) and digital-to-analog (D/A) converters required at the head and tail of each component. So why not keep things in the digital domain once they're there?

The only requirement for this scenario is a standard digital audio interface that all digital devices will support, for purposes of interconnection in the digital domain. For a while, converters would still be required on everything, but they could soon start to become optional extras on many types of units, and eventually be phased out on some devices altogether. Simple, right?

Well, not quite. The idea of digital interconnection was snapped up by practically every equipment manu-

facturer in the industry, and it seems each has its own proprietary interconnection format, many with partially or fully incompatible protocols, using a wide variety of connectors. They seem guided by the principle quoted by the CBC's Steve Lyman at a recent Audio Engineering Society (AES) gathering on the subject: "The nice thing about standards is that you can have so many of them!" Lyman is the chair of an AES Subgroup on Implementation of the AES/EBU digital audio interface standard, the closest thing to a unified professional interconnection format that exists today. (It is the only two-channel format not developed or licensed by a manufacturer.) He has taken on the vast project of coming to grips with this ever-burgeoning list, and trying to make some order out of the chaos. His sense of humor will serve him well through this arduous task. During the group's last meeting at the AES

Digital Audio Conference in Toronto last May, he asked an assembled group of about 50 engineers to call out the formats they were aware of. As the list ran longer and longer, the group's spirits sagged, but it provided a unique opportunity to discover problems in a comprehensive fashion.

Dissimilarities among formats exist in two areas, grouped as "electrical" and "protocol" differences. The first refers to cabling and connector configurations, along with levels and impedances; the second includes such parameters as sampling frequency and the arrangement of data bits. It is within the latter category that the most confusion exists. To further complicate matters, while a user may easily verify the electrical nature of a signal by simple observation and measurement, its exact protocol is not so easily determined.

This problem is exemplified by the most common current complaint of users, that many of the formats seem compatible, but really aren't. Audio data may pass from one digital output

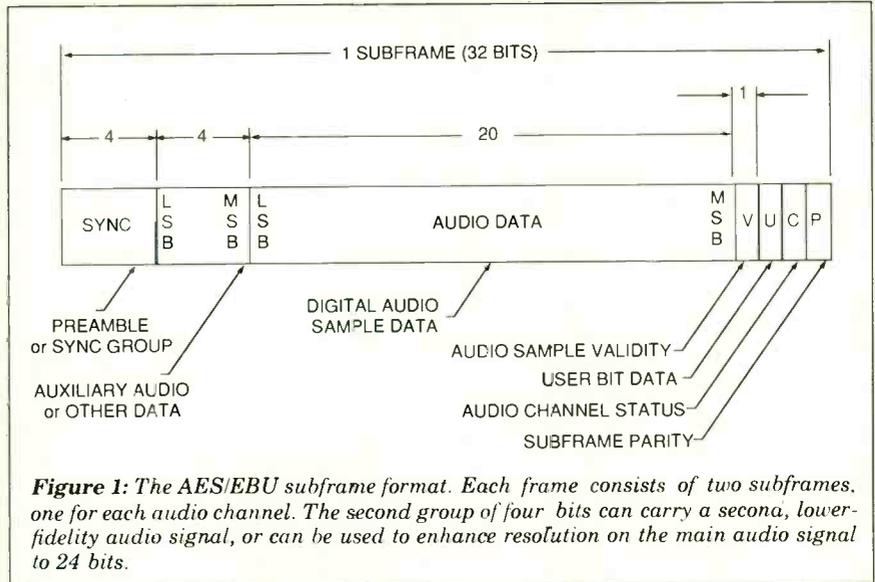
---

BY SKIP PIZZI

---

to another digital input just fine, but status bits (those important adjuncts of data other than audio, such as preemphasis on/off, copy prohibit flags, control and synchronization data, validity and parity bits, subcode information, and other user, auxiliary and identification data, all of which vary widely between formats) may not. As long as synchronization holds, and audio sample data is not significantly corrupted, loss or impairment of other status data may not be immediately noticeable, since the digital *audio* signal is what is typically monitored. The user may realize only well after the fact that some status data did not survive the transfer process, at which point it may be too late to do anything about it. (A common example of this problem comes up when a DAT digital dub is made; checking the copy, one may find that audio is OK, but all index marks are missing.)

To make matters even more precarious, Richard Cabot, president of Audio Precision, Inc., reports that it is common to find a digital input/output (D/I/O) port labeled as being of a certain standard when it is in fact not fully conforming to that standard. He cites several examples of AES/EBU ports found on some of the most respected and highly priced workstations that only approximate that standard. "They are typically using a Signetics consumer D/I/O chip with an



**Figure 1:** The AES/EBU subframe format. Each frame consists of two subframes, one for each audio channel. The second group of four bits can carry a second, lower-fidelity audio signal, or can be used to enhance resolution on the main audio signal to 24 bits.

RS-422 balancing stage added to make it look like AES/EBU," says Cabot, who is in a position to know, as head of one of the country's leading test equipment manufacturing firms. As described above, when an input of this type is fed by a true AES/EBU output, audio will indeed pass in a recoverable form, but most if not all status information will be lost. This type of problem seems rampant throughout the industry at present, although not all manufacturers are guilty. The current lack of a cost-effective and widely available chipset for the AES/EBU interface is a major cause of the problem, but at least one well-known company, Lexicon, is currently pursuing this process and its chipset is expected on the market soon. Meanwhile, though, some weighty investments may be made under the erroneous assumption that an AES/EBU D/I/O is included. Since some status bits are not fully implemented yet, and, more importantly, since most users haven't yet employed all of the status capabilities in their applications, this is a problem that may become more serious to a user with time. *Caveat emptor.*

Lest the professional user perceive

him or herself as a particular target here, rest assured that the situation is not much better in the consumer and the MI (musical instrument) digital camps, where several formats having varying degrees of compatibility exist. Of course, more and more consumer and MI digital audio equipment appears in professional applications now, so this is far from a detached reality for broadcasters. Further, most of the consumer/MI D/I/O jacks are simply labeled "Digital Out" or "Digital In," with no mention of format. This may understandably lead the newcomer into the naive belief that "digital is digital," and

*While a user may easily verify the electrical nature of a signal by simple observation and measurement, its exact protocol is not so easily determined.*

*The digital revolution means more than just a piecemeal replacement of studio hardware; it will affect the way facilities are built from the ground up.*

**PRO FORMATS**

**CONSUMER FORMATS**

AES/EBU*	EIAJ CP-340 Type II, form
SDIF-2 (3 coax)	1**
PD-Dub A, B & C	S/PDIF
MADI (56 ch., coax)	CD "Red Book"
Akai (12 ch.)	IEC 958 Form II, type 1**
Yamaha "Cascade"	
Yamaha DMP7D	
EIAJ CP-340 Type I*	
CCIR Rec. 647*	
IEC 958 Form I	

*Table 1. Selected digital audio interface standards. Except as noted, pro formats use a single twisted pair to carry two channels of audio. Connectors vary, but most twisted pairs use XLR-3 and coax uses BNC. Consumer formats are all unbalanced stereo on a single phono-plug cable (video-type cables recommended). Formats marked \* are essentially identical to each other, as are those marked \*\*. Unfortunately, this table does not constitute an exhaustive listing.*

eningly Byzantine process that has taken place in the attempt to establish the AES/EBU standard and decries the lack of conformity, proper equipment labeling and documentation throughout the industry in this area. Finger is especially vehement on consumer manufacturers' handling of this. "When a CD player says 'Digital Out,' how do you know what that really means?" he wonders. But Finger notes that the AES has no business dictating any of this directly to the consumer manufacturers, stating, "The AES interconnection standard is only directed at the professional audio industry." Nevertheless, he points in particular to the popular consumer format known as S/PDIF (Sony/Phillips Digital Interface Format), claiming there is no official supporting document describing this format.

"There is a section in the back of the 'Red Book' [the CD standards manual for digital audio applications] that refers to a suggested digital interface, but is that really what S/PDIF is based on? The manufacturers have never specified," Finger notes. And so it goes.

