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Vice President
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Radio News

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

The 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.
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SCES Downplays HDTV

While 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 Rinalde (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...

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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-I)).

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 Ruthner, 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 establishment 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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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 become 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 (YBa$_2$Cu$_3$O$_7$), belongs to a new class of what are known as "high-temperature" supercon-
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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 YBa$_2$Cu$_3$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 superconducting properties.

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

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 ¾-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 ¾-inch U-matic to Betacam for its spot news operation. “We would have replaced the ¾-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 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

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.”
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 Exflex/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 Abekas 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 pondered 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 broadcaster. 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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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.

"In smaller radio markets, you
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 autopower 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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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.

### PRODUCT GUIDE

#### VIDEO
- Camcorders
- Cameras: ENG/EFP
- Cameras: Studio
- Camera Lenses
- Camera Pickup Tubes
- Camera Support Equipment
- Cart Playback Systems
- Character Generators
- Clocks, Timers
- Color Correctors
- Digital Disk Recorders
- Digital Video Effects
- Edit Controllers
- Edit Systems, Multisource
- Editing Systems, Random Access
- Editor Interfaces, Accessories
- Election Reporting Systems
- Frame Synchronizers
- Graphics Systems, 2D
- Graphics Systems, 3D
- Animation & Modeling
- HDTV Production Equipment
- Lighting Equipment
- Keyers
- Monitors, Video
- NTSC Encoders, Decoders
- Projectors, Video
- Remote Motion Control
- Robotic Camera Systems
- Standards Convertors
- Still Store Systems
- Switchers, Master Control
- Switchers, Production
- Switchers, Routing/DAS
- Switching Automation
- Sync and Pulse Generators/Processors
- Tape Erasers, Degaussers
- Tape Synchronizers
- Telecines
- Teleprompters
- Time Base Correctors
- Time Code Equipment
- Video Delays, Filters
- Video Processors
- Video Recorders, Solid State
- Video Recorders, Other
- Video T&M
- Videotape
- VTRs, Digital
- VTRs, One-Inch
- VTRs, ¾-, ½-Inch
- VTR Heads, Electronics
- Weather Graphics, Radar

#### AUDIO PRODUCTS
- Amplifiers, Pre-amplifiers
- ATRs, Digital
- ATRs, Field
- ATRs, Studio
- ATR Synchronizers
- Audio Heads, Accessories
- Audio Processors
- Audio Routing Switchers, DAS
- Audio Tape, Carts
- Audio Test Equipment
- Cart Players
- Cassette Player/Recorders
- Compact Disc Equipment
- Console Automation
- Delay Systems
- Digital Audio Workstations
- Electronic Audio Editors
- Faders, Attenuators
- Headphones
- Intercoms
- Level Indicators
- Microphones, Accessories
- Mixers, On-Air
- Mixers, Portable
- Mixers, Post-Production
- Monitor Speakers
- Noise Reduction Equipment
- Remote Pickup, RENG
- Reverb, Special EFX
- Sound Insulating Material
- Studio Automation Equipment
- Telco Interface Equipment
- Turntables

#### RF, OTHER PRODUCTS
- AM Stereo Equipment
- Antennas, Towers
- Business Automation
- Connectors, Jackfields
- Diplexers, Multiplexers
- EBS Equipment
- ENG/EFP Vehicles
- Equipment Enclosures
- Exciters
- Fiberoptic Systems
- Hum Eliminators
- Lightning Protection
- MDS, SMATV Systems
- Microwave for ENG
- Microwave, Intercity
- Mobile Production Units
- Modulators, Demodulators
- MTS Equipment
- Newsroom Computers
- Power Supplies, Batteries
- Remote Monitoring Systems
- RF Amps, Switches
- RF Components
- RF Loads, Filters
- RF Test Equipment
- Satellite Earth Stations
- SCA Equipment
- SNG Systems
- Stereo Generators
- STLs, TSLs
- Studio Furniture
- Tape Storage Systems
- Teletext Equipment
- Tools
- Transmission Line
- Transmitter Remote Control
- Transmitters, Radio
- Transmitters, Television
- Transmitter, Power Tubes
- Transportation Cases
- Wire, Cable

#### SERVICES
- Equipment Distributors
- Financial Services
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PANASONIC BROADCAST
PANASONIC INDUSTRIAL
SHARP ELECTRONICS CORP.
SONY BROADCAST
SONY PRO VIDEO
THOMSON VIDEO EQUIPMENT

CAMERAS, ENG/EFP

AMPEX
BTS
HITACHI DENSII 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

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

CAMERA LENSES

ANGENIEUX CORP. OF AMERICA
APOLLO AUDIO VISUAL

CART PLAYBACK SYSTEMS

AMPEX
ASACA SHIBASOKU CORP.
CHANNELMATIC
LARK SYSTEMS CORP.
MATCO
ODETECS BROADCAST
PANASONIC BROADCAST
SOLITEC
SONY BROADCAST

COLOR CORRECTORS

COLORGRAPHICS SYSTEMS
COMPREHENSIVE VIDEO SUPPLY
CORPORATE COMMUNICATIONS
CONSULTANTS
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FORTEL
JAMES GRUNDER ASSOCIATES
LAIRD TELEMEDIA
NYTONE ELECTRONICS
QUALITY VIDEO SUPPLY
QUANTEL
RANK CINTEL
SIERRA VIDEO SYSTEMS
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DIGITAL DISK RECORDERS

ABEKAS VIDEO SYSTEMS
ADVANCED DESIGNS CORP.
ASACA SHIBASOKU CORP.
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QUANTEL

DIGITAL VIDEO EFFECTS

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AMPEX
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FOR-A CORP. OF AMERICA
JAMES GRUNDER ASSOCIATES
HOTRONIC
MICROTIME

CLOCKS, TIMERS

ALAMAR ELECTRONICS
APLEX SYSTEMS
AUDIOLAB ELECTRONICS
BEAVERONICS

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Our Network Ratings Are In.

Our clients have certainly appreciated the cost savings, and everyone has enjoyed the extra time satellite has provided us. Cycle-Sat has proven that satellite is a very viable method to distribute commercials.

— Dana Geiken, DMB & B

Our association with Cycle-Sat has been an exciting time for us. Cycle-Sat has made it easier for us to execute spot T.V. buys in multiple markets.

— Merle Welch, Foote, Cone and Belding

We have become accustomed to the ease and reliability of receiving commercial spots via satellite. We are also impressed with the flexibility of the system in regard to getting refeeds and special feeds. We look forward to a long working relationship.

— Karl Hagauer, KPLR

Our experience at WGN-TV with Cycle-Sat has been quite positive. The system has been very reliable and the convenience of receiving the commercials in non-primetime has been helpful in scheduling our tape machines. Our equipment has been freed for production use during the prime hours.

— Robert Strutzal, WGN-TV

The quality and reliability of the hardware and software is outstanding. It's error free in its operation, and the speed with which we receive commercial feeds saves us make-goods and lost time.

— Jim Martin, WOAY-TV

If you haven't already joined the Cycle Sat spot delivery network, check out the reception we're getting from those who have. We guarantee network quality transmission of your spots, along with standardized traffic instructions. For service that's out of this world... Call 1-800-274-2728.

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A COMMUNICATIONS NETWORK
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STRAND ELECTRO CONTROLS
STRAND LIGHTING
TEATRONICS
Tekno
THEATRE SERVICE & SUPPLY
TIMES SQUARE LIGHTING
TVI/Theatre Vision
TWR Lighting
Ultimate Support Systems
Union Connector
UNIVERSE STAGE LIGHTING
USHIO AMERICA
Video Services Unlimited

KEYERS

Beaveronics
Graham-Fatten Systems
The Grass Valley Group
Tecon

MONITORS, VIDEO

Asaca/Shibasoku Corp.
Barco Industries
Combat World Systems Div.
Comrac Display Prods.
Electrohome
Hitachi Densihi 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.
Vister

NTSC ENCODERS/DECODERS

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Broadcast Video Systems
Central Dynamics Ltd.
Comprehensive Video Supply
Conrac Display Prods.
Faroujda Labs
For-A Corp. of America
Intevideo
Lenco Electronics
Lyon Lamb VAS
Omicron Video
Panasonic Broadcast

Progressive Image
Quality Video Supply
Shintron Co.
Sigma Electronics
Telemet
Thomson Video Equipment
Truevision
TTE
Video Associates Labs
Vister
Vortex Communications
Yamashita Engineering

STILL STORE SYSTEMS

AbeKas Video Systems
Alta Group
Amex
Asaca/Shibasoku Corp.
Aston Electronics
BTS
CEL Electronics
Dunbar Computer Systems
Harris Broadcast
Harris Video Systems
Leitch Video
Oktel Corp.
Pinacle Systems
Quantel
Rank Cintel
Shintron Co.
Sony Broadcast

SWITCHERS, MASTER CONTROL

Amex
BSM Systems
BTS
CCI
The Grass Valley Group
Image Video
Kaitronics Corp.
Omicron Video
Torrey Controls/Key Video
Utah Scientific

SWITCHERS, PRODUCTION

AbeKas Video Systems
Alamair Electronics
Alta Group
Amex
AMX
Central Dynamics Ltd.
Comprehensive Video Supply
Crossttream Latch Corp.
Echobar
For-A Corp. of America
The Grass Valley Group
Intergroup Technologies
Kaitronics Corp.
Matrix Systems Corp.
Ross Video
Shintron Co.
Sierra Video Systems
Sony Broadcast
Thomson Video Equipment
Toshiba America
Videotek
Vital Industries

SWITCHING AUTOMATION

American Broadcast
Amherst
BTS
CCI
Channelmatic

AMERICAN BROADCASTING
ADRIENNE ELECTRONICS
ADVANCED VIDEO ASSOC.
AMTEL SYSTEMS
AUBURN INSTRUMENTS
BSM SYSTEMS
BTS
CCI
CEL ELECTRONICS
CENTRAL DYNAMICS LTD.
CHANNELMATIC
COMPREHENSIVE VIDEO SUPPLY
DATATEK CORP.
DI TECH
DIANA ELECTRONICS
DYNAMIC TECHNOLOGY
ESI
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
SoliTec
Telemet
Thomson Video Equipment
Torrey Controls/Key Video
Utah Scientific
Video Accessory Corp.
Videotek
Vital Industries
Vortex Communications

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CONNOLEY SYSTEMS
DYNAMIC TECHNOLOGY
FLORICAL SYSTEMS
THE GRASS VALLEY GROUP
GIURMAN ELECTRONICS
ISS ENGINEERING
MEDIA COMPUTING
TORPEY CONTROLS/KEY VIDEO
UTAH SCIENTIFIC
VIDEO DATA SYSTEMS
VITAL INDUSTRIES

