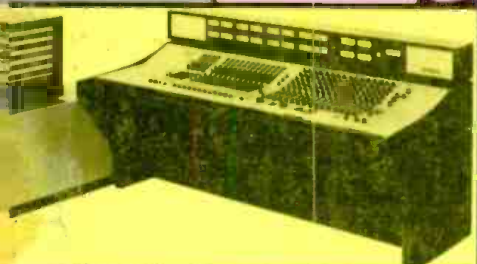
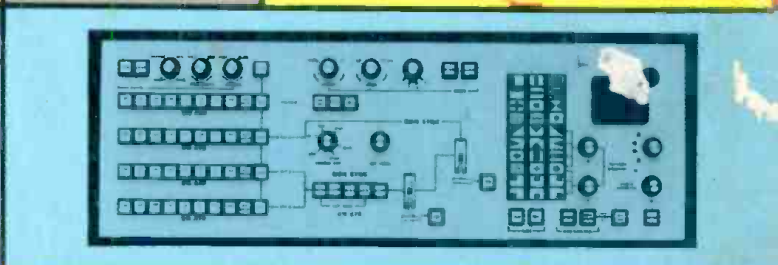
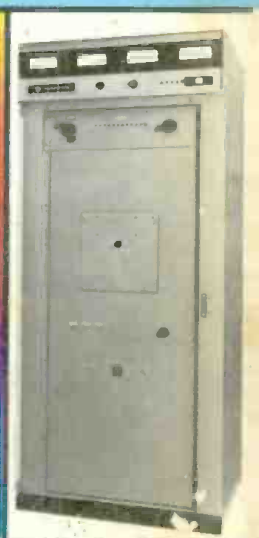


# BROADCAST ENGINEERING



## 1977 Buyers' Guide

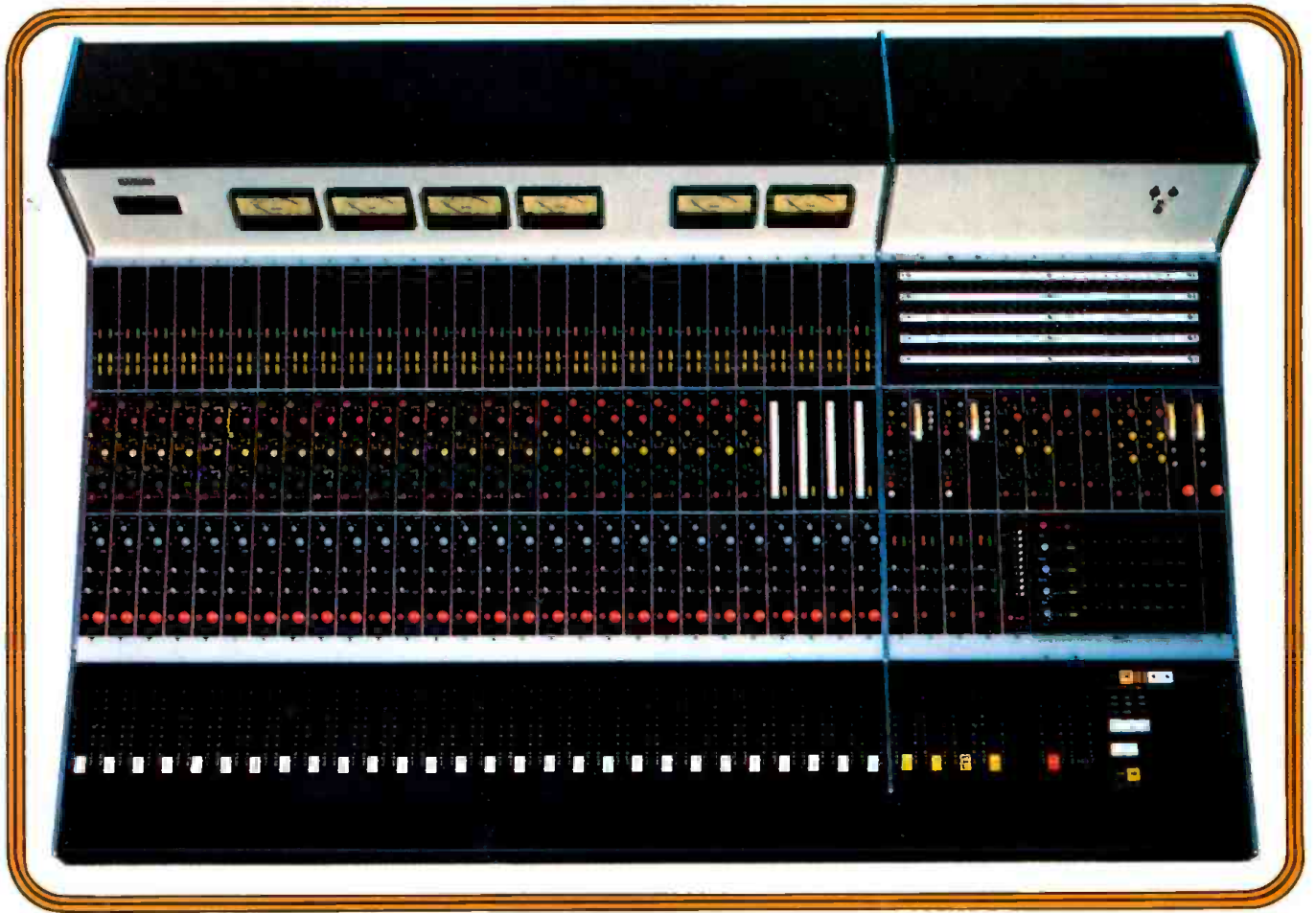
Will The NAEB Survive?  
Live Via Satellite



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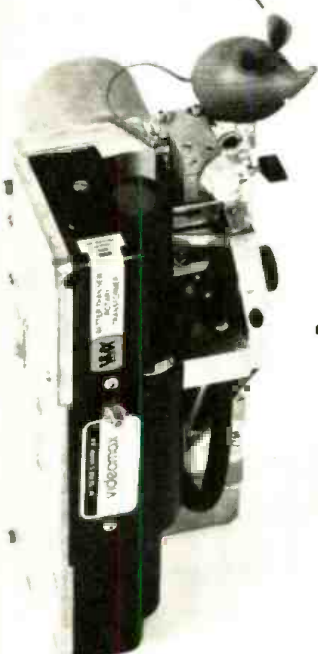
Ward-Beck Systems Inc., 290 Larkin Street, Buffalo, N.Y. 14210.



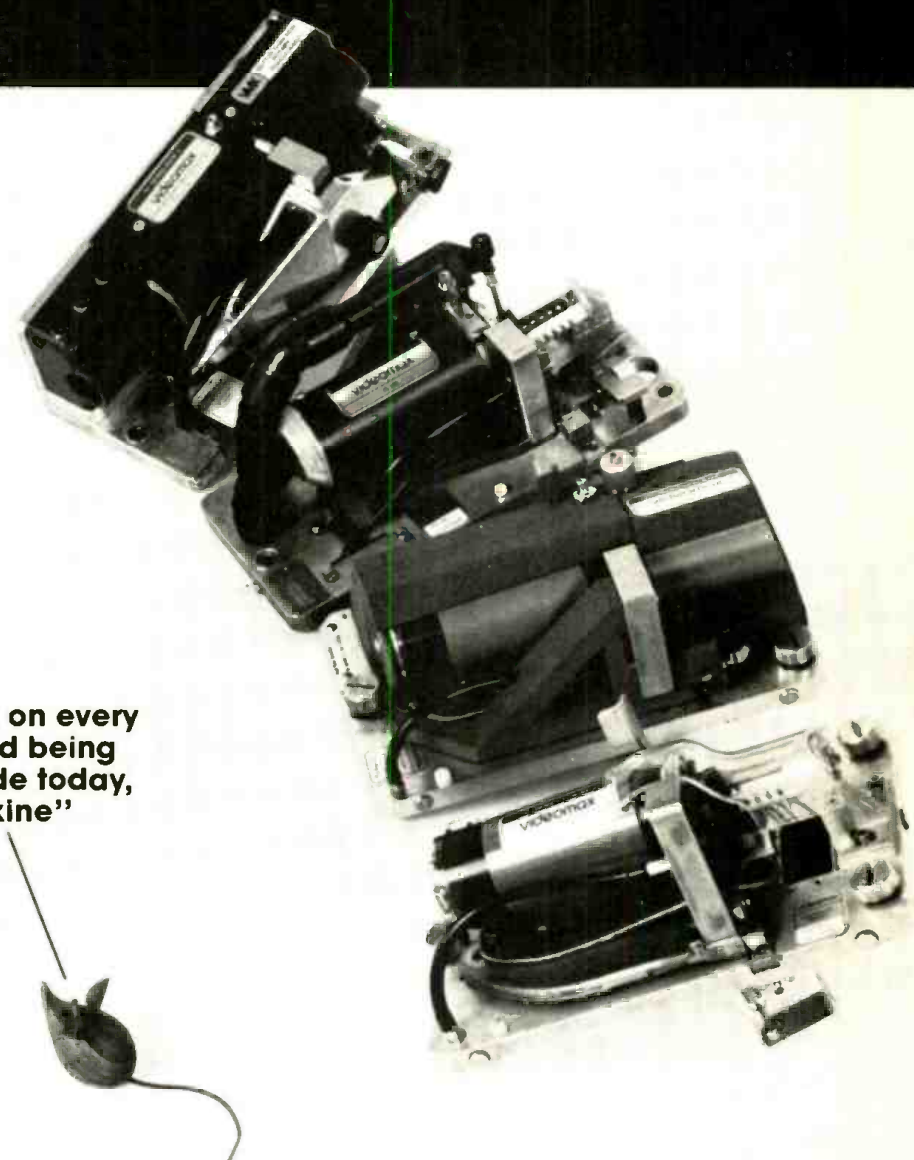
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For More Details Circle (16) on Reply Card

- 26 NAEB's 1977 National Convention. BE interviews NAEB president on key problems facing the Association. *Ron Merrell.*
- 42 ENG: It Pays To Be Committed. *Phil Dean.*
- 56 Profanity Is No Problem For WTIC. *Michael Russell.*
- 66 "Live Via Satellite." *Joe Roizen.*
- 76 STL Operating Techniques. Part 2 of a 2-part series. *John E. Leonard, Jr.*
- 84 A Systems Concept For Audio Interface. *Peter Burk.*
- 107 BE 1977 Buyers' Guide Section.
- 166 WTAR-TV/AM Combines Operation For Better News Coverage. *Dave Busch.*
- 231 Manufacturers Address Section.

### About the cover

Our cover depicts the theme of our largest-ever verified broadcast product directory, which begins on page 107. Graphic design by Mary Christoph.

### Departments

Direct Current .....	4
Industry News .....	8
Radio Workshop .....	84
SBE Journal .....	94
People in the News .....	178
News Briefs .....	194
Blue Bananas .....	202
Technical Data .....	204
New Products .....	220
Ad Index .....	272
Classified Ads .....	277

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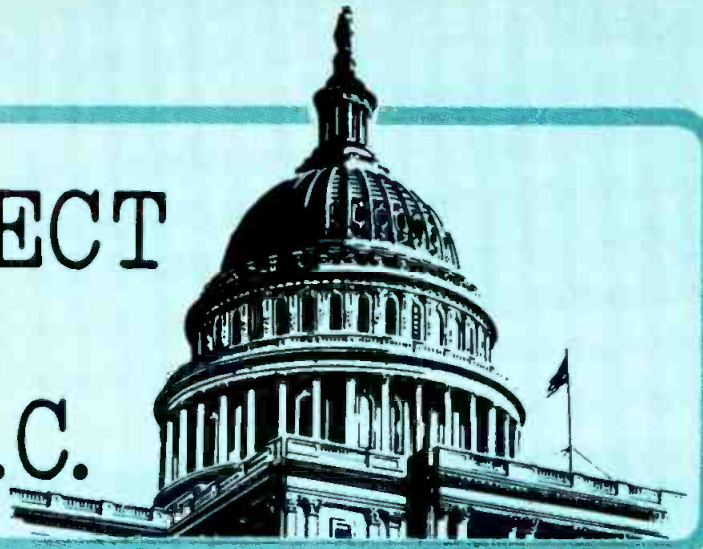
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# DIRECT CURRENT FROM D.C.



September, 1977/By Howard T. Head & Harold L. Kassens

## Changes Proposed in Operator Licensing

The Commission has proposed sweeping changes in the present system of radio operator licensing. The proposals arose from a Commission Inquiry initiated last year.

The new proposals make a clear distinction between licenses issued certifying competence for technical duties and those intended merely to authorize routine operation. The technical licenses would designate the holders as technicians while those dealing with routine operation would be identified as operators. The proposed technician series would consist of: radiotelephone technician license; radio broadcast technician license; and television broadcast technician license. The routine operator series of permits would consist of limited radiotelephone operator permit and restricted radiotelephone operator permit.

Holders of current licenses would be permitted to renew existing licenses at the expiration of the present license term.

Most of the comments filed in response to the Commission's Notice of Inquiry overwhelmingly favored the retention of a licensing system to demonstrate the competence where the installation, servicing and maintenance of radio transmitting equipment is involved. On the other hand, there was a preponderance of feeling that licensing of an operator served little purpose where routine operation is involved due to the reliability of existing equipment.

The Commission has invited comments on these proposals (Docket #20817) by October 3, 1977.

## Rules Adopted to Control Interference from Cable System Radiation

The Commission has made final its proposal (May, 1977) to protect air communications and navigation systems from any interference which might be caused by radiation leakage from cable television systems. This interference potential was brought to attention by an incident last year which affected aircraft communications in the vicinity of Harrisburg, Pennsylvania.

*continued on page 6*



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For More Details Circle (17) on Reply Card

# DIRECT CURRENT FROM D. C.

*continued from page 4*

---

The new rules prohibit the use of carriers in the vicinity of the emergency frequencies 121.5 MHz, 156.8 MHz, and 243.0 MHz. In addition, cable systems employing the bands 108-136 MHz and 225-400 MHz must maintain information on signals carried and file the data with the Commission. Regular monitoring of systems employing these frequency bands must be performed throughout the entire system to detect any evidence of signal leakage in the cable. Details are not spelled out, but the method must be sufficiently effective to detect any instances of leakage which might be a significant source of interference.

## Problems In Land Mobile Sharing of UHF TV Channels

The Commission has announced the results of negotiations with Canada intended to enable the sharing of UHF TV Channels 14 and 15 with land mobile operations in the Cleveland, Ohio area and similar sharing of Channels 15 and 16 in the Detroit, Michigan area. It was necessary to coordinate this sharing, which was authorized by the Commission in 1970 in Docket #18261, because of the closeness of both of these cities to the Canadian border.

The Commission's announcement met with prompt objections from various television broadcast interests, chief among which was the Council for UHF Broadcasting (CUB), a coalition of various educational and commercial broadcast organizations. These objections pointed out that the original authorization for the sharing of UHF Channels 14-21, inclusive, by land mobile operations had been temporary in nature intended to bridge the gap with the development of equipment suitable for operation in the frequency region near 900 MHz, which was opened up at the same time the sharing of the lower channels was authorized.

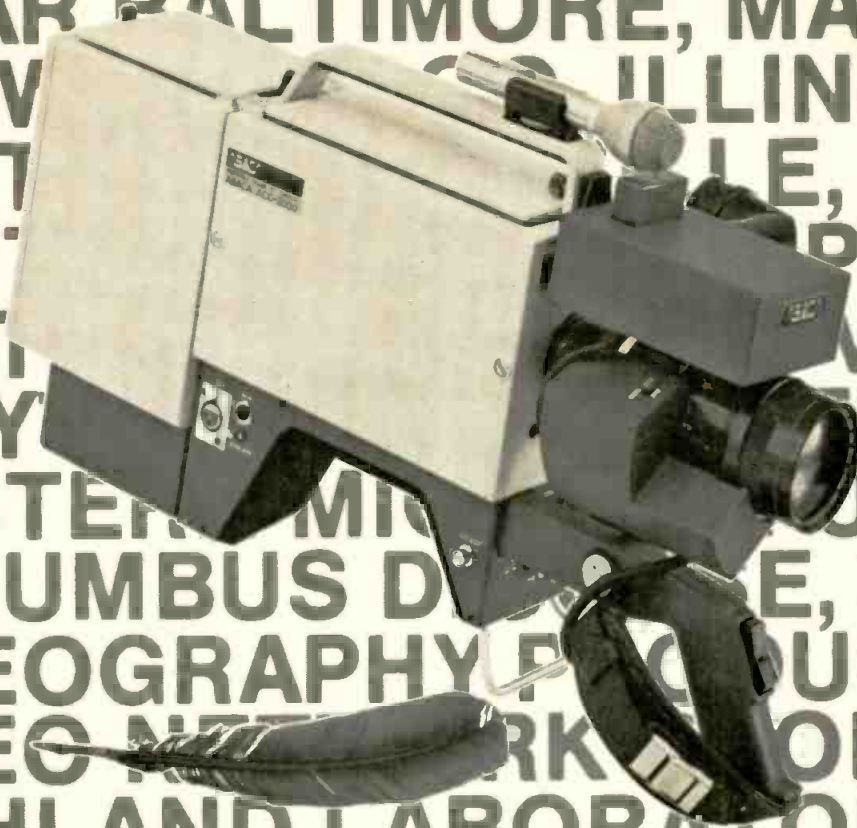
In the meantime, considerable controversy over land mobile sharing of UHF TV channels throughout the entire UHF television broadcast band continues, with particular emphasis on the development of a U.S. position for the 1979 World Administrative Radio Conference (WARC).

## Short Circuits

The proposed prototype television "Receiver of Tomorrow" was delivered by the contractor to the Commission for testing on August 15... Field tests of the various AM stereo systems have been completed with a report to the Commission due on October 1...The Commission has declined to prohibit the construction of a high power shortwave broadcast station in California on radiation hazard grounds, pointing out, among other things, the RF energy concentrations near C.B. transmitting antennas...The Commission has approved systems for wideband swept RF anti-pilferage devices in frequency bands at 2, 4.5, and 8 MHz.



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## FCC announces availability of revised broadcast forms

Noting that forms for broadcast applications and reports are revised frequently, the FCC has issued a revised listing of acceptable editions of such forms.

The Commission said revision of a form usually makes the previous edition obsolete. In turn, it added that use of obsolete forms can result in unnecessary delays in processing applications, requests for more information, or the preparation and submission of data no longer required.

The following recently revised forms are now available for use:

- Form 302. Application for New Broadcast Station License (March 1977);
- Form 308. Application for Permit to Deliver Programs to Foreign Broadcast Stations (March 1977);
- Form 309. Application for Authority to Construct or Make Changes in an International, Experimental, Television, Experimental Facsimile, or Developmental Broadcast Station (March 1977);
- Form 315. Application for Consent to Transfer of Control of Corporation Holding Radio Broadcast Station Construction Permit or License (March 1977);
- Form 330-L. Application for Instructional Television

Fixed Station License (March 1977):

- Form 348. Application for Renewal of TV or FM Broadcast Translator Station License (April 1977);
- Form 349-L. Application for an FM Booster Station License (April 1977).

## SMPTE preparing for record crowd

To meet the overwhelming demand for booth space at its upcoming Technical Conference, the SMPTE has increased the exhibit area to accommodate companies in both the motion picture and television industries.

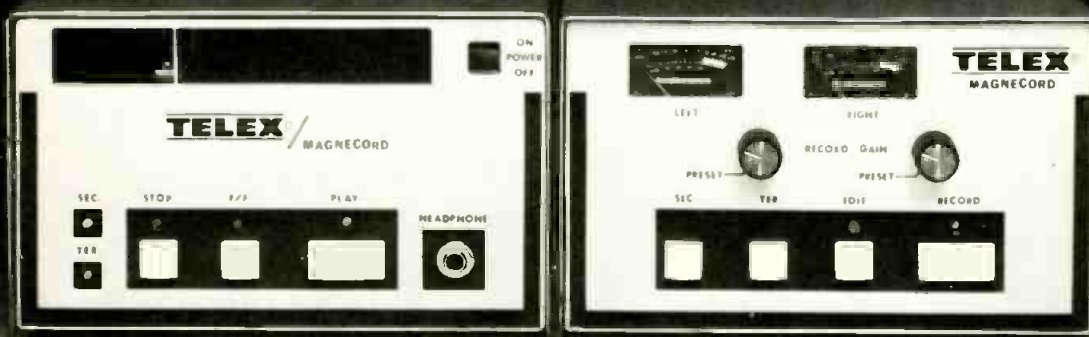
The Conference is set for the Century Plaza Hotel in Los Angeles, October 16-21.

According to SMPTE Conference vice president, Harry Teitelbaum, Hollywood Film Co., the 168 booths the SMPTE had available were all reserved by June 20. SMPTE's largest previous exhibit was in 1976 in New York, where they had a 166-booth sellout exhibit.

The Century Plaza is building another exhibit area adjacent to the area the SMPTE is now scheduled to occupy. This new area will have space for an additional 72 booths, giving the SMPTE a capacity of 240 booths.

*continued on page 10*

# At Last, a Cart Machine that Keeps its Cool



Telex/Magnecord broadcast cart machines run cool and steady. So cool no ventilation is required, so steady not even voltage or frequency fluctuations will alter their speed. Thanks to our dc servo flutter-filter drive.

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Designed for type A or B carts, the MC series meets all NAB specifications, offers full immunity to EMI and RFI, is remote controllable and automation compatible with CMOS digital logic. Audio muting, air damped low voltage

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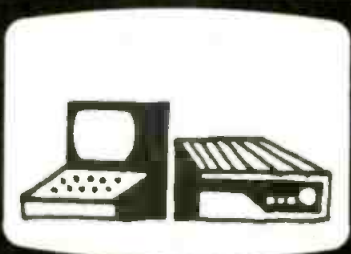
# WHAT IS A CMX?



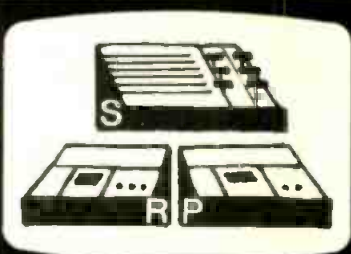
CMX is the best computer assisted video tape editing system in the world.



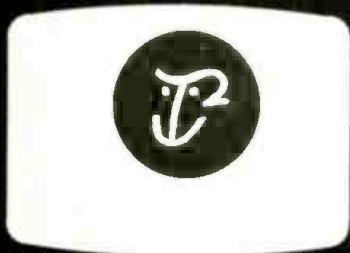
From the System 600 (at about \$350,000) until today (at less than \$20,000) CMX has been the recognized leader in the field.



A CMX is a whole system. It's a keyboard, a computer...



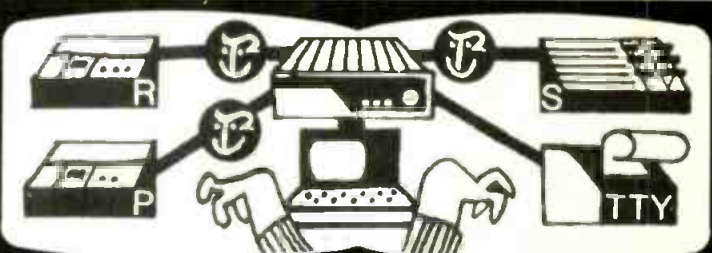
a switcher, a minimum of one record machine, and one playback machine (CMX interfaces with most machines)...



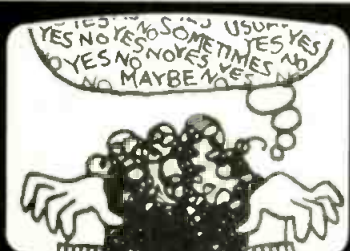
and an Intelligent Interface (I<sup>2</sup>)™



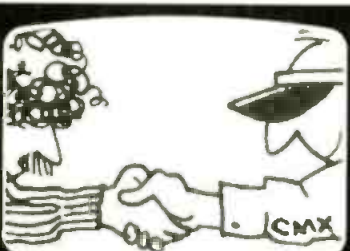
between each and every sound and picture source and the computer, and most importantly, the creative editor.



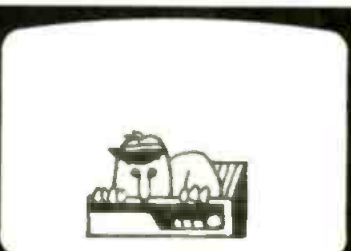
This is the simplest configuration possible. The creative editor and the keyboard. By merely touching the keys, he determines what happens to the video tapes under his control. From the keyboard, he is able to effect all decisions.



He can select individual frames; cut action and dialogue; reedit and rearrange scenes at will.



The editor's genius is matched by our software's genius. Incredibly complex technical operations are performed with sublime ease.



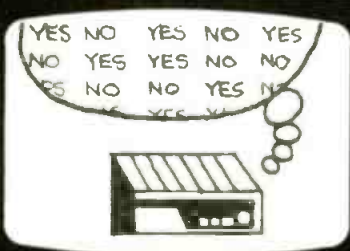
CMX calls its genius software the "Supervisor," and the Supervisor resides in the computer.



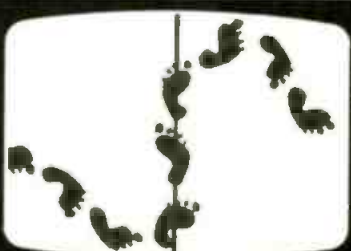
The editor talks to the Supervisor through the keyboard.



The Supervisor relays the information to the respective machine or switcher through the Intelligent Interface.



The edit decision list is kept in the computer to be read out as you need it — on punched paper tape or in human language. Auto assembly is great.



The results are a good work print (off-line) or a Master recording (on-line).



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## FCC opens TV inquiry on use of subcarrier frequencies

The Federal Communications Commission has instituted an inquiry into the use of subcarrier frequencies in the aural baseband of television transmitters.

The action was in response to a petition by Boston Broadcasters, Inc. (BBI), licensee of WCVB-TV, Channel 5, Boston. BBI asked the FCC to amend Part 73 of the rules to permit television stations to use subcarriers on their aural transmitters to cue and coordinate electronic news gathering (ENG) crews in the field.

For more than a year, WCVB-TV, under special authority from the FCC, has been testing the use of a 67 kHz subcarrier on its aural transmitter for those purposes. This has been done with the simultaneous use of a 39 kHz telemetry subcarrier.

Test reports submitted by BBI with its petition indicated that the subcarriers do not interfere with each other nor cause interference to the aural or visual portions of the television broadcast. The National Broadcasting Company, American Broadcasting Companies, Inc., and National Association of Broadcasters supported BBI's position.

The Commission said since the type of subcarriers proposed by BBI might have additional applications and since there might be other uses for the aural baseband that could be affected by standards developed, an inquiry to investigate such applications and uses was appropriate.

The Commission noted that several proposals have been developed through the years for multi-channel TV audio transmission, and invited comments on some possible uses, including: stereophonic television sound broadcasting; foreign language translation, and augmented audio for the blind.

### Technical considerations

The implementation of any of those applications of television aural transmitter subcarriers would involve making technical evaluations and decisions on the feasibility of each application and the most practical method for its implementation.

Some of these considerations include:

- degradation of service;
- subsidiary communications authorization (SCA) specifications;
- stereo interest;
- foreign language and augmented audio interest;
- other uses;
- equipment considerations.

The FCC said it must be determined whether the use of a subcarrier for any purpose would cause degradation of audio or visual transmissions or cause interference to adjacent television channels or radio services.

The restrictions on use of subcarriers also must be determined, including: what part of the baseband should be used; what modulation levels should be authorized; how many subcarriers could be authorized without causing degradation of normal television

continued on page 14



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# The BVH-1000.

## Consider the advantages.

Last year, Sony Broadcast introduced the prototype of a new 1" high band video recorder. The BVH-1000.

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Since then, we've made some changes. Added more features. Expanded the BVH concept to include a portable model, the BVH-500, for professional 1" production in the field.

And we've sold a lot of machines.

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**1. The Advantage of Shared Sector Scanning.** The Sony Broadcast BVH-1000 and BVH-500 both use an exclusive system of scanning that records video and sync (lines 1-17) with separate heads. Which means the entire vertical interval is captured and available for encoding any signal required in the future by the FCC.

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**2. The Advantage of BIDIREX.** Film editing techniques, with a professional video recorder?

That's what you get with the BVH-1000. Not one, but two control modes are provided to give editors a true "film" feeling. In shuttle mode, the tape can be moved in either direction, from stop to 30 times normal speed. With a recognizable picture, so you can make fast editing decisions.

In jog mode, the BVH-1000 lets you move the tape as though you were positioning the reels by hand—while you monitor a fully locked picture.

**3. The Advantage of Interchangeability.** 1 dB down is the specification. Need we say more?

Sony's interchange is guaranteed by a gimmick-free devotion to precision mechanics and supported by the experience of building several hundred thousand video recorders.

**4. The Advantage of Color Framing.** Some high end production recorders don't offer color framing. Others make it available as an expensive option.

But both the BVH-1000 and BVH-500 provide color framing capability as standard equipment. Add that to a logic system ideally suited for computer assisted editing, and the Sony BVH-1000 is your best bet to produce that "word from our sponsor."

**5. The Advantage of High Fidelity Audio.** Not one, not two, but three isolated audio tracks with frequency response from 50 Hz to 15 kHz. With over 50 dB isolation between tracks.

Never before has any production recorder offered the level of audio quality found in these two new Sony Broadcast machines.

And a special wide band amplifier is automatically switched onto the cue track in search mode, to accommodate SMPTE code playback in high speed.

But it is impossible to describe all the advantages of the Sony BVH-1000 and BVH-500 high band recorders. You must see them to believe them.

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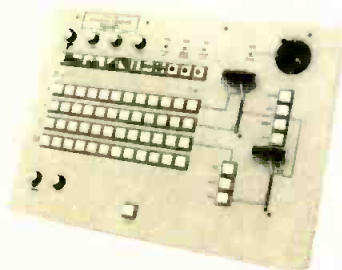
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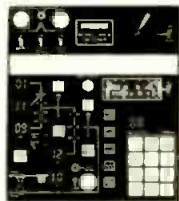
The most complete line available. Improve picture detail without color distortion or noise addition.

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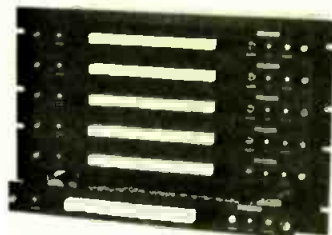
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**industry  
news**

*continued from page 10*

service; and should interim standards for the use of subcarriers be authorized for use as proposed by BBI while considering other uses.

The Commission said it also must be determined whether the public is interested in stereo TV and is willing to bear the additional costs involved; are broadcasters interested in such transmissions and would they make the necessary expenditures to make them a reality; what system proposals are feasible for implementing stereo TV; what studio-transmitter transmission techniques are available for local and network programming; should systems lend themselves to quadrasonic sound to increase the realism of programs, and if there is a desire for TV stereo, can stereo as well as subcarriers for other uses be accommodated.

**Foreign language audio**

With respect to foreign language and augmented audio, the FCC said it must be determined if there is a need and interest for such services; what is the best way of accomplishing them; and is there a multi-channel sound scheme that would lend itself to these types of services in a way compatible with stereo TV transmissions.

The FCC has asked for comments on whether there are other uses for aural baseband or subcarriers that have not been addressed here.

Comments also were requested on the difficulties that might be encountered in designing and manufacturing receivers for reception of stereo television; whether manufacturers, in the interim, would produce receivers or special television aural receivers that have output jacks for connection to external stereophonic or quadrasonic equipment; and could similar outputs be provided for subcarriers used in foreign language transmissions and augmented sound for the blind.

**NAB wants NCCB to stay out  
of FCC fee refund controversy**

The National Association of Broadcasters (NAB) is opposing the National Citizens Committee for Broadcasting (NCCB) in its request to delay the refund of fees due broadcast licensees by the FCC.

NAB's Erwin G. Krasnow wrote to Vincent J. Mullins, FCC secretary, citing the NCCB's lack of standing "to inject itself into the final stages of years of litigation." He added that it had no involvement in any of the proceedings or orders that were the subject of Supreme Court review.

He also asked that the portion of the NCCB's accompanying rulemaking petition dealing with refunds be dismissed.

Krasnow stated that full refund at this point is the most equitable solution because:

- of the amount of time that has passed since 1970 when refunds were first requested;
- of the significant portion of fees paid that would be refundable under even a partial refund formula;

*continued on page 16*



# 8½ 4 Good Reasons Why Philips is Setting The Standard in TV Test Equipment

## 1. PM 5580 Modulator

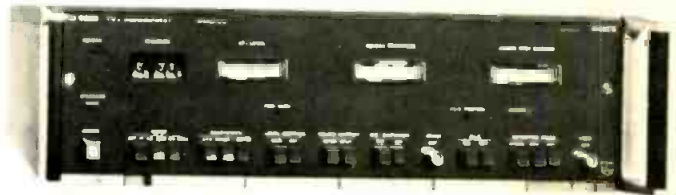
- Vestigial sideband modulator.
- Used extensively by transmitter manufacturers.
- Synthesized carriers derived from internal 10 MHz oscillator.



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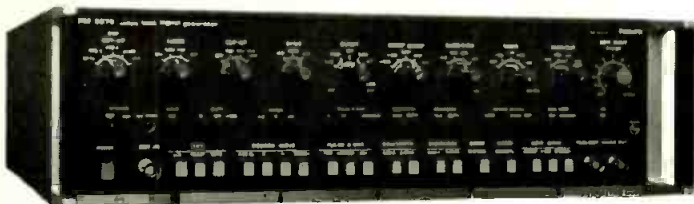
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## 7. PM 5576 VITS Generator/Inserter

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For More Details Circle (26) on Reply Card

## industry news

continued from page 14

- the government has had these funds during the intervening period without paying interest;
- cable television operators have already received full fee refunds; and
- of the uncompensated effort and expense to which broadcasters have been put in more than three years since the Supreme Court decision.

### First Bahaman TV station will start with color

The first national television broadcast system in the Bahamas will be established later this year by the Broadcasting Corporation of The Bahamas, known as RADIO BAHAMAS.

The \$2.5 million equipment order calls for studio and portable color cameras, television film and videotape systems, remote production and newsgathering equipment, and transmitting systems, according to J. E. Hill, division vice president and general manager, RCA Broadcast Systems.

The new Channel 13 outlet will bring the first local programming to Nassau, the Bahamas' capital, and to New Providence Island and several Family Islands.

Studio facilities in Nassau will include three TK-46 television cameras, two complete TK-28 film originating systems, two TR-600 quadruplex videotape recorders and two HR-1060 videocassette editing recording-reproducers, Hill said.

An RCA-equipped compact television van will be used for on-the-scene program and commercial production. The van will be equipped with two TKP-45 portable color cameras, TR-600 videotape recorder, video switcher, and audio and intercom equipment.

RADIO BAHAMAS also will operate a complete electronic newsgathering department, Hill said. Three TK-76 lightweight portable cameras and four HR-1020 portable videocassette recorders will provide for fast-response, on-site recording of events. Two additional HR-1060 recorders will be used for editing and airing of the news material.