The professional standard, on the other hand, is quite tightly specified, in large part due to the efforts of Bob Finger and others. According to AES 3-1985, the AES/EBU digital audio interconnection standard is a modified RS-422 format, using standard audio cabling terminated on standard three-pin XLR connectors. Electrically, it is a balanced, self-synchronizing, two-channel system, thus allowing professional digital stereo audio

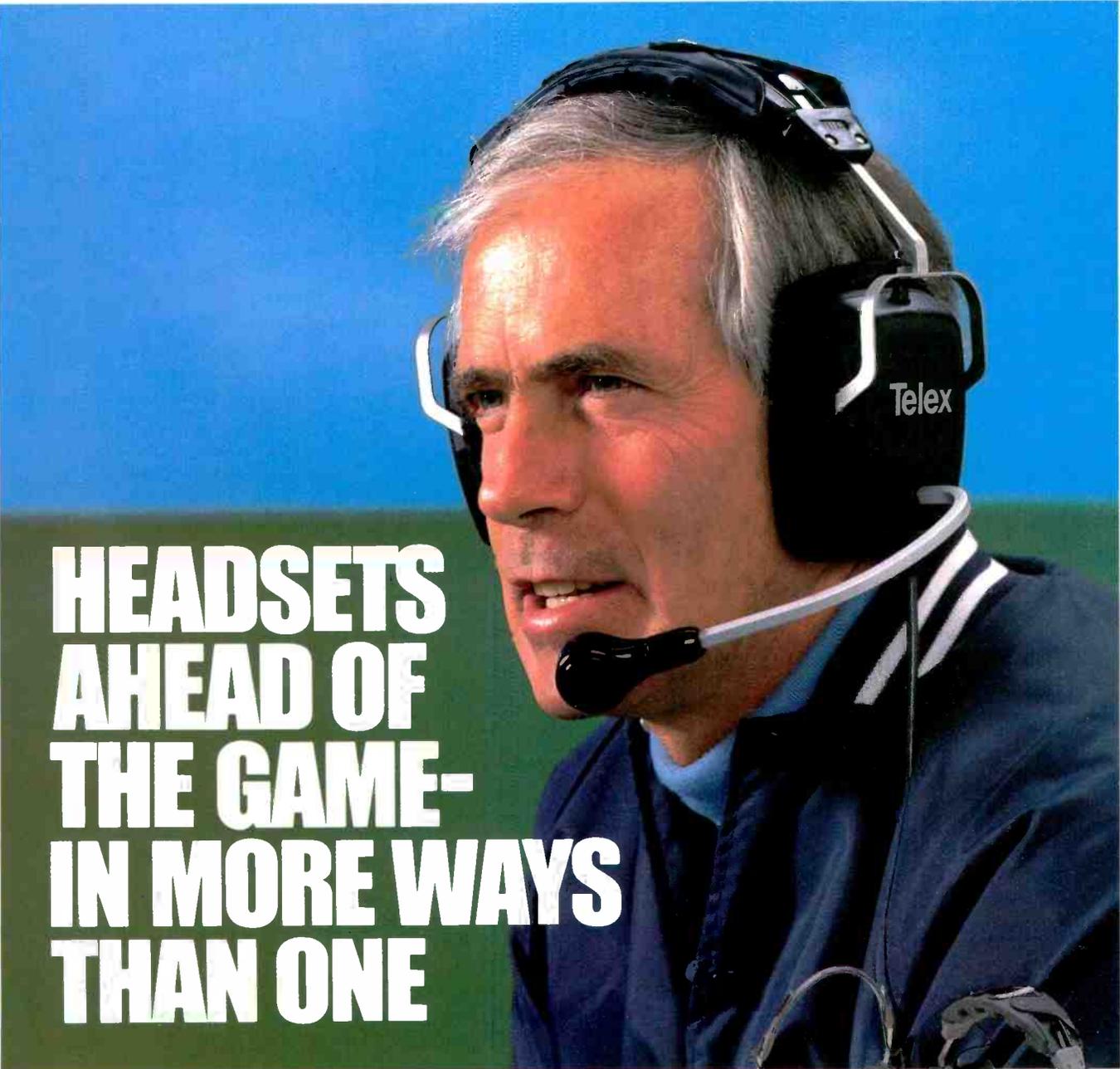
that one simply plugs it in and it works. Those simpler days may be past.

Nevertheless, the present situation must be understood as best it can. Table 1 shows a list of today's most popular digital interconnection formats. If any of these were properly implemented in a facility, the advantages—beyond simply avoiding the audio quality degradation caused by additional conversion—would include immunity from the audible effects of most EMI radiation, the inclusion of certain control parameters embedded in the digital audio datastream, the potential reduction in the number of cables required (depending on the format), and eventually some additional advantages relating to high-speed upload and download of audio programming, or the application of global processing to a "sound file" in less-than-real time.

Current confusion notwithstanding, the AES/EBU interface is the format of choice for many audio professionals, including broadcasters. At an NAB '89 group discussion chaired by Stan Salek of NAB Science and Technology, it was recommended that NAB endorse the standard and work with AES to prepare an appendix to its AES 3-1985 (the original standard document). The new text would consider implementation guidelines on the facility level. Others from the recording industry had also called for this, and the AES took up the challenge, forming the Subgroup on Implementation of its Working Group on Interconnection mentioned above.

Robert Finger, assistant director of the Matsushita Technology Center, is chairman of the full Working Group and is among the most knowledgeable individuals on the subject of digital interconnection. He details the fright-

*The more a signal is passed through analog-to-digital-to-analog conversion, the more degradation it will suffer.*



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signals to be routed on a single, familiar cable and connector. The EBU requires transformer coupling, and the AES specifies it as an option (the only difference between the two formats). It is limited to cable lengths of 100 m (400 feet), but can run longer if specified pre- and de-emphasis is added.

Among other popular professional formats, the Sony SDIF-2 format is perhaps the most in favor, having recently appeared on a few non-Sony products (including the Lexicon 480L digital reverb), as well as all Sony digital recording hardware. This is a TTL-compatible format, requiring a separate coaxial cable for each channel, and a third for synchronization, terminated on BNC connectors, so it is not nearly so advantageous or elegant as the AES/EBU approach, but it has enjoyed widespread and fairly

*"The nice thing about standards is that you can have so many of them!"*  
—Steve Lyman, CBC.

reliable use.

MADI is a recently proposed multi-channel incarnation of the AES/EBU format, allowing up to 56 channels of digital audio to be carried on a single coaxial cable or fiber link. Coax applications are limited to 150 feet (50 m) in length. An external synchronization line is required. As such, it is designed for point-to-point distribution between genlocked equipment,

unlike the two-channel AES/EBU, which is better suited than MADI for central distribution. Several major manufacturers have endorsed this standard, and it is expected to begin showing up on multitrack recorders and mixing consoles soon. Other applications may follow. Within the constraints of its application, MADI is an efficient system, carrying 125 Mbit/s (on coax or fiber), while AES/EBU handles about 3 Mbit/s (on twisted pair).

In its eventual full implementation, a digital audio system will provide mixing capability in the digital domain. All digital sources fed to such a mixer will of course need to be of the same or compatible formats, and synchronized to a common reference, just as video systems are today. Outboard format and sampling frequency converters are available today as a sort of

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niche market, where they are used to convert one digital recording format to another without resorting to use of analog connecting paths. Such devices will be no such luxury when digital mixing of varied sources becomes a reality, but rather an absolute requirement. Implementation for a total "in-house" production will not be difficult, but what of the radio broadcast that includes both in-house and live remote elements, all to be maintained in digital form? And what of master control switchers' ability to handle a variety of formats? Obviously, versatile and format-agile devices will be required for the all-digital broadcast facility, hopefully relegating such conversions to simple and routine tasks. The BBC is out in front on this, currently developing synchronizers capable of combining local and remote elements in the digital do-

*"When a CD player says 'Digital Out,' how do you know what that really means?"*

*—Robert Finger*

main.

The coming of the digital workstation simplifies the issue of digital interconnection a bit, since by its ultimate nature, it combines the functions of several currently separate devices (multitrack recorder, mixer, and mastering deck), thus obviating the need for their external interfacing. The workstation's integration also provides short path lengths be-

tween its internal or peripheral elements, which allows the use of the newer generation of fast and "smart" data buses.

Although much of this may seem a long way off or not pertinent to the broadcaster, it's worth keeping an eye on, and already high time to start familiarizing yourself with this whole interconnection issue. The digital revolution means more than just a piecemeal replacement of studio hardware; it will affect the way facilities are built from the ground up.

This is only chapter one of a long story, in which audio interconnection is dealt with digitally, and a tale of the heroic struggles toward unanimity are told. The sequel for broadcasters will involve similar battles over digital RF standards, no doubt, and that one's waiting in the wings to make its entrance. ■

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# COMPUTE

## Find Coaxial Transmission Line Attenuation on Your PC

By Ronald F. Balonis

**T**he more you get to know them, the more you realize that computers complement humans in many ways. In us, knowledge is perishable, but evolving; in a computer, it's permanent and static. In us, reasoning is inconsistent, but unlimited; in a computer, it's consistent and limited.