SYNCH AND PULSE
GENS/PROCS

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R.B. ANNIS CO
ANRITSU AMERICA
CCI
DIGITAL PROCESSING SYSTEMS
JOHN FLUKE MFG. CO
THE GRASS VALLEY GROUP
HEIDCO
LEITCH VIDEO
LENCO ELECTRONICS
LYON LAMB VAS
MULTIDYNE ELECTRONICS
OMICRON VIDEO
PROGRESSIVE IMAGE
QSI SYSTEMS
SIERRA VIDEO SYSTEMS
SIGMA ELECTRONICS
VIDEO ACCESSORY CORP.
VIDEOTWEB
VORTEX COMMUNICATIONS
YAMASHITA ENGINEERING

TAPE ERASERS,
DEGAUSSERS

ALLSOP
AUDIOLAB ELECTRONICS
CMC TECHNOLOGY
COMAD COMMUNICATIONS
COMPREHENSIVE VIDEO SUPPLY
GANER INDUSTRIES
GENEVA GROUP
MICROTAN CO
RECORTEC
RESEARCH TECHNOLOGY INTL.
SIRA
TAPER
VIDEO MAGNETICS
WEIRCLIFFE

TAPE
SYNCHRONIZERS

AMTEL SYSTEMS
AUDIO KINETICS
CIPHER DIGITAL
EDITORON USA
EVERTZ MICROSYSTEMS
MULTI-TRACK MAGNETICS
UNITED MEDIA

TELEVISIONS

BTS
IKKAMI ELECTRONICS
L.W. ATHENA
LARDI TELEMEDIA
MAGNA-TECH ELECTRONIC CO.
MARCONI COMMUNICATION
MULTI-TRACK MAGNETICS
NYTONE ELECTRONICS
RANGERTONE RESEARCH
RANK CINTEL
STEAD-FILM
STE十四条ECK
VIDEO BROKERS

TELEPROMPTERS

CINEMA PRODUCTS CORP
COMPREHENSIVE VIDEO SUPPLY
COMPROMPTER
COMPUTER PROMPTING CORP.
DYNATECH NEWSTAR
ELECTRONIC SCRIPT
PROMPTING
LYNN GREENBERG
LISTEC VIDEO CORP.
Q-TV
SISCOM
TEKSKIL INDUSTRIES
TELESCRIPT

TIME BASE
CORRECTORS

ALTA GROUP
AMFEX
AMX
CEL ELECTRONICS
CROSSPOINT LATCH CORP.
DIGITAL PROCESSING SYSTEMS
FOR-A CORP. OF AMERICA
FONTEL
HARRIS BROADCAST
HARRIS VIDEO SYSTEMS
HOTRONIC
I.DEN VIDEOGRAPHICS
JVC PROFESSIONAL PRODUCTS

LENCO ELECTRONICS
MICROTIME
NOVA SYSTEMS
OKTEL CORP.
PANASONIC BROADCAST
PRIME IMAGE
PROGRESSIVE IMAGE
SHINTRON CO
ZAXCOM VIDEO

TIME CODE
EQUIPMENT

ADAMS SMITH
ADRIENNE ELECTRONICS
AMHERST
AMTEL SYSTEMS
CIPHER DIGITAL
COHERENT COMMUNICATIONS
COMPREHENSIVE VIDEO SUPPLY
DATUM
ESE
EVERTZ MICROSYSTEMS
FAST FORWARD VIDEO
JOHN FLUKE MFG. CO
FOR-A CORP. OF AMERICA
FONTEX
GI!
GRAY ENGINEERING LABS
KINEMETRICS/TRUETIME
MAGNA-TECH ELECTRONIC CO.
MULTIDYNE ELECTRONICS
OTARI CORP.
SHINTRON CO
SIERRA VIDEO SYSTEMS
SKOTEL
TELEMET RESEARCH
TIMEBASE
VIDI VIDEO
VIDEO LAB
VORTEX COMMUNICATIONS

VIDEO DELAYS,
FILTERS

ALLEN AVIONICS
BROADCAST VIDEO SYSTEMS
TELEVISION EQUIPMENT ASSOC.
TTE

VIDEO PROCESSORS

ACCOM
ALTA GROUP
AMHERST
AMP PRODUCTS CORP.
BROADCAST VIDEO SYSTEMS

COMPRESIVE VIDEO SUPPLY
FLORICAL SYSTEMS
THE GRASS VALLEY GROUP
HIGH RESOLUTION SCIENCES
LEITCH VIDEO
LENCO ELECTRONICS
MICROSONICS
MICROTIME
OPTICAL DISC CORP.
PROGRESSIVE IMAGE
SHINTRON CO
TECCOM
TELEMET
TELMAK
TOKYO AMERICA
ULTIMATE CORP.
VIDEO ASSOCIATES LABS
VIDEOTWEB

VIDEO
RECORDERS,
SOLID STATE

NEC AMERICA
SONY BROADCAST

VIDEO
RECORDERS,
OTHER

EIGEN VIDEO
OPTICAL DISC CORP.
POLAROID CORP.
SONY INFORMATION SYSTEMS

VIDEO
T&M

A.F. ASSOCIATES
ANRITSU AMERICA
ANSA/SHIBASOKU CORP.
B&K PRECISION
BROADCAST VIDEO SYSTEMS
COMSAT WORLD SYSTEMS DIV.
DIGITAL PROCESSING SYSTEMS
JOHN FLUKE MFG. CO.
HEWLETT-PACKARD CO.
LEADER INSTRUMENTS
LEITCH VIDEO
LENCO ELECTRONICS
MAGNI SYSTEMS
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RE INSTRUMENTS CORP.
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Hitachi presents two new 3-chip CCD broadcast cameras that give you higher resolution and better image quality than you have ever seen before in a broadcast camera.

The SK-F3 dockable and the SK-F700 studio cameras include the newest Frame Interline Transfer (FIT) CCD technology. Smear is virtually eliminated. Sensitivity is dramatically improved.

A 6-speed electronic shutter and contrast function are both built-in. And as for high resolution, the SK-F3 and SK-F700 have crystal clear 700 lines.

Your choice for a high performance camera system has never been easier. Learn more about the new SK-F3 and SK-F700. In the studio or in the field, they are clearly superior.

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VTR HEADS, ELECTRONICS
CMC TECHNOLOGY
MICROTAN CO.
SAKI Magnetics
VIDEO Lab
VORTEX Communications

WEATHER GRAPHICS/RADAR
ACCU-WEATHER
ALDEN ELECTRONICS
ASSOCIATED COMPUTER Svcs.
ColorGraphics Systems
DUNNEER COMPUTER SYSTEMS
ENTERPRISE ELECTRONICS
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THE GRASS VALLEY GROUP
ISS ENGINEERING
KAVOYRAS
OKTEL CORP.
R-SCAN CORP.
TEXAS ELECTRONICS
WEATHER NETWORK
WEATHER SERVICES CORP.
WEATHERBANK
WSI CORP.

AUDIO HEADS, ACCESSORIES
CMC TECHNOLOGY
GOTHAM AUDIO CORP.
Marathon PRODUCTS
MICROTAN Co.
NORTHERN Magnetics
NORTONICS
OLD Dominion
PROTECH AUDIO CORP.
SUNTEK Magnetics
SPRAGUE Magnetics

WEATHER PRODUCTS
ALAN GORDON ENTERPRISES
GOTHAM AUDIO CORP.
HARRIS CORP., Broadcast Div.
INTERNATIONAL MUSIC/AKAI
MITSUBISHI PRO AUDIO
NAKAMICHI America CORP.
OTARI CORP.
PANASONIC INDUSTRIAL Co.
PANASONIC PRO AUDIO/RAMSA
Radio Systems
SCHAEFER WORLD COMM.
SONY PRO AUDIO
STUDER REVOX America
Synchronization
TASCAM

VTRS, DIGITAL
AMPEX
BTS
Hitachi Denshi America
Panasonic Broadcast
SONY Broadcast
THOMSON VIDEO EQUIPMENT

ATRS, DIGITAL
FOSTEX
ALAN GORDON ENTERPRISES
GOTHAM AUDIO CORP.
HARRIS CORP., Broadcast Div.
INTERNATIONAL MUSIC/AKAI
MITSUBISHI PRO AUDIO
NAKAMICHI America CORP.
OTARI CORP.
PANASONIC INDUSTRIAL Co.
PANASONIC PRO AUDIO/RAMSA
Radio Systems
SCHAEFER WORLD COMM.
SONY PRO AUDIO
STUDER REVOX America
Synchronization
TASCAM

VTRS, ONE-INCH
AMPEX
BTS
Hitachi
SONY Broadcast

ATRS, FIELD
MITSUBISHI PRO AUDIO
NAGRA MAGNETIC RECORDERS
OTARI CORP.
PANASONIC PRO AUDIO/RAMSA
TASCAM
TELECTRO SYSTEMS
UHER of AMERICA

VTRS, 3/4-, 1/2-INCH
ALPHA VIDEO
AMPEX
BTS
Hitachi Denshi
JVC Professional Products
OTARI CORP.
PANASONIC Broadcast
Panasonic INDUSTRIAL Co.
PANASONIC PRO AUDIO/RAMSA
SHARP ELECTRONICS Corp.
SONY Broadcast
SONY PRO VIDEO
TOSHIBA AMERICA

ATRS, STUDIO
AEG Bayly
AMPEX
INTERNATIONAL MUSIC/AKAI
OTARI CORP.
PANASONIC PRO AUDIO/RAMSA
SONY PRO AUDIO
STUDER REVOX America
TASCAM

AMPLIFIERS, PREAMPLIFIERS
ATLAudio Technologies
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BLOM Systems
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BROMSTON Ltd.
GML
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JENSEN TRANSFORMERS
LOGITEK
MC MARTIN Industries
MODULAR AUDIO Products
Panasonic INDUSTRIAL
PROTECH Audio
QSC Audio Products
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AMS Industries
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DOLBY Laboratories
DORRIGE Electronics
ELCOM BAEKER
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FOCUSRITE Audio
GENTNER Electronics Corp.
GML
ALAN GORDON ENTERPRISES
GOTHAM AUDIO CORP.
INDUSTRIAL Research
INOVONICS
Kahn Communications
RINTEK
KLARK-TEKNIK
LEXICON
LPB
MARCOM
MC MARTIN Industries
MODULAR Audio Products
NUMARK Electronics
ORIAN Associates
PROTECH Audio CORP.
RAMLKO Research
RICHMOND Sound Design
SESCom
SHURE Brothers
SONY PRO Audio
SPECTRA Sonics
SYMTREX
TEVAR

AUDIO ROUTING SWITCHERS, DAs

AUDIO TAPE, CARTS

AUDIO TEST EQUIPMENT

CART PLAYERS

CASSETTE PLAYERS/RECORDERS
Gotham Audio Corp. International Music/AKAI Professional Nakamichi America Corp. Old Dominion Broadcast Engineering SVC Studio Revox America TASCAM Telestro Systems Uher of America

COMPACT DISC EQUIPMENT
Gotham Audio Corp. Numark Electronics Panasonic Pro Audio/Ramsa Schafer World Communications Sono-Mag Corp. Sony Pro Audio TASCAM Tennaplex Systems

CONSOLE AUTOMATION
Amer/Tac US Operations GML Logitek Neve Solid State Logic

DELAY SYSTEMS
Audio/Digital Eventide McCurdy Radio Inds.