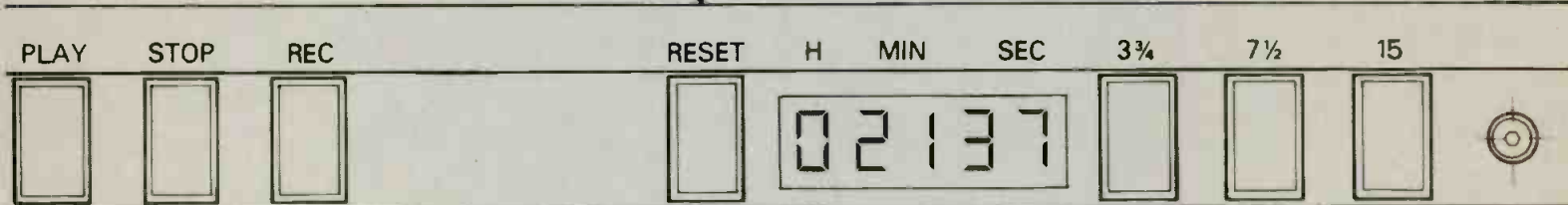
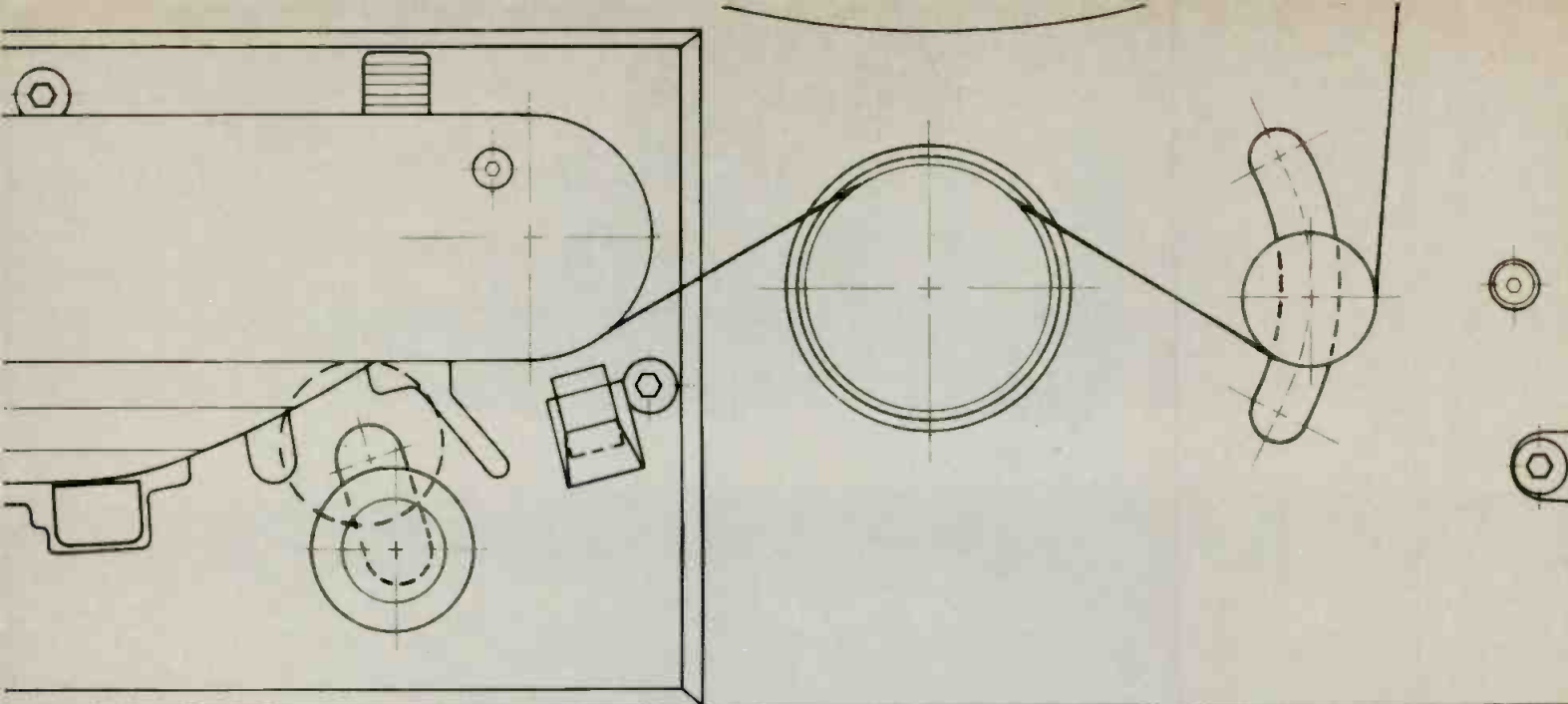
The transmitting system will use two 2.5-kilowatt units, operating in parallel to produce 5 kw visual power output. Combined with the antenna, the transmitting system will produce approximately 40 kw effective radiated power, the minimum required for coverage of the New Providence area and environs.

### INTELSAT now includes 96 member countries

The Republic of Chad has acceded to the Agreement of the International Telecommunications Satellite Organization (INTELSAT), thus bringing that organization's membership to 96. The INTELSAT Operating Agreement, concluded among telecommunications entities designated by the member countries, was signed by the Société de Télécommunications Internationales du Tchad. Chad becomes the twenty-third African nation to join INTELSAT.

continued on page 18





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## industry news

continued from page 16

INTELSAT, created in 1964, now provides through its global satellite system more than half of the world's transoceanic international telecommunications services, as well as satellite capacity for domestic communications systems in nine countries. Services on a full-time basis are provided through 174 antennas at 140 earth stations in 82 countries.

### CMX Systems and Marconi reach agreement

CMX Systems, a division of Orrox Corporation, and Marconi Communications Systems of Chelmsford, England have reached an agreement giving Marconi exclusive marketing rights in the United Kingdom and a non-exclusive arrangement in other areas of the world.

Al Behr, general manager of CMX Systems, indicated that Marconi would market and provide full support for the CMX product line of computer-assisted editing systems such as the 340X and the peripheral devices like its time code generators and readers.

Marconi's recent entry into the VTR business required the company to offer its clients the most modern and sophisticated time code editing systems, and it chose the CMX Systems product line to fulfill that need, according to Cyril Teed, Marconi's marketing director.

Marconi Communications Systems manufactures a wide range of television equipment for broadcast applications.

### PMPEA seminar will feature Academy-award winners

Several 1977 Academy-award winners are scheduled to lead the opening event of the upcoming SMPTE conference in Los Angeles, planned and organized by the Professional Motion Picture Association (PMPEA).

The program, called the Motion Picture Production and Hands-On Equipment Seminar, is scheduled for Sunday, October 16. Academy-award winners Haskell Wexler, ASC, (*Bound for Glory*) and John Alonzo, ASC, (*Black Sunday*) each will demonstrate and discuss studio cinematography techniques. Verna Field, production executive for Universal Studios and winner of an Academy award for best editing (*Jaws*), is tentatively scheduled to lead a discussion on post-production techniques. Jim Webb, co-winner of the 1977 Academy award for sound (*All the President's Men*) will demonstrate production recording.

"This seminar," says Roy Isaia, vice president of the PMPEA, "is a unique opportunity for filmmakers to see top professionals demonstrate their craft, with the latest equipment, on a Hollywood soundstage.

The seminar will be held on the 20th Century Fox lot from 10 am to 2 pm.

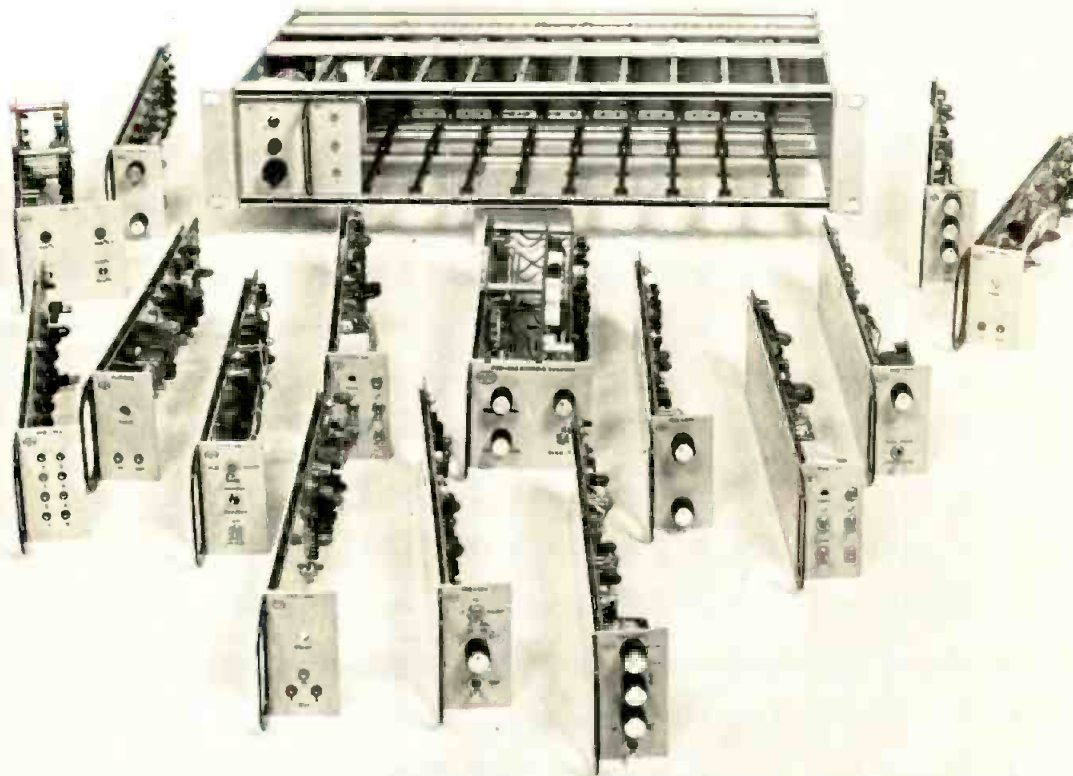
continued on page 20



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PBD-322 Bar Dot and Visual Reference Generator

PMB-323 Multiburst and 12 MHz Sweep Generator

PSS-324 Stairstep and Ramp Generator

PPD-325 Sin<sup>2</sup>, 20T Pulse and Window Generator

PSD-340 System Delay Module

PPA-346 Pulse Distribution Amplifier

PSA-346 Subcarrier Distribution Amplifier

PVA-350 Video Distribution Amplifier

PVD-354 Video Delay Amplifier

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## Telecommunications featured at Southeast Asia Conference

Telecommunications representatives from more than 30 Southeast Asia countries are expected to attend the first US/Southeast Asia Telecommunications Seminars Program and Exhibit.

Designed as an overview of telecommunications hardware and technology, the program and exhibits are scheduled for January 19-21, 1978 at the Hyatt Singapore Hotel. The seminar will be sponsored by the Electronic Industries Association, communications division.

The exhibitors will display a wide range of hardware representing top U.S. manufacturers, said John Sodolski, staff vice president of EIA, communications division.

The conference will cover a variety of state-of-the-art advances in U.S. telecommunications hardware and technology. Such subjects as telephone equipment and systems, transmission equipment and systems, and mobile communications will be covered.

## Broadcast and cable TV ownership limit affirmed

A federal appellate court has affirmed the FCC's June 10, 1976, order setting a 5% limit on institutional ownership of broadcast and cable television companies for the purposes of applying the Commission's multiple ownership rules.

The limit was appealed by the National Citizens Committee for Broadcasting, a Washington-based public interest group, in the U.S. Court of Appeals for the District of Columbia.

The 1976 action raised the ownership benchmark for investment companies from 3% and for insurance companies from 1% to the 5% standard in force for bank trust departments. The standard applied only to widely-held broadcast and cable entities having more than 50 voting stockholders.

For revised benchmark to be applicable these institutional investors must exercise no control over the management of policies of these concerns.

Banks, investment firms and insurance companies may hold up to 5% in broadcast and cable companies, provided they exercise no control over the management or policies of the concerns.

The rules change had been requested by the Aetna Life and Casualty Co., The Teachers Insurance and Annuity Association of America and College Retirement Equities Fund, The Prudential Insurance Company of America, the American Life Insurance Association, the National Association of Independent Insurers and the Investment Company Institute.

The FCC said its adoption of the 5% rule was in the public interest because it would be likely to increase investments in broadcast and cable companies and thus strengthen the economic foundation of these industries without creating undue concentration of control.

continued on page 184



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This complete, sophisticated stand-up time code editing accessory can put you in command of as many as seven additional (similarly equipped) machines working in any combination of master/slave for production or multiple dubbing service.

Modular construction means an easy fit for your AVR-2, no matter where you want to use it—at a remote location, in your tape room, or out in the mobile van.

AVR-2 is the quad recorder that grows. Every accessory for this machine is available upon initial purchase or at any time in the future when you're ready. Tell us what it has to do, and we'll recommend the model that suits your needs.



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REF MAT: TRAINING MANUAL - VOL. 5 & 6

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James A. Fellows (right), NAEB president, discusses the 1977 national convention with Mary Lynn Moody, convention director, and Dan Wells, senior vice president for engineering and operations, Public Broadcasting Service. (Photos by Olga Zabludoff)

## NAEB's 1977 National Convention: Can the "little NAB" come back?

By Ron Merrell

*James A. Fellows, NAEB president, discusses the upcoming convention and NAEB's new efforts to serve non-commercial broadcasting.*

There was a time, not very long ago, when the National Association of Educational Broadcasters national convention was referred to as the "little NAB." But over the last five years the NAEB's national meeting has taken such a steep attendance slide that some have openly wondered if a 1977 convention would even be held.

First off, there will be a 1977 convention. It will be held in Washington, D.C. November 13 through 16, with the Sheraton Park designated as the exhibit hotel.

Whether or not the NAEB will be able to put together a convention with the earmarks of a major broadcast meeting will depend upon how many nagging problems have been solved. To get a handle on how the NAEB plans to come back, I talked to the NAEB's president, James A. Fellows, and asked many of the hard questions that will have to be fielded before a comeback is possible.

The following are questions from Broadcast Engineering and the official NAEB response.

**BE:** Whom does the NAEB represent? And, how are their needs being met?

**Fellows:** NAEB is the most comprehensive organization in public and educational communications. Its constituency includes individuals as well as institutions and organizations. Public radio and television stations, colleges, schools, universities, ITFS operations, and industrial closed-circuit organizations are part of the NAEB family. Our individual constituency includes trustees, managers and other execu-

tives, producers, programmers, graphic specialists, engineers, business officers and instruction personnel.

To meet the specialized needs of these individual groups, the membership of the NAEB is organized into professional councils which provide a means through which many of the programs and activities of the association are carried out.

Through the councils, NAEB maintains close touch with each professional discipline represented in its membership, enabling the association to tailor its services to meet existing and emerging needs.

**BE:** In what areas are these councils presently involved?

**Fellows:** At the present time, professional councils have been established in the following areas: broadcast education; business officers; directors of volunteers; engineers; graphics and design; instruction; producers; production managers; radio; research; state administrators; television station managers; and television programming.

**BE:** Concerning the 1977 national convention, will the selection of Washington, D.C. represent any problems?

**Fellows:** Not only will it not represent any problems, it presents an opportunity for suppliers that cannot be duplicated as easily in any other city. Much of the support for technical and equipment purchases by education and public broadcasting comes from programs of the federal government. There is no

better opportunity for suppliers to show the federal planners and legislators of advances in equipment and to dramatize the need for support to encourage the necessary updating and improvement in all technical aspects of the system.

There couldn't be a more natural place for a major technical exhibition than Washington; as for logistics, the NAEB will be contained in the Sheraton Park-Shoreham-Americana complex. "No bus, no fuss, no bother."

**BE:** What plan do you have for increasing general attendance?

**Fellows:** Several activities will result in increased attendance, including:

- The involvement of the professional councils in the program planning has resulted in more participation, earlier and more extensively than ever before. For the first time a full-day meeting was recently held for all elements within the professional councils.
- Special mailings in the Washington area to organizations and individuals whose interests are in some way related to public broadcasting will invite them to the convention and to the exhibits.
- A liberal policy for exhibitors to provide exhibit guest passes will be observed.
- The registration fees will be kept low with only modest adjustment from last year.

**BE:** How can you convince prospective exhibitors and trade press that the numbers and quality of the

*continued on page 28*



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## NAEB

continued from page 26

exhibit area attendees will improve?

**Fellows:** We have had the cooperation and support this year from an exhibitors committee that has made very constructive and helpful suggestions that will make the show much more appealing and useful for suppliers. Among the recommendations that have been established as policies are the following:

- Exhibitors will have opportunities this year for technical and other

presentations in the professional programs of the convention, both in the meetings and on the exhibit floor.

- There will be several times when there are no program conflicts with the exhibit hours. Eight and one-half hours have been allotted during which the exhibit will be open and no sessions have been scheduled.

- A general session on technology and the future will include exhibitors as major participants.

- The engineering and technical program has been designed to attract a large number of personnel

who will find attendance at the convention a professional necessity.

**BE:** Are there any signs that these changes are helping?

**Fellows:** One early sign that the suggestions are working: six exhibitors who were not in the 1976 show were among the first to sign in for the 1977 show.



“Satellite developments and ENG developments will receive extensive attention in the program components of the convention and there are obvious benefits to suppliers who are involved in these areas.”

**BE:** How will you increase attendance of those people who make equipment purchase recommendations or decisions?

**Fellows:** The key people involve chief executives, senior technical and senior production personnel. The NAEB is the only national meeting where these people are together. The television managers council, the engineering council, the radio council and others are planning extensive programs that will require participation.

Specifically, the television managers council, the radio group and the engineering group are planning station- and institution-based tours of the exhibit area so that the key people from each organization will receive a guided tour of the exhibit from their engineering director.

The technical program and the production program will both be key factors. Satellite developments and ENG developments will receive extensive attention in the program components of the convention and there are obvious benefits to suppliers who are involved in these areas.

In addition, the PBS Engineering Committee will be meeting at the convention and the vice president for technical and engineering affairs at PBS, Daniel Wells, will be co-chairing the engineering program with our engineering council director, Noyes Willett. Thomas Keller of

continued on page 32

# Committed to serving the broadcaster.



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# Why Panasonic's Series 9000

## We started with an annealed aluminum die-cast chassis.

Up to now selecting the right VCR deck or system left you with one major problem: To get the features you wanted, you had to pay a small fortune. Now there's Panasonic's new generation VCR. Series 9000. Two standard-performance decks. Two high-performance decks. And a high-performance, direct-drive editing system. Each with the kind of features and performance you may not find even in the most expensive  $\frac{3}{4}$ " decks.

Like an annealed aluminum die-cast chassis. For better stability of alignment, greater strength and long-term durability. Like individually removable cabinet panels on the outside. And low-density circuit boards on the inside. There's also a new jam-proof gear tape loading system. Less jitter. A high S/N ratio of 45 dB. And more.

For those who want a meaningful alternative in standard VCR performance, Panasonic offers the NV-9100 player. And the NV-9300 player/recorder

with VHF and UHF tuners. Both decks include high resolution: 330 lines mono and 240 lines color. A VTR/TV antenna switch. An optional RF modulator. And just about everything else you need for the kind of picture you want.

There are also two high-performance, direct-drive decks. The NV-9200 player/recorder and the NV-9500 editing recorder. The NV-9200 gives you outstanding performance at a very affordable price. Because it gives you a direct-drive video head cylinder. Patented HPF video heads. Chroma level adjustments. As well as the capstan servo system.

The results: Highly stable color and black and white pictures with less jitter. High resolution: 330 lines mono and 250 lines color. And dubs that look more like masters than copies. But whether you use it as a high-quality master recorder, a CCTV studio deck or a dubbing deck, the NV-9200 will give you the performance you expect at a price you don't.





# should be your next 3/4" VCR.

**We finished with a direct-drive editing system for under \$10,000.**

With the NV-9500 editing recorder, you also get frame-by-frame insert and assembly edits that are crisp and clear. Without tear, roll or loss of chroma information. And with its two independently selectable audio channels, you can also edit audio without affecting video.

But perhaps the best part about the NV-9200 and the NV-9500 is what goes between them—the NV-A950 editing controller. With its five-minute memory for entry and exit points of video and audio inserts, the NV-A950 will let you perform insert and assembly edits automatically. What's more, at a complete system price of under \$10,000 you can also achieve considerable savings over comparable editing systems.

And for complete 3/4" mobility, Panasonic also offers the NV-9400 portable VCR, as well as the WV-2210 portable color camera. Both are compact, lightweight and operate on rechargeable

Panaloid™ batteries.

But the best way to be convinced about our new VCR's is to see them in action. Ask your Panasonic dealer for a demonstration. He'll show you how to get the 3/4" VCR system you want at a price you can afford. Series 9000 by Panasonic.

For more information write: Panasonic Company, Video Systems Division, One Panasonic Way, Secaucus, N.J. 07094. In Canada, contact Panasonic Video Systems Department, 40 Ronson Drive, Rexdale, Ontario M9W 1B5.

\*Optional remote control for all Series 9000 decks shown below.

All cabinetry is simulated wood.

## Panasonic.

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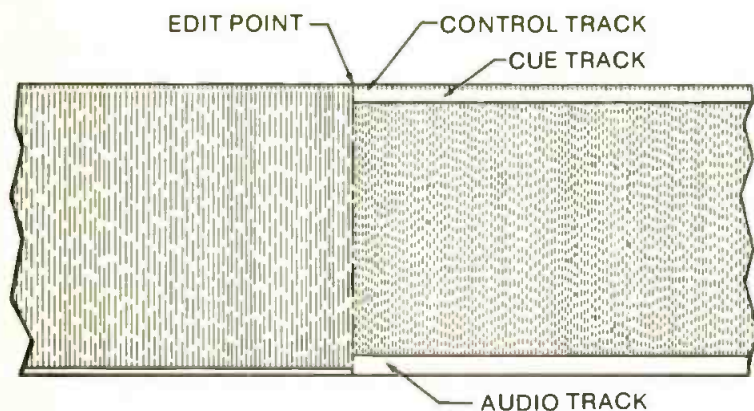
For More Details Circle (37) on Reply Card



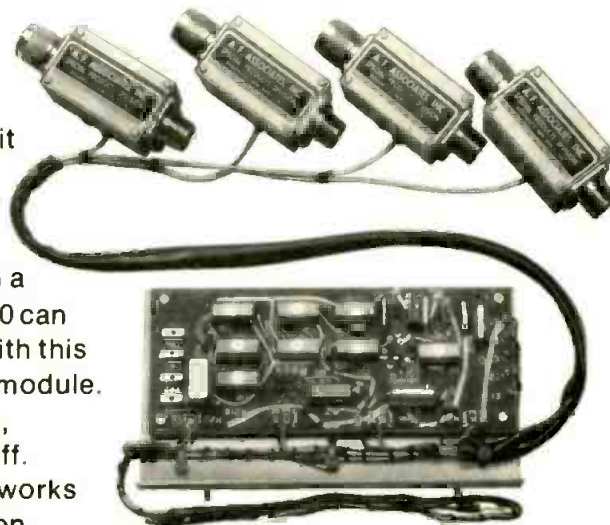
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## NAEB

continued from page 28

WGBH. Robert Klein of Kentucky Educational Television, Frederick Remley of the University of Michigan, and Evert Anderson of KCET are also invited in the program planning.



"The new policies are designed to accommodate the needs of the exhibitor and therefore the needs of our constituency to benefit from an effective exhibit program."

**BE:** Will the convention attendee have adequate time to visit the exhibit area? And will there be any added incentive to visit the exhibits?

**Fellows:** The new policies are designed to accommodate the needs of the exhibitor and therefore the needs of our constituency to benefit from an effective exhibit program. The governing principle is that the exhibit policy should enhance the exhibitors' opportunity to meet customers in an environment conducive to marketing their products and services. This is the main reason for an exhibition and our policies are supportive of that practical business goal.

In particular, the new policy establishes 8½ hours during the convention when no scheduled program will conflict with the exhibits, as previously mentioned. We are also setting up a food service within the exhibit area; a Monday afternoon reception will be held within the exhibit area; and follow-up sessions from the technical sessions will be held in the exhibit section.

**BE:** Will the 1977 convention sessions cover topics of interest to attendees representing CCTV, instructional TV, campus-limited radio and educational AM-FM?

**Fellows:** The preliminary program planning schedule shows the following topics:

Radio: Fifteen sessions covering community ascertainment, pro-

continued on page 34



# About the only thing our new 3M D-8800 Titling System can't do is spel.



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Variable font sizes  
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\*Video effect simulated.

If you can spell, you can create video excitement never before possible with the new dual-channel 3M Datavision D-8800 Titling System. That's because we've combined two fast, programmable microprocessors with some innovative video engineering to produce a flexible video graphics system that'll make you look great on the tube, whatever the job.

At the 8800's control console, you can make titles and credits using up to four complete type fonts at a time, chosen from our varied and extensive library. You can

change from one font program to another letter by letter, generate letters and words in 8 different colors, and in several sizes at the touch of a button. You can even control the letter spacing!

On the 8800, not only will your words be gorgeous, you can present them just the way you want 'em, too.

You can initiate roll and crawl at several speeds and adjust both the roll and crawl masking to achieve just the 'right' look. And you can also select crawl position and roll and crawl direction. An

inter-active panel display 'walks' the operator through every move, so complicated effects are easy to make and error free.

All graphic font and title information is stored on floppy discs for quick, easy program changes and retrieval. And the 8800 features numerous custom fonts and other options, to help you create those very special images you want for your station.

If you want great video graphics, put your best font forward. Take a good look at the new 3M Datavision Model D-8800.

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## NAEB

continued from page 32

ducers exchange, handling of volunteers, fund raising, non-CPB affiliated stations, station operations, music programming, information exchange on new equipment, copyright, career potential, top-level administrative support for radio, and business meetings.

**Instruction:** Sessions covering instructional radio production techniques, instructional radio research,

the Newark school radio project, CPB and PBS education activities, regional instructional television campaigns, instructional television programming update, the Essential Skills Learning project, technological advances in instructional television delivery systems, television in higher education, instructional radio/television in school emergencies, faculty involvement in school television course utilization, improving reading skills by television, and student involvement in television

production.

The sessions are being developed on the basis of input we receive from our professional councils, which continually monitor the needs of their respective groups in broadcast and non-broadcast facilities throughout the country.

**BE:** Will the sessions be aimed at "blue sky" projections, innovative and/or practical solutions to everyday problems, descriptions of new hardware by manufacturers, or a combination of these?

**Fellows:** We are aiming for a healthy and realistic balance. Manufacturers will participate specifically in a general session of the technological "future" that they are forecasting and it is altogether likely that they will participate in other sessions within various convention programs.

Public broadcasting is unquestionably the innovator in the use of satellites for interconnection. Considerable attention during the convention will be devoted to the "here and now" in satellite transmission, as well as plans for nationwide interconnection by satellite for the public system.

**BE:** Looking past the 1977 convention, is the general direction of the NAEB shifting? If so, why?

**Fellows:** It would be fair to say that the NAEB is shifting its direction with changes in the field itself. The lines between the exclusive broadcast outlet and the non-broadcaster are becoming less necessary to distinguish. Many major broadcasting stations are developing other means of distribution and many non-broadcast systems are becoming larger and more diversified. NAEB reflects and encourages this kind of growth and development.

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Looking past the convention:

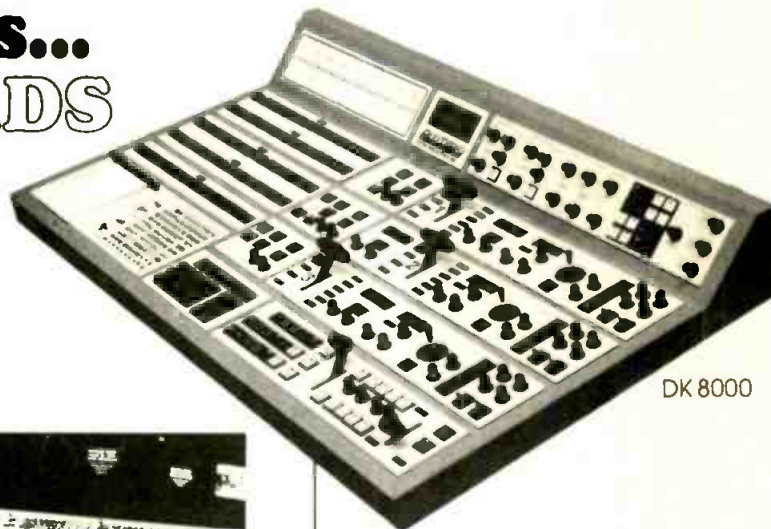
## Will the NAEB survive?

There are grumblings from many quarters that there are too many conventions, some going so far as to suggest the NAB convention should be held every two years instead of annually. Yet despite the complaints, conventions with equipment

continued on page 38



# From the World's largest producer of custom video controllers... new STANDARDS of excellence.



DK 8000

## DK8000/VIDEO CONTROLLER

This new system offers features and value unique among video switchers. The DK8000 incorporates a number of advancements including multiplexing, L.E.D. indicators and readouts and keyboard M/E programming for efficient operations. The DK Series has been pre-designed to incorporate a small memory, thus allowing storage and re-call of complex production set-ups. Keyboard M/E programming offers remote operation in which all M/E functions (such as transition mode, time selection, pattern selection and key selections) may be quickly and efficiently entered via the key board. The DK8000 combines aesthetic appearance with optimum control panel operation to produce a powerful video production tool.



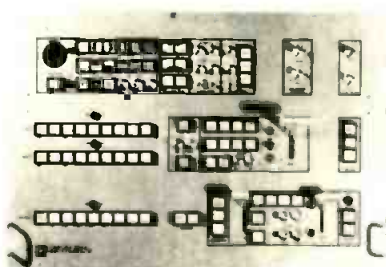
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SL 3000

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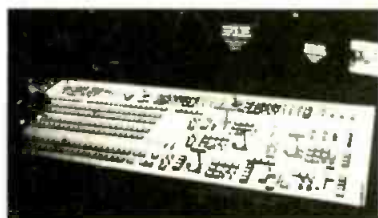
Models are available for single or dual audio editing applications, plus master control, mobile or studio production/post production and on-air applications.

New features include the addition of dual audio to editing models. Rho-Tery wipes, a dual fader arm DSK (with internal color gen and key PVW), \*integrated image compression, independent chroma key buffer amplifiers and controls, up to five levels of keying, torque adjustable fader arms, and for the larger production switchers, quad split with input selector.

Other significant features of the SL Series include up to 85 wipe patterns each with adjustable borders (softness, width, color), 10-18-26 inputs including color black and background, provisions for up to 12 external key sources, hybrid format that maximizes the performance to cost ratio, and packaging with front loaded PC boards for ease of access.

Also new in the series this year is the SL1000, "stand alone" downstream mixer-keyer. This device will offer broadcasters the capability to upgrade existing switching systems to include such features as full pattern effects with soft edge and color borders, Rho-Tery wipes, linear chroma keyer, external keying with border/dropshadow effects, program fade to black, etc. The SL1000 DMK is compatible with up to two (2) standard NTSC color signals (1 volt p-p composite) and up to four (4) key sources (0.7 volt p-p non-composite or 1 volt p-p composite).

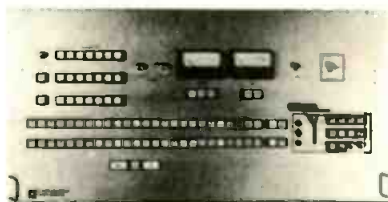
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## CUSTOM AUDIO/VIDEO CONTROLLERS

The Computer Image Custom Video Controller line provides 36 different basic configurations varying from a simple 10 input 2 bus model to the top of the line 26 input 7 bus model. Each basic system can be equipped from a list of 45 defined options offering a wide choice of effects and system "expanders". These can be supplemented further by special user defined options and configurations, e.g., the addition of custom machine controls or other ancillary monitors and controls. The custom design approach allows the discriminating buyer to design to his own exacting requirements.



SL 2000MC

## TECHNICAL AUTOMATION

The AMC 440 Series automation system is a sophisticated broadcast operation controller offering significant advancements in reliability and simplicity. Because of its modular design, should failure occur, a self diagnostic feature expedites servicing. Other advantages include better system throughput and performance capabilities, such as an optionally available terminal to support production automation. The AMC 440 Series can be interfaced with a business computer system.





# The fire, earthquake, election and touchdown company now brings you love scenes in Studio Two.

## The new HK-312 studio camera from Ikegami, the ENG experts.

Wherever there's been news, from natural disasters to national elections to sport events, Ikegami ENG cameras have been there with the news teams. Now Ikegami makes news of its own: the introduction of our new state-of-the-art HK-312 studio and field camera.

We've built ENG cameras so good in the rough-and-tumble of news-gathering that more Ikegami ENG cameras are in use than all others combined.

So imagine how good an Ikegami camera can be in the stable environment of a studio.

Very good indeed.

Ikegami's new HK-312 color-TV camera is like no other. It has a built-in minicomputer that helps trim the daily camera checkout from a one-hour ritual to an automatic run-through that's shorter than a 20-second commercial. With its auxiliary computer, you'll be able to cycle your Ikegami HK-312 (and up to four other Ikegami HK-312 cameras linked to it) through every adjustment parameter in under two minutes: white balance, black balance, flare correction, gamma correction, video gain, beam alignment, and eight registration functions.

All this before you start shooting. The HK-312 gives you three 30-mm Plumbicon tubes for highest picture quality. You frame your shot on a high-intensity, high-resolution, seven-inch tiltable viewfinder. Signal-to-noise ratio is better than 54 dB.

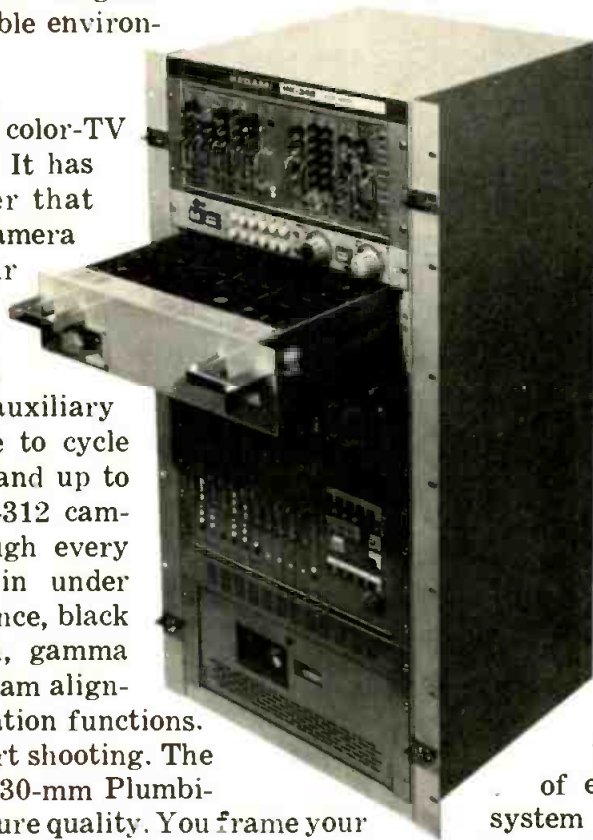
We've combined the zoom lens and camera tube into a single rigid assembly for highest accuracy of the optical axis. Class-A deflection amplifiers assure maximum linearity and best picture quality. Black level balance correction is automatic. Picture quality and brightness are maintained in spite of flare.

A complete two-line image enhancer provides horizontal and vertical detail correction. A special comb filter keeps background noise to a minimum.

All this and a lot more.

If your budget or production requirements are smaller, use our tried-and-tested TK-355 studio camera. Five were used for network feed at the 1976 Democratic National Convention where camera failure would blow a lot more than a few fuses.

Camera-control unit for the HK-312



The TK-355 uses three 25-mm Plumbicon tubes which are bias-lighted for reduced lag at low lighting levels. This reduces studio lighting and air conditioning power consumption. And the camera is more compact and lighter, a little easier to maneuver. The unique half-rack CCU facilitates multi-camera studio installations.

Both broadcast cameras use TV-81 minicable for ease of handling.

If you need a small, fixed-position camera for announcer booth and news-casting, check out the Ikegami HK-309. It can be operated remotely or simply turned on and left in fixed position.