In us, thinking ability is holistic and varied, but slow; in a computer, it's sequential or singular and fast.

As usual, this month's Compute program is one for an application that's easier for a computer to do—especially if the need to “Find the Attenuation of a Length of Coaxial Transmission Line” is only an occasional task, such as when setting up an STL, installing an RPU, or making changes in the FM's antenna system. COAXATTN.BAS finds the attenuation and efficiency for a coaxial transmission line data committed to its memory.

Finding the attenuation for a length of coaxial transmission line requires that you first find the value of attenuation per 100 feet (or meters) for the frequency. To do that, you have to find the right page in the catalog, and then interpolate from the manufacturer's data in the table or chart. COAXATTN.BAS does it the same way (almost), only quicker and easier.

COAXATTN.BAS consists of four program modules: initialization, data input, interpolation, and coaxial line data table. The module from line 0 to 90 initializes program variables and the multidimensional data arrays (X and Y) from the DATA table in lines 800 to 844. As the data is read into the arrays, a simple running checksum

is made of it (SUM). The last data read, line 80, reads the actual checksum of the data table and converts it to integers for comparison testing in line 90. Line 90 tests for equality between SUM and CKSUM. If not, it displays an error message and halts the program. This checksum routine is not infallible, but it's better than none at all, and can help in debugging programs that use a table of data in their operation.

The module from line 100 to 260 performs data input prompting, conversion from string values to numeric values, and error checking. To simplify data entry, the data—frequency, length, and coax line—are entered on one line separated by a space (DOS command line-like), and then sequentially parsed using the INSTR function to find the spaces and the VAL function to convert to numeric.

The interpolation module, lines 500 to 590, implements one of the general class of interpolation algorithms known as “Neville's Repeated Process.” Basically, it's an iterative application of linear interpolation, and it finds attenuation values for frequencies between the data points. Line 595 then calculates the Attenuation and Efficiency. Lines 600 to 615 print the results on one line on the screen.

The last module, lines 800 to 844, forms a coaxial transmission line DATA table. Line 802 specifies the size of the data table, number of coax lines and number of data points. The DATA value in line 846 is a six-digit integer of the data table's checksum (INT (100\*SUM)).



The attenuation data points in the data table were interpolated and extrapolated by hand from manufacturer charts. Coaxial line attenuation varies as a function of frequency, its length, and the

```
COAXATTN.BAS          ++ Coaxial Line Attenuation ++
< 1>FHJ1-50 (1/4)   < 2>FSJ1-50 (1/4)   < 3>FSJ4-50B (1/2)   < 4>LDF2-50 (3/8)
< 5>LDF4-50A (1/2) < 6>LDF5-50A (7/8)   < 7>LDF6-50 (1-1/4) < 8>LDF7-50A (1-5/8)
< 9>RG-8          (.402) <10>RG-58U (.196) <11>RG-59U (.242)

ENTER <Freq. Length Coax> separated by a space.

At 1.00MHz 500.00FT of FSJ1-50 : ATTEN.= 0.900dB EFP%= 81.28
At 100.00MHz 100.00M of LDF6-50 : ATTEN.= 0.902dB EFP%= 81.25
At 950.00MHz 150.00FT of LDF5-50A : ATTEN.= 1.898dB EFP%= 64.60

<>Quit or <####MHz ####FT/M #: 450 100FT 5
```

Figure 1. Demo screen for COAXATTN.BAS.

# COMPUTE

```

0 'COAXATTN.BAS ** FIND COAXIAL LINE ATTENUATION
5 'BY USING AN INTERPOLATION ALGORITHM **
10 'BY RONALD F. BALONIS MARCH 18, 1989
20 '
30 '
40 TLES$="          ** Coaxial Line Attenuation **
45 READ K,N:DIM X(N),Y(K,N),C(N),D(N),COAX$(K)
50 CLS:PRINT "COAXATTN.BAS ";TLES:PRINT
55 FOR I=1 TO K:READ COAX$(I):NEXT I
60 FOR I=1 TO K:READ AS: '----- READ the kinds of Coax
61 COAX$(I)=COAX$(I)+" "+AS
62 NEXT I
65 FOR I=1 TO K:READ AS: '----- Show the kinds of Coax
66 PRINT USING"<##>\          \":I:COAX$(I)+" (" +AS+")":
67 NEXT I:PRINT:PRINT
70 FOR I=1 TO N
71 READ X(I):SUM=SUM+X(I): '----- Frequency on the X axis
72 FOR J=1 TO K
73 READ Y(J,I):SUM=SUM+Y(J,I): '--- Attenuation on the Y axis
74 NEXT J
75 NEXT I
80 READ CKSUM:CKSUM=INT(CKSUM):SUM=INT(100*SUM)
90 IF CKSUM<0 THEN PRINT "*** DATA ERROR ***":STOP
95 '
100 PRINT"ENTER <Freq. Length Coax> separated by a space."
105 PRINT
110 PRINT:LOCATE CSRLLN-1,1:PRINT SPACES(79)
115 PRINT"<Q>Quit or <##>MHz <##>FT/M <#>: ";DATS="":L=0
120 LINE INPUT DATS:IF DATS="" THEN STOP
125 I=INSTR(DATS," ")
130 IF I=0 THEN 250: '--- ELSE PARSE THE COMMAND LINE FOR DATA
135 PRQ=VAL(MIDS(DATS,1,I)): '----- Frequency in mHz
140 IF PRQ<X(1) OR PRQ>X(N) THEN 250: '--- Too BIG/small
145 II=INSTR(I+1,DATS," ")
150 IF II=0 THEN 250
155 '
160 LGTH=VAL(MIDS(DATS,I,II-I)): '--- Length in FT or M only
165 IF LGTH<1 OR LGTH>5000 THEN 250: '--- Too BIG or too tall
170 FOR J=1 TO II:AS=MIDS(DATS,J,1): 'is it FEET OR METERS?
175 IF AS="F" THEN L=1:AS=AS+"T":J=II
180 IF AS="M" THEN L=2:J=II
185 NEXT J
190 IF L=0 THEN 250: '----- What kind of UNITS? FT or M
195 IF L=2 THEN L=3.28: '--- IF METERS then Convert to Feet
200 '
205 COAX=VAL(MIDS(DATS,II,3)): '--- kind of coax, a (#)
215 IF COAX>1 AND COAX<N THEN 500: '----- COAX # OK
220 '
250 '--- ELSE CLEAR THE PROMPT LINE ON AN ERROR
255 LOCATE CSRLLN-1,1:PRINT SPACES(79):BEEP
260 LOCATE CSRLLN-1,1:GOTO 115: '----- GO TRY AGAIN
300 '
500 '----- INTERPOLATE COAX DATA to find the Attenuation
505 XX=FRQ:YY=0:K=COAX:J=1:DPD=C:DF=0:NDF=ABS(XX-X(J))
510 FOR I=1 TO N
515 DF=ABS(XX-X(I))
520 IF DF=0 THEN YY=Y(K,I):I=N: '----- IF DATA THEN DONE
525 IF DF<NDF THEN J=I:NDF=DF
530 C(I)=Y(K,I):D(I)=Y(K,I)
535 NEXT I
540 IF DF=0 THEN 595: '----- IF DATA THEN DONE
545 YY=Y(K,J):J=J-1
550 FOR M=1 TO N-1: '----- ELSE INTERPOLATE BETWEEN TWO
555 NM=N-M
560 FOR I=1 TO NM
565 II=I+1:T=(X(I)-XX)*D(I)/(X(I+M)-XX):DD=T-C(II)
570 IF DD=0: THEN DD=1E-25: '----- NO Zeros ALLOWED
575 DD=(C(II)-D(I))/DD:D(I)=C(II)+DD:C(I)=T*DD
580 NEXT I
582 IF C(J+1)<.00001 OR D(J)<.00001 THEN M=N-1: '--- CLOSE
585 IF 2*J<NM THEN YY=YY+C(J+1) ELSE YY=YY+D(J):J=J-1
590 NEXT M
595 ATTN=L*YY*LGTH/100:EFF=100/10^(ATTN/10)
598 '
600 LOCATE CSRLLN-2,1: '--- WRITE OVER PROMPT LINE
605 PRINT USING"At ###.##MHz ###.##\ ";FRQ:LGTH:AS;
610 PRINT USING"of \          \":COAX$(I);
615 PRINT USING"ATTEN.=###.##dB EFF=###.##":ATTN:EFF
620 GOTO 110: '----- THEN GO FOR MORE
700 '
705 '----- COAXIAL TRANSMISSION LINE DATA -----
802 DATA 11, 18: '--- # OF COAX, # OF DATA          Data in dB/100ft
805 DATA          PHJ1,PSJ1,PSJ4,LDP2,LDP4,LDP5,LDP6,LDP7, RG,RG,RG
806 DATA 50, 50, 50B, 50, 50A, 50A, 50, 50A, 8 " " "58U "59U "
807 DATA 1/4, 1/4, 1/2, 3/8, 1/2, 7/8,1-1/4,1-5/8,.402,.196,.242
810 DATA .5,.130,.130,.073,.073,.047,.026,.019,.015,.102,.200,.190
812 DATA 1,.163,.180,.101,.100,.066,.035,.026,.021,.150,.310,.258
814 DATA 2,.230,.250,.143,.140,.094,.050,.037,.030,.215,.470,.408
816 DATA 3,.305,.305,.185,.185,.118,.061,.048,.039,.360,.800,.695
818 DATA 5,.400,.400,.225,.225,.165,.080,.060,.049,.360,.800,.695
820 DATA 7,.480,.480,.280,.280,.187,.093,.071,.058,.410,.980,.810
822 DATA 10,.530,.560,.332,.330,.210,.112,.084,.068,.502,1.25,.995
824 DATA 20,.800,.800,.480,.480,.300,.170,.120,.099,.715,1.77,1.42
826 DATA 30,0.93,0.99,.563,.570,.370,.197,.150,.122,.900,2.30,1.77
828 DATA 50,1.20,1.29,.732,.750,.480,.260,.192,.158,1.22,3.10,2.30
830 DATA 70,1.70,1.70,.900,.960,.590,.310,.226,.192,1.40,3.85,2.80
832 DATA 100,1.72,1.85,1.05,1.05,.680,.369,.275,.225,1.70,4.78,3.40
834 DATA 200,2.50,2.66,1.65,1.50,.980,.535,.397,.330,2.45,7.10,4.90
836 DATA 300,3.45,3.45,1.92,1.92,1.25,.680,.500,.407,3.00,8.05,6.05
838 DATA 500,4.52,4.52,2.55,2.55,1.70,.895,.670,.550,3.95,11.8,8.00
840 DATA 700,5.55,5.55,2.96,2.96,1.97,1.08,.800,.685,4.70,15.0,9.60
842 DATA 1000,6.20,6.50,3.58,3.50,2.34,1.31,.967,.819,5.6,18.00,11.5
844 DATA 2000,9.40,9.70,5.31,5.10,3.46,1.97,1.45,1.25,8.05,27.0,16.0
846 DATA 537477: 'DATA CHECKSUM ----- END OF DATA and END OF PROGRAM.