DIGITAL AUDIO WORKSTATIONS

ELECTRONIC AUDIO EDITORS
Adams-Smith Alpha Audio Audio Kinetics Cinedco Cipher Digital CMX Corp. Fostex Paltek Solid State Logic Soundmaster USA

FADERS, ATTENUATORS
Kay Elemetrics Penny & Giles Protech Audio Ramko Research

HEADPHONES
Beyer Dynamic Nakamichi America Sennheiser Electronic

INTERCOMS
Atlas/Soundolier ClearCom Fairtronic Fm Electronics HM Electronics McCurdy Radio Inds. McMartin Industries Motorola Communications Old Dominion Pesa Electronica S.A. Protech Audio Corp. R-Columbia Products
**LEVEL INDICATORS**

Dorrough Electronics
Logitek
Motorola Communications
Protech Audio Corp.
Ramko Research
Selco/Sifam
Symtrix

**MICROPHONES, ACCESSORIES**

ACO Pacific
AKG Acoustics
Altec Lansing
Atlas Soundolier
AudioTechnica U.S.
Benchmark Media Systems
Beyer Dynamic
Bogen Communications
Bruel & Kjaer
Carvin Corp.
Cetec Ivie
Coherent Communications
Comtek
Countryman Assoc
CRL/Circuit Research Labs
Crow International
Edcor
Electro-Voice
GML
Alan Gordon Enterprises
Gotham Audio Corp.
Karl Heitz, Inc.
HM Electronics
Jensen Transformers
Leotronics
Micron Audio Products
Nady Systems
Panasonic Pro Audio/Ramsa
R.Columbia Products
Samson Technologies
Sanken Microphones
Sennheiser Electronic
Shure Brothers
Sony Pro Audio
Spectra Sonics
Studio Technologies
TeleX Communications
Ultimate Support Systems
Valley International
Vega
Yamaha Music Corp.

**MIXERS, PORTABLE**

ADM Technology
Allen & Heath
Amek/Tac US Operations
Ampex
AMS Industries
Airpipe Systems
ATL/Audio Technologies
Auditionics
Autogram Corp.
Biamp Systems
Broadcast Audio Corp.
Broadcast Electronics
Carvin Corp.
He Micro-Trak Corp.
Hallkainen & Friends
Harris Corp.
Broadcast Div.
Harrison Consoles
Howe Technologies
Kintronic Corp.
Logitek
LPB
McCurdy Radio Inds.
Mitsubishi Pro Audio
Rupert Neve Inc.
Opamp Labs
Orion Research
Pacific Recorders
Panasonic Pro Audio/Ramsa
Precision Design
Protech Audio Corp.
Ramko Research
Richmond Sound Design
Schafer World Comm.
Shure Brothers
Sony Pro Audio
Spectra Sonics
Studer Revox America
Tascam
U.S. Audio Div.
Whirlwind
Ward-Beck Systems Ltd.
Yamaha Music Corp.

**MIXERS, POST-PRODUCTION**

Allen & Heath
Amek/Tac US Operations
Ampex
AMS Industries
Auditionics
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

**MONITOR SPEAKERS**

Acoustic Research
Atlas/Soundolier
Auerleimer Lab & Co.
Auraton 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
Tannoy North America
TeleXo Systems
UREI
Westlake Audio
Yamaha Music Corp.

**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.

**SYSTEMS**

**MONITORS, ACCESSORIES**

ACO Pacific
AKG Acoustics
Altec Lansing
Atlas Soundolier
Audio Technica U.S.
Benchmark Media Systems
Beyer Dynamic
Bogen Communications
Bruel & Kjaer
Carvin Corp.
Cetec Ivie
Coherent Communications
Comtek
Countryman Assoc
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Crow International
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GML
Alan Gordon Enterprises
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Karl Heitz, Inc.
HM Electronics
Jensen Transformers
Leotronics
Micron Audio Products
Nady Systems
Panasonic Pro Audio/Ramsa
R.Columbia Products
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Sanken Microphones
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TeleX Communications
Ultimate Support Systems
Valley International
Vega
Yamaha Music Corp.

**MIXERS, PORTABLE**

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Amek/Tac US Operations
Ampex
AMS Industries
Airpipe Systems
ATL Audio Technologies
Auditionics
Autogram Corp.
Biamp Systems
Broadcast Audio Corp.
Broadcast Electronics
Carvin Corp.
He Micro-Trak Corp.
Hallkainen & Friends
Harris Corp.
Broadcast Div.
Harrison Consoles
Howe Technologies
Kintronic Corp.
Logitek
LPB
McCurdy Radio Inds.
Mitsubishi Pro Audio
Rupert Neve Inc.
Opamp Labs
Orion Research
Pacific Recorders
Panasonic Pro Audio/Ramsa
Precision Design
Protech Audio Corp.
Ramko Research
Richmond Sound Design
Schafer World Comm.
Shure Brothers
Sony Pro Audio
Spectra Sonics
Studer Revox America
Tascam
U.S. Audio Div.
Whirlwind
Ward-Beck Systems Ltd.
Yamaha Music Corp.

**MIXERS, POST-PRODUCTION**

Allen & Heath
Amek/Tac US Operations
Ampex
AMS Industries
Auditionics
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
In this business, you can't afford to be satisfied with less.

The people who use our tape are not easily satisfied. In fact, our best customers are never satisfied. They constantly demand more from themselves. And more from their tape. That's why they demand 3M tape. And why you should try it. Because, in our products and service, 3M is committed to one goal: We won't be satisfied until you are.
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-Chenlo
Kintronic Labs

EXCITERS
ISS Engineering
McMartin Industries
QEI Corp.
Townsend Electronics
Vector Technology

FIBEROPHTIC SYSTEMS
Artel Communications Corp.
Avantek
Comilux
Comprehensive Video Supply
Dynair Electronics

MICROWAVE, INTERCITY
Avantek
Broadcast Microwave
Harris Broadcast Microwave
International Microwave

MICROWAVE FOR ENG
Broadcast Microwave
Conifer Corp.
Harris Broadcast Microwave
Idemco Electronics
International Microwave
Itelco U.S.A.
M.A. Com Mac
Marit Electronics
Microwave Radio Corp.
Narda Microwave
Nurad
RF Technology

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
Bays
Columbine Systems
Compucenter
Data Center Mfg.
Dynatech Newsstar
Jefferson Pilot Data Syvces
McK Data Services
Media Computing
TUI Computer Syvces
Twentier Systems
VCI Video Communications

POWER SUPPLIES, BATTERIES
Adcourage

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.
Synergistic Batteries
Teledyne Energy Systems

REMOTE MONITORING SYSTEMS
Andrew Corp.
Bird Electronic Corp.
CAT Systems
Comtek
Dielectric Communications
DSI Communications
Hallkainen & Friends
Hughes & Phillips
Moseley Associates
Potomac Instruments
Schaefer World Comm.
Thomson-LGT

RF AMPS, SWITCHES
Blonder-Tongue Labs
Catel Telecommunications
ISS Engineering
ITT Jennings
Kelttec Florida
MCL
McMartin Industries
Motorola Communications
Mu-Dei Electronics
QEI Corp.
RF Technology
Introducing the AVS ISIS...

A superb standards converter that grows with your business.

The AVS ISIS is a modestly-priced 3 field standards converter from the manufacturer of the 1988 Emmy Award-winning ADAC.

But only the price is modest. For openers, the ISIS is a high-quality unit that is ideal for most users of standards converters. The basic ISIS will perform conversions of composite, PAL or NTSC signals to a bandwidth of 3.5 MHz, utilizing 8 bit 4:2:2 digital processing throughout. And by converting over three fields, the ISIS produces extremely smooth motion performance.

But it doesn't stop there. As television industry requirements change—or your business needs expand—so, too, can the ISIS. By simply adding a number of performance and format options, the ISIS can deliver full bandwidth—4 field—broadcast-quality conversions between all the world's television standards.

The ISIS is designed to work with extraordinary precision and quality at whatever level you require. Basic or fully-upgraded, the ISIS is an exceptionally cost-efficient converter.

And because the ISIS is AVS designed-and-manufactured, and is supported by A.F. Associates' outstanding sales and service organization, it is virtually obsolescent-proof.

The AVS ISIS. Great from day one. And it only gets better!
<table>
<thead>
<tr>
<th>TRANSMITTERS, RADIO</th>
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<tbody>
<tr>
<td>AEG Bayly</td>
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<tr>
<td>Broadcast Electronics</td>
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<td>Marcom</td>
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<td>Marconi Communication</td>
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<td>Thomson-LGT</td>
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<td>Watco</td>
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<td>Axil Cases</td>
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<td>Calzone Case Co.</td>
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<td>Duggan Mfg.</td>
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<td>Excalibur Industries</td>
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<td>Fireblitz Cases</td>
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<td>Hardigg Industries</td>
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<td>Jensen Tools</td>
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<td>K&amp;H Products/Portabrace</td>
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<td>Kangaroo Video Products</td>
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<td>Nalpak Video Sales</td>
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<td>Quality Video Supply</td>
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<td>Star Case Mfg.</td>
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<td>Telepak San Diego</td>
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<td>Thermodyne Intl.</td>
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<td>Viking Cases</td>
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<tr>
<th>WIRE, CABLE</th>
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<tr>
<td>Alpha Wire Corp.</td>
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<td>Anixter Bros.</td>
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<td>Bi-Tronics</td>
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<td>Brintec Corp.</td>
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<td>Jensen Tools</td>
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<td>Trompeter Electronics</td>
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<td>EQUIPMENT DISTRIBUTORS</td>
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<tr>
<td>Allied Broadcast Equip.</td>
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<td>The Audio Broadcast Group</td>
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<td>Barrett Assoc.</td>
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<td>BCS/The Broadcast Store</td>
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<td>Broadcast Supply West</td>
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<td>Camera Maitf</td>
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<td>Central Tower</td>
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<td>Information Display</td>
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<td>Innovative Automation</td>
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<td>Maze Broadcast</td>
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<td>Media Concepts</td>
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<td>Midwest Communications</td>
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<td>Ram Broadcast Systems</td>
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<tr>
<td>Mobile-Cam Products</td>
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<tr>
<td>Morton Hi-Tech Furnishings</td>
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<td>Perice-Phelps</td>
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<td>Pesa Electronica S.A.</td>
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<td>Roscor</td>
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<td>Rosner Television Systems</td>
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<td>Specialty Vehicles</td>
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<td>Wolf Coach</td>
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<th>SATELLITE DISTRIBUTION</th>
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<td>AT&amp;T Communications</td>
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<table>
<thead>
<tr>
<th>STUDIO DESIGN &amp; CONSTRUCTION</th>
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<tbody>
<tr>
<td>A.F. Associates</td>
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<tr>
<td>Acoustic Systems</td>
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<td>Allied Broadcast Equip.</td>
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<td>Arben Design</td>
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<td>Industrial Acoustics</td>
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<td>Lake Systems Corp.</td>
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<td>Landy Associates</td>
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<td>Lerro Electrical Corp.</td>
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<td>Morton Hi-Tech Furnishings</td>
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<td>MyComp Technologies Corp.</td>
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<td>Pacific Recorders</td>
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<td>Perice-Phelps</td>
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<td>Rees Associates</td>
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<td>Roscor</td>
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<td>Rosner Television Systems</td>
</tr>
<tr>
<td>Swiderski Electronics</td>
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<table>
<thead>
<tr>
<th>TECHNICAL/ENGINEERING CONSULTANT</th>
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<tr>
<td>B&amp;B Systems</td>
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<td>BDS</td>
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<td>Walter S. Brewer Co.</td>
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<td>Central Tower</td>
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<td>DSI Communications</td>
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<td>Information Display</td>
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<td>Landy Associates</td>
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<td>MCI/Micro Communications</td>
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<td>Roscor</td>
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<td>Rosner Television Systems</td>
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<td>Soll. Inc.</td>
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<td>SWR</td>
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</table>