For movies, the Ikegami TK-950 is a large-image film-chain broadcast camera system for 16-mm or 35-mm film or slides with highest quality color reproduction. Much of its operation is automatic, requiring a minimum of engineering support. Its unique optical system is dust-shielded and unusually compact.

Ikegami has been famous for its ENG cameras for a long time. Now take a look at what we can do with studio cameras. For specs or a demonstration, get in touch with us. We have nation-wide distribution.

# Ikegami

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www.americanradiohistory.com

# It's in the cards

**NAEB**

*continued from page 34*

exhibitions are necessary. Whether or not equipment exhibitions are necessary at every national convention, however, is another matter.

It's no secret that a well-run convention and equipment exhibition can be a great revenue-producing venture. But it's the exhibitor who usually pays the freight. And knowing this, the exhibitors are at the point of demanding better convention treatment and services.

For the attendee, choosing the most appropriate convention is a problem. There are so many these days that narrowing it down to a few must conventions is no easy task. In the last few years, we've seen the growth in popularity of the National Radio Broadcasters Association (NRBA), the Society of Broadcast Engineers (SBE), and the Industrial Television Association (ITVA).

For the educational broadcaster, there are many possibilities. ITVA covers the closed circuit field. NAB, SBE, SMPTE and NRBA hit the AM, FM and over-the-air side. But there is a gap, and that's where strictly public broadcasting, instructional TV and educationally-oriented AM and FM come in. While the equipment doesn't know where it's operating, these special interest groups do have unique problems, as well as problems common to most communications operations. And that's why there is a need for an organization with a name like the National Association of Educational Broadcasters.

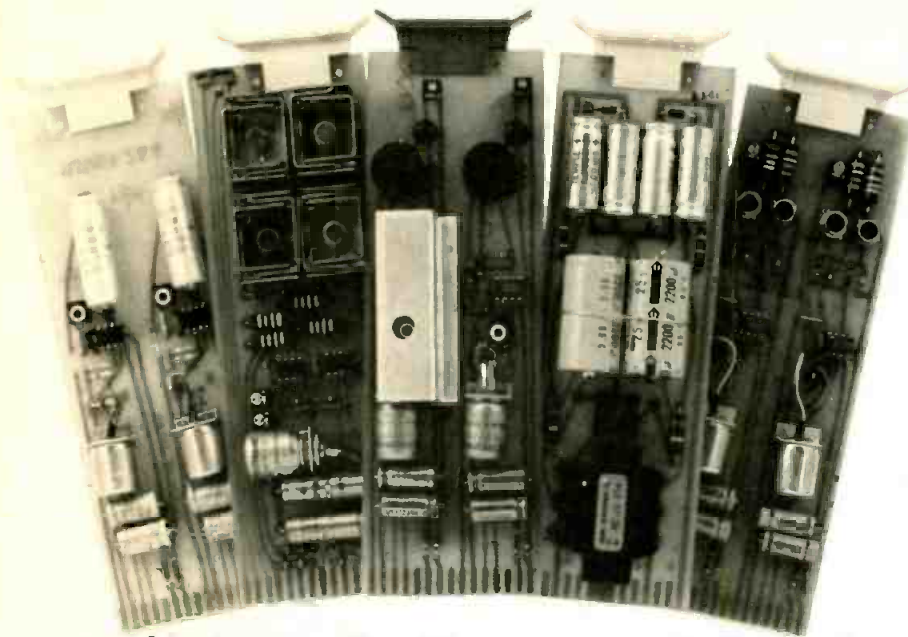
Many other associations place so much emphasis on the commercial broadcaster that such acronyms as NPR, ITFS, PBS, ITV and CCTV serve to identify real minorities that, when lumped together, can be referred to as the non-commercial broadcasters. Better yet, they could be called non-commercial communicators.

## Out of the same mold?

There has always been something different about this group of communicators. Maybe it's because they aren't faced with dollar returns on investments. It could be that they, for the most part, operate on or near the grounds of a college or university. Whatever the reasons, they need a clearing house for educational/non-commercial information.

And strangely enough, it has been these same types who have been a

*continued on page 40*



## and Integra 3 offers you a full deck

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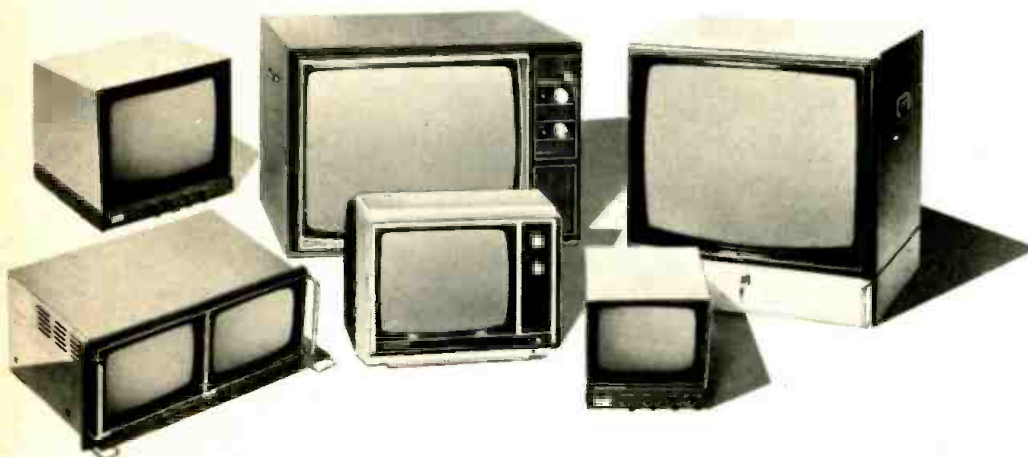
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### NAEB

*continued from page 38*

vital part of the broadcast industry, sometimes even leading the way into fresh viewpoints or technological innovations. (The origins of several well-known radio stations can be traced to the engineering department of various state universities.)

**"The eyes of the broadcast industry will once more focus on our educational stations. And, once more the challenge of the times will be forced upon the National Association of Educational Broadcasters."**

And now we see the movement of satellite program relay being set up for what could be the largest radio network. And it's coming through educational stations. The eyes of the broadcast industry will once more focus on our educational stations. And, once more the challenge of the times will be forced upon the National Association of Educational Broadcasters.

If attention will be given to the individual needs of this presently almost homeless group, as the NAEB promises, there will be little need in the future to beat the drums for upcoming conventions. For aside from the fact that their needs must be met by some professional association, it is a fact that technological developments are coming along so fast in the 1970s that not even the most professional of them all can satisfy the tremendous need for more and more information.

Convention theme choice will become of greater importance. Any professional association today offering seminars, sessions and literature on digital basics and digital troubleshooting would have long, wonderful lines waiting at the registration desk. Equally important, the successful convention of the future depends upon satisfying the needs of the attendee and the exhibitor.

#### So what happens next?

It's up to the NAEB now. Their hopes and aspirations might not be fulfilled in Washington this November, but there is every indication that the NAEB is finally headed in the right direction. We'll take a flyer on the 1977 convention, based mostly on interest and need. If the promises are not fulfilled, there will be little hope for future years, and other associations will be forced to pick up the load.



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# ENG:

## It pays to be committed

By Phil Dean

The news tradition of KSTP started in 1925, when the station established the first local radio news department of any station in the country. Back in those days the call sign was WAMB. And as you'd suspect, in the '70s KSTP-TV's news emphasis rides on ENG, a move that began two years ago.

Unlike many TV stations which use their ENG equipment solely for

ENG, KSTP-TV encourages experimentation with the mini-cameras for creative programming.

KSTP-TV is the flagship station for Hubbard Broadcasting, Minneapolis-St. Paul. And that news tradition was started by Stanley E. Hubbard, chairman of the board. News emphasis in the future is assured with his son, Stanley S. Hubbard, working as president of the company and general manager of KSTP-TV/AM/FM. Their goal

is to keep the emphasis on news by supplying their news staff with "an environment, equipment and talent" to insure that the commitment to news is maintained.

Consequently, KSTP-TV has established a news approach in the Twin City market that has gained national recognition not only for its news excellence, but also for its creative use of the ENG gear for unique programming. These efforts

*continued on page 44*



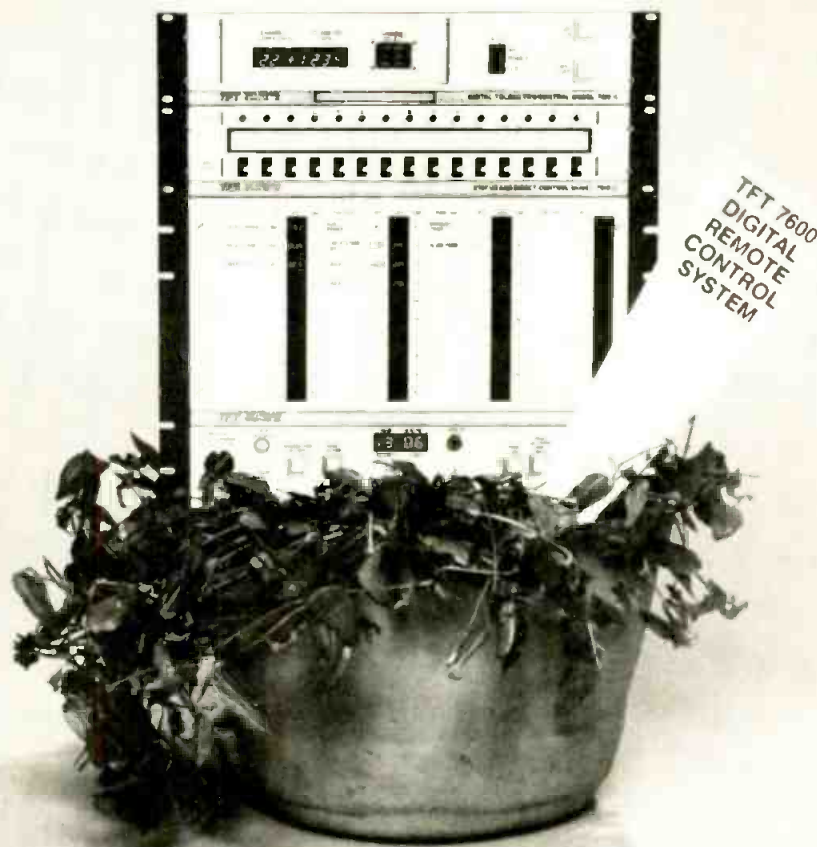
Consistent use of ENG is the key to an effective approach to the news. It's also an expensive investment if it's not in regular use.



KSTP's ENG action-cam team is shown here before a pro soccer game at Metropolitan Stadium.



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As with all TFT broadcast products, engineering excellence is the key to acceptance. That's why, in the 9 months since TFT 7600 was introduced, over 60 systems have been delivered and are now handling the remote control needs of every size radio and TV station throughout the country.

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Inside the van, Jim Biagi checks one of the cameras, while Al Kaplan makes last minute adjustments.



The specially designed master control console is the core of the communication system. More than 40 channels are covered, including communications with two-way equipped radio cars.

## ENG

*continued from page 42*

include all ENG news programming, (using both live ENG origination and ENG taped news stories), a ballet produced with ENG equipment, and several special local documentaries.

When Hubbard's son decided that the news staff needed more space to become a more effective department, he spared no expense and completely renovated the station at a cost of about \$2 million. The core of the renovation was a wing that connected the original

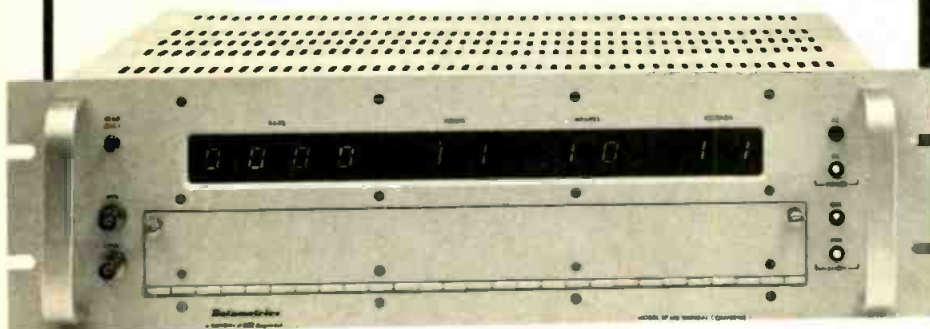
KSTP-TV building with an adjacent building.

The entire first floor, over 10,000 sq. ft., was assigned to the news department. It's beautifully decorated with wall-to-wall carpeting and is scientifically lit. All of the

*continued on page 46*

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This is one of KSTP's four editing rooms located along the perimeter of the newsroom.

Film is still a factor in covering the news. Here Gary Hill works on a triple reel convergence system developed for KSTP's setup.



## ENG

continued from page 44

equipment, most of which was specifically designed for the station, is positioned for the most efficient and maximum access by the staff.

Although the KSTP-TV newsroom has the openness associated with the city room image of major newspapers, the clatter and clutter is missing. Electric typewriters now occupy reporters desks, the teletype

machines are of the latest silent "X-Tel" variety, and the AP's new laser-style photo copier is within reach of the photo editor.

### The Dispatch Center

The functional core of the news center, from a communications standpoint, is the "Dispatch Center" featuring a specially designed

Motorola console which operates on four separate channel frequencies. Three units operate on 160 MHz and one on 450 MHz for instant communication with the ENG crews in the field.

The Dispatch Center controls all the taping of news. From the Center, stories are distributed to

continued on page 54

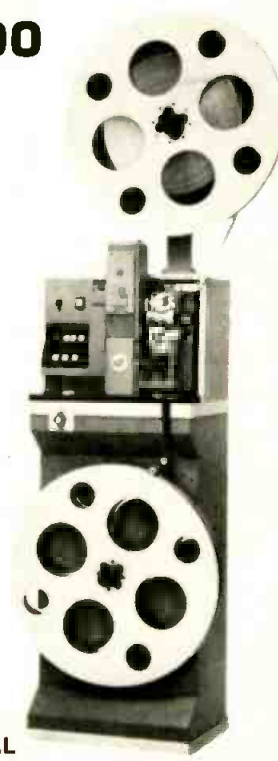
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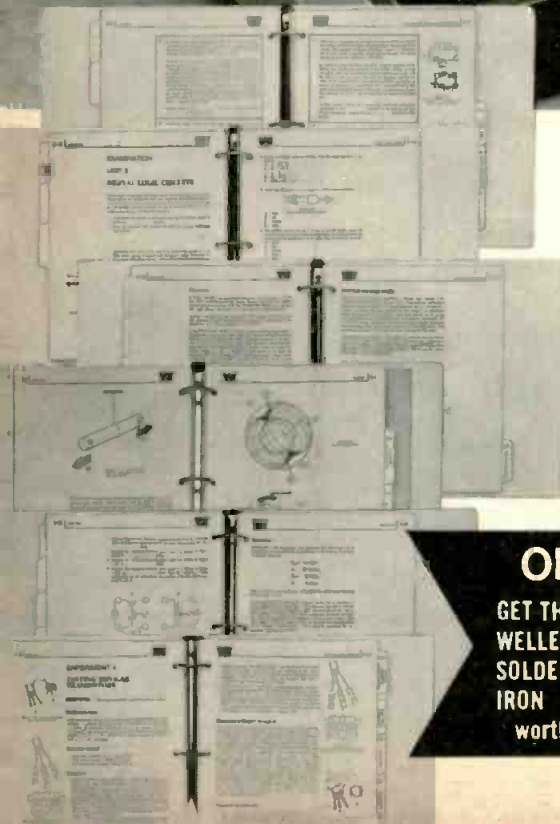
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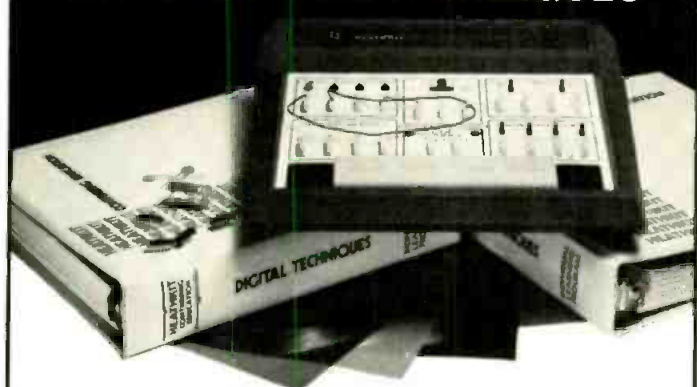
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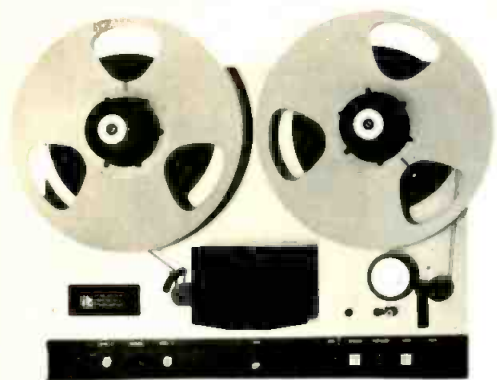
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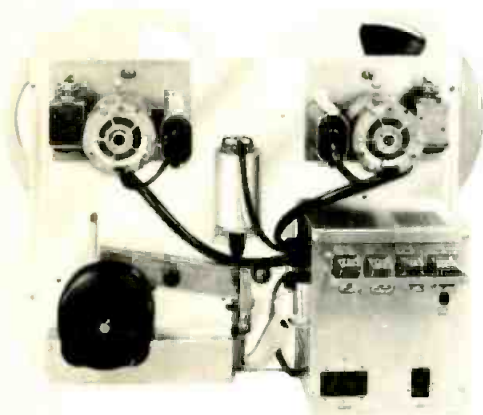
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## ENG

continued from page 46

one of four editing rooms, located along the side of the city room, for processing and story selection. The editing rooms are equipped with two 2850 Sonys for instant editing via a triple-reel system that is much faster than normal editing systems. Each of the areas has an announce booth with audio that is tied to the overall communications system. The booth is also used for adding on audio portions to the tape.

The Center also monitors over 40 separate channels; police, fire, public service and others, and is equipped with a scrambler for private communications with the 40 separate two-way systems in news staff and management cars.

KSTP-TV news staffers also have at their disposal two aircraft. An F-27 is used for stories outside the Metropolitan area and their helicopter can be summoned for instant use for coverage of fast-breaking stories.

### Mercedes Mobile Units?

The cars utilized by the news staff are probably the most unique ENG equipped mobile units in the country. In addition to the remote mobile van, which is completely equipped to originate live remotes via microwave, the station boasts three Mercedes-Benz limousines. Each of them carries a two-man ENG crew equipped with a mini-cam ENG camera and a tape recorder for instant editing.

The Mercedes-Benz' were bought by the elder Hubbard for several reasons. Being diesel driven they consume less fuel, they're easier to maintain in cold weather (a major factor in Minnesota), and they can

be driven over rougher terrain than American cars with a far smoother ride. And, as Hubbard puts it, "They're great public relations assets for our news staff. What other news staff drives around in a Mercedes-Benz?"

In addition, the trade-in value and life expectancy of the Mercedes-Benz far exceeds that of American cars.

KSTP-TV's advocacy of the superiority of ENG cameras as overall news and general production equipment has been strong. Since the time they were first unveiled, the station has acquired several more portable cameras. All the other television stations in the Hubbard Broadcasting Company are now equipped with the latest in ENG gear.

Hubbard's dedication to the further use of the ENG cameras for news and feature programming was emphasized recently when Chief Engineer George Merrill ordered 10 new cameras, totalling over \$500,000 for the new equipment.

With the innumerable advances in signal processing and editing equipment, Merrill is continually searching for technical equipment which can be used to carry on the process of up-grading the signal that goes out over the air.

Where news is concerned, whether it's the collection, communication, distribution, programming or presentation, the policy of the Hubbards has always been, "Spare no Expense" and over the years the reputation of KSTP-TV has grown in its excellence in news programming and has gained national recognition. □

### Editor's Note:

*Effective use of ENG implies a commitment. If stations look upon ENG equipment as effective only for coverage of hot, late-breaking news stories, the image of local news will suffer. Most stations are still running their news right off the news set. This approach boxes-in the news, cutting off the extra dimension film and ENG offer.*

*And it doesn't change the image to get out occasionally. That only tells the viewer that you can do it. Then he wonders why you don't do it more often. Doing it more often makes you different, creating an image of real interest in the local news.*

*The tough part of a commitment to ENG is that its use must be consistent.*

**Ron Merrell**



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# PROFANITY is no problem for WTIC

By Michael Russell, Engineering Supervisor, WTIC-AM-FM, Hartford, Conn.



WTIC's talk show studio incorporates a custom telephone system for handling incoming calls. The Marc Howard Show, shown in progress, uses a profanity fill setup in the control room.



The WTIC talk show setup includes a delay system in the control room. The system delays all program material for eight seconds, and allows either control room personnel or talent to edit air material.

When the decision was made at WTIC to change over our 6:20 p.m. to 6 a.m. programming to a telephone talk show format, we were faced with the need to purchase or develop the most efficient equipment to do the job. We knew that we would be using one studio for most of the on-air work and that we'd have to solve the problem of getting in and out of delay without any loss of air time.

Our first task was to look at other telephone talk shows. We considered every aspect of the show, including engineering, production, and talent. We also drew heavily on our own experience of doing a telephone talk show. After all, we had been running one ourselves for 20 years.

#### From our observations, several criteria arose:

1. We would have to develop, along with our local telephone company, an entirely new telephone assembly capable of conferencing several lines together.
2. We would have to delay the programming with a delay cartridge machine, instead of our present system of two reel-to-reel machines.
3. A cartridge system would have to be developed that would not leave dead air as we went in and out of delay.
4. A system would have to be developed that would automatically start and sequence all these machines with one-button operation.
5. A system of profanity editing would have to be developed that would be foolproof.

#### Telephone system

The concept of our telephone system is based on one developed at WCAU-Philadelphia by Chief Engineer  
*continued on page 60*



# MARTI

**Gives You Radio  
ENG Power**

## PORTABLE BROADCAST REMOTE PICKUP TRANSMITTER

Model RPT-1 Series



**FEATURES:** • Portable operation on internal rechargeable nickel-cadmium battery. Total weight only 5¼ lbs. • All Solid-State • Built-in battery charger • Dual frequency operation (One crystal included) • Meter indicates battery condition and modulation • Whip antenna mounted directly on unit • Broadcast-quality Compressor/Limiter handles toughest remote pickup conditions • Two microphone inputs (one push-to-talk) and one Hi-Level input each with individual mixing gain control

## MOBILE RELAY RECEIVERS

Models RR-30/150  
RR-50/450

Transforms a mobile RPU transmitter into an automatic relay station

## REMOTE PICKUP

150 - 450 MHZ



RPU Transmitter

RPT-40 (150 MHZ)  
RPT-25 (450 MHZ)

**FEATURES:** • All Solid-State • Direct FM Modulator • Broadcast Quality — Continuous Duty • Four Audio Mixing Channels • Plug-in Modular Construction • Taut Band Meters.

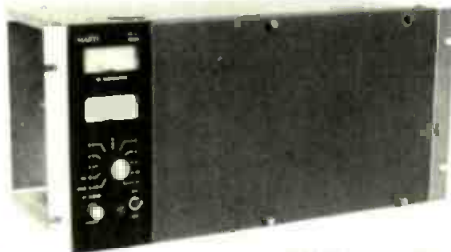
## Also...

- Automatic Repeaters
- Base Stations
- Complete System Packages Including Antennas

## Broadcasters

GET UN-HOOKED FROM  
THE TELEPHONE COMPANY  
— PROVIDE YOUR OWN  
"PROGRAM LINES" WITH

# MARTI STL



STL-8 Transmitter

## FEATURES

- All Solid State
- Direct FM Modulator
- Modular Construction
- Test Meter Built in
- Proven Reliability in hundreds of installations
- Unsurpassed for Dual Channel Stereo STL, Single Channel AM STL or Inter City Relay

## SPECIFICATIONS - STEREO

Stereo Cross Talk ..... —65 DB  
Noise ..... —65 DB or less  
Response ..... ±0.5 DB 30-15000 Hz.  
Distortion ..... Less than 0.5%

## PRICES

Dual Channel Stereo ..... \$4,160.00  
Single Channel ..... \$2,290.00  
Cost of Antenna Systems not included.

## STL-8 ACCESSORIES

RMC-20 Digital Remote Control  
ST-10/SR-10 Digital Status/Alarm  
RMC-2AX Analog Remote Control  
SCG-8 SubCarrier Generator  
SCR-8 SubCarrier Receiver  
ASO-8A Automatic Transmitter Switcher  
ASO-200A Automatic Receiver Switcher  
CLA-40A Compressor/Limiter  
HRC-8A Transmitter Combiner  
Complete Antenna Systems

# MARTI RMC-20

## DIGITAL REMOTE CONTROL



RMC-20S  
Studio Unit



RMC-20T  
Transmitter Unit



RY-5T  
Relay Control Panel

**FEATURES:** Fully Digital Command and Telemetry (FSK) • Single Push-Button Channel Select • Telemetry Accuracy 0.1% for Directional Antenna Monitoring. RMC-20S Does Not Require Operator to Calibrate Each Time Data Taken • Channel Capacity 5, 10, 15 or 20 Channels • 10 Amp 120 VAC 5 Amp 240 VAC UL Recognized Relays • Test Meters Built-In for Setting Levels and Test. • Quartz Clock Synchronized • Radio Link or Wire Line Operation • Large Digital LED Readout at BOTH Studio and Remote Unit • Decimal Point Location Can Be Selected for Each Channel.

Who builds a simple, effective, reliable, versatile, reasonably priced compressor/limiter with thousands of satisfied users in the AM-FM-TV and Recording industries?

# MARTI



CLA-40 Compressor/Limiter

## USER SELECTED OPTIONS:

- Symmetrical or Asymmetrical Peak Limiting.
- Pre-Emphasized or Flat Response.
- Selection of Compress/Limit, Compress Only, or Compress Off (For Proof of Performance).
- Release Time (3' Ranges).
- Meter Switch Selects Gain Reduction or Output Level.

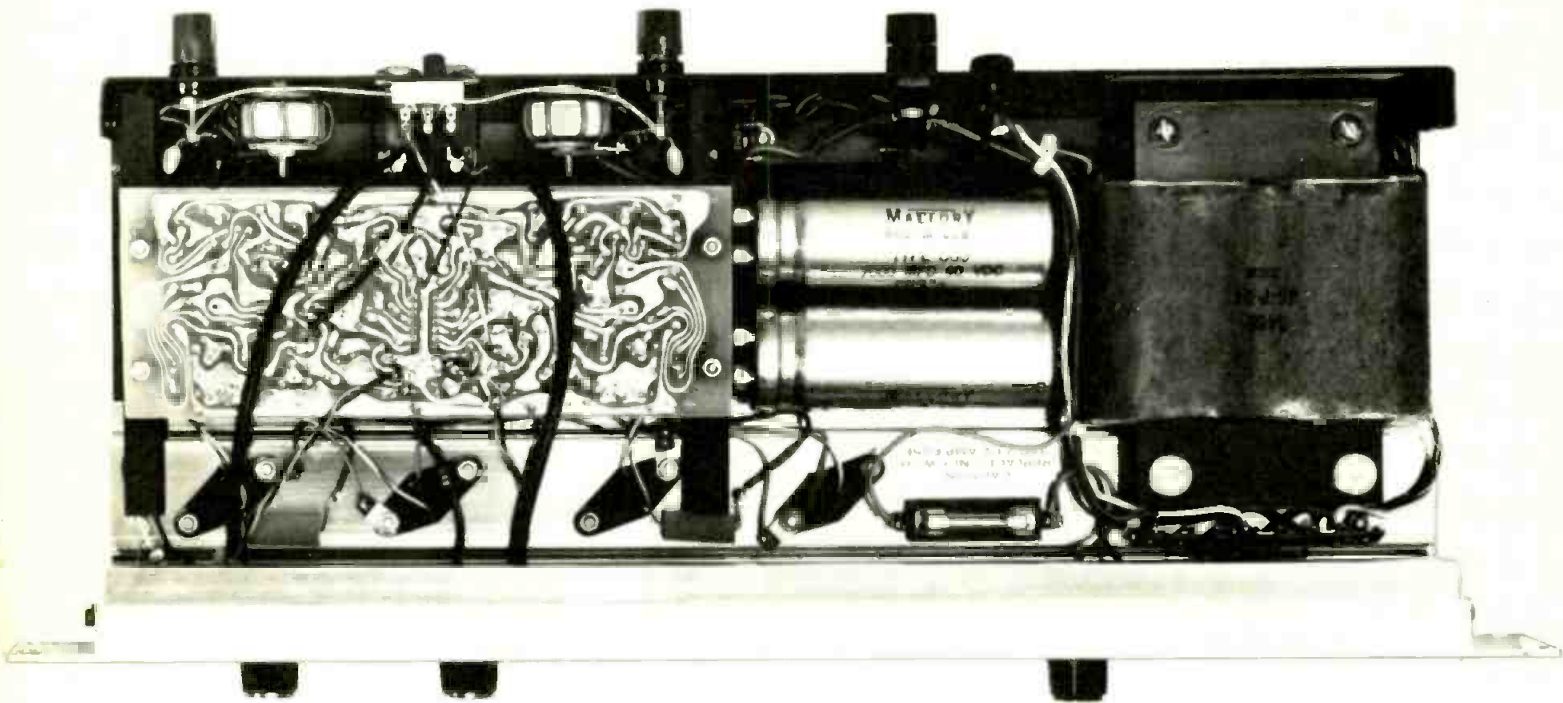
Construction is modular and all solid state. Two units may be ordered matched for stereo.

\$445.00 Each

# MARTI Electronics, Inc.

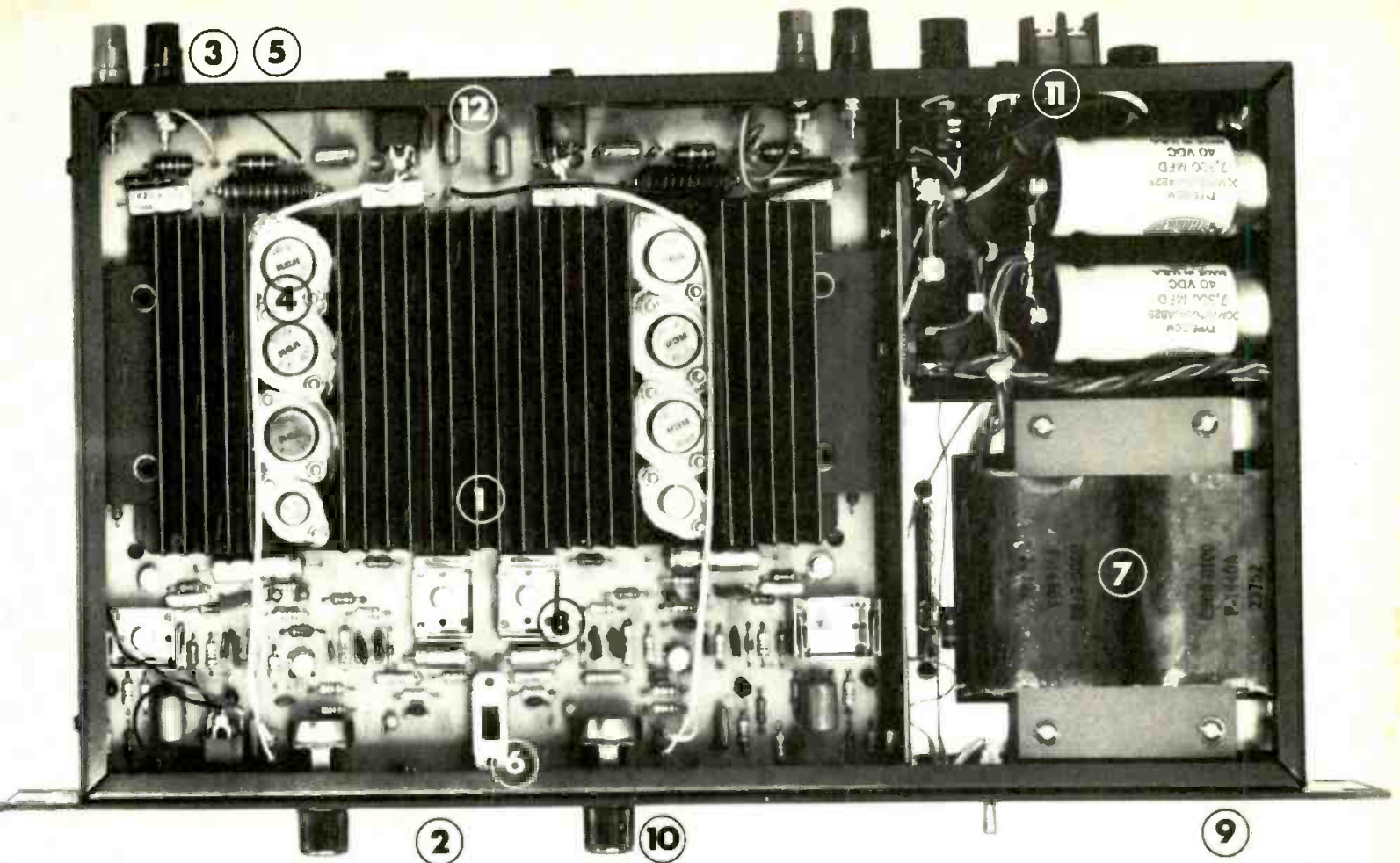
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817/645-9163

For More Details Circle (56) on Reply Card



**WHICH ONE**





# IS THE BGW?

Theirs and ours. Brand C and the BGW. We thought it was about time to give the whole story—in one glance. Here are twelve good reasons why you should demand a BGW for your next amp. It's obvious, isn't it!

1. A massive heat sink assembly—330 square inches,—modular.
2. L.E.D. front-panel clipping indicators (driven by a sophisticated one-shot circuit, they are turned on to full brilliance if the amplifier is clipped).
3. Sonically superior performance—virtually unmeasurable Transient Intermodulation Distortion.
4. Unlimited output stage design; no form of output limiting is required.

5. Extremely stable output which delivers 30 watts minimum average continuous power per channel, with I.M. distortion less than 0.01% to rated output.
6. Instantly convertible normal dual channel operation to bridged mono mode (80 watts, I.M. distortion less than 0.01%).
7. Fully shielded power supply for noise improvement: Hum and noise level—better than 106dB below rated output into 8 ohms.
8. Teflon insulated harness wiring, modular epoxy glass circuit board for ease of servicing, hermetically sealed metal can transistors in all signal handling circuitry, and 5% tolerance precision resistors.
9. 16 gauge welded steel packaging.

10. Individual channel gain controls.
11. Both chassis and circuit grounding available at rear panel barrier strip—eliminates troublesome ground-loop problems.
12. Professional Cannon-type input connectors and provisions for plug-in input matching transformers available (order option Model 100-01).

Take a close look. And don't be surprised if you never again see the inside of the above amp. It's the Model 100 from BGW—just one in a full line of proven amplifiers built for the professional.

THE PROFESSIONAL'S  
CHOICE





## Cart machines

continued from page 56

neer Jack Miller, with help from Bell Telephone of Pennsylvania. They designed a system that would conference up to five lines at one time. Working with our Southern New England Telephone Company, we adapted this system to our needs.

The conferencing operation takes place in the studio without the assistance of an outside operator. An important feature of the system is the use of a telephone speaker phone system, but not in the conventional manner. Through a telephone repeat coil, we feed the studio microphones into the speaker phone transmitter. This assures that everyone in the studio who is on mic also will be heard by the telephone caller. This direct feed also eliminates the hollow "barney sound" that is commonly associated with speaker phones.