```

Figure 2. COAXATTN.BAS, a program to find coaxial transmission line attenuation.

ambient temperature. The nominal values of attenuation listed in the table are for 24 degrees C, or 75 degrees F. So however the attenuation and efficiency, the absolute accuracy depends on them. Overall accuracy is subject to these limitations, along with any others expressed by a cable's maker. Also, the interpolating routine introduces a small error because it performs linear interpolation on data that is nonlinear (varies as a power function). Even so, the program produces results that are within one or two percent of manually computed ones more quickly and with a lot less work. It does this by random checking (frequency, line length, and line) using Andrew's "Microwave Antenna System Computer/Transmission Line Selector," Bulletin 8525 (English) and M8525 (metric).

Run through the demo screen examples to proof out the program and to get an idea of how it works and how the three data items are entered on one line. For programs with a limited number of data inputs, just type in the data separated by spaces: frequency in MHz, length tagged with FT for feet or M for meters, and the number for the coax. Press enter to display the line's attenuation and its efficiency. Entry errors in the prompt line,

a number too small or too big or the wrong units designator for length (FT or M only) result in a beep and reprompt from the start. And a null enter at the input data prompt ends the program. As you use the program, it builds a line-by-line analysis on the screen. Use the print screen key to make a copy of the analysis.

While the same type of calculation can be done using a "curve-fitting" technique (formula), curve-fitting requires another program to derive the formulas and their coefficients, and depending on the data to fit, its accuracy can be no better. The interpolation algorithm is more elegant because it provides comparable results with just the data. And the data set can be altered to supply the coax required for particular applications by using new data and the new checksum.

That also makes it easy to modify this program to do interpolation on other charts or tables of data. All you have to do is change the data table and modify the data entry module to suit the new application. ■

Balonis is chief engineer at WILK, Wilkes-Barre, PA. His Compute programs are available for download on A/V Sync, (404) 320-6202.

## Changing FCC May Reconsider City-of-License Policy

By Harry Cole

**O**ne thing is safe to say: The Commission of the 1990s will be different from the Commission of the last year or so. Normally a five-member body, the FCC has been reduced to only three members because former President Reagan's last two nominees were never confirmed by the Senate, and President Bush has been slow to offer his own nominations. Further, Chairman Dennis Patrick has announced his resignation, and Commissioner Patricia Dennis's term expired at the end of June.

Few insiders expect that any new Commission will hit the ground running. It is far more likely that the new Commissioners will move cautiously at first, educating themselves before moving too quickly in any one direction.

This prospect can create some interesting situations, particularly when it comes to policies and decisions made by a thin majority of Commissioners, a majority which is no longer on the Commission. One example of such a situation popped up recently.

Several months ago, the Commission announced that it had decided to make life easier for FM and/or TV licensees interested in changing their cities of license. Previously, if you wanted to change your city of license, you had to open yourself up to competing applications for use of your channel in the proposed community. Suppose your FM or TV station is licensed to City A, and you want to be licensed to City B. In the old days (*i.e.*, prior to July 1989), any effort you made along those lines would create the opportunity for applicants to file for use of your channel in City B, creating a substantial disincentive.

Recognizing this, the Commission has decided to permit FM or TV licensees (or permittees) to change their cities of license without comparative challenge "where the amended allotment would be mutually exclusive with the licensee's or permittee's present assignment." In other

words, if your present channel, now allotted to City A, could be allotted to City B, and if the fact that it is already allotted to City A would technically preclude its allotment to City B, you will probably be able to benefit from the new policy.

To take advantage of it, you would need to file a petition for rulemaking in which you propose to have the Table of Allotments amended to reflect City B, rather than City A, as the community to which your channel is allotted. If the present and proposed allotments are, in fact, mutually exclusive, no competing expressions of interest in your channel in either City A or City B would be accepted and, in most instances, you could probably expect the proposed city swap to be adopted—subject to several major-league uncertainties.

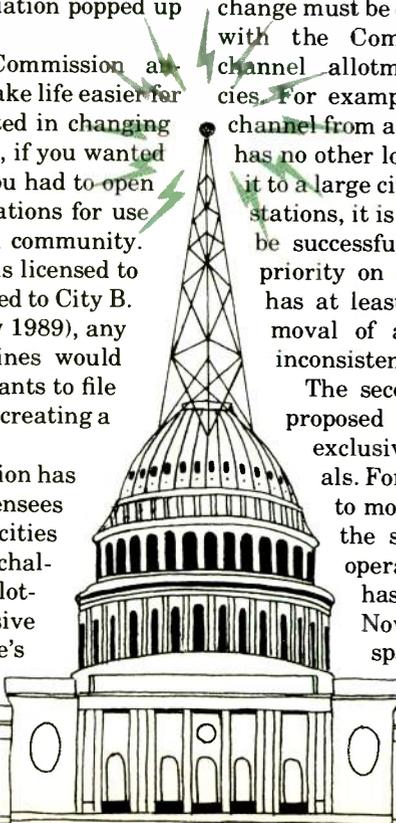
The first important condition is that the proposed change must be consistent with the Commission's channel allotment policies.

For example, if you want to remove your channel from a relatively small community that has no other local broadcast service and reallocate it to a large city that already has multiple local stations, it is extremely unlikely that you will be successful. The FCC places a very high priority on assuring that every community has at least one local broadcast outlet; removal of a city's only station would be inconsistent with that policy.