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# ALPHABETICAL LISTING OF MANUFACTURERS

## A

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Address</th>
<th>Phone</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABEKAS VIDEO SYSTEMS</td>
<td>101 Galveston Dr., Redwood City, CA 94063</td>
<td>415 369-5111</td>
<td>Electronic still stores; character generators; digital video efx; digital disk recorders; production switchers.</td>
</tr>
<tr>
<td>ACCOM</td>
<td>1430-F O'Brien Dr., Menlo Park, CA 94025</td>
<td>415 328-3818</td>
<td>Digital image enhancers.</td>
</tr>
<tr>
<td>ACCU-SOUND</td>
<td>516 Township Line Rd., Blue Bell, PA 19422</td>
<td>215 542-7000</td>
<td>Portable audio mixers; on-air consoles, mixers, audio routing switchers.</td>
</tr>
<tr>
<td>A.C.E.</td>
<td>Hanworth Trading Estate, Hampton Rd. W., Feltham, TW13 6DH England</td>
<td>01 894 5622</td>
<td>2D graphics systems; digital video efx.</td>
</tr>
<tr>
<td>ADAMS-SMITH</td>
<td>34 Tower St., Hudson, MA 01749</td>
<td>508 562-3801</td>
<td>Time code equip.; electronic audio editors; ATR synchronisers.</td>
</tr>
<tr>
<td>ADVANCED DESIGNS CORP.</td>
<td>804 N. College Av., Bloomington, IN 47402</td>
<td>812 333-1922</td>
<td>2D graphics systems; digital disk recorders.</td>
</tr>
<tr>
<td>ADVANCED MICRO-DYNAMICS</td>
<td>7 Lomar Dr., Peppermint, MA 01463</td>
<td>508 433-8877</td>
<td>Transmitter remote control; SCA equip.</td>
</tr>
<tr>
<td>ADKOUR</td>
<td>18 Billings St., Sharon, MA 02067</td>
<td>617 784-8123/800 232-3557</td>
<td>Power supplies, batteries.</td>
</tr>
<tr>
<td>ADELPHON</td>
<td>Box 7256, Ft. Worth, TX 76111</td>
<td>817 335-8666</td>
<td>Antennas, towers; tower-mounted housing.</td>
</tr>
<tr>
<td>ACO PACIFIC</td>
<td>2604 Read Av., Belmont, CA 94002</td>
<td>415 595-8588</td>
<td>Digital image enhancers.</td>
</tr>
<tr>
<td>ACOUSTIC RESEARCH</td>
<td>630 Turnpike St., Canton, MA 02021</td>
<td>617 821-2300</td>
<td>Studio monitors; turntables.</td>
</tr>
<tr>
<td>ACOUSTIC SYSTEMS</td>
<td>415 E. St. Elmo Rd., Austin, TX 78745</td>
<td>512 444-1961/800 531-5417</td>
<td>Studio design &amp; construction.</td>
</tr>
<tr>
<td>AGRODYNE INDUSTRIES</td>
<td>516 Township Line Rd., Blue Bell, PA 19422</td>
<td>215 642-7000</td>
<td>TV transmitters: translators; turnkey transmission systems.</td>
</tr>
<tr>
<td>AGS SOFTWARE</td>
<td>2135 E. Sunshine, Ste. 106, Springfield, MO 65804</td>
<td>417 987-9923</td>
<td>Computer software for production and management.</td>
</tr>
<tr>
<td>ADC TELECOMMUNICATIONS</td>
<td>4900 W. 76 St., Minneapolis, MN 55435</td>
<td>612 835-6800</td>
<td>Connectors, jackfields.</td>
</tr>
<tr>
<td>ADCOUR</td>
<td>18 Billings St., Sharon, MA 02067</td>
<td>617 784-8123/800 232-3557</td>
<td>Power supplies, batteries.</td>
</tr>
<tr>
<td>ADVANCED DESIGNS CORP.</td>
<td>804 N. College Av., Bloomington, IN 47402</td>
<td>812 333-1922</td>
<td>2D graphics systems; digital disk recorders.</td>
</tr>
<tr>
<td>ADVANCED MICRO-DYNAMICS</td>
<td>7 Lomar Dr., Peppermint, MA 01463</td>
<td>508 433-8877</td>
<td>Transmitter remote control; SCA equip.</td>
</tr>
</tbody>
</table>

*See ad pg. 113*  
*Circle #145*
ADVENT COMMUNICATIONS
Alma Rd., Chesham, Bucks, HP5 3HE UK
49 477 4400
SNG systems; satellite earth stations.

AEG BALY
167 Hunt St., Ajax, ON L1S 1P6 Canada
416 362-9181
Toronto, ON M5C 1P1 Canada

A.F. ASSOCIATES
5 Connair Rd., Orange, CT 06902
516 248-8080
Video filters, delay lines, hum eliminators.

AGFA CORP.
3/4-, 1/2-inch VTRs; mobile vehicle systems.

ALLIANCE RESEARCH
110 Richmond St. E. #501, Toronto, ON M5C 1P1 Canada
416 362-9181
3D modeling, animation.

ALLEN & HEATH
5 Connair Rd., Orange, CT 06876
203 795-3594
Portable audio mixers; on-air consoles, mixers; post-production consoles.

ALLENS AVIONICS
224 E. Second St., Mineola, NY 11501
516 248-8080
Video filters, delay lines, hum eliminators.

ALLIED BROADCAST EQUIPMENT
Box 1487, Richmond, IN 47374
317 962-3859
Equipment distributor; studio design & construction.

ALLIED TOWER CO.
12450 Old Galveston Rd., Webster, TX 77598
713 486-7691
Character generators; tape synchronizers.

ALLISON RESEARCH
10500 W. Reno, Oklahoma City, OK 73128
405 324-5311
Mics, accessories.

ALTRONIC RESEARCH
110 Richmond St. E. #501, Toronto, ON M5C 1P1 Canada
416 362-9181
Audio processing; noise reduction; mics, accessories; audio reverb, special effects.

AMBER ELECTRO DESIGN
3391 Griffith St., St. Laurent, QC H4T 1W5 Canada
514 734-4105/800 361-3697
Audio test equip.

AMCO ENGINEERING
3801 Rose St., Schiller Park, IL 60176
312 671-6670
Studio furniture.

AMEX/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 systems.

AMERICAN BROADCAST SYSTEMS
8222 Jamestown Dr., #109B, Austin, TX 78758
512 837-3737
Television automation systems.

AMERICAN LASER SYSTEMS
761 S. Kellogg Av., Goleta, CA 93117
805 967-0423
STLs, TLSs.

AMERICAN STUDIO EQUIPMENT
8922 Norris Av., Sun Valley, CA 91352
818 768-8922
Lighting equip.; camera support.

AMPEREX ELECTRONIC CORP.
Providence Pike, Slater Springs, RI 02876
401 762-3800
Pickup tubes; solid state imaging devices.

AMPEX RECORDING MEDIA CORP.
401 Broadway, MS 22-02, Redwood City, CA 94063
415 367-3809
Videotape; audio tape, carts.

AMTEL SYSTEMS
Box 31864, 3827 Stone Way N., Seattle, WA 98103
206 633-1956
Audio processing; on-air consoles, mixers; post-production consoles, digital audio workstations.

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.

AMX
12056 Forestgate Dr., Dallas, TX 75243
312 444-1686/800 222-0193
Time code equip.; switching automation; video processing equip.; VTR editor/controllers.

AMP PRODUCTS CORP.
Box 1776, S. Eastern, PA 19398-1776
215 647-1000
Sync & pulse gens/proc; video processing equip.; VTR editor/controllers.

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.

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.

BME August 1989 51
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.

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.

BRETTFORD 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 SVCES.
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 SVCES.
7322 Convoy 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

Circle 121 on Reader Service Card

BME August 1989
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.
BROADCAST VIDEO SYSTEMS
40 W. Wilmot St., Richmon
Hills, ON L4B 1H8 Canada
416 764-1584
NTSC encoders/decoders; line
keys; video sweep generators;
Safe area pens; 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 transmit-
ers.

BRUEL & KJAER
PRO AUDIO GROUP
810 N. White Rd., Lakeville, MN
508 433-8877
Us.也为: TRANSFORMERS
BROADCAST VIDEO SYSTEMS
501 S. 3500 W., Salt Lake City,
UT 84119
2300 S. 2300 W., Salt Lake
City, UT 84119
518 771-3171
10540 Chester Rd., Cincinnati,
OH 45215-0888
1000 New Holland Av.,
Lancaster, PA 17601-5688
717 295-6000
Transmitter remote control.

BUSH & MILLIMAKI
800 C Arcadia Dr., Huntsville, AL
35801
205 533-9274
Repair & modification of cam-
eras, 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.

CALWAY 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, jack-
fields.

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.

CANARE CABLE
511 Fifth St., #6, San Fernando,
CA 91340
818 365-2446
Wire, cable; connectors, jack-
fields; tools.

CANON USA, OPTICS DIV.
7175 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.
1185 Industrial Av., Escondido,
CA 92025
619 747-1710/800 854-2235
On-air consoles, mixers; mics,
accessories; studio monitors.