The great advantage of the speaker phone is its AGC action and sidetone nulling. Our audio for on-the-air use comes through a telephone repeat coil from the speaker phone. This assures good, clean audio with AGC, with sidetone nulling, and also assures that the audio heard by the

audience is the same that is heard by the announcer.

We further improved the telephone audio quality by processing it through a graphic equalizer. This allows us to shape the audio response of the call and make it more intelligible. We greatly attenuate frequencies above 3 kHz, since there is little available voice information in this range. We add 3 to 5 dB gain to frequencies from 300 Hz to about 2 kHz. By switching the equalizer in and out, you can readily appreciate its value as an audio processing tool.

The next step is to take the equalized audio and process it through a limiter. This gives us an additional level control before the audio reaches the console. We limit the average call from 5 to 7 dB. This gives us some additional gain on weak calls. On a strong local call, we can limit up to 20 dB. When the speaker phone AGC reaches the end of its effective range, the limiter takes over. With this arrangement, the engineer has to make very few gain adjustments throughout the course of the show

and has more time to concentrate on other matters, such as commercial breaks.

### Delay system

We have been doing a telephone talk show for 20 years and we have been delaying the programming by four seconds with two Ampex 351s. This system worked fine. However, when we decided to do this show continuously for almost 12 hours a day, the system became a little impractical. The choice was clear: We would use a delay cartridge system.

We chose a delay machine built by UMC's Beucart Division. We worked closely with Beucart and developed a new delay machine using a Beucart® Type 20 machine. With on-the-air quality paramount, we decided upon full track record/playback and erase. This system gives maximum signal-to-noise ratio and maximum erasure.

### Profanity fill system

What makes our delay system unique is the use of secondary and  
*continued on page 62*

## Micro-Perfect Film Cleaner/Conditioner LIPSNER-SMITH CF200

- Smaller in size
- Smaller in price
- Same capacity as larger units

**NEW!**

Nothing touches your film except filtered air and cleaning/conditioning liquid

Academy Award Winner

**WORLD'S SAFEST SYSTEM**



The Lipsner-Smith System In Use By:

ABC, WABC-TV, KGO-TV, MCA-TV, NBC, WDXR-TV, WFLA-TV, WOR-TV, WPIX-TV, WXYZ-TV, WTOP-TV, KTTV-TV, WMAR-TV, United Artists TV.

This is the same CF2 micro-perfect cleaning/conditioning method used by leading television stations, motion picture studios and labs in 60 countries. Now offered in a new, slightly smaller model at 40% less cost. From ultrasonic bath to the patented non-evaporative drying system, nothing but air and liquid touch your film. Lipsner-Smith cleaning improves sound as well as picture quality.

Send for free full-color specification brochure today.



**LIPSNER-SMITH CORPORATION**  
4700 Chase, Lincolnwood, Illinois 60646  
312/675-8473; 800/323-7520 (Toll-Free)

## TV 120



**NEW!**

The First Film Care Machine Specially Designed For Television's Demanding Uses

Now there's a proven way to help eliminate make-goods and improve on-air film quality. The model TV 120 Film Inspection/Cleaning Machine with Previewing and Editing Capabilities gives you all this and more!

High speed inspection (up to 1600 FPM) lets you find film defects easily before air time! Find edgeouts, bad perforations, poor splices and Cue Tabs. Cleans away surface dirt for top quality image and audio when film is aired. Easy film editing with large 40-sq. inch PREVIEWER screen for sharp picture quality, clear sound; choose sound speed or variable edit 0-400 FPM. Digital, sprocketless film counter for accurate film timing and editing, preset function allows automatic stopping.



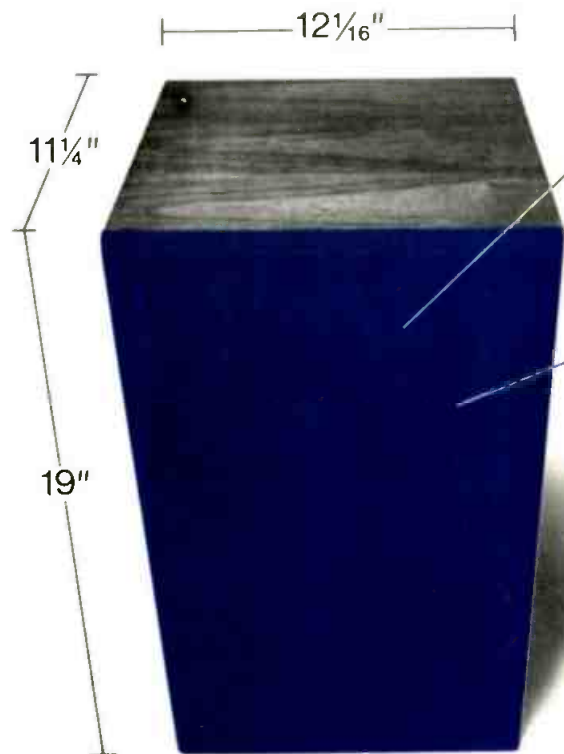
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# Now there's a JBL monitor specially designed for broadcast studios.



Fits on EIA Standard Rack shelf.

Does your monitor tell you about turntable rumble and ambient noise (like your air conditioning) and tape hiss and cue tone leakage? The JBL 4301 will.

Our call letters. If you're tuned into the professional recording studio business, you know about JBL's studio monitors.

If you're the station engineer or the jock on duty, why should you be the last to know what sound you're putting out?

Listen to the JBL 4301. It's a compact that delivers wide band sound reproduction accuracy—the kind of accuracy your station is going to need to keep up with the new broadcast standards.

Among other good things, the 4301 has exceptional clarity, solid bass, open high frequency reproduction and a nice honest face.

If you'll fill out the coupon, we'll send you a lot more specs and the name of your nearest JBL Professional Products Dealer who would be very glad to set up a test listening at your convenience.



James B. Lansing Sound, Inc.  
Professional Products Division  
8500 Balboa Blvd., Northridge, Calif. 91329

I like what I hear so far. Tell me more.

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Title \_\_\_\_\_

Station \_\_\_\_\_

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

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## WILKINSON ELECTRONICS MANUFACTURES

10 WATT FM TRANSMITTERS\*  
100 WATT FM TRANSMITTERS\*  
250 WATT FM TRANSMITTERS\*  
500 WATT FM TRANSMITTERS\*  
1 KW FM TRANSMITTERS\*  
1.5 KW FM TRANSMITTERS\*  
2.0 KW FM TRANSMITTERS\*  
4 KW FM TRANSMITTERS\*  
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7.5 KW FM TRANSMITTERS  
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20 KW FM TRANSMITTERS  
25 KW FM TRANSMITTERS  
50 KW FM TRANSMITTERS  
FM LINK TRANSMITTERS\*  
FM RELAY RECEIVERS\*  
STEREO & SCA GENERATORS\*  
STEREO CONSOLES\*  
1 KW AM TRANSMITTERS  
5 KW AM TRANSMITTERS  
10 KW AM TRANSMITTERS  
20 KW AM TRANSMITTERS  
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AM MODULATION MONITORS\*  
AM RF AMPLIFIERS\*  
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TURNTABLE PREAMPLIFIERS\*  
MONITORING AMPLIFIERS\*  
REMOTE AMPLIFIERS\*  
DISTRIBUTION AMPLIFIERS\*  
LINE AMPLIFIERS\*  
LIGHTNING PROTECTORS\*  
SILICON RECTIFIER STACKS\*  
AIR COOLED DUMMY LOADS -  
15-25-50-80 KW-To UHF

\* All Solid State

## WILKINSON ELECTRONICS, INC.

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CHESTER, PA. 19013  
(215) 497-5100  
TWX 510 669 3188

## Cart machines

continued from page 60

tertiary cues in the fill cartridge machine. In other words, the "fill cartridge" machine is used to present prerecorded audio on the air when the studio is going into the delay mode. This eliminates dead air and gives smooth transitions from real-time audio to delayed audio.

The first function of the "fill cart machine" for each hour is promo fill. This consists of a prerecorded announcement telling listeners to stay tuned for a certain show. This cartridge is encoded with two additional cues. A tertiary cue is used to achieve a cue light and sound a "Sonolert." This lasts about 1/2 second, signaling the engineer to start the show. There is no guesswork as to how much to "lead" the promo fill, as the promo fill tells you when to go. The tertiary cue is always eight seconds before the end of the audio. The secondary cue is always placed at the end of the fill promo audio. This tone is used to switch the studio output line from the fill machine to the output of the delay machine.

The fill cartridge machine also serves as the profanity fill machine. As soon as the opening promo fill cartridge has recycled, the producer changes cartridges in the fill cartridge machine. This "profanity fill" cartridge will remain in the machine on a stand-by basis until the end of each hour.

We use two systems for profanity editing. The first system consists of lifting the audio output of the studio for as long as the "spot edit" button is depressed. This is ideal for deleting a person's name, commercial mention, or an occasional mild profanity that might be uttered by a guest. The other system consists of dumping out of the delay mode as soon as the "profanity dump" button is depressed. This assures complete certainty of catching a profanity, since the audio is dumped as soon as the button is pressed. This can be activated by the producer, engineer, or announcer.

As soon as the profanity dump button is activated, a warbling Sonolert goes off. This allows activation of the system even though someone may not catch the word.

Again, the tertiary and secondary tones come into play. The tertiary cue tone sounds eight seconds before the end of the profanity fill, allowing the announcer time to get rid of the call and compose himself.

The secondary cue tone is again used to switch the audio relays from the fill machine back to the delay machine. By using the cue tones, we can use any length of profanity fill.

On the more serious shows, the profanity fill audio consists of the telephone call-in numbers repeated several times. Other fills consist of short comic routines, lasting about 15 seconds.

### Simplified controls

In our quest for a telephone talk show system, we were faced with the task of building a complicated system that would be operated by nontechnical personnel. So, we built several automatic functions with automatic sequencing which are activated by a simple control. The producer in charge of the show has very few technical responsibilities. Once the delay machine has a tape inserted and the promo fill machine is loaded, the producer, engineer, or announcer need only to depress "delay start." Automatic devices take over from there.

By depressing the delay start button, the following takes place:

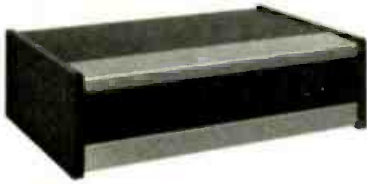
1. The studio output lines are put into the delay mode.
2. The delay machine record is "set."
3. The delay machine starts recording.
4. The fill cartridge is started with the audio output going to the studio output lines.
5. The tertiary tone on the fill cart tells when to start the program.
6. The secondary cue tone transfers the audio from the fill cart to the output of the delay machine. Now you are in delay with no loss of air time and a smooth program.

All of our machines are stereo units. These machines are used only in that mode on WTIC-FM. We feel that AM stereo will be here in four or five years; therefore, we are gearing towards the future. When we built new studios two years ago, we installed four new Harris Stereo 80 consoles in the three AM studios. We added four additional mixing positions, remote control, and other functions as well as mono mixdown. In the coming year, we will be putting approximately 3,000 records on cartridge on the AM side. These will obviously be recorded in stereo.

continued on page 64

For More Details Circle (61) on Reply Card





**DIGITAL CLOCK**  
ES 112/124 (\$139)

ES 112 (12 hr.) and ES 124 (24 hr.) are solid state, six digit clocks. Three simple controls make setting to the precise second easy. Fast Advance. Slow Advance. Hold. Can drive Jumbo Slaves.

Dimensions: 2 1/2" High x 8" Wide x 5-5/8" Deep  
Case: Etched Aluminum  
Electrical: 117V AC 50/60 Hz 10W max.  
Options: B C D J K L P O R S W

Do you need a contact closure one or more times during the hour? Many ESE clocks can be equipped to generate a time pulse. Contact factory for pricing.



**DIGITAL CLOCK THERMOMETER**  
ES 142/144 (\$241)

ES 142 (12 hr.) and ES 144 (24 hr.) are MOS, solid state digital clock/thermometers. Displays 6 digits of time (hours, minutes, seconds) and 3 digits of temperature (-50°F to +150°F or -45°C to +66°C) in planar, gas discharge displays. 55" high. Temperature sensor on 25 ft. cable included; attaches to rear-mounted connector.

ES 240 Digital thermometer is available as separate unit, calibrated for °F or °C.

Dimensions: 2 1/2" High x 10" Wide x 6" Deep  
Electrical: 12W max. 117V AC 60 Hz  
Options: B C D J K P R S W



**SIX DIGIT CLOCK TIMER**  
ES 500 (\$160)

ES 500 is a 12 hour clock or timer with 5 front-mounted controls: Start, Stop, Reset, Fast Advance, Slow Advance. Will run continuously to 12:59:59. Advances to 1:00:00 and continues as clock unless stopped or advanced. After use as a timer, time of day must be re-established. Can drive Jumbo Slaves.

Dimensions: 2 1/2" High x 8" Wide x 5-5/8" Deep  
Case: Etched Aluminum  
Electrical: 117V AC 60 Hz 12W max  
Options: B C D J K P O R S W



**CONSOLE MOUNT CLOCKS AND TIMERS, 70 SERIES**

All units have access to control inputs on rear-mounted connector. Displays are 3" red LEDs.

ES 172 Six Digit, 12 Hour Clock (\$134.00): Three setting controls—Fast Advance, Slow Advance, and Hold. Four line multiplexed BCD's present on the rear connector. Options are C, D, J, M and V.

ES 174 Six Digit, 24 Hour Clock (\$134.00): Otherwise identical to the ES 172.

ES 370 Four-Digit, One Hundred Minute Up/Down Timer (\$171.00): Six controls—Count Up, Count Down, Stop, Minutes Advance, Seconds Advance, Reset. Options are B, C, D, J, M and V.

ES 371 Up/Down Timer (\$267.00): Similar to the ES 370 except with Leverwheel Preset capability for faster setting of the desired time. Option D is an integral, separately mounted part of this unit. Options are C, J, and V.

Displays are 1" planar gas discharge.

ES 182 Six Digit, 12 Hour Clock (\$230.00): Three rear-mounted setting controls—Fast Advance, Slow Advance and Hold. Options are B, C, D, J, P, Q, R, S, and W. When option Q, panel mount, is specified digits will be separated by colons.

ES 184 Six Digit, 24 Hour Clock (\$230.00): Otherwise identical to the ES 182.

ES 380 Four Digit, 100 Minute Up/Down Timer (\$267.00): Displays minutes and seconds, with rear-mounted connector to allow remote wiring of six momentary SPST controls—Count Up, Count Down, Stop, Minutes Advance, Seconds Advance and Reset. Other features similar to ES 300. Options are B, C, D, J, N, P, Q, S, T, W, Y, and Z.

ES 381 Up/Down Timer (\$353.00): Similar to ES 380, except that leverwheel preset is used instead of pushbutton preset. Option D is supplied as part of this unit. Options are B, C, J, N, P, Q, S, T, W, Y, and Z.

ES 570 Four Digit, Sixty or 100 Minute Timer (\$134.00): Select 60 or 100 minute mode on rear connector. Start, Stop and Reset controls. Runs continuously unless stopped. Reset will return all displays to zero. Unit will run if reset while running or will stay at zero if reset when stopped. Options are B, C, D, J, M and V.

ES 572 Six Digit, 12 Hour Clock or Timer (\$160.00): Five controls—Start, Stop, Reset, Fast Advance, Slow Advance. Will run continuously to 12:59:59. Advances to 1:00:00 and continues as clock unless stopped or advanced. After use as a timer, time of day must be re-established using Fast Advance, Slow Advance and Stop Controls. Options are C, D, J, M and V.

ES 574 (\$160.00): A 24 hour version of ES 572.

Dimensions: 2.16" High x 4.5" Wide x 4.13" Deep  
Electrical: 117V AC, 60 Hz

ES 580 Four Digit, 60 Minute Timer (\$193.00): Displays minutes and seconds. Rear connector allows remote wiring of three momentary SPST controls—Start, Stop and Reset. Runs continuously unless stopped. Reset returns all displays to zero, and timer will continue to run from zero if reset while running. Options are B, C, D, J, P, Q, S, T, and W.

ES 582 Six Digit, 12 Hour Clock or Timer (\$267.00): Five control inputs (SPST momentary) brought to rear connector—Start, Stop, Reset, Fast Advance and Slow Advance. After use as a timer, time of day must be re-established using Fast Advance, Slow Advance and Stop controls. Options are B, C, D, J, P, Q, S, and W.

80 Series slaves are also compatible with other ESE clocks and timers: ES 112/124, 300, 301, 302, 400, 510, and 500.

Dimensions: 4.45" High x 10.38" Wide x 6.58" Deep  
Electrical: 117V AC, 60 Hz



**JUMBO CLOCKS AND TIMERS, 80 SERIES**



**ES 512/524 FOUR DIGIT CLOCK TIMER WITH MEMORY (\$200)**

Combination four digit 12 or 24 hour clock and 60 minute timer with memory, allowing the user to set the clock to the correct time of day, switch to timer mode, then switch back to time of day by pushing one button; time of day will be correctly displayed, in hours and minutes.

Electrical: 117V AC, 60 Hz, .8 watts Max.  
Mechanical: 8" Wide x 2-3/4" High x 5-5/8" Deep.  
Case: Etched Aluminum.  
Display: Four digits of .55" Planar Gas Discharge Display.  
Options: B, C, D, J, P, Q, R & W.



**THREE DIGIT 10 MINUTE TIMER ES 400 (\$105)**

The ES 400 has three controls—Start, Stop, Reset. Runs continuously unless stopped. Reset returns display to all zeros. Can be reset while running or stopped. If reset while running, timer will continue to run. Can drive Jumbo Slaves.

Dimensions: 2 1/2" High x 6" Wide x 5-5/8" Deep  
Case: Etched Aluminum  
Electrical: 117V AC 60 Hz 8W max.  
Options: B D J K P O R S T W



**FOUR DIGIT 60 MINUTE TIMER ES 510 (\$134)**

ES 510 is a four digit, sixty minute timer (59:59) with Start, Stop and Reset controls (Single pole, momentary, push-button). Runs continuously unless stopped. Reset returns display to all zeros. Can reset while running or stopped. Can drive Jumbo Slaves.

Dimensions: 2 1/2" High x 6" Wide x 5-5/8" Deep  
Case: Etched Aluminum  
Electrical: 117V AC 60 Hz 10W max.  
Options: B D J K P O R S T W



ES 300 (\$180)



ES 301 (\$198)



ES 302 (\$254)

**100 MINUTE UP/DOWN TIMERS**

ES 300 is a four digit, one hundred minute timer (99:59) with six controls: Count Up, Count Down, Stop, Minutes Advance, Seconds Advance, Reset. Controls are single pole, momentary, push-button switches. When "Stop" control is pressed the four digit display is held. Counting direction (up or down) can be changed or time can be reset to zero without stopping the count. It will continue to register elapsed time beyond the zero setting unless stopped. The ES 300 can drive Jumbo Slaves.

Dimensions: 2 1/2" High x 8" Wide x 5-5/8" Deep  
Electrical: 117V AC 60 Hz 10W max.  
Options: B D J K P O R S W Y Z

The ES-302 is similar to the ES 300, except that planar gas discharge displays are used in the ES 301-302. Display height is .55". All the ES 300 features are included in the ES 301. Additionally, with the ES 302, the user can preset times

much faster than with the ES 300 or ES 301, because lever-wheel type switches are used for the preset feature. The ES 301-302 can drive Jumbo Slaves.

Dimensions: ES 301: 2 1/2" High x 8" Wide x 6" Deep  
ES 302: 2 1/2" High x 10" Wide x 6" Deep  
Electrical: 117V AC 60 Hz, 7 W max  
Options: 301—B D J K N P O R S T W Y Z  
302—B D J K N P O R S T W Y Z

For More Details Circle (62) on Reply Card

# THINKING IKEGAMI? THINK CAMERA MART.

Because we're a full-service Ikegami Dealer.



At Camera Mart, we feature the entire line of Ikegami quality products. And we service what we sell—with our own in-house, factory-trained technicians and factory-approved facilities. The ENG package below is just one of the many we offer, so why not talk to us about your needs... or come in for a demonstration.

## CAMERA MART CUSTOM IKEGAMI PACKAGE

**The camera:** Ikegami's HL-77,\* completely self-contained. High-sensitivity color in a compact, light-weight three-Plumbicon\*\* package. All in a single low-profile 16mm-size

camera with eye-level CRT monitoring on take and playback, plus many more features you'll appreciate.

**The lens:** The Canon f/1.6 10-100mm zoom, for wider wide-angles and tighter tele's.

**The recorder:** Sony's easy-to-operate VO-3800—a 30-lb. package that gives you up to 20 minutes of NTSC color on a single U-Matic® cassette which can be edited on the 2850.

\*Also available with HL-35.

\*\*Plumbicon is a trademark of N.V. Philips

### OPTIONAL ACCESSORY: VIDEO CRASH CART™

Custom-designed to make production safer and smoother, with reduced set-up and strike time, easier transport and fatigue-free shooting. Sturdy, welded construction with 2-position handle lets you transport or operate in upright "handtruck" or horizontal "dolly" position. So it can go virtually anywhere your crew can go.

Holds camera backpack, recorder, AC adapter, cables—even extra cassettes.

### RENTAL-LEASE-PURCHASE:

Pick the terms that suit your budget (and tax situation) best.



# CAMERA MART

THE CAMERA MART, INC.

456 W. 55th Street, New York 10019 (212) 757-6977 Telex: 1-2078  
Sales • Service • Rental



For More Details Circle (63) on Reply Card

## Cart machines

continued from page 62

Sooner or later we'll probably go to all cartridge music on WTIC-FM. We feel that carting the music will give better and tighter control and will eliminate record wear out.

FM is a cluster medium, working in time blocks like an automation system. Commercials, promos, I.D.'s, weather, and so forth, are run in clusters with long, uninterrupted music segments between. Right now we have a six-machine multi-cart installation in our FM studio and, while four machines might have been enough, we wanted to make it as easy for the talent as possible. The Programming Department might, for instance, want a 10-second promo tacked onto a five-second I.D., tacked onto a 30-second commercial. Those extra slots save a lot of scurrying around, which sometimes leads to carts not being recycled. This is also a consideration in AM because all records are not the exact length of the cartridge. If the talent forgets to recycle a cart at the end of the recorded material, he may find himself with 20, 30, or 40 seconds of recue time facing him the next time he uses the cart, and there's nothing more embarrassing than a big silence. The availability of six independently operated slots helps to alleviate that problem. We're working on a six-slot system for our AM studios, too.

We're in the process of developing a small sequencer to help the talent sequence from cart to cart using the Beucart® secondary and tertiary tones. We'll use the tones much like an automation system to prearrange the breaks between cartridges by going from A to B, B to C, and so forth by pushing one switch. LEDs are used to indicate the presence of the trip tone and when the talent should come in live.

### Stereo phasing is everything

One of the prime requirements in FM is stereo phasing. Because there are so many mono sets out there, the mono listeners frequently get shortchanged when carts are slightly out of phase. We bought our new FM cart machines to replace the units which were 10 or 12 years old. Cartridge movement is a problem in good stereo phasing, and systems using a center hold-down can cause a bow in the cart, detrimentally affecting phasing.

All in all, we're very satisfied with the operation of this equipment and the reception to our talk show programming. □





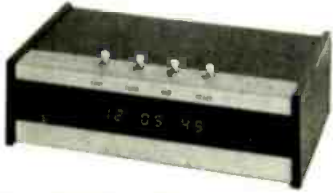
## PROGRAMMER/ COMPARATORS 750 SERIES

For flexibility and economy with up to ten events ESE has designed the 750 Series of Programmer/Comparators. Rugged thumb-wheel programmers coupled with an ESE clock or timer to provide single pole form A contact closure (1 Amp contact rating) for the length of time program matches display. All this on a 3 1/2" high 19" relay rack mounting panel. Power required: 117V AC 60 Hz; 220V AC 50 Hz may be specified.

If required control function involves a count other than timing, these products can be adapted to your needs.

### Thumbwheel Comparator Systems:

ES 750—ES 112 and one 6 Digit Program  
ES 751—ES 124 and one 6 Digit Program  
ES 752—ES 500 and one 6 Digit Program  
ES 753—ES 112 and two 4 Digit Programs  
ES 754—ES 124 and two 4 Digit Programs  
ES 755—ES 500 and two 4 Digit Programs  
ES 756—ES 510 and one 4 Digit Program  
ES 757—ES 300 and one 4 Digit Program  
ES 758—ES 510 and two 4 Digit Programs  
ES 759—ES 300 and two 4 Digit Programs



## ES 1296 (\$150)

For Off-Air taping, or operating tape recorders when nobody is there, ESE has created ES 1296.

ES 1296 is a six digit, twelve hour clock with LED displays and a programmable, 300 watt, 117V AC outlet on the rear.

Once the rear outlet is activated, it will remain on for 66 minutes, unless manually terminated, or an optional Record Duration switch is set to a different time interval. This Record Duration option allows the user to select one of four time intervals for recording. These four time intervals are either 16, 33, 66 and 138 minutes, or 33, 66, 138 and 250 minutes. Price \$25.00.

An additional option is Sequential Turn-on, for those machines that require Power, Play, Record in sequence, for proper operation. This option costs \$25.00.



## ES-251 (\$250)

ES 251 SMPTE Time Code Reader ES 251 is a six digit SMPTE Time Code Reader displaying Hours, Minutes and Seconds. Receives the standard SMPTE Time Code through rear mounted BNC connector, converts it into six digits of clock time. Source of the code is normally a SMPTE time code generator but the unit will read the time code directly from a tape machine running at playback speed. This unit produces an extremely accurate time of day display when driven from a time code generator which is locked to a color sub-carrier frequency. The momentary hold switch allows holding of time on display. Releasing hold switch updates display to correct time.

The input code is AC coupled to two stages of amplification and level shifting to obtain a ground reference. The input circuit requires between 1 and 20 volts peak to peak of input signal and presents an input impedance of 50 Kohm. ES 251 is a CMOS design which operates from a single power supply.  
Dimensions: Aluminum Case 2 3/4" High x 8" Wide x 5-5/8" Deep  
Electrical: 117V AC 50/60 Hz 6W Max.  
Options: BJPOW

ES 252 SMPTE Time Code Reader: Exactly like ES 251, but displays Minutes, Seconds and Frames.

# Perfect Timing



## MASTER CLOCKS

ES 160 (\$750.00): Mounted in a 5 1/4" relay rack panel and chassis, displays six digits of time information on large, easy to read .3" LED displays, in 12 or 24 hour format, as specified. ES 160 has its own internal timebase, with three second per month accuracy. Its standard output is serial BCD, CMOS compatible, and can drive 20 ES 161, 166, 168 or 171 Remote Displays without buffering. All inputs and outputs are through rear-mounted connectors.

Dimensions: 5 1/4" High x 19" Wide x 15" Deep

Electrical: 117V AC 50/60 Hz.

Options: B (CMOS Compatible), J, One PPS Output, Relay Closure on hour and half hour, Battery/Charger (ES 163) Impulse Driver (ES 162), External Timebase-1, 5 or 10 MHz.

ES 160/1 (\$900.00) One second per month version of ES 160

ES 190 (\$900.00) The ultimate in accuracy! A digital clock, similar to ES 160, with special circuits for receiving and decoding a 1000 Hz tone at the start of each minute. The decoder output resets the seconds' counters in the clock each minute except the first minute of every hour, when a 1500 Hz tone occurs. These tones are transmitted by Radio Station WWV, with an oscillator accuracy of  $\pm 1$  part in  $10^{11}$  ES 190 has an antenna and internal WWV receiver with audio-output. Its crystal timebase is accurate to  $\pm 1.7$  seconds per day, used when WWV is not received. A battery and charger (ES 163) is available to protect against power interruptions. Displays are .3" red LEDs. Serial output drives ES 161, 166, 168 or 171 Slaves.

Dimensions: 5 1/4" High x 19" Wide x 15" Deep

Electrical: 117V AC 50/60 Hz

Options: B (CMOS compatible), J, One PPS Output, Relay Closure on hour and 1/2 hour, Battery/Charger (ES 163)

ES 192/194 (\$275.00) The most economical Masters. ES 192 (12 Hr) and ES 194 (24 Hr) are constructed using ES 112 or ES 124 digital clocks and adding the ES 167 Serial Time Code Generator to provide the output needed to drive Remote Serial Displays ES 161, ES 166, ES 168 and ES 171. 60 Hz timebase is derived from the power line. Displays are .6" incandescent type.

Dimensions: 2 1/2" High x 8" Wide x 5-5/8" Deep.

Electrical: 117V AC 60 Hz

Options: BCDJLPQR, Time Pulse Outputs, Battery and Charger, Impulse Driver. Unit mounted on a 3 1/2" High panel when certain options are specified.

ES 196 (\$650.00): Time and Temperature Master—Basically the same as ES 192, with gas discharge displays, panel mounting and separate serial BCD outputs for time and temperature. Displays either 12 or 24 hours and °F or °C, as specified.

Dimensions: 3 1/2" High x 19" Wide x 8" Deep

Electrical: 117V AC 60 Hz

Options: BCDJR, Time Pulse Outputs, Battery/Charger.

## ACCESSORIES

ES 161 Remote Digital Display (\$140.00): Designed to function with any ESE Master Clock, decodes serial time data and displays six digits of clock time on large .55" Gas Discharge Displays, in either 12 or 24 hour format as specified.

Dimensions: 8" Wide x 2 1/2" High x 6" Deep.

Electrical: 117V AC 50/60 Hz.

Options: JPOW.

ES 162 Impulse Driver (\$170.00): Plugs into the ES 160 chassis, can drive 20 Impulse Clocks. Designed so that, if power fails, impulse always comes on with the same polarity when power is restored. Drives minute or second clocks as specified.

ES 163 Battery and Charger (\$140.00): Plugs into the ES 160 or ES 190 chassis. Fast charge, 12 hours continuous use. When operating on battery, displays are automatically blanked and may be viewed by actuating Display button on the front panel.

ES 164 Remote Digital Impulse Display (\$170.00): Similar to the ES 161 except that the ES 164 derives its count command from the ES 162 Impulse Driver, or any impulse clock drive circuits already installed. Choice of 12 or 24 hour display and available either as desk top unit or panel mounted.

Dimensions: 8" Wide x 2 1/2" High x 6" Deep.

Electrical: 117V AC 50/60 Hz.

Options: BJPOW.

ES 166 Jumbo 1" Clock Display (\$215.00): Features six digits of one inch high planar gas discharge displays in 12 or 24 hour format as specified. Receives serial time code input from any ESE Master Clock or serial time code generator.

Dimensions: 10 1/2" Wide x 4 1/2" High x 6 1/2" Deep.

Electrical: 117V AC 50/60 Hz.

Options: JPOW. If Q is ordered digits are separated by colons.

ES 167 Serial Time Code Generator (\$125.00): Offers a low cost answer to a master timing system. An integral part of ES 160, 190, 192/194 and 196 Master Clocks, this unit can be added to many other ESE products, including ES 112, 124, 182, 184, 500, 582, 750, 751, 752, 753, 754, 755, and all 780 Series Time Programmers. The ES 167 fits inside the case so that no extra space is needed. Drives 20 ES 161, 166, 168 or 171 Remote Displays. ES 167 provides CMOS compatible serial BCD output and operates from the logic supply voltage.

ES 168 Remote Electromagnetic Display (\$388.00): 4" HEIGHT! Used wherever large size at low cost is essential. Receives the serial time code from any ESE Master Clock, displays the time on four bright, yellow-green digits in 12 or 24 hour format as specified. Designed to mount on wall or ceiling. When time changes, audible "click" is heard.

Dimensions: 6" High x 16 1/2" Wide x 6" Deep.

Electrical: 117V AC 50/60 Hz.

Options: JW

ES 169 Temperature Slave (\$125.00) Receives serial BCD temperature code from ES 196, displays it on .55" Gas Discharge Displays.

Dimensions: 8" Wide x 2 1/2" High x 6" Deep.

Electrical: 117V AC 50/60 Hz.

Options: JPOW.

ES 171 Console Mount Display (\$134.00): Newest of the 70 series console mount clocks and timers. ES 171 receives the serial time code generated by any ESE Master Clock, or any ESE product containing the ES 167 serial time code generator, and displays it on bright red .3" LEDs.

Dimensions: 2 1/4" High x 4 1/2" Wide x 4" Deep.

Case: High Impact Black Plastic.

Electrical: 117V AC 50/60 Hz.

Options: JW.



## RAM TIME PROGRAMMERS 780 SERIES

The ES 780 Series Programmers provide 32 events (expandable to 96) in 5/8 inches of rack space. Ten minutes is all that is required to install, set the clock and program 32 events. Bright .3" LED displays and all controls are on the front panel, outputs and battery test are on the rear. ES 167 Serial Time Code Outputs can be specified as an option. Line frequency time base with backup crystal time base. 72 hour battery/battery charger are standard. External time base can be used. 60 Hz is preferred, others may require additional internal circuitry.

### Eight Digits of Programming Capability:

ES 780—10 Days, 10 Outputs, Hours, Minutes, Seconds

ES 781—100 Days, Hours, Minutes, Seconds

ES 782—16 Outputs, Hours, Minutes, Seconds

ES 783—Hours, Minutes, Seconds

ES 784—100 Days, Hours, Minutes

ES 785—100 Days, Minutes, Seconds

ES 786—16 Outputs, Hours, Minutes

ES 787—16 Outputs, Minutes, Seconds

ES 788—Hours, Minutes

ES 789—Minutes, Seconds

ES 782, 786, and 787 have 16 isolated outputs. Any of the 32 events can be programmed to activate any of the 16 outputs. ES 780 has 10 outputs. The other units have a single output.

ES 784, 786, and 788 have a one minute contact closure. The others have a one second contact closure.

Displays:

REAL TIME: An eight digit display when day selection is required as on the ES 781, 784, 785, seven digits for ES 780, and six digits for the others.

NEXT EVENT: A two digit display of next event number.

NEXT EVENT TIME: An eight digit display when ES 780, 781, or 782 is specified, a six digit display when ES 783, 784, 785, 786, or 787 is specified, and a four digit display when ES 788 or 789 is specified.

Dimensions: 5 1/4" high x 19" wide x 10" deep.

Weight: Approx. 20 lbs. varying with model number.

Front Panel: Brushed, etched, anodized aluminum.

## OPTIONS

Please Note: Some combinations of options are not compatible. Consult factory if in doubt.

B BCD Output

C Crystal Timebase: A  $\pm .002\%$  crystal is employed in an oscillator for those applications requiring independence from the power line frequency. Trimmer included for greater accuracy.

D Remote Connector, 6' Cable and Control Switch Set: This option consists of a rear-mounted connector wired for all control functions, a mating connector, wired to six feet of cable, the other end of which is connected to control switches which are mounted on a 1/8" anodized satin finish aluminum plate suitable for mounting on most surfaces.

L .55" Planar Gas Discharge Display

M Front-mounted pushbutton controls: available on 70 Series except for ES 371.

N Available on ES 301, 302, 380, 381. Provides a change in count direction from down to up at zero when the unit has been counting down from a preset time.

P 19" Front Panel, 3 1/2" high.

Q 9" Front Panel, 3 1/2" high.

R Remote Connector

S Slave/Remote Display: User must specify option B (BCD Output) on master when ordering a slave.

T Tenths of Seconds

V DC Operation (includes crystal timebase)

W Three Wire Cord

Y Relay Closure at Zero: Available on ES 300, 301, 302, 380 and 381 only.

Z Relay Contact Closure and Stop at Zero: Available on ES 300, 301, 302, 380 and 381 only.