The second major condition is that the proposed change must not be mutually exclusive with other allotment proposals. For example, let's say that you want to move from City A to City B, and at the same time some other licensee, operating on your channel in City C, has decided to try to move to City D. Now let's also say that, because of spacing or other technical limitations, that channel cannot be



*Cole is a partner in Bechtel, Borsari, Cole & Paxson, a Washington, DC-based law firm.*

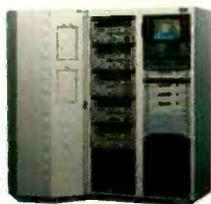


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both B and D at the same time. If both proposals are submitted to the Commission in a timely manner, the FCC would treat them as mutually exclusive and would resolve them by reference to the normal allotment criteria.

You may be able to minimize the potential hassles by careful preparation. By familiarizing yourself with the allotment criteria, you should be able to identify a proposed city of license that will advance those criteria. Further, review of the existing channel allotments in your general neck of the woods should give you some idea of where conflicting channel proposals might pop up. While such knowledge does not mean that you can prevent such conflicting proposals, it does give you the opportunity to minimize the risk.

If you have any interest in changing your city of license, it would probably be best to notify your consulting engineer and communications lawyer at once. Working closely with them from the very outset, you should be able to prepare a reasonable proposal while keeping an eye out for possible conflicting proposals that might get filed while your proposal is still in the formative stages. Monitoring filings at the FCC is an important part of this process. Most consulting engineers should be able to provide you with day-to-day monitoring of proposals filed with the FCC, so you will ideally be able to avoid being foreclosed from any particular opportunity.

While the procedure for changing cities of license is of recent origin, there is a chance that it may not be long for this world. It is possible, of course, that the procedure might get appealed to the U.S. Court of Appeals and reversed by the court. More important, though, is the fact that the Commission adopted this new procedure by a 2-1 vote, with Commissioner Quello dissenting. As discussed above, it is almost certain that, within a matter of months (if it has not already happened by the time this is published), Chairman Patrick and Commissioner Dennis—who comprised the two votes in support of the new policy—will be gone, and Commissioner Quello will be the only one of the three left on the Commission.

This may be significant, especially because Commissioner Quello feels strongly about the potential negative effects of the new policy. As he

sees it, permitting licensees to change their cities of license almost at will is likely to result in a migration of stations away from rural areas and toward suburban and urban areas. Such a migration would, in Quello's view, be inconsistent with the FCC's longstanding efforts to assure a fair distribution of broadcast licenses among the various communities throughout the U.S. This

fear is not at all unjustified. For a rural FM station with a minimal available advertising base, the attraction of a move that might give it access to suburban or metropolitan advertisers and listeners could easily be irresistible.

Quello further notes that the Tables of FM and TV Allotments—both as they were originally established and as they have gradually developed since then—constitute “the cornerstone of communications policy.” Noting that the new procedure could likely lead to many changes in those Tables, Quello argues that the city change procedure “will set in motion the entire table of allotments.”

What he seems to be saying is that the new procedure could destabilize the tables of allotments to the detriment of the public and the Commission. The public might suffer from the anticipated city-ward migration of stations, and the Commission from an influx of rulemaking petitions designed not necessarily to create new or more efficient use of the spectrum, but rather to permit licensees, in effect, to use a leapfrogging combination of city-of-license changes and transmitter-site moves to secure a more advantageous competitive position, possibly to the public's detriment.

Quello will soon be (if he is not already) the only Commissioner left of the three who voted on the new procedure. He could be a strong advocate for revising or even eliminating the procedure. Licensees who are aware of changes they might like to accomplish under the new procedure thus should probably move forward with their plans as quickly as possible. The new procedure was scheduled to go into effect on July 31.

If you have any questions about the process for seeking a change in your community of license, or if you need help in taking advantage of that process, be sure to contact your communications counsel and/or consulting engineer. ■

*While the procedure for changing cities of license is of recent origin, there is a chance that it may not be long for this world.*

# ANNOUNCING BME'S THIRD ANNUAL EXCELLENCE IN ENGINEERING AWARDS

NOMINATIONS ARE NOW BEING ACCEPTED



Photo: Garrett Hopson

**F**or the third consecutive year, BME magazine will present the Excellence in Engineering Awards, recognizing those organizations and individuals who have made significant contributions to the art of broadcast and teleproduction engineering.

Honorees may include stations or facilities that have demonstrated innovation in design or operation; industry groups that have spearheaded technological progress; or researchers who have furthered the science of broadcasting.

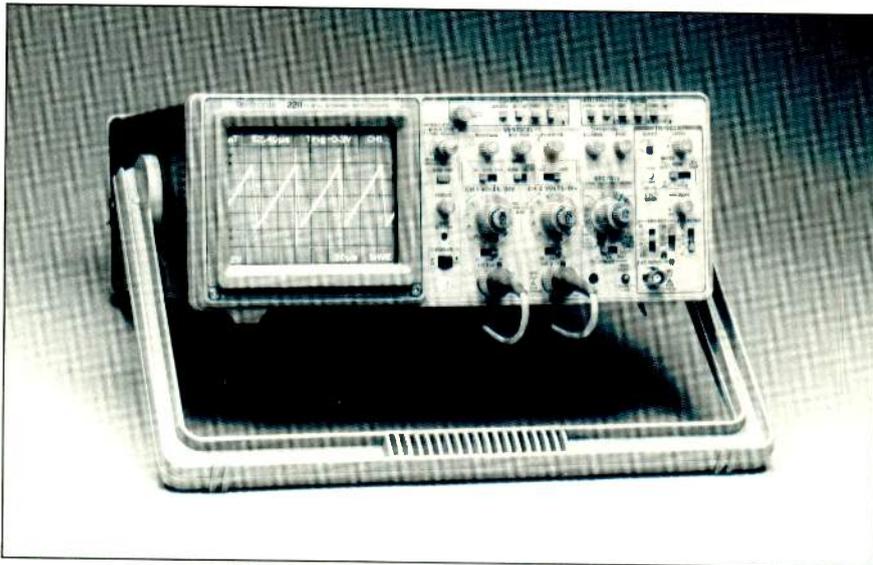
To nominate an organization or individual, or for more information, contact Eva J. Blinder, Editor, BME magazine, 401 Park Avenue South, New York, NY 10016, (212) 545-5100.

## **BME**

*Nominations must be received no later than October 30, 1989.  
Award winners will be announced in the February, 1990 issue.*

# EQUIPMENT

*Tektronix Portable DSO Offers Serial Interface...  
Omnitronix Premier's Solid-State AM Transmitters...  
Nalpak Presents Folding Lens Cap...  
Nady Premier's Narrator Headset for Video Cameras*



## **Tektronix Portable DSO Offers Serial Interface**

**T**he Tektronix 2211 portable oscilloscope features both digital and analog capabilities and provides 50 MHz bandwidth and 20 MS/sec sampling rate per channel. The scope also offers eight-bit vertical resolution, 4K record length per channel, on-screen cursors, CRT read-out and hardcopy serial interface. List price is \$2395.

**Reader Service #200**

## **Omnitronix Premier's Solid-State AM Transmitters**

**T**he OMNI-1000 AM transmitter from Omnitronix is a 1000 W solid-state unit featuring a modular design that allows modules to be replaced "hot" while the transmitter is operational, as well as an internal

NRSC audio processor. The frequency synthesizer operates in 9 or 10 kHz steps. Redundant modulator and power amp circuits prevent failures of single modules from putting the transmitter off the air. Modulation is up to 125 percent positive peak. Frequency response is +0.3 dB, -1.5 dB 20 Hz to 10 kHz. Audio distortion is <2 percent 50 Hz to 8 kHz.

**Reader Service #201**

## **Nalpak Presents Folding Lens Cap**

**D**esigned to prevent lost lens caps, Nalpak's new device, Model LC-5, pulls away from the lens, where it is held in place by an elastic band, and folds to fit in the user's pocket.

**Reader Service #202**

## **Nady Premier's Narrator Headset for Video Cameras**

**T**he Nady NHM-220 headset allows a video camera operator to record voice-overs while shooting. The system is compatible with all video cameras and camcorders; the headphone connector plugs into the camera's headphone jack and the mic connector plugs into the external mic or on-board mic jack on the camera. List price is \$24.95.

**Reader Service #203**

## **JVC Intros SEG**

**J**VC Professional Products' KM-2500 special effects generator contains all the features of its

predecessor, the KM-2000, along with a number of enhancements, including GPI remote control connection, color border function, color-bar generator for systems calibration and auto-transition function. The KM-2500 also accepts the input of a key signal from a character generator or black-and-white camera and features a built-in color-key generator.