CASCOM
707 21 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;
thursday remote control

CATEL
TELECOMMUNICATIONS
4050 Technology Pl., Fremont,
CA 94537-5122
415 659-8998
STLS, TSLS; MTS equip.; stereo
generators; RF switches.

DOWITT CAVEINDISH
2117 Chesnut Av., Wilmette, IL
60091
312 256-0937
Videocassette duplication equip.

CBS/CUSTOM BUSINESS
SYSTEMS
Box 67, Reedsport, OR 97476
503 271-3681/800 547-3930
Business automation.

CCA ELECTRONICS
360 Bahanon Rd., Box 426,
Falmouth, GA 30213
404 946-3530
Radio transmitters.

CCI
2001-1 Hickory Valley Rd.,
Chattanooga, TN 37421
615 894-2580
MC switches; switching automa-
tion; video routing switches,
DAs; sync & pulse gens/proc.

CEL ELECTRONICS
Distributor; technical/engineer-
ing consultant.

CENTURY PRECISION OPTICS
10713 Burbank Blvd., N.
Hollywood, CA 91601
818 766-3715
Lenses.

CENTRAL DYNAMICS LTD.
147 Hymus Blvd., Pointe Claire,
QU H9R 1G1 Canada
514 687-0810
NTSC encoders/decoders; pro-
duction switches; video routing
switches; DAs.

CENTRAL TOWER
Box 530, Newburgh, IN 47630
812 853-0595
Antennas, towers; equipment
distributor; technical/engineer-
ing consultant.

CENTURY TOWER
213 875-1900
Studio monitors; audio tape du-
plicators.

CETEC GAUSS
9130 Glen Oaks Blvd., Sun
Valley, CA 91352
213 875-1900
Audio processing; portable audio
mixers; mics, accessories; stu-
dio monitors.

CETEC IVIE
1366 W. Center, Orem, UT
84057
801 224-1800
Audio processing; portable audio
mixers; mics, accessories; stu-
dio monitors.

CHANNELMATIC
821 Tamis Rd., Alpine, CA
92001
619 445-2691
Cart automation/MERPS; switch-
ing automation; video routing
switchers, DAs; clocks, timers.

CHAPMAN/LEONARD STUDIO
EQUIP.
12950 Raymer St., N.
Hollywood, CA 91605
213 877-5309
Camera support equip.
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 transmitters.

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

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; multisource 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 prevention system.

COUNTRYMAN ASSOC.
417 Stanford Av., Redwood City, CA 94063
415 364-9588
Mics, accessories.

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

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

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 modeling, animation.

CURRENT TECHNOLOGY
1400 S. Sherman, #202, Richardson, TX 75081
214 238-5300
Surge protectors.

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

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

COUNTRYMAN ASSOC.
417 Stanford Av., Redwood City, CA 94063
415 364-9588
Mics, accessories.

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

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<thead>
<tr>
<th>Company Name</th>
<th>Address/Location</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATAWORLD</td>
<td>Box 30730, 4827 Rugby Av., #200</td>
<td>201-265-8100/800 882-9100 Video routing switchers, DAs; audio routing switchers.</td>
</tr>
<tr>
<td>DECISION</td>
<td>402 S. Ragsdale, Jacksonville, TX 75766</td>
<td>800-251-6677 Business automation; newsroom computers.</td>
</tr>
<tr>
<td>DEDOTEC USA</td>
<td>210 Westlake Dr., Valhalla, NY 10595</td>
<td>914-761-5608 Lighting equipment.</td>
</tr>
<tr>
<td>DELCOM USA</td>
<td>2344 Perot St., Philadelphia, PA 19130</td>
<td>215-765-8811 Studio design &amp; construction; mobile vehicle construction: technical/engineering consultant; studio furniture.</td>
</tr>
<tr>
<td>DELTA ELECTRONICS</td>
<td>5730 Gen. Washington Dr., Box 11268, Alexandria, VA 22312</td>
<td>703-354-3350 Audio processing; antennas, towers; AM stereo equip.; studio monitors; audio test equip.; RF test equip. See ad pg. 97 Circle #139</td>
</tr>
<tr>
<td>DESISTI LIGHTING/DESMAR</td>
<td>1109 Grand Av., N. Bergen, NJ 07047</td>
<td>201-319-1100 Lighting equipment.</td>
</tr>
<tr>
<td>DIELECTRIC</td>
<td>48 Jefryn Blvd., Deer Park, NY 11729</td>
<td>516-667-6300/800 595-1012 Video routing switchers, DAs; audio routing switchers.</td>
</tr>
<tr>
<td>DIELIGHTFUL</td>
<td>1913 Atlantic Av., Manasquan, NJ 08736</td>
<td>201-223-9400 Connectors, jackfields.</td>
</tr>
<tr>
<td>DICTAPHONE CORP.</td>
<td>4 New King St., White Plains, NY 10604</td>
<td>914-946-4240 Tape-based loggers.</td>
</tr>
<tr>
<td>DYNASTIC TECHNOLOGY</td>
<td>403 426-1551/800 661-6453 Live assist systems.</td>
<td></td>
</tr>
<tr>
<td>DYNAIR ELECTRONICS</td>
<td>55 Nugget Av., Scarborough, ON M1S 3L2 Canada</td>
<td>416-754-8090 TBCs: frame synchronizers; video test equip.; sync &amp; pulse gens/ procs.</td>
</tr>
<tr>
<td>DYNATECH CORP.</td>
<td>200 Potrero St., San Francisco, CA 94103-4813</td>
<td>415-558-0200 Audio processing; noise reduction systems.</td>
</tr>
<tr>
<td>DORROUGH ELECTRONICS</td>
<td>5221 Collier Pl., Woodland Hills, CA 91364</td>
<td>818-999-1132 Audio processing; audio test equip.; audio level meters.</td>
</tr>
<tr>
<td>DOLBY LABORATORIES</td>
<td>100 Potrero Av., San Francisco, CA 94103-4813</td>
<td>415-558-0200 Audio processing; noise reduction systems.</td>
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<td>5221 Collier Pl., Woodland Hills, CA 91364</td>
<td>818-999-1132 Audio processing; audio test equip.; audio level meters.</td>
</tr>
<tr>
<td>DOLBY LABORATORIES</td>
<td>5221 Collier Pl., Woodland Hills, CA 91364</td>
<td>818-999-1132 Audio processing; audio test equip.; audio level meters.</td>
</tr>
</tbody>
</table>
Widest Range of Protectors Available Anywhere!

Data Line Protection
MCG provides a sophisticated blend of high speed (less than 5ns) and brute force protection for the sensitive equipment on your data lines. Guards computers and terminals, video cameras and cable, video wideband equipment, modems, and more, against induced transient voltage surges. Available in multiple configurations, they are designed to be used with coaxial cable, single or twisted pairs, RS-232, -422 and -423, 20 ma loops, etc.

MCG is your one complete source for cost-effective protection against voltage surges and transients. SEND COUPON FOR FREE CATALOG.

AC Power Line Protection
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

☐ I have an immediate need, please contact me.
☐ Yes, send me your free full-line catalog on:
   ☐ AC Power Line Protection  ☐ Data Line Protection

Name ___________________________  Title ___________________________
Company _________________________
Address ___________________________
City/State/Zip _____________________
Telephone _________________________

Circle 124 on Reader Service Card.
DYNATECH NEWSTAR
6400 Enterprise Ln., Madison, WI 53719
608 274-8866
Newsroom computers; election reporting systems; teleprompters.

EASTERN KODAK
343 State St., Rochester, NY 14650
716 274-3313
Motion picture film; still video products.

ECHOLAB
175 Bedford St., Burlington, MA 01803
617 273-1512
Digital video effects, production switchers.

EDCOR
1546 E. Pomona, Santa Ana, CA 92804
714 648-0292
RF mics; audio preamps, line amplifiers, hum bucking coils.

EDITRON USA
748 N. Seward St., Hollywood, CA 90038
213 464-8723
VTR editor/controls; multi-source video editors; tape synchronizers; ATR synchronizers.

EEG ENTERPRISES
1 Rome St., Farmingdale, NY 11735
516 293-7472
Teletext equipment; VBI data transmission; closed-captioning equipment.

EEV
4 Westchester Plaza, Elmsford, NY 10523
914 592-6050/800 431-1230
Pickup tubes; transmitter, power tubes.
See ad pg. 71 Circle #128

E&G
35 Congress St., Salem, MA 01970
617 745-3200
Tower lighting.

EIGEN VIDEO
Box 848, Nevada City, CA 95959
916 381-3750
Audio processing; radio transmitters; FM exciters, antenna tuning units; AM diplexers.

ELCOM BAUER
6199 Warehouse Way, Sacramento, CA 95826
916 381-3750
Audio processing; radio transmitters; AM diplexers.

ELCTRO-VOICE
1205 W. Benicia St., Sunnyvale, CA 94086
518 288-1690
Radio transmitters.

EMCO/BROADCAST EQUIPMENT
202 7th Ave., Suite 102, Red Bank, NJ 07701
201 745-3200
Audio test equipment.

EMERGENCY ALERT RECEIVERS
Box 20629, New York, NY 10029
212 695-4767
SQA equip.; EBS systems.

ENERGY-ONIX BROADCAST SYSTEMS
2930 Cloverdale Ave., Concord, CA 94518
415 798-4060
ENG/EFP vehicles.

ENTRY SYSTEMS
77-79 E. Main St., Elmsford, NY 10523
914 347-5776
Power supplies, batteries.

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.

EVENTIDE
1 Alsan Way, Little Ferry, NJ 07643
201 641-1200
Audio processing, noise reduction systems; analog audience monitor; special effects; obscenity delay.

EVERTZ MICROSYSTEMS
3333 Mainway, Burlington, ON L7M 1A9 Canada
416 335-3700
Character generators; VTR editor/controls; tape synchronizers; time code equipment; 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.

FAROUDJA LABS
946 Benicia Av., Sunnyvale, CA 94086
408 245-1492
HDTV production equipment; NTSC encoders/decoders; component video transcoder.

FARRTRANICS
45 Campbell Av., Kitchener, ON N2H 4X8 Canada
519 741-1010/800 265-2713
IFB systems; telco interface equipment; stereo DAs; video patchfields; audio punchblocks.
See ad pg. 113 Circle #146
WHAT'S... ecologically sound, for a great cause and makes cents?
OVER 90 BROADCAST ENGINEERS AND MANAGERS AND 100'S OF OTHER VIDEO USERS KNOW!