505-1/2 Centinela Ave.  
Inglewood, CA 90302  
(213) 674-3021

For More Details Circle (64) on Reply Card



# “Live via satellite”

By Joe Roizen, TELEGEN

This caption superimposed on the lower half of a color television screen is so commonplace an occurrence in 1977 that it is hard to realize how young this technology really is.

A little over 30 years ago, in January of 1946, the U.S. Army Signal Corps using a modified SCR 271 radar succeeded in making

radar contact with our moon. They not only achieved a precise earth to lunar distance ( $384,402 \pm 1.5$  km), but also the distinction of generating the first useful round trip space signals.

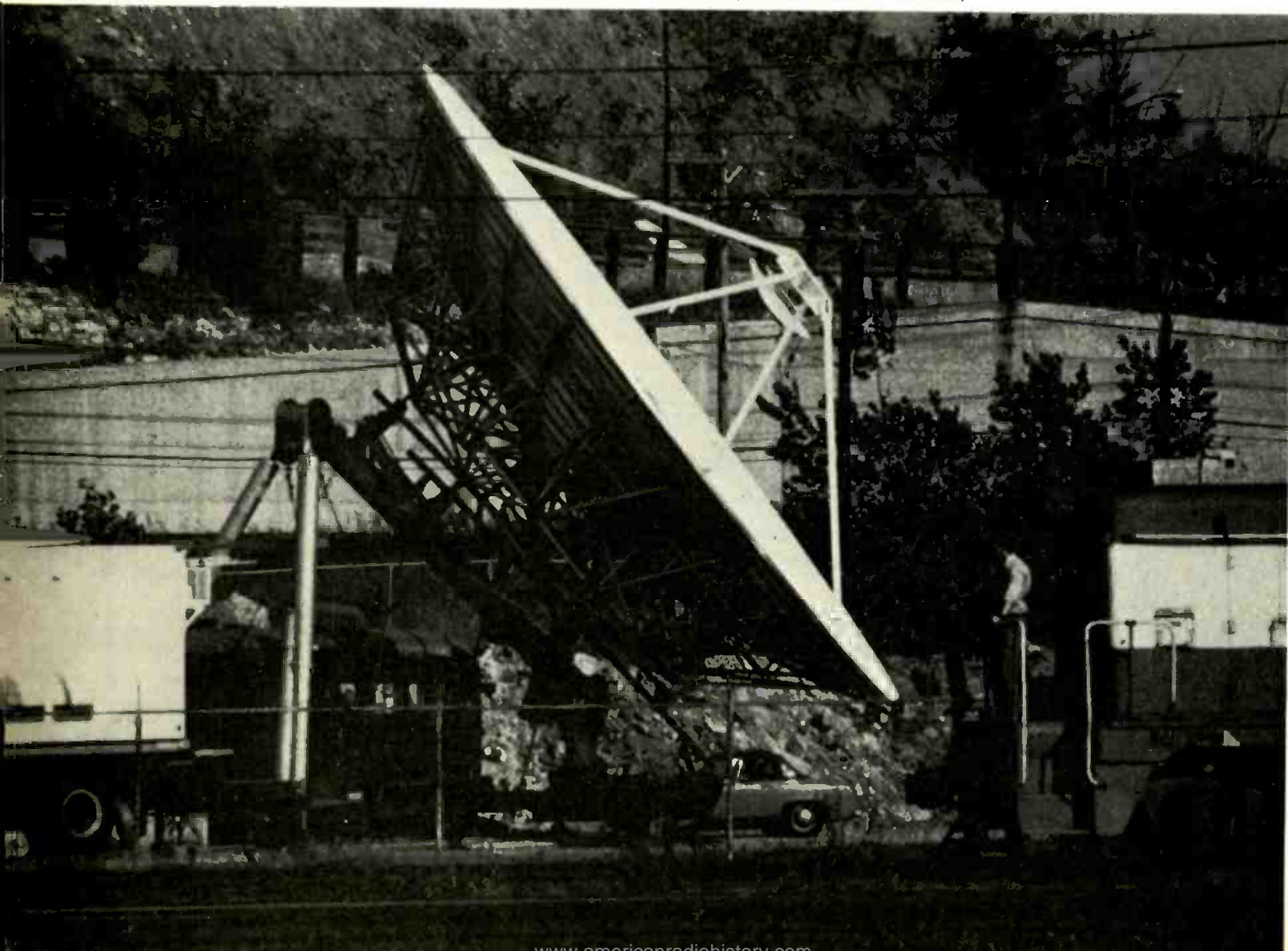
It took the intermittent bleep of the Soviet Union's first orbital space vehicle, Sputnik I, launched just twenty years ago (October 4, 1957),

*continued on page 68*



Three antennas atop the Intelsat IV-A communications satellite are designed to give the satellite two-thirds more channel capacity than its sister spacecraft, the Intelsat IV, by using a spot-beam technique. The satellite is being inspected by an engineer of Hughes Aircraft Company, designers of the antenna.

This Westar mobile earth station was used during the 1976 Republican National Convention in Kansas City to relay television coverage to Europe. (Photo by Donna Foster Roizen)





**First Hitachi developed the revolutionary Saticon tube. Then Hitachi designed the perfect camera for it...**



## The new portable **HITACHI SK-80**

The remarkable new SK-80 has three superior  $\frac{2}{3}$ " Saticons at its heart, for unexcelled image and color fidelity. Hitachi's sophisticated electronics coupled with the high resolution capability of the Saticon set a new high level of performance for a portable EFP camera under the most demanding conditions.

Moreover, the SK-80 feels and handles like a true portable should. And its 2-hour battery belt with 1-hour charge time assures you of adequate power for continuous long-term shooting when you're on location. The standard C-mount and optional Arri adapters give you the added versatility of selecting the exact lens that fits your shooting requirements.

But performance is only half the SK-80 story. A special training tape on videocassette is available with complete camera set-up and maintenance instructions, to help you keep your SK-80 making its excellent pictures. Beyond this, our six Hitachi regional offices are all staffed with qualified engineers and fully stocked with parts. They stand ready to back up our vast national network of servicing dealers.

We urge you to check out the performance features of the SK-80, as well as its low price, before specifying any other camera. Arrange a demonstration with your local Hitachi dealer or call the Hitachi regional office nearest you.



**HITACHI**  
Hitachi Denshi America, Ltd.  
FORMERLY HITACHI SHIBADEN CORP OF AMERICA

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For More Details Circle (65) on Reply Card

## "Live via satellite"

continued from page 66

to accelerate experimental work in the United States and elsewhere on long-range transmission of radio signals via passive or active devices in space.

By 1960 transcontinental signals were relayed by huge reflective balloons 100 and 135 feet in diameter. Made of an aluminum-coated thin plastic and launched into orbits above 600 miles up, the balloons were appropriately named Echo I and II.

Although the two Echoes proved they could reflect radio and television signals between stations thousands of miles apart, the attenuation was too great and they confirmed the need for active satellites in practical space communications. These were not long in coming.

Less than two years later (July 10, 1962) the first active repeater satellite with a transponder aboard was launched into an elliptical orbit between 600 and 3500 miles. This was Telstar I; solar-cell powered, spin stabilized and with a 157-minute orbital time, it provided a

15-20 minute transmission window between continents as it came into view of the stations on Earth.

Telstar I proved that both the Atlantic and Pacific Oceans could be spanned by color TV signals, and its successors brought the opening ceremonies of the Tokyo Olympics (1964) to North America in full color.

Not willing to give up completely on passive reflectors, NASA launched project Westford in 1963. This far-out idea, which actually did provide a space communication capability, consisted of 400 million individual copper wire dipoles that formed a signal reflecting grid in the stratosphere. However, passive systems were giving way to more sophisticated active repeaters.

It was evident by now that short of launching a series of Telstars every few degrees along the orbital path, no continuous TV programming could be carried. The answer to this dilemma was to place the communication satellite in an orbit that matches the rotational period of our planet, thus creating a geostationary position in relation to any spot on the Earth. The physics of our space mechanics dictated that this location must be on an equatorial plane, 22,300 miles above the surface of our own satellite, Earth.

In June 1965 the first such geosynchronous satellite, Intelsat I (Early Bird), was launched and placed above the Atlantic for U.S.-to-Europe TV relay services. It carried a lot of the early programs between continents including a "Town Meeting of the World" when President Eisenhower and Field Marshal Montgomery reminisced across a split screen.

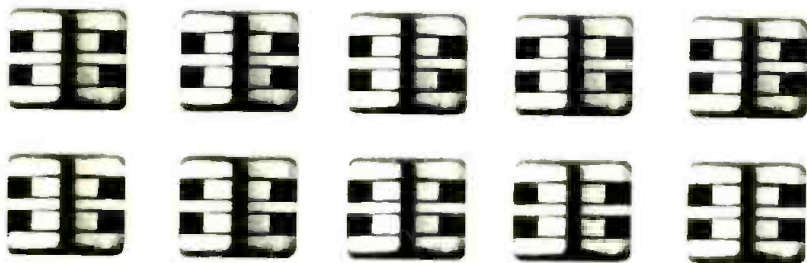
But Early Bird was a baby by modern satellite standards. It was barely two feet tall with a girth of 28.4 inches and an operational weight of 85 pounds. It carried 240 sound circuits or one TV channel; TV transmission required the relinquishing of the voice traffic. It did, however, exceed its designed life expectancy of 18 months by staying operational for more than 3½ years—not an insignificant factor since the spacecraft contractors (Hughes) collect substantial longevity bonuses during the active life of any satellite they build.

Early Bird and many of its Intelsat successors are now officially listed as "no longer in service." They have joined the growing list of space "junk" (including the Echoes) that float around the nether regions

continued on page 70



## Ten heads are *not* better than one When the one is Duracore™



### New From Nortronics

Whenever a magnetic head needs replacing, you're faced with recorder downtime, electronic adjustments and costly service calls. Now Nortronics introduces a way to reduce these profit-slicing problems... Duracore direct replacement heads.

Developed after several years of extensive research, Duracore is a mu-metal type material with **ten times** the lifespan of conventional mu-metal heads. Duracore heads replace conventional heads without requiring mechanical or electrical adjustments in your equipment, and their performance along the entire frequency range is identical to mu-metal.

To find out more about Duracore heads, contact your local Nortronics distributor. Available for all equipment formats, Duracore is the state of the art in magnetic tape heads.

Recorder Care Division



# NORTRONICS

Nortronics Company, Inc.  
8101 Tenth Ave. North, Minneapolis, Minn. 55427  
Telephone (612) 545-0401, Telex 290304

For More Details Circle (66) on Reply Card



# UNCOMPROMISING PERFORMANCE

## Aural Studio-Transmitter Links



PCL-505 Transmitter

All silicon solid-state circuitry and utilizing **direct FM**, Moseley aural studio-transmitter links offer uncompromised, dependable performance—a **Moseley tradition**. Micro-stripline techniques and true modular construction are but a few of the features typical of the advanced technology used in the **PCL-505** and **PCL-101** series STL systems.

For AM PCL-101 or PCL-505      For FM PCL-101 or PCL-505

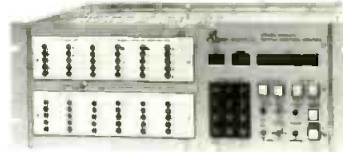
For FM Stereo

**DUAL STL**—Two monaural links conveying left and right audio.

**COMPOSITE STL**—Stereo on a single RF carrier—the PCL-505/C—a system pioneered by Moseley!

## Remote Control

### DIGITAL

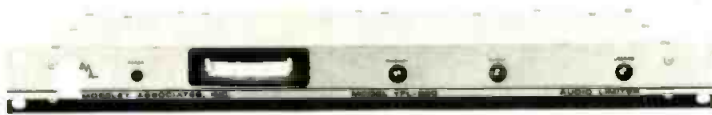


DCS-2A Control Terminal

Fully digital remote control of a remotely located transmitter plant is provided by the **DCS-2A Digital Control System**. Multiple transmitter site operation — a standard option. Command, telemetry, and status provided in groups of thirty channels. **Automatic parameter logging available.**

**Computer-assisted operation** of the DCS-2A is another standard option, and can provide **totally automated plant operation**. With CRT display, thirty telemetry or status channels are displayed simultaneously. Tolerances on all telemetry channels and logging are also provided.

The **Model DRS-1A Digital Remote System** provides telemetry, command and status capability at an affordable price. The system is available for operation over telephone or radio interconnecting facilities. Automatic logging is accommodated by the companion **Model DLS-1 Digital Logging System**.



Loudness and clarity without compromise... the Moseley Associates **TFL-280 Audio Limiter** precisely controls the modulation levels of FM and TV aural transmitters. FM monaural, stereo, quadraphonic, FM SCA, TV aural are all expertly processed. This frequency-conscious limiter cleanly solves the problems associated with the transmission of pre-emphasized audio, including the ringing (over-modulation) produced by low-pass audio filters.

## Audio Limiter



TCS-1 Command Terminal

Fully independent command and status reporting capability is

provided by the **Model TCS-1 Telecontrol System**. Applications for the TCS-1 include command and status (tally-back) from broadcast transmitters, electronic news-gathering or similar antenna systems, microwave transmitters and receivers, or remotely-located television cameras.

## ANALOG REMOTE CONTROL

Fifteen telemetry and 30 command functions are provided by the **TRC-15A Remote Control System** on telephone or radio interconnection circuits.

### OTHER MOSELEY PERFORMERS:

- Model SCG-9 Stereo Generator
- Model RPL-4A Remote Pickup Link
- Model RPL-3A Remote Pickup Link

- STL Accessories
- Remote Control Accessories
- Model SCG-8 Subcarrier Generator
- Model SCD-8 Subcarrier Demodulator

SANTA BARBARA RESEARCH PARK, 111 CASTILIAN DRIVE, GOLETA, CALIFORNIA 93017  
(805) 968-9621      TELEX: 658448      CABLE: MOSELEY

# FROM MOSELEY ASSOCIATES, INC.

## "Live via satellite"

*continued from page 68*

beyond our atmosphere. However, for all of its lack of sophistication, Early Bird laid the foundations for the global system of satellites and earth stations that now provide instant television contact among more than 90 countries around the world.

### Current Satellites

Most TV communication services are presently supplied by the Intelsat IV and IV A series of satellites

over the Atlantic, Pacific and Indian Oceans. Canada has its own satellites (Anik I, II, III), all positioned over the Pacific Ocean. In addition, there are now private satellites launched for RCA (Satcom I, II) and Western Union (Westar) that provide commercial services.

Intelsat IV A is a good example of the current status of reliable satellite construction and operation. It is over ten times as tall as Early Bird (275 inches) and weighted 22 times more at launch (3,340 pounds). It took an Atlas Centaur vehicle 133 feet tall and having a gross weight

of 163 tons to get Intelsat IV A into synchronous orbit. Where this satellite really shines is in its signal handling capacity. It can relay 12,500 voice circuits *plus* two TV channels. There are 20 transponders on board, each with a 36 MHz bandwidth. Mounted above the 111-inch height of solar panels are three dish antennas. Two of them are 53 inches in diameter and are used for transmission. The reception dish feeds two sets of horns and the internal circuit design is such that simultaneous reuse of the same frequencies is possible.

The Intelsat IV series is expected to provide seven years of continuous service and the first one, activated on March 26, 1971, is still operational, although in reserve. Signals transmitted up to the satellite are in the 5.9-6.4 GHz range and the down link is between 3.7 and 4.2 GHz.

### The Earth Stations

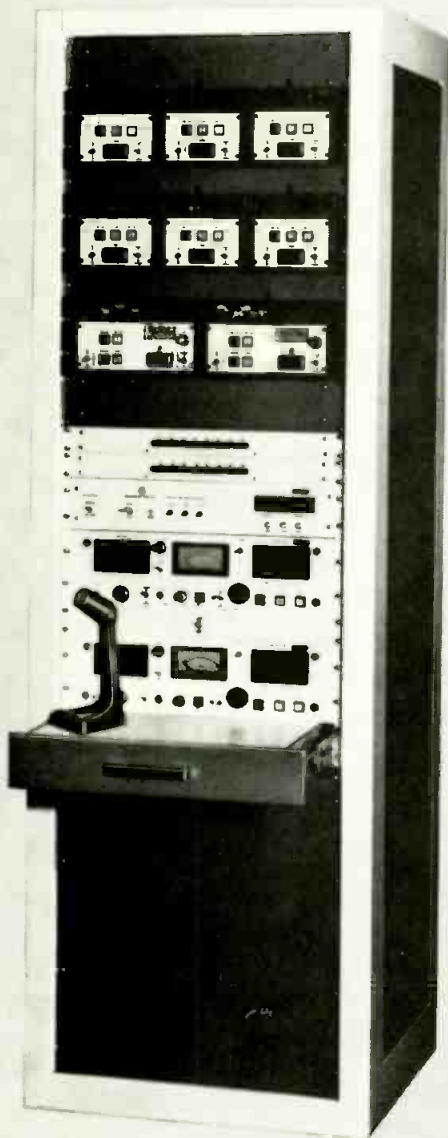
Current earth stations that connect the Intelsat countries with the communications satellites are in their fifth generation of antenna and associated circuitry design. The dish-shaped parabolic reflector concentrates the signals from space onto the antenna at the focal point. The whole structure, which is as tall as a twelve-story building, can be rotated on a 50-foot-diameter track. It is also servoed so that precision tracking down to two one-hundredths ( $2/100$ ) of a degree is possible. The diameter of the dish is 105 feet and the movable portion weighs 300 tons.

As satellite transmitters have increased in power and directivity, the need for such huge antenna structures is reduced. Many ground stations now use 36-foot (11-meter) parabolic dishes for reception from present day 4/6 GHz transponders on commercial satellites. The increase in signal strength at the antenna has also simplified the input amplifier. Present systems use gallium-arsenide field effect transistor (GaAsFET) in a redundant configuration to assure reliable reception.

The new Communications Technology Satellite (CTS), Hermes, launched in 1976 as a joint venture between Canada and the U.S., has a 200-watt transponder and makes possible the use of earth stations having a 15-foot dish (4.57 meters). Operating in the new band of 12-14 GHz, these dishes (Farinon STL) are steered about  $\pm 6$  degrees and are servoed to follow the figure-8 pattern the satellite forms in the

*continued on page 72*

# They chose AMPRO.



A lot of people depend on emergency weather broadcasts for their livelihood, and their lives.

So when the National Weather Service looked for cartridge equipment for their over 300 weather and emergency broadcasting stations, they needed top performance and proven reliability.

In other words, they chose Ampro.

Ampro Cartridge Equipment. Our engineering expertise gives you top performance, proven dependability. We can custom-design the system you need.



## AMPRO BROADCASTING INC.

850 PENNSYLVANIA BLVD., FEASTERVILLE, PA 19047 • (215) 322-5100  
Professional Equipment for Broadcasting Professionals

VISIT US AT BOOTHS 8-8-10; NRBA SHOW, NEW ORLEANS

For More Details Circle (82) on Reply Card



# Our tradition of excellence your decision for today M15A

Today's ever increasing quantity and complexity of Control Room equipment makes the concept of solid engineering and trouble-free performance more important than ever before. AEG-TELEFUNKEN, the developer of the world's first professional tape recorder, has been the leader for well over 35 years — longer than any other manufacturer in the field. Their engineers apply this experience and the excellent rapport they enjoy with their many demanding clients worldwide to make sure that today's magnetophon always reflects an optimum balance between objective quality, serviceability, human engineering and price.

Today we present the latest result of AEG-TELEFUNKEN's efforts: The new magnetophon 15A — based on the M 15 deck, proven in years of service throughout the world. The M15A — the master recorder for today and for tomorrow.

— new and more compact electronic assembly built into the deck itself features all-electronic timed switching, which permits electronic editing without modulation overlap on RECORD activation or the »hofs« usually experienced after STOP.



— electronic digital timer as standard equipment; a highly sophisticated »auto-locator« provides heretofore unheard of operating ease and time economy.  
— improved performance-to-price ratio makes AEG-TELEFUNKEN quality more affordable than ever before.  
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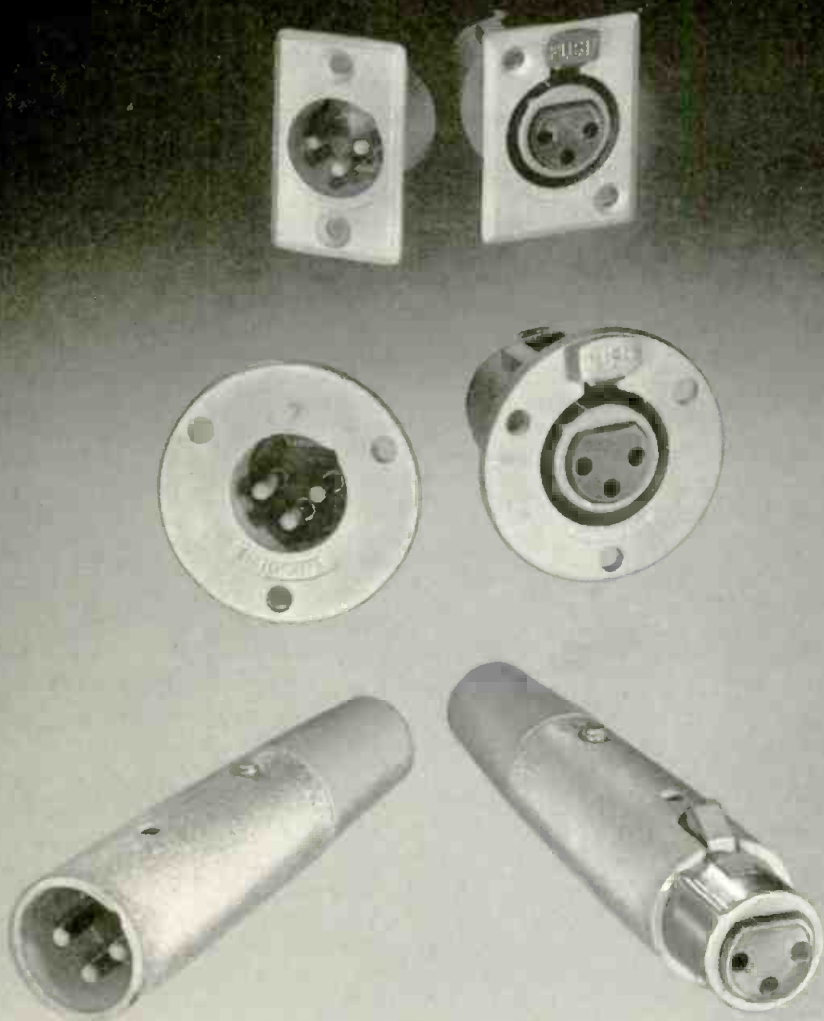


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All in all, the QGP audio connectors are unlikely to be surpassed in quality of performance or variety of features for some time to come. Of course the Switchcraft Quick-Ground Professionals carry a price tag commensurate with their position at the top.

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## "Live via satellite"

continued from page 70

stratosphere as its hydrazine motors correct its orbital position. This electro mechanical servo works on a self-seeking basis and is capable of maintaining a 1/10 degree pointing accuracy. It is actuated by 1.5 dB signal level drop-limits which are adequate for this type of operation. The result is a compact and relatively low-cost, receive-only earth station that can be used for many localized applications in smaller communities.

### The New Satellites

Already in orbit or about to be launched are a whole series of new satellites designed for very specialized applications. Using higher power outputs, narrow-beam antennas, three-axis pointing and better solar energy conversion, these satellites will usher in a new era of television signal availability in even the most remote areas. In addition, the reduced cost factor for earth stations will greatly expand utility of these systems in developing nations or lower budget industrial and educational applications.

The CTS satellite is already on line. From its 116° West longitudinal position on the equator, its footprint (as the coverage area is called) covers most of North America. Since it is a joint Canadian/American venture, its duty cycle will be on an alternate-day basis. CTS works at the newer super-high frequencies: the up link for received signals is between 14-14.3 GHz in two 85 MHz pass bands. The transmit frequency is in the 11.8-12.1 GHz region with similar bandwidths.

CTS is the most powerful satellite in use today. Its 200-watt travelling wave tube (TWT) puts out 40 times the power of the Intelsat series, thus greatly reducing the need for large earth station antennas. The higher power is made possible by a new approach to converting solar energy into usable watts. Unlike the Intelsat series which use spin stabilizing techniques and require the solar cell arrays to be around the circumference of the "bird" (thus having only partial solar access at any given time), the CTS uses extended solar sails which unfurl in accordion fashion once the satellite is properly positioned in its geostationary location. The solar panels, 22 feet long and 51 inches wide, face the sun constantly through a sensing and steering electromechanism. Initial power output of this array is 1260

continued on page 74



# The mobile studio tape recorder



Any supplier who attaches as great an importance to the practical solution of problems as AEG-TELEFUNKEN does, is not likely to abandon its studio customers when it comes to solving the problems of remote recording. On the contrary, it will offer them sturdy and efficient "all-purpose" devices able to hold their own in stationary studio operation, remote recording assignments, and mobile installations (OB vans).

AEG-TELEFUNKEN produces just such a universal device, the M 12 1/4" Studio Magnetic Recorder. It is small, compact, easily transportable and, of course, remote controllable. Whether in mono (with or without pilot sync), stereo or two-track recording and whether for 9.5/19 cm/s (3 3/4/7 1/2 ips) or 19/38 cm/s (7 1/2/15 ips), it fulfills all that the professional demands in the 1/4 inch field, and more. In its integrated mic/line mixer version, complete with

vu meters, it even serves as a fully self-contained system for every recording purpose. Due to its technological perfection, it guarantees optimum specifications, audible quality, and an exceptionally long life expectancy with a minimum of maintenance.

There you have it — a self-contained unit. Practical. Reliable. At a reasonable price.

- The mechanical and electronic components fulfill all studio requirements for quality and reliability.
- The large, well decoupled capstan flywheel provides for the lowest flutter even when used on poorly stabilized power lines.
- The sensitive, though uncomplicated, tension control maintains constant tension with 7 to 27 cm (3" to 10 1/2") diameter reels without the need for switching.
- Vertical or horizontal mounting with perfect performance.
- The amplifiers are easily aligned to every kind of tape made.
- All deck mechanical assemblies are easily accessible and all amplifiers are plug-in.
- Its construction on a robust, die-cast aluminium frame allows the magnetophon 12 to stand up to even the roughest duty without impairment to the quality of the recording.

Should your unit ever require service, you can rest assured that your M 12 is in good hands with our servicing experts world wide.



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- The MCI JH-110A series of recorders is now available with a 14" transport.
- Precise electronic editing (new bias and erase timing generators for all three speeds eliminate clicks, gaps and overlaps).
- The tape counter displaying minutes and seconds in real time can be combined with the JH-36 "Return to Zero" Cue-up function (optional).
- The variable profile cabinet equipped with a gas spring tilting mechanism allows optimal positioning of tape transport for all different working modes (from editing to just watching) in seven steps over a range of 22 degrees.
- MONO and STEREO (on ¼" tape) as well as FOUR TRACK configuration (on ½" tape) are available.
- All systems are pre-wired for four-track operation.
- The JH-110A transport can easily be converted for ¼" and ½" tape use.
- All Head assemblies are self-aligning "plug-in" type and provide space for an optional fourth head.
- Independent head adjustments for Height, Zenith, Azimuth and Tape Wrap are non-interacting.

**MCI**

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## "Live via satellite"

*continued from page 72*

watts with the mean figure over its life span expected to be at least 1000 watts.

The SHF antenna on board has a beam width of 2.5° and can be boresighted over a 15° range. Since Earth sensors maintain the platform accuracy to within 0.1° there is no problem with accurate coverage of the intended area.

CTS is the first, but the late 1970s will see a whole series of new satellites for individual country coverage like Japan's ETS II and CS that will start in 1977 and their experimental broadcast satellite (BSE) scheduled for February 1978.

Intelsat V is also under construction and will be ready to replace current satellites starting in 1979. This series will follow the CTS solar array principle and operate on both frequency spectra (4-6 and 12-14 GHz) in addition to having steerable spot antennas to service high-traffic regions. Beam isolation between antennas is achieved through careful beam shaping and linear orthogonal polarization. Polarization techniques are making possible the doubling of transponder channels on existent satellites like Satcom and Westar.

### The Organizations

Satellite communications has grown into a huge enterprise in less than a decade. In 1966 there were 172 hours of satellite time on the only available circuit over the Atlantic. By 1976 the Pacific circuits alone carried 2418 hours and the total for the three regions (Atlantic, Pacific, Indian) was just under 18,000 hours. As cost of such communications comes down, various segments of society begin to see a potential for their own communicative needs.

COMSAT was formed in 1963 to carry out the Congress Communications Satellite Act, designed to set up a global network in cooperation with other countries. COMSAT also has a 30% share of INTELSTAT, a legal international entity with a \$400 million-plus equity in which 92 countries hold shares. According to their own publication, they make a 14% return on investment.

Two years ago (March 1975) the Public Service Satellite Consortium (PSSC) was set up to take advantage of the new emerging technological capabilities of more powerful satellites like NASA's ATS-6. More than 45 non-profit organizations concerned with public interest projects

in health, education, religion etc. see this as a way to affordable domestic networks through the use of small diameter earth stations that fit their pocketbooks. Even the ethnic groups with language or cultural communicative needs or remote groups like the citizens of Alaska have put in bids to participate in these new satellite services.

On the commercial side, the economic advantages for CATV operators, pay television distributors, and industrial or corporate communicators provided by these satellites over terrestrial signal-delivery systems will no doubt lead to a clamor for expanded capacities and FCC ratification of use. It may be cheaper to broadcast instructional tapes over satellites for re-recording in each school district than duplicating and sending those cassettes by mail. The PSSC and a lot of other groups are investigating the answers to these questions right now.

### Summary

The technology for satellite-to-home broadcasting is not very far away. In fact, if it were not for rain attenuation of SHF signals the CTS satellite could feed an easily affordable 3-foot (1 meter) dish on a roof top with a usable color television signal.

Jim Murray of Farinon Electric, who make satellite and microwave equipment, says that a one-meter antenna is marginal on signal-to-noise ratio if the safety factors for climatic variations are cranked in. Dr. Bruce Lusignan of Stanford University's Communication Satellite Planning Center is a little more cautious. He feels that a communal antenna of 9-10 foot (3 meter) diameter with a down converter could be jointly purchased for \$2,000 and the signal then distributed with an RF modulator on a UHF or VHF channel to a group of users at very little individual cost.

Of course the overall question of governmental attitudes both for national and international broadcasts is still to be settled. In today's world it's unlikely that citizens of most countries would be given access to foreign broadcasts direct from satellites even if the available technology made it economically feasible. □

The author would like to acknowledge the invaluable help provided for this article by Jim Murray, vice president, Farinon Electric; Dr. Bruce Lusignan, director of the Communication Satellite Planning Center at Stanford University; Dr. Joseph Pelton of Intelsat; B. Bellit of Aeronutronic Ford; and Steve Rupp, staff engineer, Farinon Electric.



# FEEDBACK

READ SOME LETTERS TO MCI REGARDING THE REMARKABLE JH-110A SERIES OF TAPE RECORDERS

I thought you may be interested in learning of some of the benefits this company has derived since we changed to MCI JH-110 tape recorders.

As you know, both stations are heavily automated. Several times during the day and night we are required to record spots from the NBC Network. One of the first "tricks" our production staff learned was to record the network on two recorders. At the beginning of spot No. 1, they punch the reset button of recorder No. 1; at the beginning of spot No. 2, they punch the reset button of recorder No. 2. Then, at their leisure, they punch the RTZ button on both recorders, and there are the two spots already cued.

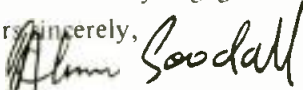
The cue facility allows us tighter "drop-ins" on beginning and end tags, and in compiling programs generally.

The calibrate/variable play and record level controls, and variable speed, are useful in that we have to process tapes received and from many different sources. The 3-speed capability also allows us to high-speed these dubs—saving valuable time.

Apart from the tremendous improvement in recorded quality (we were able to align the recorders to better than factory specifications) since installing the recorders we have not had one case of stretched or broken tape.

We have been able to design and build relatively simple units to interface with the control logic to enable us to—for example—pre-time record start and multi-recorder start and stop.

In closing, might I just say that original alignment and installation was very quick and simple, and maintenance has been virtually negligible.

Yours sincerely,  


H. Graeme Goodall,  
WVCG-WYOR, Coral Gables, Florida

It's been nearly a year since I purchased an MCI JH-110, and it's been a year of pleasure! I am (at least I consider myself to be) one of the best production persons in the country, and your machine puts all the others to shame!!!

I must tell you that I bought my machine by chance. I was not satisfied with our Ampex and ITC's, and Scully just couldn't handle it. I read a tiny ad in the trades and called your chief engineer for details on performance. Never having seen nor heard of your machine before, I



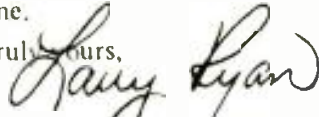
was impressed with his recommendations and therefore purchased one.

I have found several uses which were not listed in the Manual, and it seems we discover new ways to use the machine every week—and we do some pretty complicated production!

I assure you that when the money and the opportunity (and in that order) arises, I will purchase a 4-track and perhaps another 2-track and, hopefully, have you add a few more production aids which I feel could be of great value to our production load.

Again, I am totally satisfied with my MCI JH-110. It's a shame everyone has not had the good fortune to work with one.

Very truly yours,



Larry Ryan, General Manager,  
KBCL, Shreveport, Louisiana

After using the MCI for a couple of weeks I'm greatly impressed by its improvements over traditional tape machines and its innovative features.

The machine is incredibly quiet—one reason being its motor does not idle but engages only during the play mode. Undoubtedly this feature will give the machine far greater mechanical life than its counterparts.

The machine's constant-tension transport feature is a plus in news situations where a mixture of small and large reels are used.

One of the more remarkable features is the machine's ability to time tape. At present, completed 60-minute shows are

Professional Recording Equipment



timed by running them through a conventional recorder at 15 IPS and the elapsed time doubled for an accurate reading of 7½ IPS programming. This MCI machine actually times the programming while in the fast-forward mode—reducing a 30-minute job to a 3- or 4-minute job and greatly reducing machine tie-up time.

Though the advantages of 2-deck electronic editing are obvious and ultimately the best state-of-the-art engineering for news producers, the MCI "tape return" feature by itself is quite helpful. I reset the mechanism while dubbing cassette material to reel-to-reel for quick and accurate recall of key segments.

The time saved in hunting material is valuable, but perhaps more importantly this is the first tape machine I have ever encountered that actually "assists" the operator. All other machines are neutral in their attitude to the job—they'll go when the right button is pressed, stop when another is pressed... but THIS machine actually is *positive*. It's a great device—too many engineers ignore the human engineering factor. These people have explored it and created a machine with a valuable accessory.

Other benefits: the machine is extremely easy to thread—and the proximity of the reels to the actual operating deck is an advantage over the Electro Sound transport system which is raised and creates the possibility of tape fall.

The machine is incredibly quick-starting, even at 15 IPS, which is the speed I most often use. I have often started the transport in mid-sentence on the air, where on other machines I have had to edit leader into the tape to account for slow-start wow.

The manual velocity control is another device which gives quick access to material on tape. I can audition material at variable speeds from a slow crawl to the speed of fast forward—slip into reverse direction with a minimum of mechanical effort—and locate key segments at three to five times the speed of conventional decks.

*I intend to chain this demonstrator model to the wall when its test period is over. Congratulations to its manufacturer and designer for creating a machine with the human factor in mind.*



Mike Linder,  
WNEW Radio, New York

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# STL Operating Techniques

Part 2 of a 2-part series

By John E. Leonard, Jr.\*

Part I of this article explored some of the reasons for selecting an aural studio-transmitter link for relaying aural program material to remotely-located AM and FM transmitter plants. These reasons included:

- lack of available leased telephone circuits;
- better quality;
- higher reliability;
- operations under station control;
- flexibility/versatility;
- savings on operating expenses.