Reader Service #204

### Crompton Unveils Digital Metering System

Crompton Instruments' Power-view/Powerbase combination is a digital metering system that measures, displays, processes and transmits more than 60 power network parameters. The Powerbase transducer and protection relay unit communicates with data acquisition systems or with Powerview. Powerview consists of three bar graphs and digital displays plus a 38-key keyboard. Display of amps, volts, watts, vars, watt-hours and other readings is user-selectable.

Reader Service #205

### Lectrosonics Introduces Portable Mic System

The Pro 4 Mini portable four-channel wireless microphone system from Lectrosonics is designed for field production and ENG. The system combines four broadcast quality wireless microphone receivers into a single assembly with built-in rechargeable gel-cell batteries and an RF/power distribution module. The CR185 receivers are compatible with all three of the company's Pro series transmitters including the H185 "plug-on" model.

Reader Service #206

### Ampex Unveils 467 DAT

Ampex Recording Media Co. has introduced Ampex 467 DAT digital audio tape. The product

comes in 45-, 60-, 90- and 120-minute lengths and uses a small tape-view window to maximize the labeling area. Ampex 467 DAT also features the company's DATpak mastering system, consisting of a two-cassette storage tray for cassette with or with-

out album box; documentation storage area for track sheets, recording info or duplicating instructions; and labeling system with check-off boxes, track sheets, cassette labels and extended J-cards.

Reader Service #207

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## EQUIPMENT

### Auto Tape Delay From Merlin

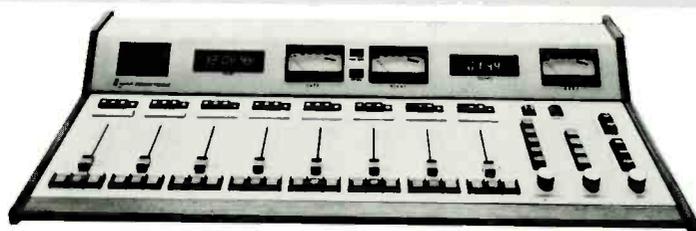
**D**esigned for the broadcaster who needs to delay programming due to time zones or local scheduling, Merlin's automated tape delay

system operates continuously or in a start time/stop time mode without operator intervention. The system is based on an IBM AT-compatible computer and communicates with the VTRs and switcher via RS-422 proto-

col. Time code is used for time-of-day determination and synchronizing of playback VTRs. Up to seven VTRs and one 10x1 output switcher can be controlled by the basic system. Options include fully redundant backup systems and interfaces for non-RS-422 protocol VTRs.

Reader Service #208

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### Anritsu Offers Optical Power Meter and Controller

**A**nritsu's ML9001A optical power meter and MN9001A controller work together to provide rapid automated measurement capability, says the company. The power meter is accurate to  $\pm 5$  percent over a given wavelength range, with guaranteed linearity of 0.15 dB. Dynamic range is -100 to +3 dBm at 1.3  $\mu$ m. The controller can store up to 1000 measurements from the power meter in its nonvolatile memory. Hard copy is provided through a built-in printer. List price on the ML9001A is \$2945; on the MN9001A is \$115.

Reader Service #209

### Energy Control Announces Protector Voltage Suppressor

**E**nergy Control's Protector ac power line transient voltage suppressor uses "electronic-chemical link" technology to increase response speed and power handling ability. The company says that, in lab tests, the Protector has withstood in excess of 20,000 transients with no deterioration or reduction in performance.

Reader Service #210

### Novadyne Intros Routing System

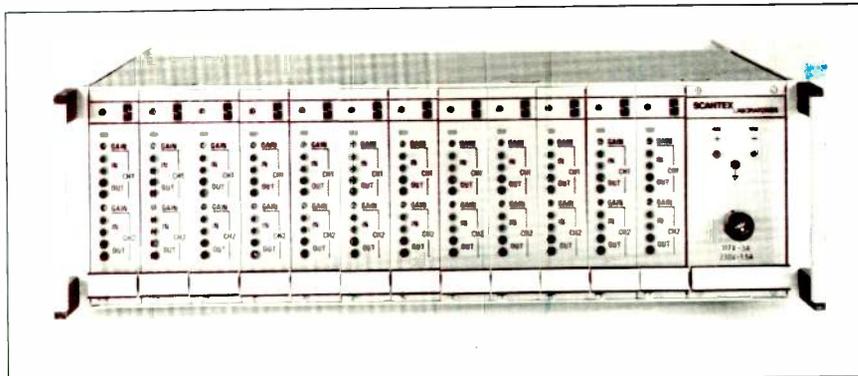
**M**odel 8X16, Novadyne's composite video/two-channel audio routing system, is com-

pletely self-contained in one 3½-inch high by 19-inch wide rack-mountable chassis. Features include all video switching done during vertical interval; simultaneous switching of all presets with a single "take" command; lithium battery backup or routing status circuit guards; and 100 kHz bandwidth on all audio/data channels.

Reader Service #211

## Scantex Unveils ADA

**S**cantex's ADA-100 Super Transparent Series is a dual-channel audio distribution amplifier that features six outputs per channel, 115 dB dynamic range, typical 0.01 percent THD at +24 dBu, programmable gain, two-wire remote control gain, high packing density, 12 dual-channel amplifiers per frame, bal-



anced inputs/outputs, low output impedance and input overvoltage.

Reader Service #212

## E&M Presents Microwave

**E**&M Development's bidirectional microwave systems offer simplex video and audio from

transmitter to receiver with a standard duplex order channel between the two. An optional third audio channel from transmitter to receiver is available for stereo. Available in both portable and STL versions, the system operates at a minimum of 60 mW RF output in the 12.2-13.25 GHz band. Features include a built-in alignment tone laid over the order

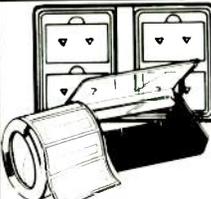
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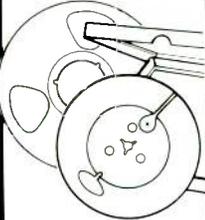


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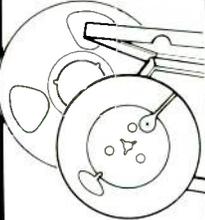


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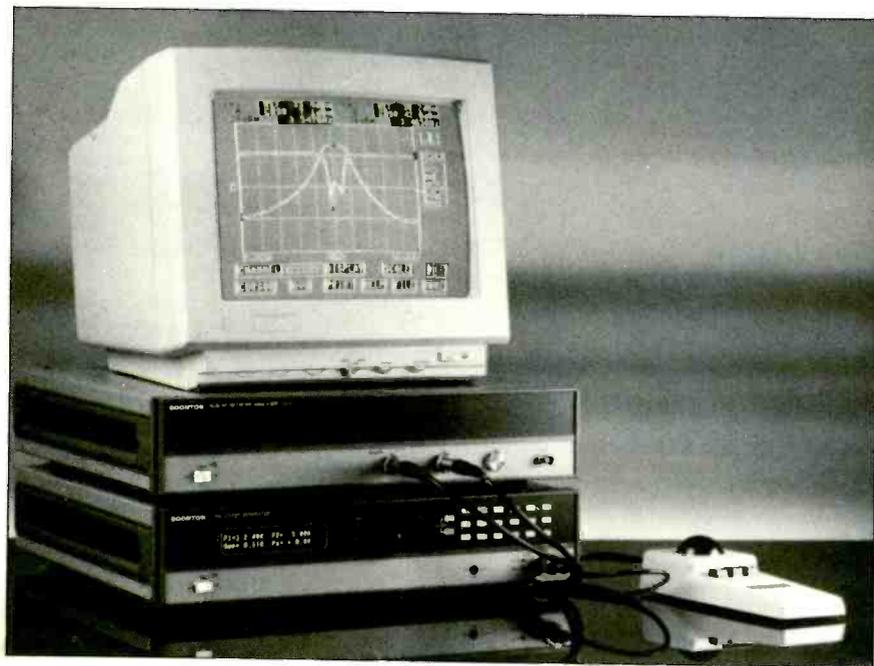
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# EQUIPMENT

channel. List price for the portable is \$9246.40; for the STL is \$10,846.40. Reader Service #213

an STL receiver and transmitter (in studio) or the two corresponding antennas (on the tower). The system



## Electron Processing Unveils Speaker Tapp Mic

The Speaker Tapp microphone is designed to provide a high-quality audio signal from any PA system without being wired into the PA amplifier. The mic uses a highly directional magnetic probe to pick up the magnetic fields of a loudspeaker. Ambient noise and room acoustics are not picked up, only the sound being fed to the speaker. The system consists of a compact probe that can be strapped to most speakers and an amp/power unit, connected by coax cable up to 50 feet in length (six-foot cable provided). The system is available with either line level (-10 to +4 dBm) or mic level (-40 to -50 dBm) output and XLR, mini phone jack or RCA phono jack output connections. Prices start at \$99.95.