Coarc Video™
CUSTOM RE-LOADED U-MATIC BETACAM CASSETTES & MULTI-LOADS®

Call Us!
1-800-888-4451

ALL NEW TAPE • ALL MAJOR BRANDS • VHS STOCK • GREAT PRICES • SUPER PROFESSIONALS
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 Series Ten 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 Series Ten in flexibility and usefulness in all audio applications is unsurpassed. The Harrison Series Ten 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 outdistance 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.
JVC PROFESSIONAL PRODUCTS CO.
41 Slater Dr., Elmwood Park, NJ 07407
201 794-3900/800 582-5825
Studio cameras; ENG/EP cameras camcorders; ¾, ½-inch VTRs; TBCs; frame synchronizers; video monitors; VTR editor/controllers; video routing switchers. DAs.
See ad pg. 29 Circle #111

KAHNN 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
415 697-9696
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 80907
719 599-1523
Business automation.

KANGAROO VIDEO PRODUCTS
10845 Wheatlands Av., Ste. C, Santa Fe, CA 90028
619 562-9696
Transportation cases.

KAVOURAS
6301 34 Av. S., Minneapolis, MN 55450
612 726-9515/800 328-2278
Weather graphics/radar.

KAY ELECTRIC CORP.
12 Maple Av., Pine Brook, NJ 07088
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.

KINEMETRICS/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.

KLEIGL BROS.
5 Aerial Way, Syosset, NY 11791
516 937-3900
Lighting equip.

KLINE TOWERS
1225 Huger St., Box 1013, Columbus, SC 29201
803 251-8000
Antennas, towers.

KNOX VIDEO
8547 Grovemont Cir., Galtersburg, MD 20877
301 840-5805
Character generators; 2D graphics systems.

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. Marlin Pike, Cherry Hill, NJ 08003
609 424-4660
Equipment distributor; studio design & construction.

LEADY ASSOCIATES
201 794-3900/800 582-5825
Satellite earth stations; RF equipment; DAs.

LEADER INSTRUMENTS
213 944-0916/800 654-8087
Digital audio workstations; audio processing; professional audio equipment enclosures.

LEA DYNATECH
12516 Lakeland Rd., Santa Fe, NM 87124
505 892-4501
Surge suppressors.

LEADER INSTRUMENTS
1890 E. Marlin Pike, Cherry Hill, NJ 08003
609 424-4660
Equipment distributor; studio design & construction.

LEEDCO 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.

LEOMECO 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 effects.

LIGHTING MACHINES
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.

LEITEL VIDEO
825K Greenbrier Cir., Chesapeake, VA 23220
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

LEMCO USA
335 Tesconl 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.

LEONTEC CO.
5009 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 effects.

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.

68 BME August 1989
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.
LIGHTNING MASTER CORP.  
Box 10597, Brooksville, FL 34601-0597  
904 799-6800  
Lightning dissipation equip.

LIPSNER-SMITH CO.  
4700 Chaske 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; on-air consoles, mixers; Post-production consoles.

LOWEL-LIGHT MFG.  
140 58 St., Brooklyn, NY 11220-3328  
718 921-0600  
Lighting equip.

LOWELL-LIGHT MFG.  
140 58 St., Brooklyn, NY 11220-2516  
718 921-0600  
Lighting equip.

LTP  
28 Bacton Hill Rd., Frazer, PA 19355  
215 644-1123  
Audio processing; on-air consoles, mixers; preamps, line amps, power amplifiers; LED displays. See ad pg. 110  
Circle #142

L&R COMMUNICATIONS LTD.  
Box 3807, Sioux City, IA 51102  
712 252-4101/800 831-0974  
Box 3807, Sioux City, IA 51102  
712 252-4101/800 831-0974  
Antennas; towers; converters, downconverters; LNAs. See ad pg. 110  
Circle #142

L-W ATHENA  
255 Easy St., Unit C, Simi Valley, CA 93065  
805 522-3264  
Telecines.

LYON LAMB VAS  
4531 Empire Av., Burbank, CA 91505  
818 843-4831  
Video animation controllers; NTSC encoders/decoders; sync & pulse gens/proc.

MACKENZIE LABORATORIES  
5507 N. Peck Rd., Arcadia, CA 91006  
818 579-0440  
Cart decks.

MAGIKE DESIGN  
7512 218 S.W., #5, Edmonds, WA 98020  
206 771-4927  
Post-production consoles.

M/A-COM MAC  
5 Omni Way, Chelmsford, MA 01824  
978 252-3212  
ENG microwave; intercity microwave.

MAGNAST TECH  
630 Ninth Av., New York, NY 10036  
212 586-7240  
Telecines, time code equip.; spokedet mag film transports. See ad pg. 53  
Circle #120

MAGNETIC REFERENCE LAB  
229 Polaris Av. #4, Mountain View, CA 94043  
415 965-8187  
Video test equip.

MAGNIFIC 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. Boyston St., W. Boyston, MA 01583  
508 853-0988  
Audio tape, carts; ATR head cleaners, degaussers; alignment & tension gauges.

MARCOM  
Box 65507, 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 transmitters; 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; transmission line; RF connectors.

MARTI ELECTRONICS  
1501 N. Main St., Cleburne, TX 76031  
817 645-9163  
Remote pickup; ENG, ENG microwave; intercity microwave; SCA equip.; STLs, TLSs; transmitter remote control; antennas, towers; transmission line.

MATCO  
427 Perrymont Av., San Jose, CA 95125  
408 998-1655  
Cart automation, MERPS (sequence & commercial insertion); routing switchers, DAs; tape duplication control systems.

MATCO  
427 Perrymont Av., San Jose, CA 95125  
408 998-1655  
Cart automation, MERPS (sequence & commercial insertion); routing switchers, DAs; tape duplication control systems.

MAXELL CORP. OF AMERICA  
22-08 Rt. 208, Fairlawn, NJ 07410  
201 795-5900/800 533-2836  
Video equip.; 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

MCX ELECTRONICS  
12 Burt Dr., Deer Park, NY 11729  
516 586-5125/800 851-1508  
Surge protectors. See ad pg. 61  
Circle #124

MCX/MICRO COMMUNICATIONS  
Box 4365, Manchester, NH 03108  
603 624-4351  
Antennas, towers; MTS systems; waveguide, transmission line; technical/engineering consultant.

MCL  
501 S. Woodcreek Rd., Bolingbrook, IL 60449-4999  
312 759-9500  
C-band, Ku-band TWT amplifier systems.

McGARTIN 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 transmitters; TV transmitters; MTS equip.; SCA equip.; RF test equip.; exciters; stereo generators. RF amp, filters.

MEDIA COMPUTING  
3506 E. Meadow Dr., Phoenix, AZ 85032  
602 482-9131  
Newsroom computers; switching automation.

70 BME August 1989
EEV’s TOTAL COMMITMENT ... what’s in it for you?

The most comprehensive range of wideband klystrons

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

Today’s klystron technology available on established products

Technical assistance available over the phone or on-site

Klystron Engineering Notes providing application guidance

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
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...

Circle 129 on Reader Service Card.
<table>
<thead>
<tr>
<th>Company</th>
<th>Address</th>
<th>Phone Number</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEDIA CONCEPTS</td>
<td>Box 7037, Rocky Mountain, NC 27804</td>
<td>919 977-3600</td>
<td>Used broadcast equip. sales.</td>
</tr>
<tr>
<td>MEDIA TOUCH SYSTEMS</td>
<td>4012 Mendenhall Dr., Dallas, TX 75244</td>
<td>214 484-5104/800 321-5104</td>
<td>Radio studio automation equip.</td>
</tr>
<tr>
<td>MERET</td>
<td>1815 24 St., Santa Monica, CA 90404</td>
<td>213 828-7496</td>
<td>Fiber optic systems.</td>
</tr>
<tr>
<td>MERLIN SNELL &amp; WILCOX</td>
<td>1890 Embarcadero Rd., Palo Alto, CA 94303</td>
<td>415 856-0900</td>
<td>Satellite earth stations.</td>
</tr>
<tr>
<td>MICRO CONTROLS</td>
<td>Box 728, Burleson, TX 76028</td>
<td>817 295-0965</td>
<td>Standards converters.</td>
</tr>
<tr>
<td>MICRODYNE CORP.</td>
<td>491 Oak Rd., Ocala, FL 32672</td>
<td>904 687-4633</td>
<td>Satellite earth stations.</td>
</tr>
<tr>
<td>MICROFLECT CO.</td>
<td>Box 12985, 3575 25 St. S.E., Salem, OR 97309</td>
<td>503 363-9267</td>
<td>Towers</td>
</tr>
<tr>
<td>MICRON AUDIO PRODUCTS</td>
<td>210 Westlake Dr., Valhalla, NY 10595</td>
<td>914 761-6520</td>
<td>Towers</td>
</tr>
<tr>
<td>MICROSONICS</td>
<td>60 Winter St., Weymouth, MA 02188-3336</td>
<td>617 337-4200</td>
<td>RF mics.</td>
</tr>
<tr>
<td>MICROTRAN CO.</td>
<td>145 E. Mineola Av., Box 236, Valley Stream, NY 11582</td>
<td>516 561-6050</td>
<td>Tape erasers, degaussers; audio &amp; video head cleaners, degaussers.</td>
</tr>
<tr>
<td>MICROWAVE FILTER CO.</td>
<td>6743 Kline St., E. Syracuse, NY 13057</td>
<td>315 437-3953/800 448-1666</td>
<td>Passive electronic filters.</td>
</tr>
<tr>
<td>MICROWAVE RADIO CORP.</td>
<td>847 Rogers St., Lowell, MA 01852</td>
<td>508 459-7655</td>
<td>ENG microphone; intercity microwave.</td>
</tr>
<tr>
<td>MIDWEST COMMUNICATIONS CORP.</td>
<td>1 Sperti Dr., Edgewood, KY 41017</td>
<td>606 331-8990/800 543-1584</td>
<td>Equipment distributor; TV transmitters; ENG/EFP vehicles; SNG systems;</td>
</tr>
<tr>
<td>MILLER FLUID HEADS</td>
<td>410 Garibaldi Av., Lodi, NJ 07650</td>
<td>201 473-9592</td>
<td>Mobile production units; mobile vehicle construction.</td>
</tr>
<tr>
<td>MILLER PROFESSIONAL EQUIPMENT</td>
<td>10816 Burbank Blvd., N. Hollywood, CA 91601</td>
<td>818 766-9451</td>
<td>Camera support equip.</td>
</tr>
<tr>
<td>MILLINA CORP.</td>
<td>103 Williams Dr., Ramsey, NJ 07446</td>
<td>201 825-4000</td>
<td>Colorimeters.</td>
</tr>
<tr>
<td>MIRALITE COMMUNICATIONS</td>
<td>4350 Von Karman Av., Ste. 430, Newport Beach, CA 92660</td>
<td>714 474-1900</td>
<td>Satellite earth stations.</td>
</tr>
<tr>
<td>MITCHELL CAMERA CORP.</td>
<td>18750 Oxnard St., Tarzana, CA 91356</td>
<td>818 609-7733</td>
<td>Camera support equip.; power supplies, batteries.</td>
</tr>
<tr>
<td>MITSUBISHI PRO AUDIO</td>
<td>225 Parkside Dr., San Fernando, CA 91340</td>
<td>818 898-2341</td>
<td>Field portable mixers; on-air consoles, mixers.; field ATRs, digital</td>
</tr>
<tr>
<td>MODULAR AUDIO PRODUCTS</td>
<td>1 Roned Rd., Shirley, NY 11967</td>
<td>516 345-3100</td>
<td>ATRs; cart decks.</td>
</tr>
<tr>
<td>MODULATION ASSOCIATES</td>
<td>897 Independence Av., Mountain View, CA 94043</td>
<td>415 962-8000</td>
<td>Satellite earth stations; video monitors; video projectors.</td>
</tr>
<tr>
<td>MODULATION SCIENCES</td>
<td>115 Myrtle Av., Brooklyn, NY 11201</td>
<td>718 625-7333</td>
<td>Satellite earth stations; digital video editors.</td>
</tr>
<tr>
<td>MODULITE/BARDWELL &amp; MCGAUSER</td>
<td>2601 Empire Av., Burbank, CA 91504</td>
<td>818 843-6811</td>
<td>Audio processors; audio test equip.; audio routing switches; audio DAs;</td>
</tr>
<tr>
<td>MOTOROLA COMMUNICATIONS &amp; ELECTRONICS</td>
<td>1627 Whistone Espy., Whitestone, NY 11357</td>
<td>718 746-1100</td>
<td>Intercoms; VU &amp; LED audio level displays; intercity microwave; antennas;</td>
</tr>
<tr>
<td>MOTOROLA AM STEREO</td>
<td>1216 Remington Rd., Schaumburg, IL 60173</td>
<td>312 576-0554</td>
<td>Two-way radio communication, transmission line, RF amplifiers, remote</td>
</tr>
<tr>
<td>MODULATION SCIENTIFICS</td>
<td>115 Myrtle Av., Brooklyn, NY 11201</td>
<td>718 625-7333</td>
<td>Satellite earth stations; digital video editors.</td>
</tr>
<tr>
<td>MPCI TECHNOLOGIES</td>
<td>1725 N. Service Rd., Transcan Hwy., Dorval, QH P11-11</td>
<td>514 683-1490</td>
<td>Intercoms; VU &amp; LED audio level displays; intercity microwave; antennas; towers; two-way radio communication; transmission line, RF amplifiers; remote video control systems.</td>
</tr>
<tr>
<td>M &amp; R DATA SERVICES</td>
<td>2205 First St., Unit 111, Simi Valley, CA 93065</td>
<td>805 582-1269</td>
<td>VTR editor/controllers, newscast computers.</td>
</tr>
<tr>
<td>MUL DEL ELECTRONICS</td>
<td>2426 Linden Ln., Silver Spring, MD 20910</td>
<td>301 587-6087</td>
<td>RF amplifiers, attenuators, filters; satellite upconverters, downconverters; LNAs.</td>
</tr>
</tbody>
</table>
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 generators; routing switchers, DAs; video 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 & construction.