Additional facilities can also be provided by the STL. These include remote control and the relaying of secondary program material, such as SCA program audio. In this concluding segment on aural studio-transmitter links, we will discuss some additional services, current Rules and Regulations and their relation to the operation of an STL, and license applications.

## Quadraphonic stereo

The block diagrams included in the first part of this article outlined two methods for conveying stereo program material. These were the dual STL, which consists of two monaural STLs (one to accommodate left program audio; the other, right program audio). The second approach is the utilization of the composite STL. With the composite STL, the stereo generator is actually positioned at the studio with the STL relaying the composite stereo waveform.

For the FM broadcaster, one future requirement

may be worth considering in selecting an aural STL. This requirement is quadraphonic stereo. This reference to quadraphonic stereo relates to discrete methods of transmission rather than matrix approaches. At this writing, Rules concerning the exact method of transmission for discrete quadraphonic stereo are still pending. The transmission for audio components as separate entities, while maintaining phase integrity, will be extremely difficult with individual program circuits.

The composite STL is the ideal alternative for the transmission of quadraphonic stereo. Such an STL was utilized as part of the EIA field tests conducted at KIOI in San Francisco. This particular STL was a standard-production unit whose baseband response had been extended slightly to accommodate the additional bandwidth dictated by quadraphonic stereo. These tests indicated that the composite STL was essentially transparent. Many STLs in service today need only slight modifications to accommodate quadraphonic stereo. (See Figure 1.)

## Intercity relay

Within the U.S., the Rules that establish aural STL service also establish another service—the intercity relay station. This service allows for the transmission of aural program material between studios located in separate cities, between broadcast stations, or similar type applications. Many stations are currently adapting this service to a variety of applications. One such station is WGH, licensed to the city of Newport News, Virginia. WGH has additional studios located in the nearby city of Norfolk. Intercity links are used daily to relay programming between the Norfolk studios and Newport News studios. A second set of

*continued on page 78*

\*Moseley Associates, Inc., Goleta, California

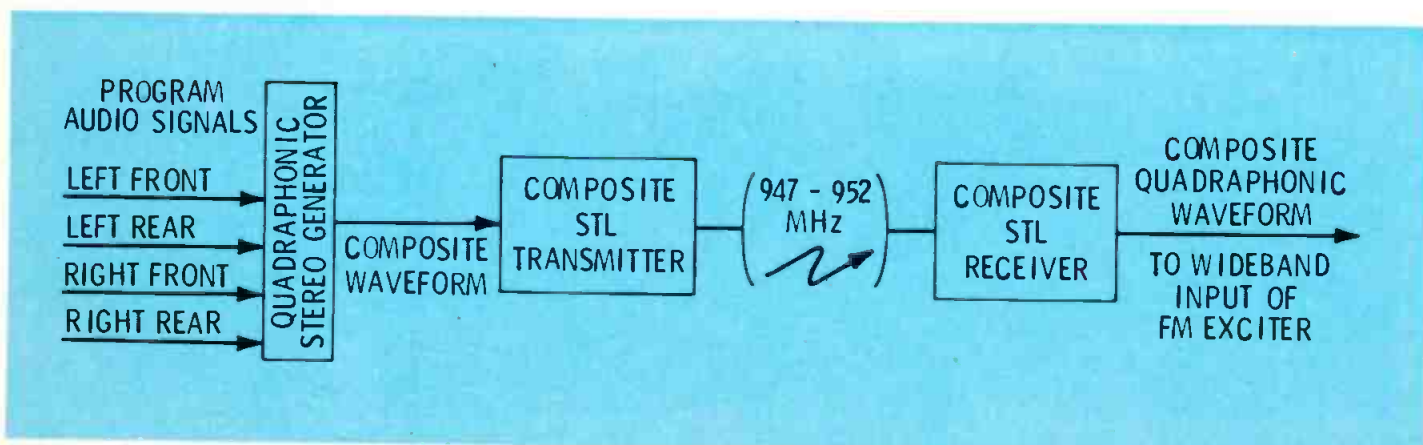
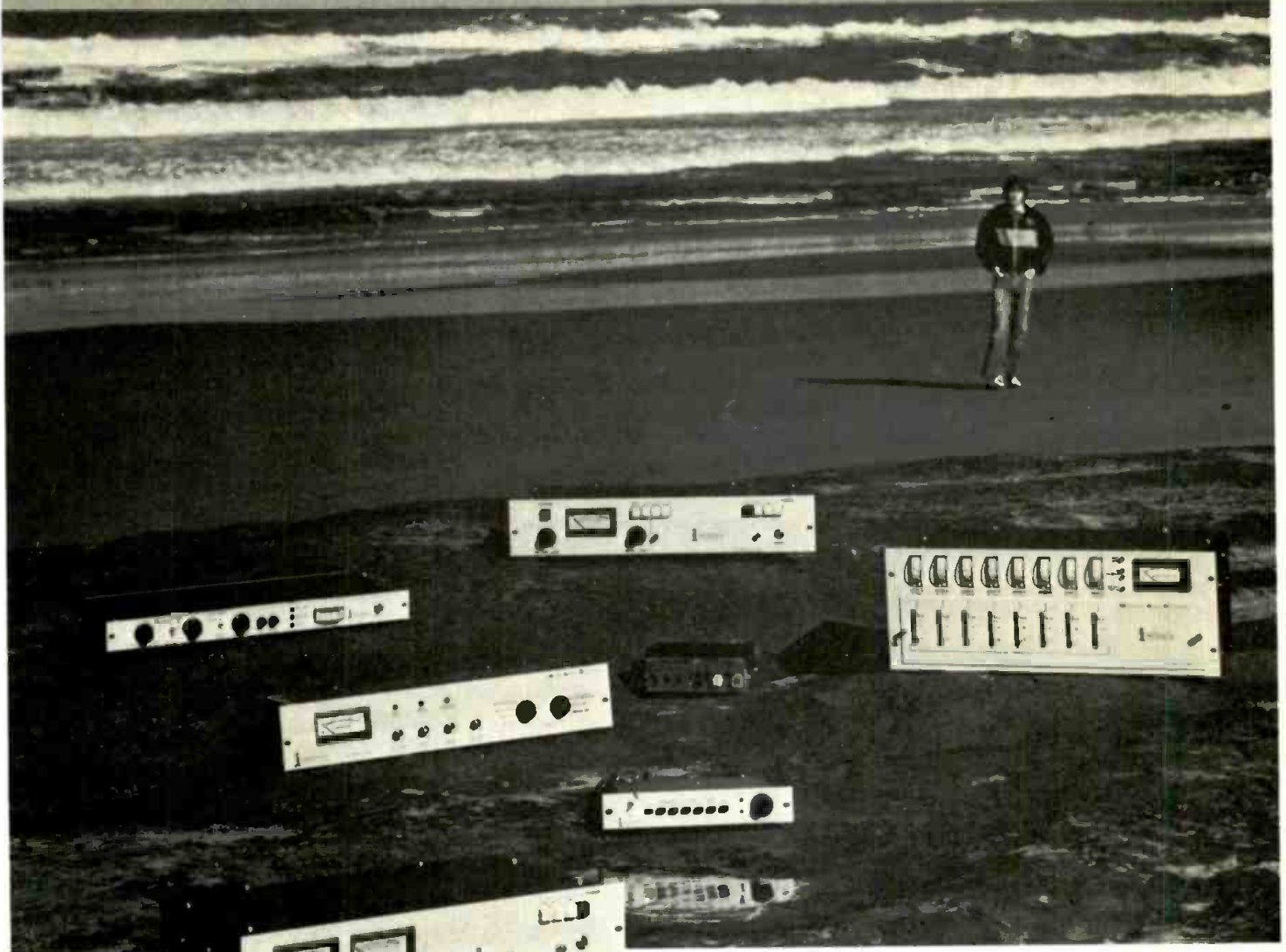


Figure 1 This is a block diagram of a composite STL for quadraphonic stereo applications.



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- tape record and reproduce electronics that set new standards for features, performance, and reliability.
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recording studios get better sound. Of course, when those products come along, they'll have the same high quality and dependability that you expect from Inovonics.

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## STL Operating Techniques

continued from page 76

links is utilized for relaying program material from Newport News to the Norfolk studios, thus providing full-duplex service. Aural STLs are also utilized by WGH between the Newport News studios and their remotely-located AM and FM transmitting facilities.

WEAU-FM, Eau Claire, Wisconsin has a similar requirement. The main studios of WEAU-FM are located in Eau Claire. A secondary studio exists in Chippewa Falls, Wisconsin and the FM transmitter facility is located near Fairchild, Wisconsin.

A composite link relays programming from the Eau Claire studio to the transmitter site. The input of the composite STL transmitter can be fed either from a stereo generator in the Eau Claire studio, or from a second link coming from Chippewa Falls. When programming is originating from the Chippewa Falls studio, a second stereo generator is utilized feeding the composite link connecting the two studios. In this configuration, the FM transmitter of WEAU-FM is being fed, in essence, by a two-hop STL system.

As with WGH, a need existed for feeding program material from Eau Claire to Chippewa Falls. This service is being accomplished with a monaural STL link. An interesting point to be noted is that duplexers were utilized by the station for combining transmitters and receivers to function from a single antenna. This was necessary due to restrictions at the studio locations. Duplexers are more commonly found in communications applications. They permit the operation of the transmitter and receiver from a single antenna.

Educational radio stations have yet another interesting application of the intercity relay link. A number of states operate statewide FM broadcast facilities. Many of these systems utilize satellite-type FM transmitting facilities to ensure coverage throughout the state. These satellites function as off-air repeaters. Because it is advantageous to limit the use of different FM frequencies, many statewide systems utilize only a limited number of channels throughout the state. For this reason, some satellite transmitters are operating on or very near the frequency of the station they are rebroadcasting. In these instances, a rebroadcast receiver is positioned some 10 or more miles from the satellite transmitter. An intercity relay link is then utilized for relaying the program material to the satellite transmitter.

Sometimes satellite transmitters cannot be positioned at a location that is ideal for reception of the station to be rebroadcast. Here again, the intercity relay link can provide a means of relocating the rebroadcast receiver at an appropriate site. Two states utilizing such service are Minnesota and Wisconsin. Monaural and composite STLs are in use in this type of service. A stereo rebroadcast receiver can feed a composite STL, thus maximizing the actual stereo performance obtained out of a satellite transmitting facility.

### License applications

Applications for an aural broadcast or intercity link license is made by filing FCC Form 313. While it goes beyond the scope of this article to cover all aspects of license application, several areas are worth noting. Sections 3, 5, 7 and 8 require technical information to

continued on page 80

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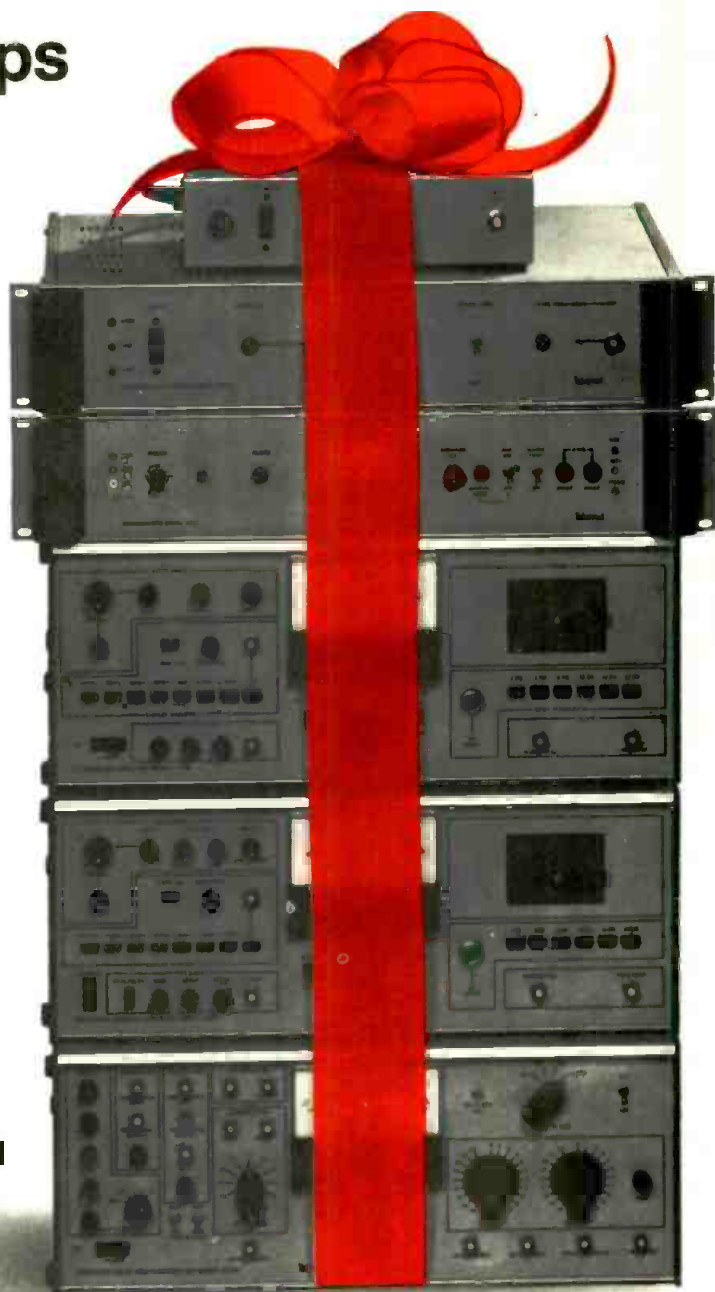
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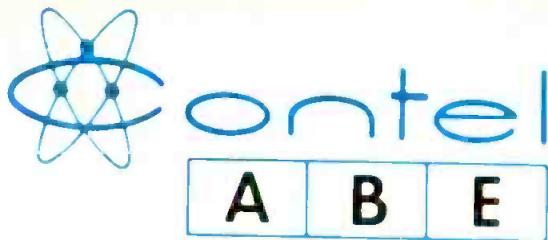
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## STL Operating Techniques

*continued from page 78*

be stated. This information, of course, is determined by the STL transmitter and transmitting antenna to be used for a given installation, and is readily available from the STL equipment manufacturer.

Typically, sample forms are available which provide pertinent details. The current Rules do not specify type approval or type acceptance of aural studio-transmitter link equipment, thus necessitating the filing of information in these sections. One important area worth noting is that, for STL or intercity license applications, both a new station (construction permit) and license may be requested with the initial application. It is not necessary to obtain a construction permit, install equipment, and then request the final license.

### Frequency selection

One area requiring attention is the selection of a frequency. When Form 313 is filed, it must show the requested aural studio-transmitter link frequency. While frequency search services are available, one of the simplest methods for selecting a frequency is to poll other stations in your immediate area. Links operating in this frequency range are restricted to broadcast stations. No sharing with other services, such as land mobile, occurs in the 947-953 MHz spectrum. Local frequency coordination is the best method of assuring selection of a clear frequency or channel. Current FCC Rules suggest that the lowest suitable frequency be selected that can be used without creating interference with other stations operating in accordance with existing frequency allocations.

The emission designator and occupied bandwidth of the system also must be stipulated on the Form 313. Current Rules require that the maximum frequency excursion of a carrier resulting from modulation shall not exceed 200 kHz above and below the assigned frequency.

When the transmitter is multiplexed by one or more subcarriers, the maximum subcarrier frequency shall be used for calculating the occupied bandwidth based on  $2M + 2D$ . This is a formula where M is the modulating frequency (in this case, the subcarrier frequency) and D equals the transmitter deviation. Of course, the tolerance of the transmitter employed should be added to the bandwidth obtained to insure that no more than 500 kHz is occupied.

As a part of Form 313, the power output for the transmitter must be stated and maximum available power. The license obtained will specify the maximum authorized power. The current Rules state no maximum power limit. Rather, an STL transmitter shall have a power output not in excess of that required to produce satisfactory service. Most current equipment operates in the 5W to 8W range.

One area that shouldn't be overlooked is the requirement for a directional antenna. Specific directivity characteristics are set down in 74.536. Antennas commonly used for this service far exceed these requirements. In cities where frequency sharing occurs, special attention must be given to the side lobes and front-to-back ratios of the selected antennas.

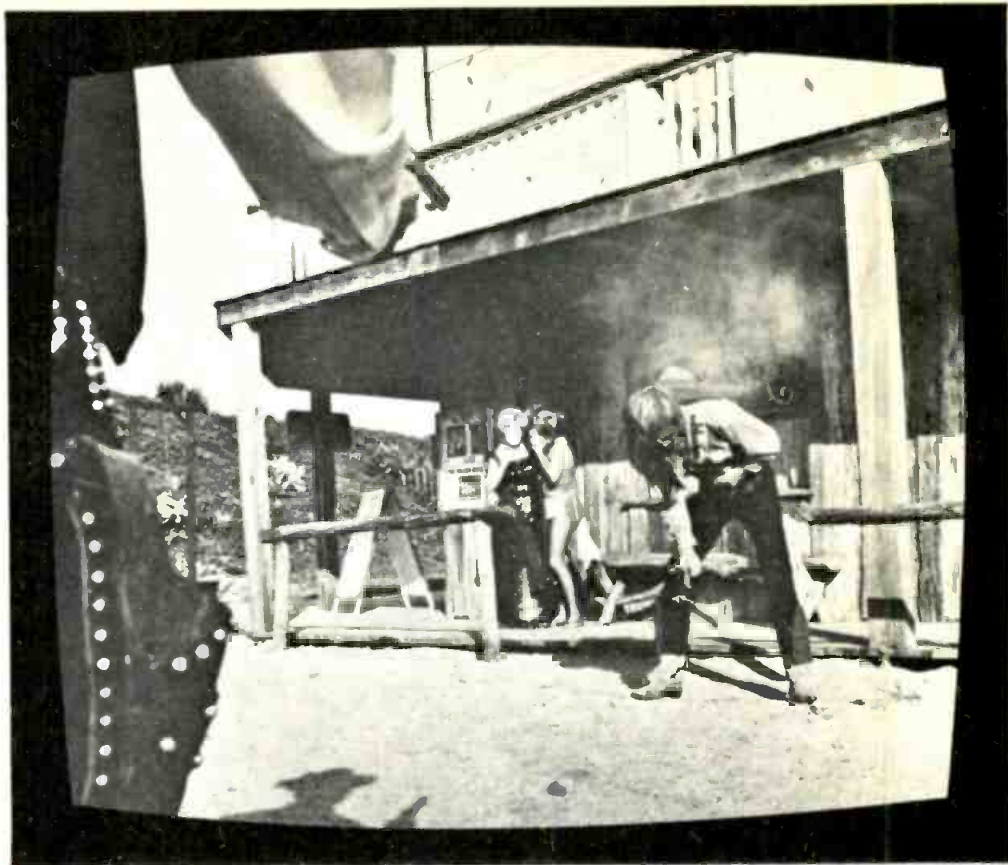
### Rules and regulations

Some of the existing Rules and Regulations under Part 74, Subpart E deserve special mention. If you are

*continued on page 82*



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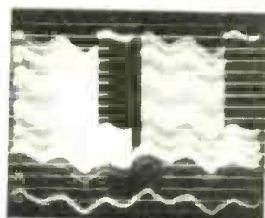
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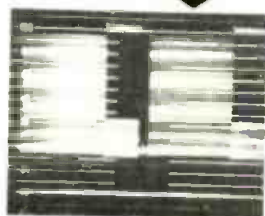
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## STL Operating Techniques

continued from page 80

considering the use of an aural studio-transmitter link or intercity relay station, a complete and careful examination of Subpart E is recommended.

In many parts of the country, the aural STL band is extremely congested. As an example, in the Los Angeles area, all channels from 947 MHz through 952 MHz are in use. Likewise, all frequencies in the 942-947 MHz spectrum are occupied. In this city, a number of channels are occupied by two stations on a shared basis. Such sharing can occur when the vectors between the studio and transmitter site, as well as geographic location of the facility will permit operation of two links without interference.

As was indicated in Part I of this article, the National Association of Broadcasters (NAB) has filed a petition requesting the reassignment of the 942-947 MHz spectrum to aural STL service. All interested parties are encouraged to support this filing. It is the writer's understanding that the FCC is currently accepting requests for frequencies in the 942-947 MHz spectrum when no frequencies exist in the current STL spectrum (947-952 MHz). These filings, however, must be such that, should the frequencies ever be employed by land mobile services, such services would have priority. It is recommended that filings of this type be closely coordinated by an engineering consultant and legal advisors.

### Remote control

As with broadcast transmitters, aural STL intercity relay transmitters may be remote controlled. Requirements for remote control are not as stringent as they are with the actual broadcast transmitter. Means must be provided to allow the transmitter carrier to be turned on and off at will. A carrier-operated indicator can be provided to show that the transmitter is actually radiating. Also acceptable is a device providing a continuous visual indication that control circuits have been placed in the mode that would produce radiation. In addition, off-air control is allowed in the case of intercity systems or two-hop type systems. Closer examination of 74.533 should be made if you are considering such modes of operation.

### More on the rules

Current Rules and Regulations do not require the continuous use of any form of monitoring equipment. Only periodic checks are required to verify that the STL transmitter is operating within the allowable tolerance of the assigned frequency. This allowable tolerance is  $\pm 0.005\%$ . When a dual STL is in use, it should be noted that a frequency stability of  $\pm 0.001\%$  is required.

From an operational point of view, logs and station identification are required. These logs are straightforward and should include the hours of operation, program transmitted, frequency checks, any additional pertinent remarks, and finally, entries required relating to tower lights, if tower lights are involved.

Station identification can occur in several ways. Transmission of a broadcast station call sign is considered acceptable identification. Such identification is to be made at least once each hour, except if it would interrupt certain types of programming. This, of course, follows the lines established for identification of the actual broadcast station. Of course, the call sign is also to be transmitted at the beginning and end of each period of operation. □



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## MONO

<b>\$2140</b>	Console: Spotmaster 4BEM50 Turntable: Russco Cue-Master TT Preamp: Ramko MPPE Tone Arm: Microtrak 303 TA Cart: Stanton 500-AL Microphone: Electrovoice RE10 Cart Record: Spotmaster 2000 RP Cart Play: Reel Record: Sony TC377 Mike Arm: Luxo LM-41 + C Clamp Digit Timer: ES400 Times: 5:59 Cart Eraser: Audiolab TD1A Splice Block: Ethral S2	<b>\$3750</b>	Console: Spotmaster 5BEM100 Turntable: Russco Studio-Pro (2) TT Preamp: Microtrak 6400 (2) Tone Arm: Microtrak 303 (2) TA Cart: Stanton 500AL (2) Microphone: Sennheiser MD-421-U Cart Record: Spotmaster 3200 RP Cart Play: Reel Record: Revox A77-1102 Mike Arm: Luxo LM-41 + C Clamp Digit Timer: ES510 Times: 59:59 Cart Eraser: Audiolab TD1A Splice Block: Ethral S2	<b>\$6100</b>	Console: Ampro AC6M8 Turntable: Russco Studio-Pro (2) TT Preamp: Microtrak 6400 (2) Tone Arm: Microtrak 303 (2) TA Cart: Stanton 500AL (2) Microphone: Sennheiser MD-421-U Cart Record: Ampro CT-RP 3545B Cart Play: Reel Record: Revox A77-1102 Mike Arm: Luxo LM-41 + C Clamp Digit Timer: ES510 Times: 59:59 Cart Eraser: Audiolab TD1A Splice Block: Ethral S2	<b>\$3790</b>	Console: Spotmaster 8BEM100 Turntable: Russco Studio-Pro (2) TT Preamp: Microtrak 6400 (2) Tone Arm: Microtrak 303 (2) TA Cart: Stanton 500-AL (2) Microphone: Sennheiser MD-421-U Cart Play: Spotmaster 3-DK 5301A Mike Arm: Luxo LM-41 + C Clamp	<b>\$5880</b>	Console: Ampro AC6M8 Turntable: Russco Studio-Pro (2) TT Preamp: Microtrak 6400 (2) Tone Arm: Microtrak 303 (2) TA Cart: Stanton 500AL (2) Microphone: Sennheiser MD-421-U Cart Play: Ampro CT-PB 3525B (3) Mike Arm: Luxo LM-41 + C Clamp	<b>\$6880</b>	Console: Ampro AC10MB Turntable: Russco Studio-Pro (3) TT Preamp: Microtrak 6400 (3) Tone Arm: Microtrak 303 (3) TA Cart: Stanton 500AL (3) Microphone: Sennheiser MD-421-U Cart Play: Ampro CT-PB 3525B (3) Mike Arm: Luxo LM-41 + C Clamp
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# radio workshop

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40 Sec	1.70	2.30	2.20	3.10
70 Sec	1.75	2.35	2.25	3.15
100 Sc	1.80	2.40	2.30	3.20
140 Sc	1.90	2.45	2.35	3.25
2.5 Mn	2.00	2.50	2.37	3.25
3.5 Mn	2.10	2.60	2.47	3.30
4.5 Mn	2.25	2.70	2.55	3.35
5.5 Mn	2.35	2.80	2.66	3.40
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10.5 M	2.90	3.27	3.05	No

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# A systems concept for audio interface

By Peter Burk

One of the biggest frustrations facing broadcast engineers is doing everything "right" and still not achieving the desired sound. The proof looks good, the new "magic black box" for processing the audio is set up properly, and yet the station still doesn't sound right. Even more frustrating, maybe some things sound fairly good, but other sources don't quite make it.

Before you stop payment on the check to the magic black box company, let's look more closely at what we're feeding into the machine.

"Hold it," you say. "I just checked everything in the chain... distortion is below one percent everywhere, and response is good to 15 kHz. I even put new styli in the turntables."

That's fine, but what about the way the equipment is connected together? If you're lucky, you got to start from scratch and put everything in the way you wanted it. If you're not so fortunate, you inherited someone else's dream, complete with ten years of add-ons, all documented on the back of an old maintenance log. If you're an inheritor, assume nothing about the interface between devices. Check out each junction yourself, and establish a plan for making the thing work like a system.

We're going to present a scientific approach for interfacing the entire system, but first let's review why we're having problems with pro-

gram even though the proof looks good.

## Peak vs. RMS

All of our testing is done with nice, pure sine waves. They're easy to make and easy to measure. Only problem is, program directors don't like sine waves a whole lot. They like messy, transient-ridden complex waveforms.

Sine waves are very efficient: the ratio of peak to RMS energy is just 3 dB. Complex waves aren't nearly as efficient with ratios on the order of 10 to 15 dB. The volume indicator (VU meter) doesn't really read either peak or RMS, but comes much closer to RMS on complex waves. This means that lots of nasty transients that don't contain much energy but require headroom are sneaking right past our meters.

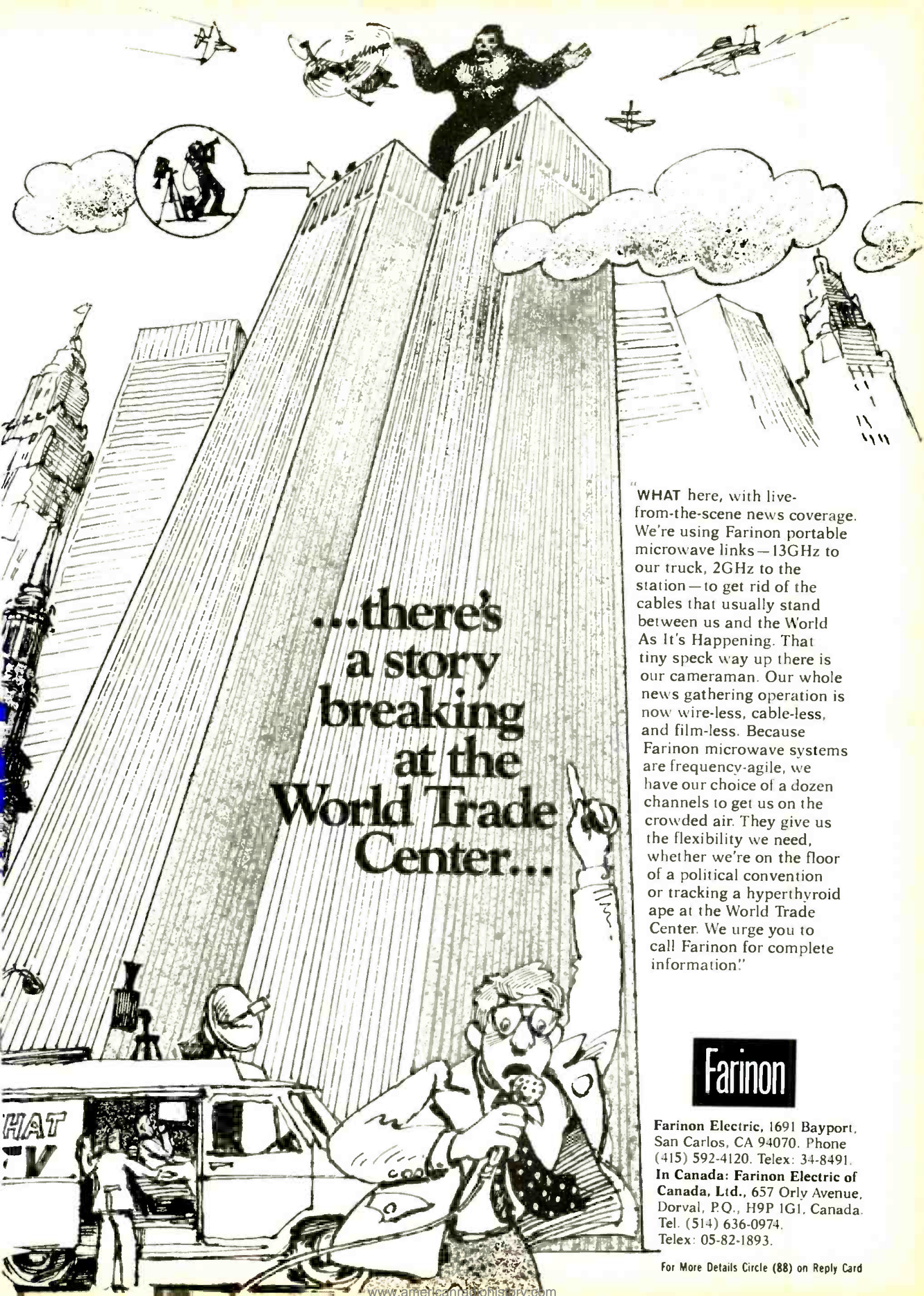
There are several possible solutions, including peak program meters, but the simplest for the moment is merely to allow adequate headroom when using tones for setup. It's either that or find a program director that likes mostly sine waves.

## The compromise

Before you start cranking the gain down on everything, consider the effect on the signal-to-noise ratio. Lots of headroom is nice, but not at the expense of hum and hiss between pauses in speech. Obvious-

continued on page 86





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## Determining operating range of adjustable gain amplifiers

1. Define desired minimum signal-to-noise ratio (S/N) in dB.
2. Define desired minimum headroom (HR) in dB.
3. Connect signal generator to amplifier input and AC VTVM and distortion analyzer to output (across appropriate load).
4. Set amplifier gain control near the low end.
5. Increase generator output level until 3% THD occurs.
6. Reduce generator level by amount of headroom desired. (THIS IS MAXIMUM INPUT LEVEL)
7. Increase amplifier gain until 3% THD occurs.
8. Reduce gain by amount of headroom desired. (THIS IS MAXIMUM OUTPUT LEVEL)
9. Reduce gain control to minimum setting.
10. Read output noise (dBm). Add desired S/N to this value. (THIS IS MINIMUM OUTPUT LEVEL)
11. Set generator output to maximum input level determined in step 6.
12. Increase amplifier gain control until maximum output as determined in step 8 is achieved.
13. Read output noise (dBm).
14. Reduce generator output level and repeat steps 12 and 13 until output noise is lower than the maximum output by desired S/N. (THIS IS MINIMUM INPUT LEVEL)

Min. Out (step 10) - Max. In (step 6) = minimum gain

Max. Out (step 8) - Min. In (step 14) = maximum gain

If minimum values exceed maximum values, reduce constraints on headroom or signal-to-noise ratio.

## Radio workshop

continued from page 84

ly, there must be a compromise. There is, and it's one that you'll have to establish yourself. The important thing is that we stick to the same compromise throughout the system. It doesn't do any good to have lots of headroom all through the system, then lose it in the last amplifier.

Same goes for noise. That is, if one amplifier has no headroom but 75 dB signal-to-noise ratio (S/N) and that amp is driven by a similar one that has 30 dB of headroom, but only 45 dB S/N, the net result is the worst of both...no headroom and 45 dB S/N. Merely readjusting the levels on those two amplifiers would produce the same net gain, but increase headroom by 15 dB and get the noise down to 60 dB. Quite an

improvement! This, then is:

### Axiom 1:

**Establish a headroom vs. noise compromise and religiously adhere to it through the entire system**

The method outlined in the box will provide the information you need to determine the proper operating range for each device in the system. You may be surprised to find how much less range is available than the spec sheets indicate.

### Impedance matching

It would be nice if we could assume everything was 600 ohms in and out. Since it's not, we'd better watch impedance matching a little more closely. Most consoles have 600-ohm high-level inputs, but don't count on it! Some older models are 150 ohms, and some are just plain

continued on page 88



# GENERAL ELECTRIC Large Screen TV Projectors

The General Electric Large Screen Video Projectors incorporate advances in simplicity, reliability and performance in large screen television projection.

This solid-state, high-brightness television projector is engineered for remote control operation; with improved circuit design for enhanced picture quality, power efficiency, and increased ease of operation, maintenance and service.

It utilizes the exclusive GE light valve—single gun, single optical path system which requires no convergence adjustments to faithfully reproduce monochrome and natural color TV pictures of high resolution and contrast.

Built-in remote control capability allows set-up adjustment and operating control at the projector, or from 200 feet away, with the addition of an accessory cable.

## APPLICATIONS

In addition to projecting information from all standard video sources such as off-air TV tuner, video tape, video cassette, live camera, closed-circuit data network, video film chain, etc., the versatile system can be coupled to computer facilities through suitable interface equipment. It can project alpha-numeric data, graphic displays and computer generated images in real time.

GE large screen TV projectors are now in use in Business, Industry, Education, Medicine, Military, Government, Entertainment and the Arts.

**Business**—Instant review and analysis of computer data bank information, stockholders meetings, conferences, presentation of advertising and sales promotional campaigns, sales meetings.

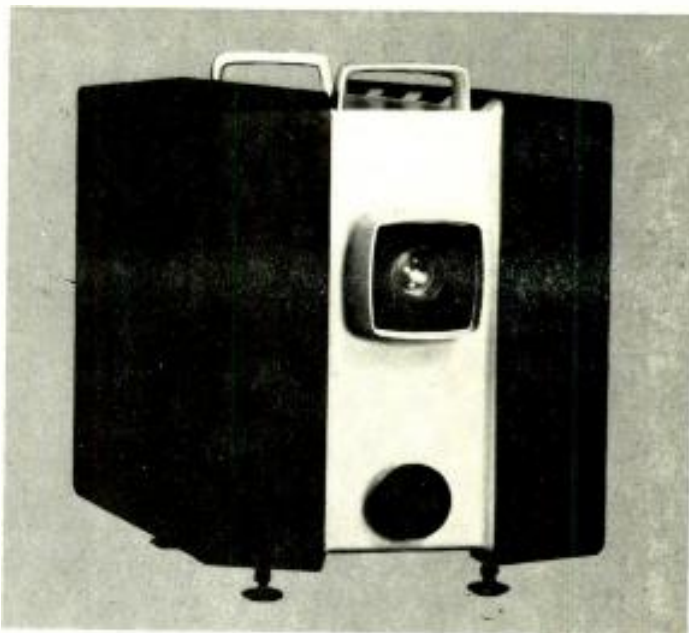
**Industry**—Safety and Industrial training programs.