Reader Service #216

## Boonton Presents Four-Channel Network Analyzer

The Boonton 2300 scalar network analyzer features four standard inputs: A, B, R and DVM. The A input features an 80 dB dynamic range from +20 to -60 dBm. Frequency range is 100 kHz to 60 GHz. Any user-selected monochrome or color display, composite video or IBM-compatible RGB TTL may be used. Private bus outputs graphic data to a Hewlett-Packard Thinkjet or compatible printer. BPIB and 9600 baud RS-232 interfaces are standard. List price is \$4000.

Reader Service #214

## Microwave Filter Intros Mutual Trap Diplexer

Designed to permit both receive and transmit to operate on one tower coax cable, Microwave Filter's Model 6511 diplexer combines

uses a mutual trap method of diplexing to prevent the transmit signal from interfering with the receiver and prevent the receive signal from "backing up" into the transmitter. Insertion loss through the common port to either the receive or transmit port is 1.5 dB maximum. Mutual isolation is 30 dB minimum (40 dB typical). List price is \$575.

Reader Service #215

## Echolab Intros Low-Cost Switcher

The DV-7 composite switcher from Echolab features automatic calibration; 10 wipe patterns including circle; three digital color generators; three video buses; background and black; fade to black; two linear keyers; a 16-digit alphanumeric display; and an RS-170 genlocking sync generator. In addition, the DV-7



offers color wash and can mix to a wipe and fade DSK to black. Options include an RGB, NTSC or PAL color keyer and a SMPTE serial interface to most editors. List price is \$5995. Reader Service #217

## PCO Offers Fiberoptic Field Transmission System

**D**esigned for use in ENG applications, the PCO-5050 fiberoptic video/audio transmission system can be worn on a belt or attached to a portable camera. The company says the system delivers broadcast-quality links up to eight km without repeaters. The PCO-5050 is fully compatible with the company's PCO-5010 and 5000 systems. List price for the standard configuration, including housing, LED transmitter, unit hold-

er/belt and power supply, is \$4195. Reader Service #218



## Benchmark Presents IFA Series Amps

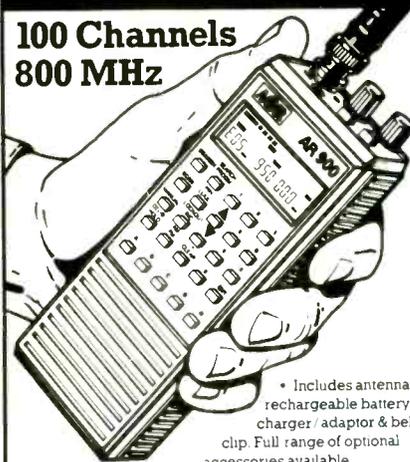
**D**esigned to accommodate a wide range of interface needs with eight different modular models, Benchmark's IFA series of interface amplifiers are mounted in small "modem" style chassis, three of which may be rack-mounted side by side in a

single-rack-height extrusion. Up to four modules may be powered from a

single power supply via RJ11 modular plugs. Currently available are the IFA-1, stereo balance to unbalanced input and output interface; IFA-2, dual balanced in, single balanced out mix amp; IFA-3, dual balanced in to balanced output amp; IFA-4, stereo balanced in to balanced output line amp; IFA-5, quad balanced in to unbalanced output amp; IFA-6, dual balanced in to unbalanced output

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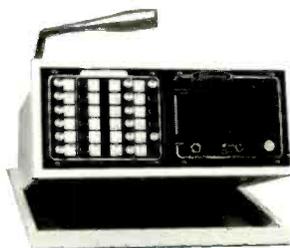


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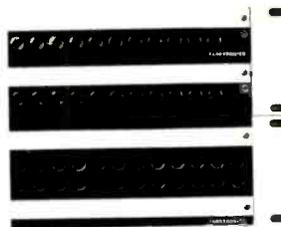
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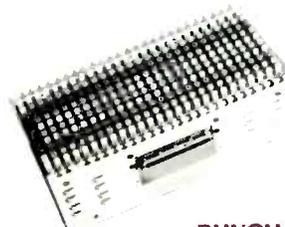
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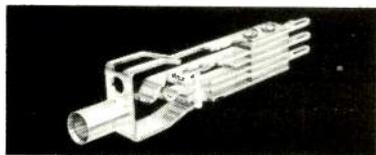
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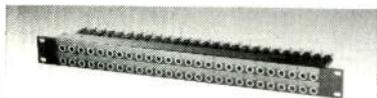


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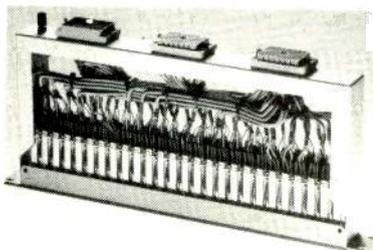
# PATCH-BAY PRODUCTS



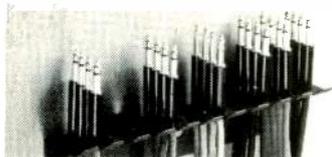
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# EQUIPMENT

amp; IFA-7, stereo balanced input headphone amp; IFA-8, quad balanced input to unbalanced output amp; PS-11, 300 mA  $\pm$ 18 V regulated power supply; and IFA-R, single-rack height, rack-mount extrusion.  
**Reader Service #219**

## Altronic Announces Dummy Load

**A**ltronic has added a 50 kW air-cooled dummy load, model 6750, to its Omegaline 6700 series. The unit is available for either 115 or 230 V ac power requirements. Altronic's sister company, Power Film Systems, provides the nonreactive cermet resistors, designed to remain more stable throughout the temperature ranges, resulting in good VSWR readings through 240 MHz.  
**Reader Service #220**

## Computer Prompting Announces SmartPrompter +

**C**omputer Prompting's CPC-1000 SmartPrompter+ features a simultaneous scroll/edit function that allows edits to be made and additional text to be loaded while the script is being scrolled for talent to read. It also allows other functions, such as setting the countdown timer, to be executed while scrolling. Other features include laptop compatibility and an external control box. List price is \$3750.

**Reader Service #221**

## Leitch Premiers D2 Line

**L**eitch Video has brought out a line of D2 products, including the STG-2520N test generator that offers D2 and analog outputs and full 10-bit precision, along with 56 test signals; the DFS-3020N frame synchronizer, with D2 input and D2 and analog outputs as well as internal signal generator, output phase presets and two- or four-field processing; the DigiTee DDA-7100 digital distribution amp, featuring two reclocked outputs and full 10-bit path; and the DigiPeek DSM-7150 digital signal monitor, with 75 Ohm composite luminance signal output and switch-selectable trigger output of sync, horizontal and vertical. Leitch's Still File System also now offers an optional frame buffer with D2 interface.  
**Reader Service #223**

## Bird Introduces Power Sensor Calibrator

**B**ird Electronic Corp. has announced its Model 4029 power sensor calibrator for use with the company's 4420 series RF power meters. Used in conjunction with a CRT terminal or PC with serial port, the Model 4029 provides in-field calibration of the power meters to within  $\pm$ 3 percent of a known RF standard. The unit supplies a menu-driven protocol to the terminal, guiding the technician through the calibration process. Connectors for standard 25-pin serial cable and power sensor cable are provided.

**Reader Service #222**





## Audiolab Intros Metal Tape Degausser

**A**udiolab's Model TD-5 metal particle tape degausser is designed to accommodate high coercivity tape cartridges (Beta SP, MII, DI-2, DAT and 8 mm cassettes), as well as reels up to 16 inches in diameter and two inches in width. The unit draws only 10 amps. List price is \$1195.

Reader Service #224

## Panasonic Premier S-VHS Player

**T**he AG-7510, an S-VHS video cassette player designed for top-quality dubbing and frame accurate editing, is available from Panasonic. The unit's amorphous video heads ensure high signal-to-noise ratio, while a seven-pin output terminal permits high-quality dubbing. Capstan override input allows direct control of the capstan during time code editing. Input/output terminals include SC-IN, SYNC-IN and DOC-OUT connectors for full TBC compatibility. List price is \$4000.