M2B/GRAY
6221 N. O'Connor, #110, Irving, TX 75039
214 869-4500
ENG/EFP vehicles.

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

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

NEC AMERICA, BROADCAST EQUIPMENT DIV.
383 Omri Dr., Richardson, TX 75080-3545
214 907-4710/800 323-6656
TV transmitters; studio cameras; ENG/EFP cameras; solid state recorders; digital video efk, 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 consoles, 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.

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

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

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

NUMBERICS
14743 Rt. 104, Box 577, Ontario NY 14519
315 524-2531
Towers.

NUMARK ELECTRONICS
503 Newfield Av., Edison, NJ 08832
714 979-3993
Camera support equip.

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. 30 Circle #140

OKI ELECTRIC INDUSTRY CO.
C/o SAECO Intl., 11122 E. Chevy 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; intercoms; transmitter remote control; remote pickup, RENG.

OLESEN
1535 Ivy 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 switches; routing switchers, DAs; sync & pulse gens/procs; NTSC genlock for Amiga computer.

ONIMMOUNT SYSTEMS
10850 Vanowen St., #A, 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 systems; 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.
375 Vintage Park Dr., Foster City, CA 94044
415 341-5900
Studio ATRs; field ATRs; digital ATRs; audio heads, accessories; cart decks; ATR synchronizers; ¾-, ½-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 reduction 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 . . .
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• 6 distinct product lines
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• 15 attractive colors
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RICHMOND, VIRGINIA 23236
804-794-2500, TLX: 701-545
FAX: 804-794-8294

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 lightweight, battery or line operated PSA-65A Portable Spectrum Analyzer from AVCOM is the perfect instrument for field testing of RF systems, classroom instruction, satellite system alignment, electronic countermeasures, cable TV maintenance, cellular and production use.

$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

Circle 131 on Reader Service Card

BME August 1989 75
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.

SCANTEX LABORATORIES Box 338, Piereemond, QU H5H 4L Canada 514-626-8943 Audio level meters.

SCAFER WORLD COMMUNICATIONS Box 31, Marlon, VA 24354 703-783-2000 Portable mixers, on-air consoles, mixers, digital ATRs; cart decks; compact disc equip.; radio studio automation equip.; remote monitoring systems.

SCHMID TELECOM Reutenstrasse 6, Zurich, CH-8002 Switzerland 011-21450-20-1111 Routing switchers, DAs.

SCHMIDER CORP. OF AMERICA 400 Crossways Park Dr., Woodbury, NY 11797 516-496-8500 Lenses; lens accessories.


SCIENTIFIC SYSTEMS 633 Hallidit 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.

SOUTHCOMM/SIFAM 7580 Stage Rd., Buena Park, CA 90631 213-921-0681 Audio level indicators.

SHELLHEISER ELECTRONIC CORP. 6 Vista Dr., Box 987, Old Lyme, CT 06371 203-434-9190 Mics, accessories; headphones.

SENTERRY SYSTEMS 2211 Fifth Av., Seattle, WA 98121 206-728-8651 Radio studio automation equip.

SESUS 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/engineering consultant.

SHARP ELECTRONICS CORPORATION, PROFESSIONAL PRODS. Sharp Plaza, Mahwah, NJ 07430 201-529-8728/800 526-0264 Studio cameras; ENG/EFP cameras, camcorders; 3/4-, 1/2-inch VTRs; video monitors.

SHINSEIKI U.S.A. 22 Abeel Rd., Cranbury, NJ 08512 609-655-4788 2D graphics systems; 3D modeling, animation; digital video efx.

SHINTRON CO. 144 Rogers St., Cambridge, MA 02142 617-491-8700/800 356-NTSC TBCs: frame synchronizers; NTSC encoders/decoders; standards converters; video processors; electronic still stores; digital video efx, production switchers; routing switchers, DAs, time code equip., audio routing switchers.

SHIVES LABS 85 Harmon Rd., Bridgeton, ME 04009 207-647-3327 Antennas, towers; coaxial transmission line; RF combiners.

SIEDER ELECTRONICS USA 6630 Topper Pkwy., San Antonio, TX 78233 512-653-6761 ENG/EFP vehicles; mobile production units.

SHURE BROTHERS 222 Hartrey Av., Evanston, IL 60202-3696 312-866-2553 Audio processors; portable mixers; on-air consoles, mixers; mics, accessories; phone cartridges.

SIECOR 489 Slocor Park, Hickory, NC 28603 704-327-5000 Fiberoptic systems.

SIERRA VIDEO SYSTEMS Box 2462, Grass Valley, CA 95945 916-273-9331 HDVT 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 LM1 Canada 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 2T4 514-444-2088/800 361-4999 Time code equip.

SOLAC 1717 Busse Rd., Elk Grove Village, IL 60007-5666 312-439-2800 Power supplies, batteries.

SOLID ELECTRONICS LABS 220 Brookthorpe Ctr., 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 audio workstations; electronic audio 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. Howe Av., Normal, IL 61761
309 452-5313
Cart decks; compact disc equip.; radio studio automation equip.; audio routing switchers.

SONO-MAG CORP., BROADCAST PRODUCTS DIV.
1600 Queen Anne Rd., Teaneck, NJ 07666
201 833-5200
Studio cameras; ENG/EFP cameras; camcorders; A5; HDTV production equip.; digital VTRs; one-inch VTRs; ¾-inch VTRs; A10; video monitors; video projectors; electronic still stores; digital video efx; solid state recorders; VTR editor/controllers; multisource video editors; production 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 mixers; on-air consoles, mixers; post-production consoles; mics, accessories; audio test equipment; studio ATRs; digital ATRs; compact 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; ¾-inch, 8 mm VTRs; video monitors.

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
201 930-6090
Video tape; 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 Stonestead Ct., Westlake Village, CA 91361
805 494-5037
Electronic audio editors; ATR synchronizers.

SPECIALTY VEHICLES
450 N. Somerset Av., Indianapolis, IN 46222
317 638-5037
Mobile vehicle construction.

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 us: 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 there all at a price that’s in sync with your budget.

Circle 137 on Reader Service Card

BME August 1989 79
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.
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; special eff; 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 Ave., 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 18th St. S., Nashville, TN 37203
615.329-2073
Pin-registered telecine film gates; telecine accessories.

STEENBECK
9554 Vassar Ave., Chatsworth, CA 91311
818.998-4033
Telecines.

STEADY-STEP
801 487-6111/800 453-7435
2975 S. 300 W., Salt Lake City, UT 84115
Portable mixers; on-air consoles, mixers; post-production consoles, mics, accessories; studio monitors; special eff; audio DAs; preamps, line amps, monitor/power amps; audio cable.

SURE SHOT SATELLITE NETWORK
12450 Hamran Rd., New Springfield, OH 44443
216.542-3686
Mobile production facilities rental.

SWIEDERSKI ELECTRONICS
1200 Greenleaf Ave., 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 Ave., Chicago, IL 60630
312.792-2700
Connectors, jackfields.

SWR
Box 215, Goffstown, NH 03045
603.529-2500
Antennas, towers; transmission line; RF switches; technical/engineering consultant.

SYMBICOM
1401 Westwood Blvd., Los Angeles, CA 90024
213.476-0681
3D modeling, animation; 2D graphics systems; HDTV production equip.

SYNTEX
965 Schulman, Santa Clara, CA 95050
408.727-4889
Intercoms.

SYNERGYSTIC BATTERIES
1425 Elm Hill Pike, Nashville, TN 37210
615.254-5651
Power supplies; batteries.

SYSTEMA
101 Sunnyside Blvd., Plainview, NY 11803
516.349-0235
Turntable preamps, styli, cartridges.

SYSTEX
5520 W. Touhy Av., Skokie, IL 60077
312.792-2700
Connectors, jackfields.

SYSTEX
5520 W. Touhy Av., Skokie, IL 60077
312.792-2700
Connectors, jackfields.