**Military**—Command and control displays, computer read-out, dynamic visual simulators, tactical and operational situation displays.

**Medicine**—Teaching surgical techniques, medical procedures, nursing, training and consultation conference information displays.

**Entertainment**—Sports, CCTV, standard TV, concerts, box office extensions.

**Education**—Off-campus programs and seminars, demonstration of the arts, teaching sciences, lecture demonstrations.



"Thousand" Series Projectors. (PJ500 and PJ700 not shown.)

## PERFORMANCE FEATURES

- High efficiency power circuits permit operation at low line voltages without affecting picture quality.
- Low input power . . . 1,200 watts compared to 1,700 watts or more for other professional television projectors.
- Operates from standard 120v/20 amp appliance outlets.
- No radiation hazard. Highest voltage used is 7,200 v.
- LED circuit monitors and beam current meter included.
- Sweep reversal switches allow easy projected image changeover for front or rear screen applications.
- Variable picture size from 2 to 20 feet in width.
- Versatile projector mounting includes table top, gimbal, or on its matching, accessory base.
- Accessory rolling base allows easy transportability.
- Afocal lenses available to vary projection distance from standard 3.0:1 (throw distance to screen width) by factors of 2 or ½.

## GE Large Screen Television Projector Specifications

Model	Projector Type	Minimum Output (in lumens)	Power Supply	Video Input & Standards	Price*
PJ500**	Color	220	60 Hz, 117 v., ± 10%	NTSC & RGB	\$35,000
PJ700**	Monochrome	600	60 Hz, 117 v., ± 10%	525 lines/60 f.p.s.	\$30,000
PJ5000	Color	220	50/60 Hz, 117 v., ± 10%	525 lines/60 f.p.s. or 625 lines/50 f.p.s., NTSC & RGB	\$54,000
PJ5100	Color	220	60 Hz, 117 v., ± 10%	1023 lines/60 f.p.s., RGB	\$99,500
PJ5800	Color	220	60 Hz, 117 v., ± 10%	875 lines/60 f.p.s., RGB	\$99,500
PJ6000	Color	220	50/60 Hz, 117 v., ± 10%	625 lines/50 f.p.s., RGB	\$54,000
PJ7000	Monochrome	600	50/60 Hz, 117 v., ± 10%	525 lines/60 f.p.s.	\$47,500
PJ7010	Monochrome	600	50/60 Hz, 117 v., ± 10%	625 lines/50 f.p.s.	\$47,500
PJ7050	Monochrome	1000	50/60 Hz, 117 v., ± 10%	525 lines/60 f.p.s.	\$52,500
PJ7100	Monochrome	600	60 Hz, 117 v., ± 10%	1023 lines/60 f.p.s.	\$51,000
PJ7150	Monochrome	1000	60 Hz, 117 v., ± 10%	1023 lines/60 f.p.s.	\$56,000

\*\*used/factory refurbished

\*effective 1/77

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strange. If you're not sure, measure it. The easy way is by resistor substitution with a generator and a voltmeter.

Output impedances are another story. When the book says 600 ohms out, that doesn't mean that the actual output impedance is 600 ohms; it means that the equipment is designed to work into 600 ohms. Most amplifiers exhibit lower distortion when the load is somewhat lighter than the maximum power transfer impedance. Just make sure that all sources are fed into an impedance equal to or slightly higher than the driving impedance.

Where transformers are used for impedance matching (or isolating an unbalanced line), several precautions are in order. Use a high quality unit with at least as much headroom as your design (compromise) value. Also beware of using more than one set of taps simultaneously on a multi-tapped transformer.

When a transformer output is connected directly to the input of another transformer, the impedance match becomes dependent on whatever is on the other windings of the transformers. To eliminate this problem, separate all transformer connections with a resistive pad, preferably at least 6 dB. Note that many units already have a pad on the input or output for this reason.

### Gain limitations

We mentioned earlier that a compromise must be struck between headroom and noise. Whenever an amplifier contains an active stage before the input level control or after the output level control, we must observe some fairly tight limits on gain within the device.

For a typical line amplifier, the procedure in the box works fine, since it takes input and output stage overload and noise into account. Operation outside of these limits in even one amplifier will defeat all of the efforts you put into the rest of the chain.

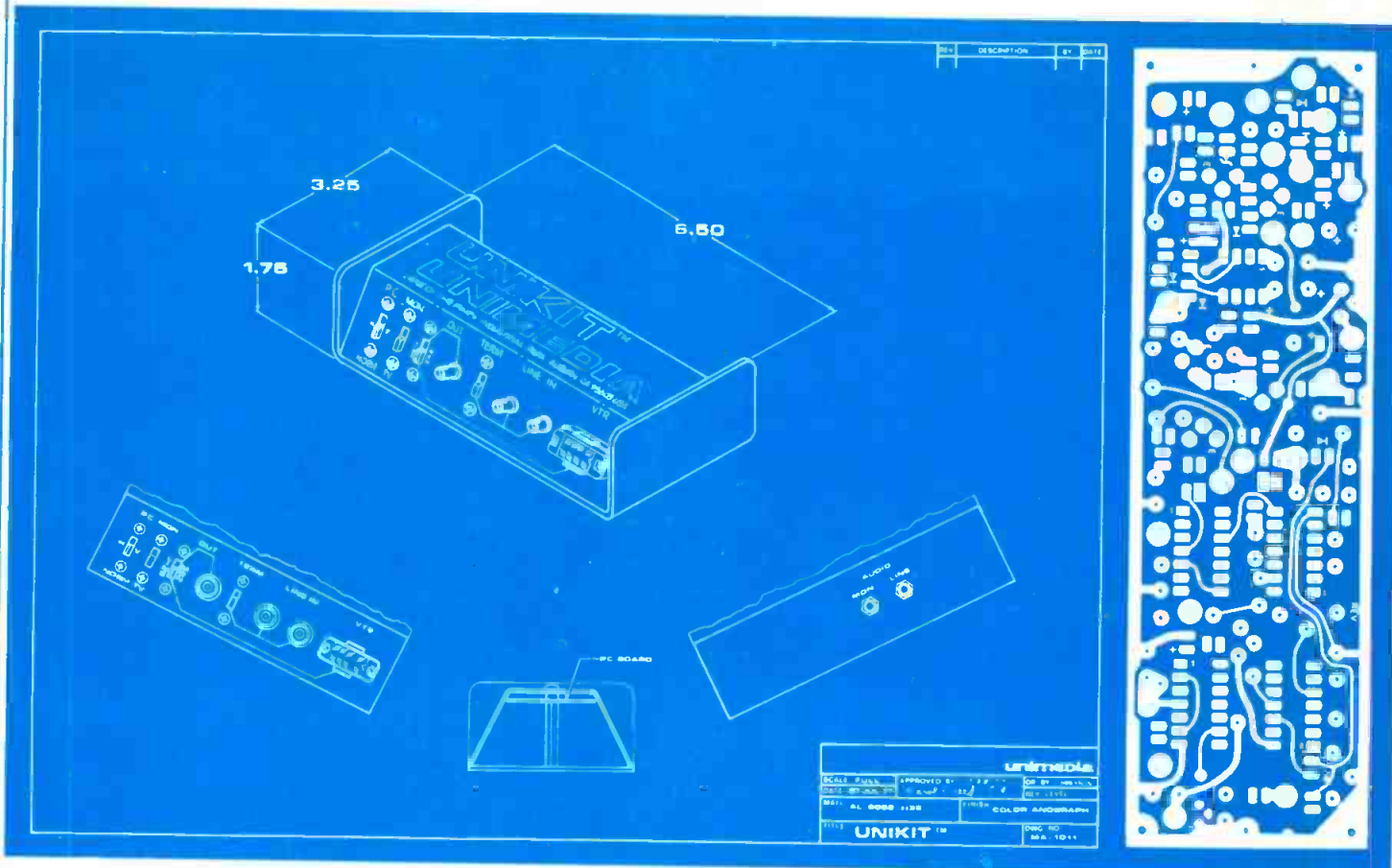
The gain limitations are much easier on sources where only output level is variable. It's only necessary to measure the clipping (3% THD) point and the output noise to arrive at a maximum and minimum output level.

Consoles really aren't too tough to measure, either. The position of the faders is arbitrarily set to a point that is convenient for the operators.

continued on page 90



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KV-1910DG/KV-1920DG/KV-1921DG	UMK-19
KV-2101G	UMK-21

ACCESSORIES	PRICE
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All Unimedia Unikits \$225.00 F.O.B. Auburn, California  
Other kits upon request: write or phone for details.

The popular Unimedia UMT Series monitor/receiver is now being built by Unimedia with Unikits.

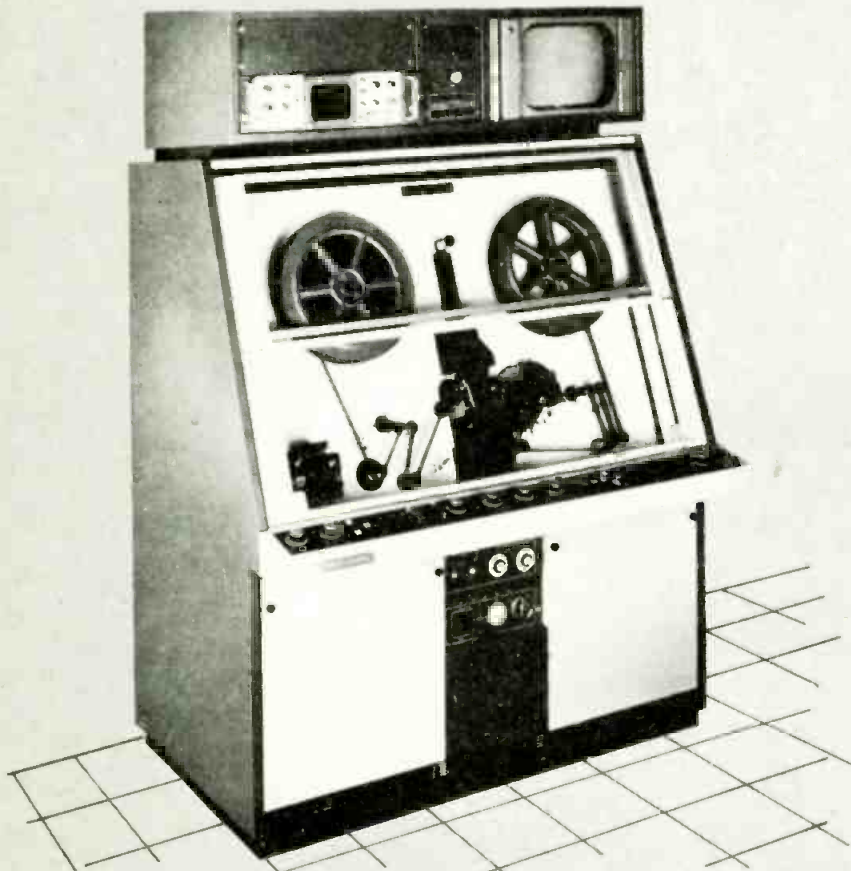
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## Mark 3 TELECINE by



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## Radio workshop

continued from page 88

but the master gain controls can be operated over a wider range than the headroom-noise compromise will allow. Consider the faders fixed and use the master gain control to vary gain for the measurements in the box. This will allow you to put limits on the input and output levels of the console. Just because the knob on the front goes to -90 dB doesn't mean that the console will meet specs over this entire range.

Dynamic devices such as compressors and limiters need to be measured the same way, but with the control signal defeated as you would for a proof.

### Block it out

Put all of the data you've collected on a complete system block diagram. Each block should contain the following information:

- Input impedance;
- Output impedance;
- Permissible input levels;
- Permissible output levels;
- Available gain;
- Sketch of the input and output networks.

Indicate all jacks on your diagram. Part of our objective is to make impedances and levels as compatible as possible at the patch panel. (See Figure 1.)

### Pads and things

The hard part is over. Now all we have to do is select places to insert pads, transformers, or possibly a couple of line amplifiers to make the whole system look like it was designed to work together.

Put matching and isolating transformers in first, then put isolation pads between all transformers. In some cases, you'll need to reduce the level anyway, so just pencil in the isolation pads at this time. When this is done, look for places where you can consolidate losses into a single pad.

Select a suitable patch panel level, based on the output and input ranges you have available. Zero dBm might work for you, but there's nothing wrong with -10 dBm or whatever it takes to fall between output and input levels.

Whenever possible, split losses on each side of the patch panel to preserve your patch panel level. For example, if your patch level is zero, and a +5 output must be connected to a -10 input, use two pads, 5 dB on the output and 10 dB on the input.

continued on page 92



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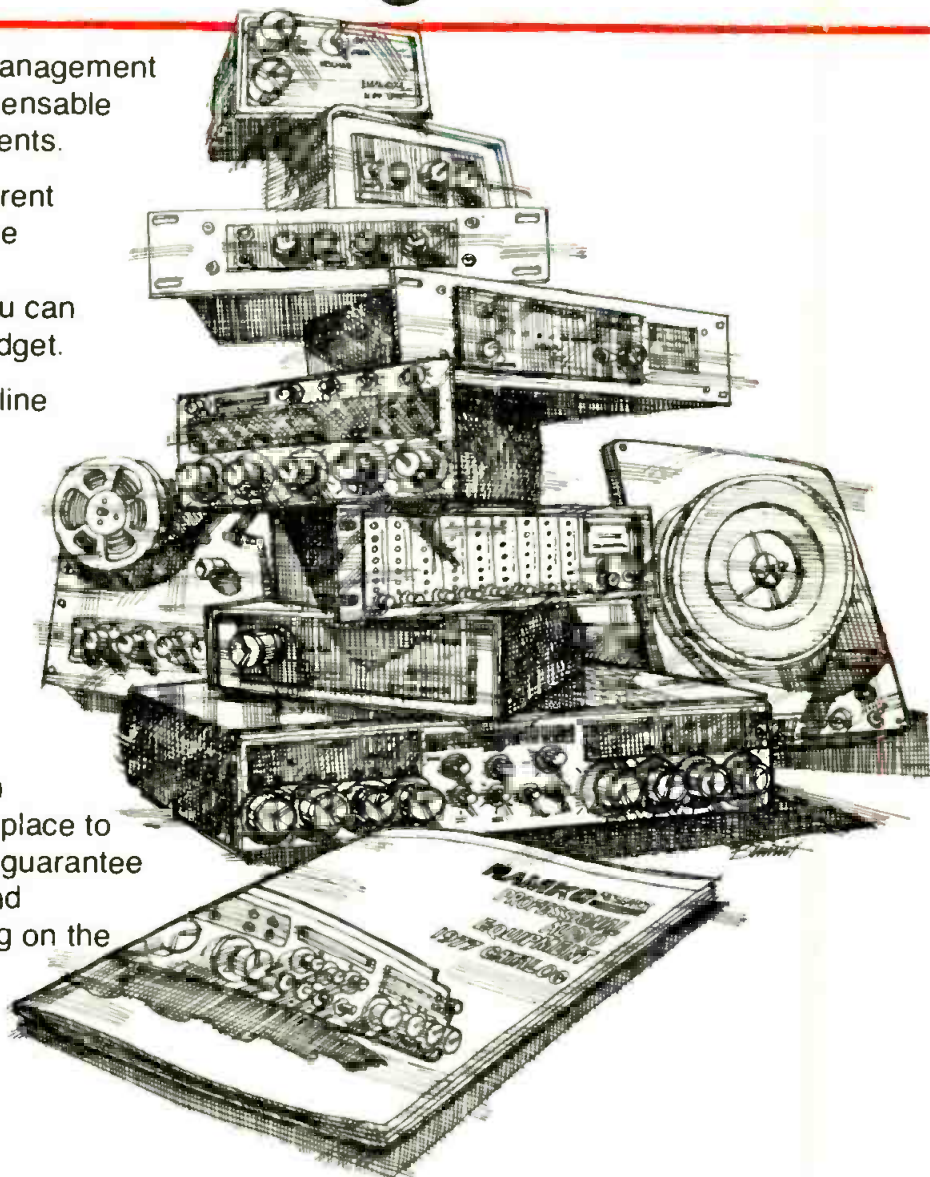
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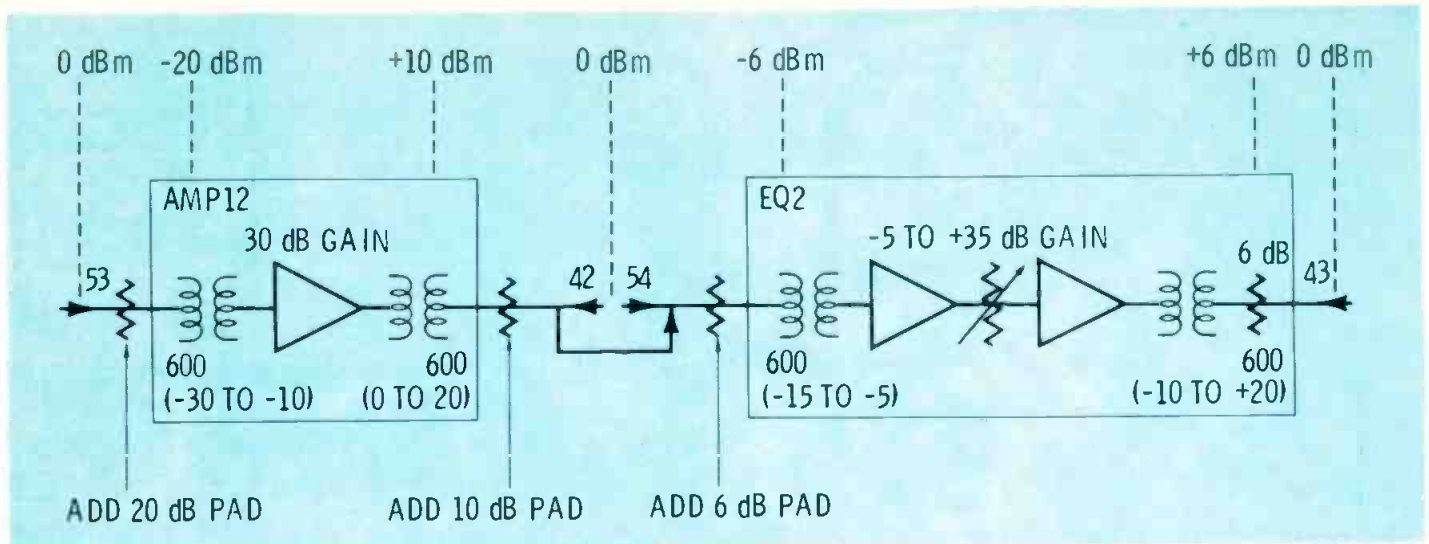


Figure 1 This portion of the block diagram shows levels, impedances and input/output configurations. Pads, transformers, etc. now can be added to complete the system.

## Radio workshop

continued from page 90

Bridging inputs should be kept separate on the patch panel, or at least marked differently. If less than 20,000 ohm bridges are used, calculate the loading on the line to make sure it isn't excessive. Make sure

that a 600 ohm termination appears somewhere on the line.

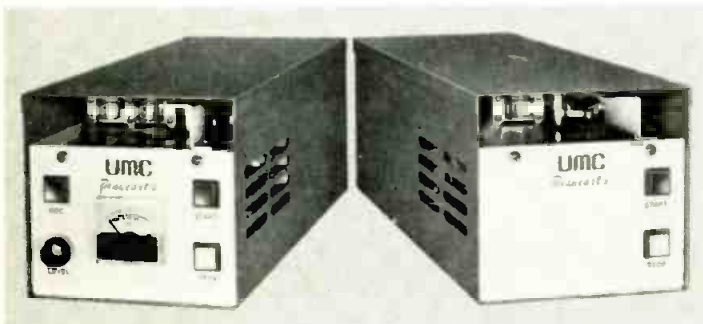
### What have we gained?

The improvements in system performance will vary from subtle to dramatic, depending on the state of the system before you started. In any event, you should see better

system signal-to-noise and headroom, easier operation for the jocks because of better consistency, and the joy of being able to patch without making gross level adjustments.

The time that you spend setting up the system will be saved many times over in future troubleshooting. □

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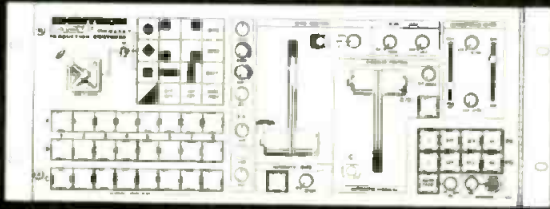
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BROADCAST ENGINEERING

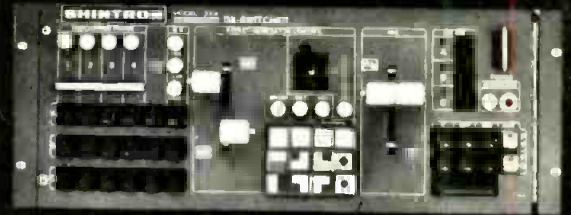


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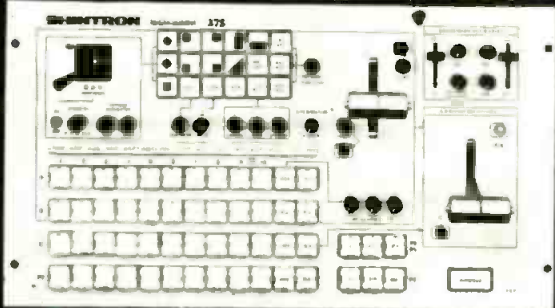
## Production Switchers • Special Effects Generators



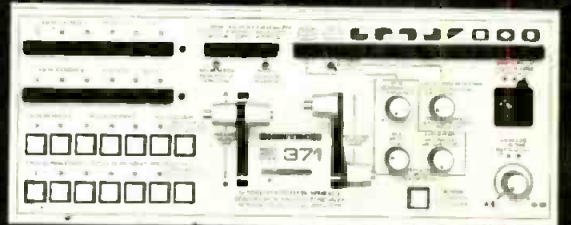
Model 370-Mark III Color Special Effects Generator



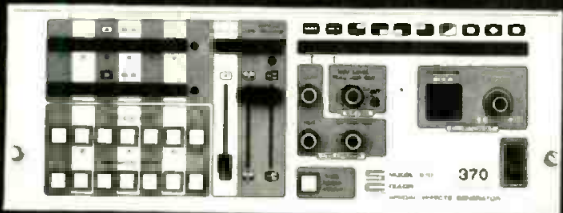
Model 373-DX Chromatic™ Production Switcher



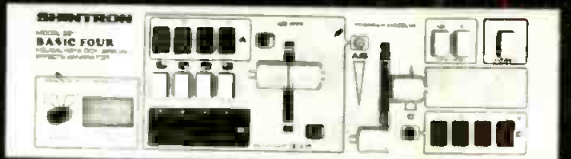
Model 375 Chromatic™ Production Switcher



Model 371 Chromatic™ Special Effects Generator



Model 370-Mark 4 Chromatic™ Special Effects Generator

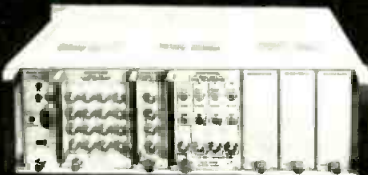


Model 361 Genlock "Basic Four" Switcher • SEG

## Sync Generator and Related Equipment



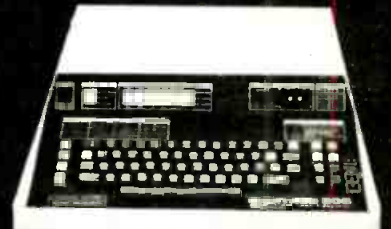
Model 312 Genlock Monochrome Sync Generator



Model 383 (CB) Color Background • Bar • Black Generator

Model 315 Color Sync Generator

## Character Generator



Model 505 Videotypewriter

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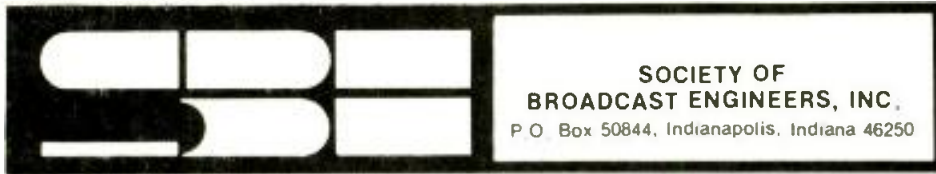
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## Digital technology course available at special rate

The SBE has entered into an agreement with the University of Wisconsin—Extension (UW) whereby SBE members will receive special

low rates for UW's course entitled "Digital Technology for Broadcast Engineers."

This agreement is designed to

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make it easier for SBE members to upgrade their knowledge and expertise in the rapidly expanding area of digital technology. Also, this agreement was made in response to a suggestion made from the floor at the SBE National Membership Meeting in Washington on March 27, 1977.

The UW course consists of 24 lessons. These lessons are taught by use of half-hour videocassettes using the U-matic format, written study guides, text books and lab experiments.

The SBE-UW agreement is in two parts: one applicable to SBE members belonging to chapters; the other for members in areas not included in chapters.

The following is the substance of the agreement between the Society of Broadcast Engineers and the University of Wisconsin - Extension:

### SBE chapters

1. A special rate will be available to SBE members who enroll through a chapter. The cost per SBE enrollee will be \$100 as compared to the normal \$480 for the first student and \$170 for each additional student. To qualify for this rate, there must be at least five enrollees in the chapter.

2. The University of Wisconsin (UW) will pay the SBE chapter \$5 per enrollee to cover expenses associated with publicizing the course and enrolling the members.

3. The participating chapters will be responsible for either procuring a copy of the UW lesson tapes from a source which has them, such as a local PBS outlet, or making a dub from a tape supplied by UW. If UW must supply tapes, the chapters must designate to what person and what station the tapes are to be sent. If a local station provides tape dubbing facilities and desires to enroll employees who are not SBE members, then the \$480 initial fee for that station will be waived by UW and the regular \$170 enrollment fee will apply.

4. Each SBE enrollee will receive a three-volume study guide included with the basic fee. Two text books are also necessary for the course. The cost of these text books is \$16 each or \$32 per set. Ownership of these text books can be useful to each individual enrollee, but one set of the text books can be shared by up to five enrollees if they are in the same general location.

5. A laboratory kit can be supplied by UW for a cost of \$75 or a parts list will be supplied at no

*continued on page 96*



# VIDEO AIDS from VACC

## COLOR GENLOCK SYNC GENERATOR MODEL 5000 OPT: 01

**SPECIFICATIONS MODEL 5000 OPTION: 01 (Helical)**  
Model 5000 Option 01: Helical tape recorder outputs have typically 1000 or more times the frequency variations of broadcast video. This new mode provides a very wide range genlock that is front panel selected to lock to helical recorder playbacks even with  $\pm 1\%$  speed variations,  $\pm 10$  microsecond skew and high amplitude head transition noise.

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## VIDEO D/A MODELS VDA-1, VDA-1P

NEW

The VACC Model VDA-1 is a video distribution amplifier which can be operated from any +12Vdc power supply capable of delivering 70 mA to the VDA-1.

The Model VDA-1P has its own self-contained 12V power supply. No cabinet is included with the VDA-1 or VDA-1P.

These video amplifiers have been designed in mind to install in TBC's and other equipment where additional video outputs or feeds are required.

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## PARTY LINE SYSTEM

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VACC's BPM-1 Option: 02 Burst-Phase Meter and H-Phase Meter is both a low-cost substitute or replacement for most vectroscope applications where burst-phase errors need to be observed and measured. Likewise, the unit is a low-cost substitute for an oscilloscope where H-Phase errors need to be observed and measured.

Price: BPM-1 (cabinet) \$599.00, Option: 02 H-Phase - add \$130.00



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Besides low cost, VACC's Video Line Isolator improves overall performance of your video system by providing better power-line isolation (80 dB) than traditional differential amplifiers.

Price: A-1, A-1A, D-1, D-1A, - \$171.00; VL-1 - \$250.00



## VIDEO AIDS corporation of colorado

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continued from page 94

cost and the enrollee may acquire his own lab parts.

6. It is assumed that the following lab equipment is available:

- (1) Power supplies  $\pm 15$  V at 50 ma  
 $\pm 5$  V at 500 ma
- (2) One oscilloscope - dual trace
- (3) One signal generator - sine and square wave signals - DC offset would be convenient.

7. One person in each chapter is to be appointed to serve as the direct contact with Willis Long at UW. An instructor's guide will be supplied to this person.

**SBE members  
not in chapters**

1. If five or more SBE members who are not members of a chapter

can arrange to group together to take the Digital Technology course, they will be entitled to receive the same deal and the same conditions from UW as that given to members who belong to chapters. The only exception will be that UW will not pay \$5 per member to the local chapter.

2. Individual SBE members may also take the course at reduced rates. The cost for an individual will be \$300 as compared to the regular cost of \$480 for the first enrollee. Additional enrollees who are members of the SBE may take the course at a cost of \$100 each.

3. The additional cost for individual enrollees is due to the wear and tear on the tape, handling charges and shipping charges.

4. UW agrees to send lesson tapes to groups of SBE members or to individual members. Members then have the option of dubbing the tapes and returning the originals to UW or keeping each cassette for two weeks, then returning it, and receiving the next one upon UW's receipt of the first tape. The last option might eliminate the necessity of dubbing.

5. It is understood that groups of SBE members and individual SBE enrollees must return lesson tapes to UW as directed by them prepaid.

SBE Chapters and members desiring to take advantage of this "Digital Technology for Broadcast Engineers" should contact the University of Wisconsin directly. Send all inquiries to: Willis F. Long, Department of Engineering - UW Extension, 432 North Lake Street, Madison, Wisconsin 53706.

**CHAPTER REPORTS**

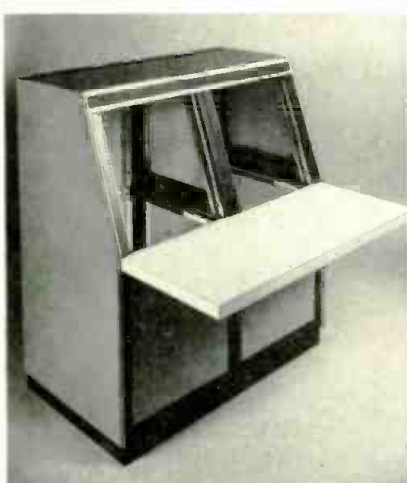
**Chapter 22—Central New York**

The regional convention equipment show will be held September 30 at the Syracuse Hilton Inn, Syracuse, New York. For more information, write: Charles Mulvey, WNYS-TV, Syracuse, New York 13214.

**Chapter 43—Sacramento, California**

Chapter 43 met July 26th for a brief business meeting followed by an excellent program given by Jeff Mendenhall, senior FM transmitter engineer from Harris Corp. in Quincy, Illinois. Mendenhall presented his NAB paper on the new MS-15 Exciter and further described actual circuitry and construction of this equipment. He answered all questions and provided a very busy and interesting two and one-half hours. (Bob Venditti, KRAK/KEWT, 3551 William Way, Sacramento, CA 95821, 916/484-7100.) □

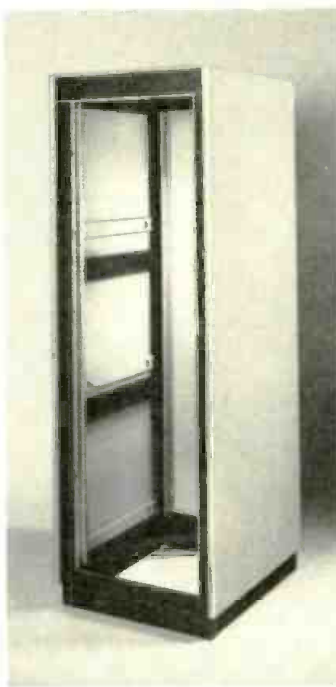
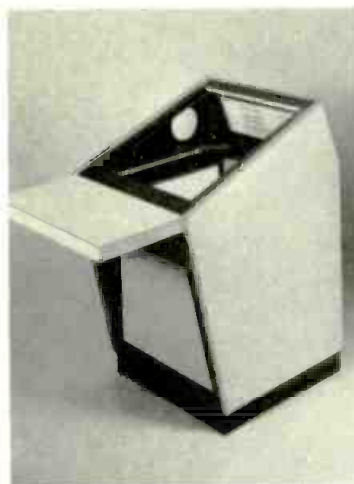
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## TeleMation Announces First-Half Earnings

(SALT LAKE CITY, UTAH)—TeleMation, Inc., reported first-half profit of \$257,000, or 25 cents per share, on revenues of \$4,709,000. This compares to a loss of \$536,000, or 52 cents per share, on revenues of \$4,754,000 for the first half of 1976.

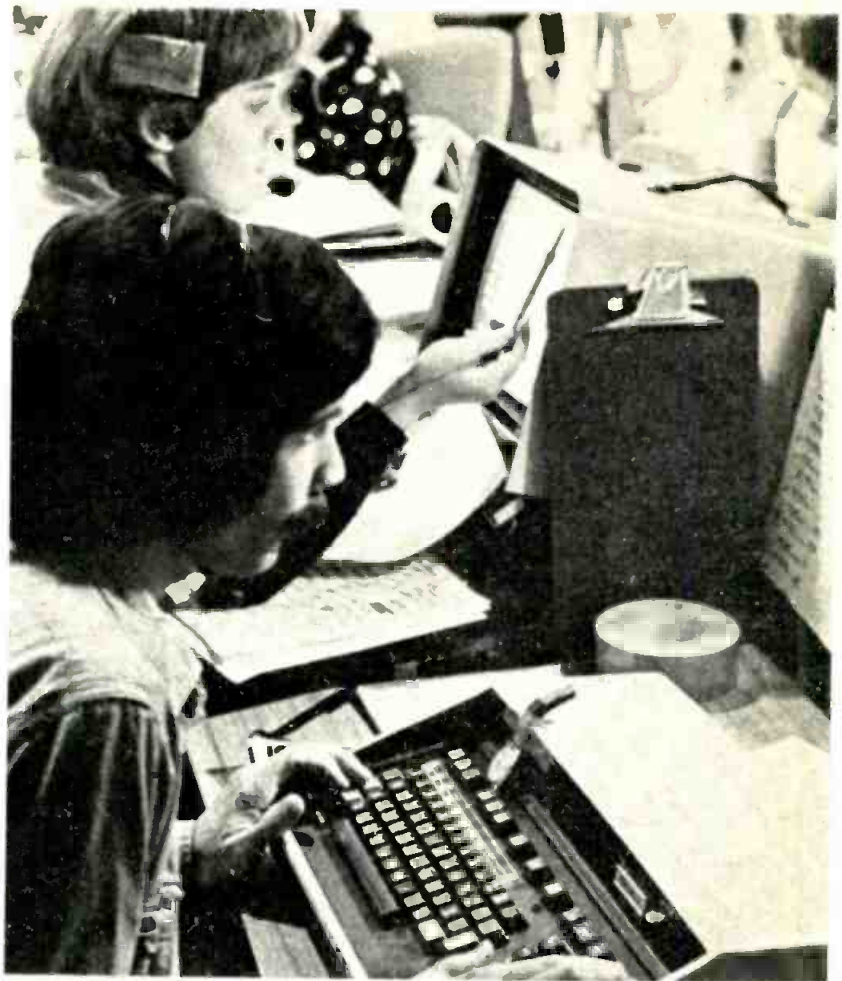
Results for the three-month period ended June 30, 1977 were a net profit of \$213,000, or 21 cents per share, on revenues of \$2,414,000 compared to the loss of \$314,000, or 30 cents per share, on revenues of \$2,339,000 for the three-month period ended June 30, 1976.