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# BUSINESS BRIEFS

**U**nder a five-year exclusive agreement, **Midwest Communications Corp.** will market **Toshiba's** line of solid-state VHF TV transmitters in the U.S. and Canada.

In addition to marketing and sales responsibility, Midwest will handle all maintenance and spare parts, both during and after the warranty . . . **Current Music Technology**, Malvern, PA, has joined forces with **AR-Sonic** of West Germany to import ARSonic's line to the U.S. . . . **Varian Associates, Inc.**, Palo Alto, CA, has reached an agreement in principle to acquire the **Walter Johnson Co.'s** space communications product line for an undisclosed price. The line includes high-reliability traveling-wave-tube amplifiers and power supplies for satellite-based communication systems.

**NBC News** is upgrading its computer system through a development agreement with **Siscom**, Boulder, CO, and **Basys**, Mountain View, CA. The network will add a DEC VAX 6310 computer system to its Siscom installation while, at the same time, Basys has agreed to work with Siscom to incorporate access to selected functions of Siscom's NewsPro software from within NBC's Basys system . . . **WGN News Radio**, Chicago, has acquired two additional **Shure Clear-Voice** hands-free cellular microphone systems to report news and traffic on-air from reporters' cars.

**Lightning Eliminators and Consultants, Inc.**, Boulder, CO, installed its Lightning Dissipation Array Systems and/or grounding systems at 11 radio and television broadcast facilities and cable stations in the U.S. during 1988 . . . **Turner Broadcast-**

**ing Systems**, Atlanta, has chosen **Scientific-Atlanta** to provide a satellite uplink for CNN International. The seven-meter Ku-band earth station provided by Scientific Atlanta will be used in conjunction with Pan Am SAT for CNN International's overseas broadcasts . . . **E-Mu Systems**, Scotts Valley, CA, has announced the first shipments of its Proteus digital sound module.

**SAIC Broadcast Systems**, San Diego, a division of **Science Applications International Corp.**, will be responsible for the design, engineering and relocation of the complete on-air, production and newsroom technical facilities of **WMAQ-TV**, Chicago, when that station moves its on-air and news production facilities from the Merchandise Mart to the new NBC Tower at City Front Center.

SAIC has also acquired the consulting firm of **Powers, Wenhardt & Associates**.

**Satellite Information Systems Co.**, Boulder, CO, has announced third-quarter earnings of \$114,233 (\$.04 per share) on revenue of \$1,144,100, compared with earnings of \$1989 (less than one cent per share) on revenues of \$491,558 in the same period last year . . . **Telesat**, Gloucester, ON, had earnings of \$18.9 million in 1988, up 29 percent over 1987 . . . **C-Cor Electronics, Inc.**, State College, PA, has said it expects a strong fourth quarter for its 1989 fiscal year. The company said revenues for the year are up 50 percent . . . **Outlet Communications, Inc.** reported net revenues for first-quarter 1989 at \$22,479,000, up 4.1 percent over the same period last year.



*The first AGFA Pancake Award was presented to Technicolor Videocassette for its achievements in the quality control of high-capacity videocassette duplication. Emmet Murphy (right), president of Technicolor Videocassette, receives the award from Maria Curry (center), VP/GM, Agfa Magnetic Tape. Joining them is Ray Reilly, vice president of purchasing, Technicolor Videocassette.*

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# NEW LITERATURE

## TELEX

TELEX COMMUNICATIONS, INC.

Telex's new, full-color Wireless Systems Product Catalog contains an informational section about system configurations and a section on wireless products.

**Reader Service #272**

# 3M

3M Broadcast & Related Services Dept. offers a series of full-color product information brochures that fully describe 3M's state-of-the-art audio and video broadcast support systems.

**Reader Service #273**

## US UTAH SCIENTIFIC

DYNATECH Broadcast Group

Utah Scientific has released an eight-page, full-color brochure covering its new Series 2 router, the AVS-2, featuring a complete product description with photos of all major components.

**Reader Service #274**



Vicon Industry's Professional Products Div. offers a package of spec sheets explaining its product line, including the "Proline" line of professional pan-and-tilt camera positioning equipment.

**Reader Service #275**

## VIDEOTEK INC.

Full-color literature is available describing Videotek products including the TVM-620 combination waveform monitor/vectorscope and TSM-60 waveform monitor/VSM-60 vectorscope.

**Reader Service #276**

## WBS

Ward-Beck Systems has data sheets on such items as jackfields, distribution amps, mic preamps and belt packs, as well as detailed sales brochures on products such as audio consoles and MicroCOM communication systems.

**Reader Service #277**

BME would like to know if this Product Literature section was helpful to you, the reader. If you would like to see more of these sections, please circle Reader Service #278.

## Will Video Meet the PC Challenge?

By Mike Fayette

It's my belief that many facilities in the post-production business are about to get their brains knocked out. For most of us, the threat will seem to have come from out of nowhere.

Let me paint a picture. It's 1995. Half of the videotape post-production businesses currently operating will be out of business—including the big ones. Half of the "full-service" operations will die. More than half of the smaller "boutiques" will collapse or sell out to survive. And it will be our own fault, because we couldn't learn the lessons of our own recent past.

The folks in the video industry have been pretty smug for the last five or 10 years. Most of us have made money. It's even been a good time to start a new facility. Our friends in the film finishing business haven't been so lucky. Most of them are gone now, poor souls. And for much of that time, many of us in the video business were actually smug about their impending demise. We were smarter than they were, weren't we? We knew that the film editing business was doomed—long before most of them did.

Some of us took malicious glee in discussing video terminology like "time code," "color framing" and "horizontal blanking" just to impress them with our superior knowledge.

The more we shouted, the more the film folks responded by attacks of their own. The new videotape medium was too sharp. It was too soft. It was too noisy. It needed too much light. It was too bulky. And finally, in desperation: "It doesn't have the film look."

Their defensive tactics couldn't hold back tape forever, and today, 10 or 15 years later, 90 percent or more of the film-only houses are gone, replaced by video. Film editing emporiums have either died or grudgingly made the transition to tape.

History is about to repeat itself. This time, the

videotape industry as we know it today will be the victim. And it won't be HDTV that does it, any more than 35 mm film died when Cinemascope came about. We're going to be killed by K mart. And Sears. And Computerland, and all the other sellers of the electronic future. Consumer technology and PCs will smash our \$1000 per hour rate cards forever.

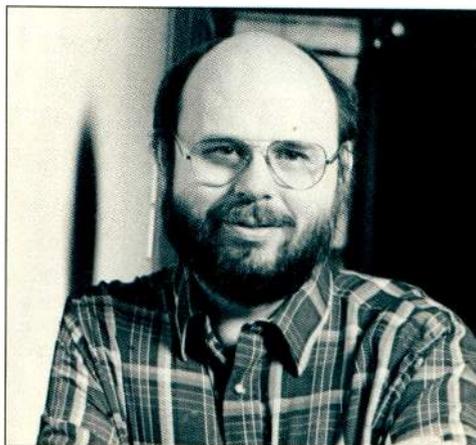
In my own facility, the transformation is already taking place. A Macintosh SE is controlling the digital audio for my D-1 editing suite. An Atari is mixing the audio on two of my one-inch on-line rooms. IBM PCs are compositing images in my Composium suite. An Amiga handles off-line design work and storyboards. Consumer S-VHS decks outfitted with time code are doing off-line work. Another just-installed PC controls a Targa board for business presentations.

It all came home to me last week, when one of our clients (who usually works exclusively on one-inch) came in and edited his new S-VHS field master recordings right up to a D-2 digital master. And it looked great.

If you listen carefully, you can hear echoes of the not-so-distant past in the words that the critics hurl against this wave of PC-based and consumer-oriented imaging systems. It's not "professional." It's not antialiased. It's too small. You need a programmer to operate it. It's too automatic. It has a "computer-generated" look. It's too cheap.

The idiots this time are we—the broadcast video industry. We have to get rid of our precon-

ceptions of what PCs can or can't do. Or that "consumer" equipment can't be used for "real" television. If we can't learn to use this new technology, we're just as doomed as the 16 mm news cameraman in 1975 who refused to learn to use a minicam. The PCs are gonna get us if we don't watch out ■



*Mike Fayette is president of Post Effects, Chicago.*

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