TABBED
217.428-7101
62523
Studio monitors.

TACOM
3750 Airport Rd., Ogden, UT 84405
801.392-7531
Audio processors; portable mixers; on-air consoles, mixers; post-production consoles, mics, accessories; studio monitors; special eff; audio DAs; preamps, line amps, monitor/power amps; audio cable.

TANNOY NORTH AMERICA
306 Gage Ave., Unit 1, Kitchener, ON N2M 2B8 Canada
519.745-1158
Studio monitors.

TAPSCAN
3000 Riverchase Galleria Tower, Ste. 111, Birmingham, AL 35244
205.987-7456
Business automation.

TASCAM
7737 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 02166
617.527-7335
VTR editor/controllers; video processors; VTR upgrade kits; stand-alone keyers; PC-based off-line EDL system.

TECHNOSPHERE CORP.
29 E. 19 St., New York, NY 10003
212.777-5100
Equipment distributor.

TECIDOS
265 Otis St., W. Newton, MA 02166
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.

TECHNOMATICS
29 E. 19 St., New York, NY 10003
212.777-5100
Equipment distributor.
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 systems.

TELEVISION ENGINEERING CORP.
560 Goddard Av., Chesterfield, MO 63005
314 532-4700
ENG/EFP vehicles; mobile production units.

TELEVISION EQUIPMENT ASSOC.
Box 393, S. Salem, NY 10590
914 763-8893
Video filters & delays.

TELEX COMMUNICATIONS
9600 Aldrich Av., Minnetonka, MN 55420
612 887-5550
RF mics; intercoms; telco interface equip.; high-speed audio tape duplicators.
See ad pg. 95 Circle #137

TELMAN
1101 A Airway, Glendale, CA 91201
818 500-0137
Genlock for Commodore Amiga PC.

TELEX TRAFFIC CONTROLS
901 W. 94th St., Los Angeles, CA 90045
213 385-4330
Traffic signals; traffic control systems.

TELEPAK SAN DIEGO
4783 Ruffner St., San Diego, CA 92111
619 268-8559
Transportation cases.

TELEVAC
1201 252-8220
Timonium, MD 21093
TELEDYN ENERGY SYSTEMS
110 W. Timonium Rd., Timonium, MD 21093
301 252-8220
Power generators.

TELEMET, DIV. G E O T E L
25 Davids Dr., Hauppauge, NY 11788
516 436-7260
NTSC encoders/decoders; video processors; video test equip.; routing switchers, DAs; fiberoptic processors; video test equip.; NTSC encoders/decoders; digital video efx; production switchers; routing switchers, DAs.

TELEMETRIC SYSTEMS
82 BME August 1989
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
Fiber optic systems; connectors, jackfields.

VECTOR TECHNOLOGY
203 Airport Rd., Doylestown, PA 18901
215 348-4100
RF mics; intercoms.

VEGA
9900 Baldwin Pl., El Monte, CA 91731-2204
818 845-1515/800 826-2305
Remote camera controls.

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., La Cruces, NM 88005
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Reader Service #241

Audio Technologies Inc. presents a full-line catalog describing its line of Problem Solver products, including consoles; amplifiers; IFH to PRO interfaces; studio metering systems; and low-cost distribution, turntable and multiple amplifier arrays.

Reader Service #245

BROADCAST AUDIO CORPORATION

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

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

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

NEW LITERATURE

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

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

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

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 "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

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
A brochure is available from Harrison by GLW, describing its AP-100 full-featured economical on-air console.

Reader Service #255

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

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

Product catalogs from Leitch feature its full line of television production equipment. A short-form catalog is also available.

Reader Service #259

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

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 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

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

McCurdy 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

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

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

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.

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Circle 136 on Reader Service Card.
FM Multipath Study Generates Cooperation

Previously 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 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?

Yesterday’s anticipation of a digitally interconnected audio world faces disillusionment at today’s standards jumble.

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 manufacturer 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 (DI/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 DI/O chip with an 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 DI/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.

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.
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 frighteningly 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.

“...”

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.

PRO FORMATS

<table>
<thead>
<tr>
<th>Format</th>
<th>CONSUMER FORMATS</th>
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<tbody>
<tr>
<td>AES/EBU*</td>
<td>EIAJ CP-340 Type II, form</td>
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<tr>
<td>SDIF-2 (3 coax)</td>
<td>EIAJ CP-340 Type II, form</td>
</tr>
<tr>
<td>PD-Dub A, B &amp; C</td>
<td>S/PDIF</td>
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<tr>
<td>MADI (56 ch., coax)</td>
<td>CD “Red Book”</td>
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<tr>
<td>Akai (12 ch.)</td>
<td>IEC 958 Form II, type 1**</td>
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<td>Yamaha “Cascade”</td>
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<td>Yamaha DMP7D</td>
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<td>EIAJ CP-340 Type I*</td>
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<td>CCIR Rec. 647*</td>
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<td>IEC 958 Form I</td>
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Circle 137 on Reader Service Card.
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 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

"The nice thing about standards is that you can have so many of them!" —Steve Lyman, CBC.
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 domain.

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 between 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.

"When a CD player says 'Digital Out,' how do you know what that really means?"
—Robert Finger

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Circle 139 on Reader Service Card
Find Coaxial Transmission Line Attenuation on Your PC

By Ronald F. Balonis

The 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 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)).

COAXATTN.BAS ++ Coaxial Line Attenuation ++

< 1>PFSJ1-50 (1/4) < 2>PFSJ1-50 (1/4) < 3>PFSJ4-50 (1/2) < 4>LDP2-50 (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 PFSJ1-50 : ATTEN.= 0.900dB EFF%= 81.28
At 100.00mHz 100.00FT of LDP6-50 : ATTEN.= 0.902dB EFF%= 81.25
At 950.00mHz 150.00FT of LDF5-50A : ATTEN.= 1.890dB EFF% = 54.60

Quit or <###mHz ###FT/M #>: 450 100FT 5

Figure 1. Demo screen for COAXATTN.BAS.
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 interpolation algorithm is more elegant because it provides comparable results with better. The interpolation algorithm is more elegant because it provides comparable results with just the data. And the data set can be altered to enter at the input data prompt ends the program. And a null beep and reprompt from the start. And a null

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 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.

BME August 1989 103
One 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...
Enough said.

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Circle 140 on Reader Service Card.
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. 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.
ANNOUNCING
BME'S THIRD ANNUAL
EXCELLENCE IN ENGINEERING AWARDS

NOMINATIONS ARE NOW BEING ACCEPTED

For 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.
Tektronix Portable DSO Offers Serial Interface...
Omnitronix Premiers Solid-State AM Transmitters...
Nalpak Presents Folding Lens Cap...
Nady Premiers Narrator Headset for Video Cameras

Tektronix Portable DSO Offers Serial Interface

The 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 Premiers Solid-State AM Transmitters

The 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

Designed 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 Premiers Narrator Headset for Video Cameras

The 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

JVC 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’ Powerview/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 without 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

EXTEND YOUR LEVEL OF SUCCESS

The ATS-100 Stereo (dual channel) Extended Range Audio Meter is a self-contained audio measuring system. Dual “VU” meters provide precision visual monitoring. Peak Program Meters offer simultaneous level and peak monitoring.

The ATS-100 input sensitivity allows for a wide range of levels, from -60 to +30 dBm, and a visual indicator is provided for accurate phase measurement. The rack-mounted, fully solid state amplifier and power supply, coupled with advanced microprocessor control, is assembled in a compact 3½” rack mount frame.

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Circle 141 on Reader Service Card
Auto Tape Delay From Merlin

Designed 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 protocol. 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

Anritsu’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 ±5 percent over a given wavelength range, with guaranteed linearity of 0.15 dB. Dynamic range is -100 to +3 dBm at 1.3 μm. 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

Energy 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

Model 8X16, Novadyne’s composite video/two-channel audio routing system, is com-
completely 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

Scantex’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, balanced 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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Circle 143 on Reader Service Card
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 an STL receiver and transmitter (in studio) or the two corresponding antennas (on the tower). The system 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

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 ampl/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

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**

Designed 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 holder/belt and power supply, is $4195. 

**Reader Service #218**

**Benchmark Presents IFA Series Amps**

Designed to accommodate a wide range of interface needs with eight different modular models, Benchmark’s IFA series of interface amplifiers are mounted in small “modern” 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.
## Patch-Bay Products

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- **Patch Cord Holders**
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- **Video Panels**

## Audio Accessories

### Leitch Premiers D2 Line
Leitch 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 DigiTec DDA-7100 digital distribution amp, featuring two relocked 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 #219

### Altronic Announces Dummy Load
Altronic 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 +
Computer Prompting’s CPC-1000 SmartPrompter+ features a simultaneous scroll/edit function that allows editing 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

### Bird Introduces Power Sensor Calibrator
Bird 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 ±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

Audiolab's Model TD-5 metal particle tape degausser is designed to accommodate high coercivity tape cartridges (Beta SP, MII, D1-2, 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 Premiers S-VHS Player

The 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.

Reader Service #225

You can measure...

with the best monitor and the most accurate test set.

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

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ELECTRONICS LABORATORY, INC.
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Call or write for more information on Belar AM, FM, Stereo, SCA and TV monitors.

Circle 148 on Reader Service Card.

Full Bandwidth In All Modes.

COMPATIBLE WITH S-VHS, VHS, U-MATIC & U-MATIC SP, Y/C INPUT AND OUTPUT

- Time base correction for Heterodyne VTRs
- Frame synchronization with full frame memory
- Adaptive comb filter
- Full bandwidth freeze field/freeze frame (Field 1 or Field 2 selectable)
- Y/C in, Y/C out and simultaneous composite out
- Composite in, composite out and simultaneous Y/C out (Composite and S-VHS Y/C transcoder)

AF75 TBC/Frame Synchronizer

HOTRONIC, INC.
1875 S. Winchester Blvd.
Campbell, CA 95008 408/378-3883

Circle 149 on Reader Service Card.

BME August 1989 115
Under 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 ARSonic 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 ClearVoice 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 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 ($0.04 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.
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**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**

**UTESCH SCIENTIFIC**

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**

**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 offline design work and storyboards. Consumer S-VHS decks outfitted with time code are doing offline 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 preconceptions 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.
This switcher handles standard bandwidth like it's going out of style.

The new TVS/TAS-3000 video/audio distribution switcher from BTS handles standard bandwidth switching in stride. But the fact is, standard bandwidth may not be the standard much longer. And that's why the TVS/TAS-3000 is not your standard switcher.

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And if high bandwidth capacity isn't a require-ment, BTS still has you covered with our best-selling switcher, the TVS/TAS-2000. The 2000 represents the same advanced technology and quality as the 3000 in a standard bandwidth switcher. BTS also offers a full-range of control panels and distribution amplifiers for a complete system designed, tested and guaranteed by one supplier.

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