The above figures are after extraordinary credits resulting from reduction of taxes by use of a tax loss carry-forward. Profits before the extraordinary credits were \$144,000, or 14 cents per share, for the first half and \$120,000 or 12 cents per share, for the second quarter.

W. Paul Warnock, president of the video equipment manufacturing and television production company, said that the return to profitability in the first half of 1977 was due to the substantially improved performance of the hardware portion of the company's business. "TeleMation Productions, our television production studio in Chicago, continues profitable as in recent years," he stated.

He attributed the improvement in the company's hardware business to a continuing strong demand for the company's principal products and to extensive action taken at year-end 1976 to bring the company's expense level into line with revenues. Mr. Warnock pointed out that backlog at June 30 was \$1.7 million compared to \$2.1 million at December 31, 1976. "The return of our hardware business to profitability has been very gratifying to us at TeleMation. The dedicated efforts of all our employees have made it possible," he said.

TeleMation, Inc. A Salt Lake City based manufacturer of professional television equipment, maintains offices in San Francisco; Minneapolis, Danbury, Connecticut; Washington, D.C.; and London. TeleMation also operates a television commercial production division in Chicago.

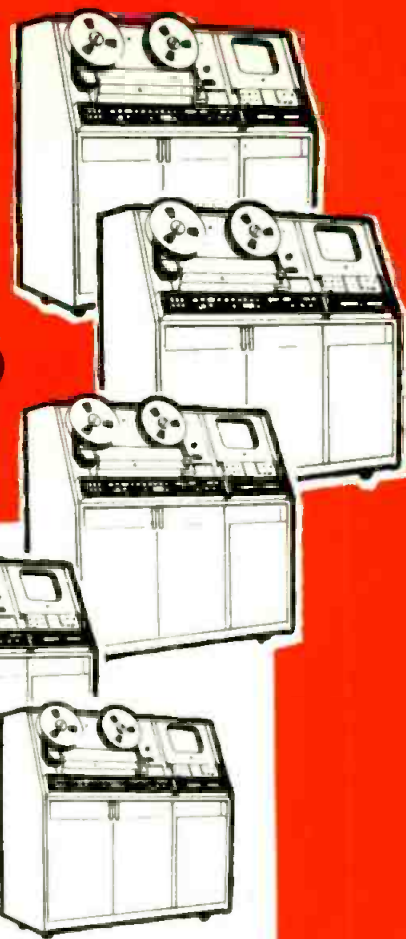


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 **TeleMation**

# Who would buy a "preowned" 2" VTR from AFA?



## TV STATIONS

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WAEO-TV Rhinelander, WI  RCA TR-70C  
WZTV-TV Nashville, TN  AMPEX VR-2000  
WVEC-TV Norfolk, VA  AMPEX VR-2000  
KEVN-TV Rapid City, SD  (2) AMPEX VR-1200's  
WCIX-TV Miami, FL  (2) AMPEX VR-1200's

## PRODUCTION FACILITIES

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National Video Center New York, N.Y.  AMPEX HS-100  
Dolphin Production New York, N.Y.  AMPEX VR-2000  
Innervision Productions St. Louis, MO  AMPEX VR-1200  
Media Stream Lake Charles, LA  (2) AMPEX VR-1200's  
Upstairs Productions Portland, OR  AMPEX VR-1200  
Modern Telecommunications, Inc. New York, N.Y.  AMPEX HS-200

## MANUFACTURERS

Consolidated Video Systems, Inc. Santa Clara, CA  AMPEX VR-2000  
Recortec Inc. Sunnyvale, CA  (2) AMPEX VR-1200's  
Spin Physics, Inc. San Diego, CA  AMPEX VR-1200  
Computer Magnetics Corp. Sunnyvale, CA  AMPEX VR-1200

## INSTITUTIONS

N.Y. Institute of Technology - Video Center N.Y.  AMPEX VR-2000  
Kansas City Baptist Temple Kansas City, MO  AMPEX VR-1200  
National Aeronautics & Space Administration  AMPEX VR-1200  
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# 1977 BROADCAST BUYERS' GUIDE

This is the largest Buyers' Guide edition of Broadcast Engineering ever published. Moreover, it's the largest single issue of Broadcast Engineering ever published in its 18-year history. Reflective of the current healthy state of this industry, the issue carries over 280 pages, and nearly 250 separate advertisers.

Buyers' Guide is designed as a year-'round reference source, a ready guide to virtually everything that's sold in the broadcast/communications marketplace. Special attention has been focused upon assembling these data in the most logical, legible and easy-to-use format as possible. The fundamentals:

**The Product Directory.** On the following pages, you'll find more than 800 categories of broadcast equipment, supplies and services. Under each heading is a complete list of every known supplier of that product. More than 725 different firms are listed this year.

Companies with advertising in this issue are listed in red under each appropriate product heading. These Red Listings include the ad page location, to serve as a direct reference to the product information you are seeking.

Each year, Broadcast Engineering mails extensive questionnaire forms to suppliers around the world. They are asked to identify, by special code number, every product they currently market. In the process, scores of new products and companies are added, while lines that have been phased out—and firms that have left the field—are deleted. Once amassed and assembled, these new data are processed through a unique computer operation, programmed to "read" the code numbers and assigned company names and Red Listings to appropriate product headings.

**A New Coding System.** Dealers or distributors are identified in the Product Directory by the letter "D" after the company name, followed by a numerical code showing the geographical regions (or portion of a region) served. The following chart shows the states included in each region:

1. New England (ME, NH, VT, MA, RI, CT)
2. Middle Atlantic (NY, NJ, PA)
3. East North Central (OH, IN, IL, MI, WI)
4. West North Central (MN, IA, MO, ND, KS, SD, NE)
5. South Atlantic (DE, MD, DC, VA, WV, NC, SC, GA, FL)
6. East South Central (KY, TN, AL, MS)
7. West South Central (AR, LA, OK, TX)
8. Mountain (MT, ID, WY, CO, NM, AZ, UT, NV)
9. Pacific (AK, WA, OR, CA, HI)

**The Master Index of Manufacturers and Suppliers.** Beginning on page 231 you'll find a complete, alphabetized index of mailing addresses for all of the companies listed in the Product Directory. Additional information appears under the index listing for advertisers in this issue: the name and telephone number of the home office sales manager, followed by, in many cases, a roster of regional sales contacts for that firm.

**Reader Service Cards.** For your convenience, multiple Reader Service Cards are bound into this edition. Each card is valid for a full year. By circling the appropriate numbers on the card, you can secure additional information, directly from the advertiser, through August 1978.

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# PRODUCT DIRECTORY

**ATS** --See Automated Transmission Systems

**Alarms, Carrier**

See Adv. Page

**B & I Electronics, Inc.**.....246

B & I Electronics, Inc.  
Hallikainen & Friends, Inc.  
Rivers Associates, Inc.  
Track Audio, Inc. D 1-9  
Video Aids Corp. of Colorado  
The Widget Works, Inc.

**Alarms, Fault**

See Adv. Page

**B & I Electronics, Inc.**.....246

**Delta Electronics Inc.**

(Va.) .....183

**Moseley Assoc. Inc.** ..... 69

B & I Electronics, Inc.  
Belar Electronics Lab., Inc.  
Beta Technology, Inc.  
Bird Electronic Corp.  
Broadcast Automation Assoc. D  
1,2,5,6  
Datalogic-Rust Co.  
Delta Electronics Inc. (Va.)  
Dranetz Engineering Labs., Inc.  
Harris Corp. Broadcast Products Div.  
Hughey & Phillips Inc.  
Moseley Assoc. Inc.  
National Electrolab Ltd.  
North Hills Electronics, Inc.  
Rivers Associates, Inc.  
Telatronics  
Tracor, Inc. Instruments Group

**Alarms, Teletype**

See Adv. Page

**Philips Test & Measuring Instruments, Inc.** ..... 15

Philips Test & Measuring Instruments, Inc.

**Alarms, Teletype Receiver**

B & I Electronics, Inc.  
Moseley Assoc. Inc.  
Sono-Mag Corp.

**Alarms, Tower Light Failure** --

See Tower Light Failure Alarms

**Alarm Systems, Burglar**

Air Space Devices Inc.  
A-Tel-A-Matic  
Delta Products, Inc.  
Emerson-Rittenhouse  
G.C. Electronics  
Emerson-Rittenhouse  
G.C. Electronics  
Heath Co.  
P. R. Mallory & Co. Inc.  
Microwave Assoc. Inc.  
Mountain West Alarm D8  
Telatronics  
Ultra Audio Pixtec  
The Widget Works, Inc.

**Alarm Systems, Fire**

A-Tel-A-Matic  
Delta Products, Inc.  
Emerson-Rittenhouse  
G.C. Electronics  
Heath Company

IGM Div. of Northwestern Tech.  
Microwave Assoc. Inc.  
Mountain West Alarm D8  
Standard Electric Time  
Telatronics  
The Widget Works, Inc.

**Alignment Projectors, TV**

KVC Video Systems Inc. D 1,2

**Amplifier Kits**

Collins Television Services  
Heath Co.  
Opamp Labs, Inc.

**Amplifiers, AF-AGC**

See Adv. Page

**Audio Distributor Inc.** .....247

**BGW Systems Inc.** ..... 58, 59

**Collins Radio**..... 21

**Robins Broadcast & Sound Equip. Corp.** ..... 38

**Russco Electronics Mfg. Inc.** ..... 18

**Sound Dynamics, Inc.** .....226

**Wilkinson Electronics, Inc.** ..... 62

Allied Broadcast Equip. D 1-9  
Altec Sound Products  
Ampro Broadcasting Inc.  
Audio Distributor Inc. D 1-9  
BGW Systems Inc.  
Belar Electronics Lab., Inc.  
Broadcast Automation Assoc. D  
1,2,5,6  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors  
Communication Medias  
Broadcast Equipment & Supply Co. D  
1-9  
Collins Radio Rockwell International  
dbx, Inc.  
Dyma Engineering, Inc.  
Elcom Engineering Co.  
Eventide Clock Works Inc.  
Harris Corp. Broadcast Products Div.  
Inovonics  
Landy Associates Inc. D 1,2  
Lauderdale Electronic Labs  
Marti Electronics  
Martin Audio/Video D2  
McCurdy Radio Ind. Inc.  
Microwave Assoc. Inc.  
Modular Audio Products Unit of  
Modular Devices, Inc.  
Monroe Electronics, Inc.  
Motorola Semiconductor Products, Inc.  
Rupert Neve, Inc.  
Opamp Labs, Inc.  
The Orange County Electronics Corp.  
Ltd.  
Orban/Broadcast  
Quad-Eight Electronics  
RCA Broadcast Systems  
ROH Corporation  
Ramko Research Inc.  
Richmond Sound Design, Ltd.  
Robins Broadcast & Sound Equip.  
Corp.  
Russco Electronics Mfg. Inc.  
Singer Products Co., Inc.  
Sono-Mag Corp.  
Sound Dynamics, Inc. D8, 9  
Sound Genesis D8, 9  
Sphere Electronics  
Stancil-Hoffman Corp.  
Thomson-CSF Laboratories, Inc.  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.  
Yamaha International Corp.

**Amplifiers, AF Compressing**

See Adv. Page

**Inovonics**..... 77

**Moseley Assoc. Inc.** ..... 69

**Robins Broadcast & Sound Equip. Corp.** ..... 38

Allied Broadcast Equip. D 1-9  
Altec Sound Products  
Ampro Broadcasting Inc.  
Automated Processes, Inc.  
Belar Electronics Lab., Inc.  
Bogen Div. Lear Siegler, Inc.  
Broadcast Automation Assoc. D  
1,2,5,6  
Broadcast Communications Devices,  
Inc. D9  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors  
Communication Medias  
Cetec Broadcast Group  
Collins Radio Rockwell International  
dbx, Inc.  
Dyma Engineering, Inc.  
EMT Franz VGmbH  
Elcom Engineering Co.  
Eventide Clock Works Inc.  
Gotham Audio Corp.  
Harris Corp. Broadcast Products Div.  
Inovonics  
LPB Inc.  
Landy Associates Inc. D 1,2  
Lauderdale Electronic Labs  
Marti Electronics  
Martin Audio/Video D2  
McCurdy Radio Ind. Inc.  
Microwave Assoc. Inc.  
Modular Audio Products Unit of  
Modular Devices, Inc.  
Monroe Electronics, Inc.  
Moseley Assoc. Inc.  
Rupert Neve, Inc.  
Opamp Labs, Inc.  
The Orange County Electronics Corp.  
Ltd.  
Orban/Broadcast  
Quad-Eight Electronics  
RCA Broadcast Systems  
ROH Corporation  
Ramko Research Inc.  
Richmond Sound Design, Ltd.  
Robins Broadcast & Sound Equip.  
Corp.  
Russco Electronics Mfg. Inc.  
Shure Brothers Inc.  
Sinai-Johnson  
Singer Products Co., Inc.  
Sono-Mag Corp.  
Sound Dynamics, Inc. D8, 9  
Sound Genesis D8, 9  
Sparta --see Cetec Broadcast Group  
Spectra Sonics  
Sphere Electronics  
Stancil-Hoffman Corp.  
TM Systems, Inc.  
Thomson-CSF Laboratories, Inc.  
Track Audio, Inc. D 1-9  
Tri-Tronics Professional Electronics  
United Recording Electronics  
Industries  
VIF International  
Val-Tronics, Inc. D1-9  
Westlake Audio  
Wilkinson Electronics, Inc.

**Amplifiers, AF General Purpose**

See Adv. Page

**BGW Systems Inc.** ..... 58, 59

**Lenco Inc.** ..... 19

**Russco Electronics Mfg. Inc.** ..... 18

**Yamaha International Corp.** ..... 78

Ailtech  
Allied Broadcast Equip. D 1-9  
Altec Sound Products  
Ampro Broadcasting Inc.  
Audio Designs & Mfg.  
Audio Distributor Inc. D 1-9  
Autogram Corp.  
Automated Processes, Inc.  
BGW Systems Inc.  
Belar Electronics Lab., Inc.  
Bell P/A Prod. Corp.  
Bogen Div. Lear Siegler, Inc.  
Broadcast Automation Assoc. D  
1,2,5,6  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors  
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C-COR Electronics, Inc.  
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Devices  
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Heath Co.  
Holland Electronics  
Industrial Sciences  
International Nuclear Corp.  
Landy Associates Inc. D 1,2  
Lenco Inc. Electronics Div.  
Logitek Electronic Systems  
Marti Electronics  
Martin Audio/Video D2  
McMartin Industries, Inc.  
Micro-Trak Corp.  
Microwave Assoc. Inc.  
Modular Audio Products Unit of  
Modular Devices, Inc.  
Monroe Electronics, Inc.  
Charles Moore  
Motorola Semiconductor Products, Inc.  
Rupert Neve, Inc.  
Norton Associates Inc.  
Opamp Labs, Inc.  
The Orange County Electronics Corp.  
Ltd.  
Oregon Sound D 9  
Paso Sound Products Inc.  
Precision Elect. Inc.  
Pulse Dynamics Mfg. Corp. (PDMC)  
Quad-Eight Electronics  
RCA Broadcast Systems  
ROH Corporation  
RAM Audio Systems, Inc.  
Ramko Research Inc.  
Richmond Sound Design, Ltd.  
Robins Broadcast & Sound Equip.  
Corp.  
Russco Electronics Mfg. Inc.  
Scientific Systems, Inc.  
Sescom, Inc.  
Shure Brothers Inc.  
Sinai-Johnson  
Singer Products Co., Inc.  
Sono-Mag Corp.  
Sound Genesis D8, 9  
Sparta --see Cetec Broadcast Group  
Spectra Sonics  
Sphere Electronics  
Superscope, Inc.  
TEAC Corp of America  
TM Systems, Inc.  
Television and Computer Corp.  
Telex Communications, Inc.  
Track Audio, Inc. D 1-9  
Tri-Tronics Professional Electronics  
Ultra Audio Pixtec



United Recording Electronics Industries  
 Val-Tronics, Inc. D1-9  
 Vamco Engineering  
 Video Aids Corp. of Colorado  
 Ward-Beck Systems, Ltd.  
 Westlake Audio  
 Wilkinson Electronics, Inc.  
 Yamaha International Corp.

**Amplifiers, AF Peak Limiting AM**

Allied Broadcast Equip. D 1-9  
 Altec Sound Products  
 Audio Designs & Mfg.  
 Automated Processes, Inc.  
 Belar Electronics Lab., Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 Cetec Broadcast Group  
 Collins Radio Rockwell International dbx, Inc.  
 Dyma Engineering, Inc.  
 EMT Franz VGmbH  
 Elcom Engineering Co.  
 Eventide Clock Works Inc.  
 Gotham Audio Corp.  
 Harris Corp. Broadcast Products Div.  
 Inovonics  
 LPB Inc.  
 Landy Associates Inc. D 1,2  
 Marti Electronics  
 Martin Audio/Video D2  
 Mastertone Co., Inc.  
 Microwave Assoc. Inc.  
 Moseley Assoc. Inc.  
 Rupert Neve, Inc.  
 The Orange County Electronics Corp. Ltd.  
 Pacific Recorders and Engrg. Corp.  
 RCA Broadcast Systems  
 Singer Products Co., Inc.  
 Sono-Mag Corp.  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Spectra Sonics  
 Thomson-CSF Laboratories, Inc.  
 Track Audio, Inc. D 1-9  
 United Recording Electronics Industries  
 VIF International  
 Val-Tronics, Inc. D1-9  
 Westlake Audio  
 The Widget Works, Inc.  
 Wilkinson Electronics, Inc.

**Amplifiers, AF Peak Limiting FM**

See Adv. Page

Inovonics ..... 77  
 Moseley Assoc. Inc. .... 69

Allied Broadcast Equip. D 1-9  
 Automated Processes, Inc.  
 Belar Electronics Lab., Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 EMT Franz VGmbH  
 Elcom Engineering Co.  
 Gotham Audio Corp.  
 Harris Corp. Broadcast Products Div.  
 Inovonics  
 LPB Inc.  
 Landy Associates Inc. D 1,2

Marti Electronics  
 Martin Audio/Video D2  
 Mastertone Co., Inc.  
 Microwave Assoc. Inc.  
 Moseley Assoc. Inc.  
 The Orange County Electronics Corp. Ltd.  
 Urban/Broadcast  
 Pacific Recorders and Engrg. Corp.  
 RCA Broadcast Systems  
 Singer Products Co., Inc.  
 Sono-Mag Corp.  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Spectra Sonics  
 Thomson-CSF Laboratories, Inc.  
 Track Audio, Inc. D 1-9  
 United Recording Electronics Industries  
 VIF International  
 Val-Tronics, Inc. D1-9  
 The Widget Works, Inc.  
 Wilkinson Electronics, Inc.

**Amplifiers, AF Remote**

Allied Broadcast Equip. D 1-9  
 Altec Sound Products  
 Audio Designs & Mfg.  
 Automated Processes, Inc.  
 Bogen Div. Lear Siegler, Inc.  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Dyma Engineering, Inc.  
 Harris Corp. Broadcast Products Div.  
 Industrial Sciences  
 LPB Inc.  
 McMartin Industries, Inc.  
 Microwave Assoc. Inc.  
 Rupert Neve, Inc.  
 Opamp Labs, Inc.  
 Pulse Dynamics Mfg. Corp. (PDMC)  
 RCA Broadcast Systems  
 Ramko Research Inc.  
 Richmond Sound Design, Ltd.  
 Scientific Systems, Inc.  
 Shure Brothers Inc.  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Television and Computer Corp.  
 Tri-Tronics Professional Electronics  
 Ultra Audio Pixtec  
 Wilkinson Electronics, Inc.

**Amplifiers, AF Reverberation**

Allied Broadcast Equip. D 1-9  
 Altec Sound Products  
 Automated Processes, Inc.  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 Collins Radio Rockwell International dbx, Inc.  
 Dyma Engineering, Inc.  
 Gotham Audio Corp.  
 Landy Associates Inc. D 1,2  
 Lauderdale Electronic Labs  
 MIC-MIX Audio Products, Inc.  
 Microwave Assoc. Inc.  
 Rupert Neve, Inc.  
 Opamp Labs, Inc.  
 Pulse Dynamics Mfg. Corp. (PDMC)  
 Quad-Eight Electronics  
 Robins Broadcast & Sound Equip. Corp.  
 Shure Brothers Inc.  
 Sound Dynamics, Inc. D8, 9  
 Sound Genesis D8, 9  
 Track Audio, Inc. D 1-9  
 Tri-Tronics Professional Electronics  
 Westlake Audio

**Amplifiers, AF Stereo**

See Adv. Page

CCA Electronics Corp. .. 99-106  
 Yamaha International Corp. .... 78

Accurate Sound Co.  
 Allied Broadcast Equip. D 1-9  
 Altec Sound Products  
 Ampro Broadcasting Inc.  
 Autogram Corp.  
 Automated Processes, Inc.  
 BGW Systems Inc.  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Crown International, Inc.  
 dbx, Inc.  
 Dyma Engineering, Inc.  
 Harris Corp. Broadcast Products Div.  
 Heath Co.  
 Landy Associates Inc. D 1,2  
 James B. Lansing Sound, Inc.  
 Logitek Electronic Systems  
 Micro-Trak Corp.  
 Modular Audio Products Unit of Modular Devices, Inc.  
 Motorola Semiconductor Products, Inc.  
 Opamp Labs, Inc.  
 The Orange County Electronics Corp. Ltd.  
 Oregon Sound D 9  
 Precision Elect. Inc.  
 RCA Broadcast Systems  
 ROH Corporation  
 Ram Audio Systems, Inc.  
 Ramko Research Inc.  
 Robins Broadcast & Sound Equip. Corp.  
 Sinai-Johnson  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Spectra Sonics  
 Studer Revox America  
 Superscope, Inc.  
 Telex Communications, Inc.  
 Track Audio, Inc. D 1-9  
 Tri-Tronics Professional Electronics  
 Val-Tronics, Inc. D1-9  
 Westlake Audio  
 Wilkinson Electronics, Inc.  
 Yamaha International Corp.

**Amplifiers, Audio Loop**

Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Equipment Distributors Communication Medias  
 Collins Television Services  
 Dyma Engineering, Inc.  
 Pulse Dynamics Mfg. Corp. (PDMC)  
 Ramko Research Inc.  
 Tri-Tronics Professional Electronics

**Amplifiers, Bridging**

See Adv. Page

Robins Broadcast & Sound Equip. Corp. .... 38

Allied Broadcast Equip. D 1-9  
 Audio Designs & Mfg.  
 Autogram Corp.  
 Automated Processes, Inc.  
 BGW Systems Inc.  
 Blonder-Tongue Labs.  
 Bogen Div. Lear Siegler, Inc.  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Equipment Distributors Communication Medias  
 C-COR Electronics, Inc.  
 Collins Radio Rockwell International  
 Collins Television Services  
 Communications Technology, Inc.  
 Delta Electronics Inc. (N.C.)  
 Dyma Engineering, Inc.

Dynair Electronics, Inc.  
 Gould Inc. Instrument Systems Div.  
 Grass Valley Group, Inc.  
 Industrial Sciences  
 International Nuclear Corp.  
 Kaitronics Corp.  
 James B. Lansing Sound, Inc.  
 Mastertone Co., Inc.  
 Merrill Cable Equipment Corp.  
 Microwave Assoc. Inc.  
 Modular Audio Products Unit of Modular Devices, Inc.  
 Norton Associates Inc.  
 Opamp Labs, Inc.  
 The Orange County Electronics Corp. Ltd.  
 Quad-Eight Electronics  
 RCA Broadcast Systems  
 ROH Corporation  
 Ramko Research Inc.  
 Richmond Hill Laboratories Ltd.  
 Richmond Sound Design, Ltd.  
 Robins Broadcast & Sound Equip. Corp.  
 Scientific-Atlanta, Inc.  
 Scientific Systems, Inc.  
 Sescom, Inc.  
 Shure Brothers Inc.  
 Sono-Mag Corp.  
 Sound Genesis D8, 9  
 Spectra Sonics  
 Superscope, Inc.  
 Television and Computer Corp.  
 3M Co. Mincom Div.  
 Tri-Tronics Professional Electronics  
 Vamco Engineering  
 Winegard Television Systems

**Amplifiers, Clamping**

American Data Div. Philips Broadcast Equip. Corp.  
 Automated Processes, Inc.  
 Broadcast Video Systems, Ltd.  
 Central Dynamics Corp.  
 Di-Tech Inc.  
 Dynair Electronics, Inc.  
 Farinon Electric  
 Grass Valley Group, Inc.  
 Industrial Sciences  
 International Communications & Control Corp.  
 International Nuclear Corp.  
 Kaitronics Corp.  
 Lenco Inc. Electronics Div.  
 Marconi Electronics Inc.  
 Microwave Assoc. Inc.  
 Peirce-Phelps, Inc. D 2, 5  
 RCA Broadcast Systems  
 Richmond Hill Laboratories Ltd.  
 Telemet a Geotel Co.

**Amplifiers, Compressing**

See Adv. Page

**Broadcast Component Dist. Communication Medias** ..... 269  
**Inovonics** ..... 77  
**Moseley Assoc. Inc.** ..... 69  
**Orban/Broadcast** ..... 189  
**Pacific Recorders and Engrg. Corp.** ..... 210  
**Robins Broadcast & Sound Equip. Corp.** ..... 38

Allied Broadcast Equip. D 1-9  
 Audio Distributor Inc. D 1-9  
 Automated Processes, Inc.  
 Bogen Div. Lear Siegler, Inc.  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Elcom Engineering Co.  
 Gotham Audio Corp.  
 Harris Corp. Broadcast Products Div.  
 Inovonics  
 International Microwave Corp.  
 LPB Inc.  
 Marti Electronics

Martin Audio/Video D2  
 Mastertone Co., Inc.  
 Microwave Assoc. Inc.  
 Modular Audio Products Unit of  
 Modular Devices, Inc.  
 Moseley Assoc. Inc.  
 Rupert Neve, Inc.  
 Opamp Labs, Inc.  
 The Orange County Electronics Corp.  
 Ltd.  
 Orban/Broadcast  
 Pacific Recorders and Engrg. Corp.  
 QEI Corp.  
 Quad-Eight Electronics  
 RCA Broadcast Systems  
 Ramko Research Inc.  
 Robins Broadcast & Sound Equip.  
 Corp.  
 Shure Brothers Inc.  
 Sinai-Johnson  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Spectra Sonics  
 Thomson-CSF Laboratories, Inc.  
 Track Audio, Inc. D 1-9  
 Tri-Tronics Professional Electronics  
 United Recording Electronics  
 Industries  
 Westlake Audio

**Amplifiers, DC**

Automated Processes, Inc.  
 Boston Sound & Power Systems  
 C-COR Electronics, Inc.  
 Central Dynamics Corp.  
 Collins Radio Rockwell International  
 Crown International, Inc.  
 Datalogic-Rust Co.  
 Dyma Engineering, Inc.  
 General Electric Co. Tubes/MW  
 Devices  
 Gould Inc. Instrument Systems Div.  
 Harris Corp. Broadcast Products Div.  
 Microwave Assoc. Inc.  
 Modular Audio Products Unit of  
 Modular Devices, Inc.  
 Moseley Assoc. Inc.  
 Motorola Semiconductor Products, Inc.  
 Opamp Labs, Inc.  
 The Orange County Electronics Corp.  
 Ltd.  
 Paso Sound Products Inc.  
 Richmond Sound Design, Ltd.  
 Singer Products Co., Inc.  
 Sound Genesis D8, 9  
 Tektronix Inc.

**Amplifiers, Distribution Audio**

See Adv. Page

**Audio Distributor Inc. .... 247**  
**Broadcast Component**  
**Dist. Communication**  
**Medias..... 269**  
**CCA Electronics Corp. .. 99-106**  
**Di-Tech Inc. .... 263**  
**Ramko Research Inc. .... 91**  
**Robins Broadcast &**  
**Sound Equip. Corp. .... 38**  
**Russco Electronics**  
**Mfg. Inc. .... 18**  
**Shintron Co. Inc. .... 93**  
**VIF International ..... 246**  
**Vamco Engineering ..... 198**  
**Wilkinson Electronics,**  
**Inc. .... 62**

Allied Broadcast Equip. D 1-9  
 American Data Div. Philips Broadcast  
 Equip. Corp.  
 Ampro Broadcasting Inc.  
 Audio Designs & Mfg.  
 Audio Distributor Inc. D 1-9  
 Auditorics, Inc.  
 Automated Processes, Inc.  
 BGW Systems Inc.  
 Bell P/A Prod. Corp.  
 Beta Technology, Inc.  
 Boston Sound & Power Systems  
 Broadcast Automation Assoc. D  
 1,2,5,6  
 Broadcast Communications Devices,  
 Inc. D9

Broadcast Component Dist.  
 Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors  
 Communication Medias  
 Broadcast Equipment & Supply Co. D  
 1-9  
 CCA Electronics Corp.  
 Collins Radio Rockwell International  
 Collins Television Services  
 Communications Technology, Inc.  
 dbx, Inc.  
 Datatek Corp.  
 Di-Tech Inc.  
 Dyma Engineering, Inc.  
 Dynair Electronics, Inc.  
 Farinon Electric  
 Fisher-Burke Broadcast Consultants  
 Harris Corp. Broadcast Products Div.  
 Holland Electronics  
 Industrial Sciences  
 International Communications &  
 Control Corp.  
 LPB Inc.  
 Landy Associates Inc. D 1,2  
 Marconi Electronics Inc.  
 Martin Audio/Video D2  
 Mastertone Co., Inc.  
 Microwave Assoc. Inc.  
 Modular Audio Products Unit of  
 Modular Devices, Inc.  
 Charles Moore  
 Motorola Semiconductor Products, Inc.  
 Rupert Neve, Inc.  
 Opamp Labs, Inc.  
 The Orange County Electronics Corp.  
 Ltd.  
 Pacific Recorders and Engrg. Corp.  
 Peirce-Phelps, Inc. D 2, 5  
 Pulse Dynamics Mfg. Corp. (PDMC)  
 RCA Broadcast Systems  
 ROH Corporation  
 Ram Audio Systems, Inc.  
 Ramko Research Inc.  
 Richmond Sound Design, Ltd.  
 Robins Broadcast & Sound Equip.  
 Corp.

Roscor Corp. D3, 4  
 Russco Electronics Mfg. Inc.  
 Scientific Systems, Inc.  
 Shintron Co. Inc.  
 Sound Genesis D8, 9  
 Spectra Sonics  
 Telatronics  
 TeleMation, Inc.  
 Tele-Measurements, Inc. B-2  
 Telemet a Geotel Co.  
 Television and Computer Corp.  
 Thomson-CSF Laboratories, Inc.  
 Track Audio, Inc. D 1-9  
 Tri-Tronics Professional Electronics  
 VIF International  
 Val-Tronics, Inc. D1-9  
 Vamco Engineering  
 Vital Industries Inc.  
 Ward-Beck Systems, Ltd.  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Amplifiers, Distribution Video**

See Adv. Page

**Central Dynamics**  
**Corp. .... 230**  
**Collins Television**  
**Services ..... 194**  
**DI-Tech Inc. .... 263**  
**Lenco Inc. .... 19**  
**Shintron Co. Inc. .... 93**  
**Vamco Engineering ..... 198**  
**Video Aids Corp. of**  
**Colorado ..... 95**

American Data Div. Philips Broadcast  
 Equip. Corp.  
 Applied Video Electronics, Inc. D 1-9  
 Beta Technology, Inc.  
 Broadcast Communications Devices,  
 Inc. D9  
 Broadcast Video Systems, Ltd.  
 C-COR Electronics, Inc.  
 Central Dynamics Corp.  
 Cohu, Inc. Electronics Div.  
 Collins Television Services  
 Communications Technology, Inc.

Comprehensive Video Supply Corp. D  
 1-9  
 dbx, Inc.  
 Dage-MTI, Inc.  
 Datatek Corp.  
 Di-Tech Inc.  
 Dyma Engineering, Inc.  
 Dynair Electronics, Inc.  
 Dynasciences Div. Whitaker Corp.  
 Farinon Electric  
 Grass Valley Group, Inc.  
 Harris Corp. Broadcast Products Div.  
 Hitachi Denshi America, Ltd.  
 Industrial Sciences  
 International Communications &  
 Control Corp.  
 Javelin Electronics D9  
 KVC Video Systems Inc. D 1,2  
 Landy Associates Inc. D 1,2  
 Leitch Video Ltd.  
 Lenco Inc. Electronics Div.  
 Marconi Electronics Inc.  
 Media Concepts, Inc. D 1-9  
 Merlin Engineering Works, Inc.  
 Microwave Assoc. Inc.  
 Charles Moore  
 Motorola Semiconductor Products, Inc.  
 Panasonic Video Systems Div.  
 Peirce-Phelps, Inc. D 2, 5  
 RCA Broadcast Systems  
 Richmond Hill Laboratories Ltd.  
 Rohde & Schwarz Sales Co.  
 Roscor Corp. D3, 4  
 Scientific Atlanta, Inc.  
 Scientific Systems, Inc.  
 Shintron Co. Inc.  
 Sigma Electronics, Inc.  
 TeleMation, Inc.  
 Tele-Measurements, Inc. B-2  
 Telemet a Geotel Co.  
 Television and Computer Corp.  
 Thomson-CSF Laboratories, Inc.  
 3M Co. Mincom Div.  
 Vamco Engineering  
 Video Aids Corp. of Colorado  
 Viscount Industries Ltd.  
 Vital Industries Inc.

**Amplifiers, FM**

AEL, Inc.  
 Belar Electronics Lab., Inc.  
 Broadcast Component Dist.  
 Communication Medias D 1-9  
 Broadcast Equipment Distributors  
 Communication Medias  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 The Finney Co.  
 Harris Corp. Broadcast Products Div.  
 KVC Video Systems Inc. D 1,2  
 Martin Audio/Video D2  
 McMartin Industries, Inc.  
 RHG Elect Labs, Inc.  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Superscope, Inc.  
 Track Audio, Inc. D 1-9  
 Val-Tronics, Inc. D1-9  
 Winegard Television Systems

**Amplifiers, Keying**

American Data Div. Philips Broadcast  
 Equip. Corp.  
 Broadcast Communications Devices,  
 Inc. D9  
 Broadcast Video Systems, Ltd.  
 Central Dynamics Corp.  
 Communications Technology, Inc.  
 Dyma Engineering, Inc.  
 Industrial Sciences  
 KVC Video Systems Inc. D 1,2  
 Microwave Assoc. Inc.  
 Richmond Hill Laboratories Ltd.  
 Shintron Co. Inc.  
 Thomson-CSF Laboratories, Inc.  
 Video Devices Co.

**Amplifiers, Line**

See Adv. Page

**Broadcast Component**  
**Dist. Communication**  
**Medias..... 269**  
**Opamp Labs, Inc. .... 277**

**Ramko Research Inc. .... 91**  
**Robins Broadcast &**  
**Sound Equip. Corp. .... 38**  
**Russco Electronics**  
**Mfg. Inc. .... 18**  
**Wilkinson Electronics,**  
**Inc. .... 62**

Allied Broadcast Equip. D 1-9  
 American Data Div. Philips Broadcast  
 Equip. Corp.  
 Audio Designs & Mfg.  
 Automated Processes, Inc.  
 Blonder-Tongue Labs.  
 Broadcast Communications Devices,  
 Inc. D9  
 Broadcast Component Dist.  
 Communication Medias D 1-9  
 Broadcast Equipment Distributors  
 Communication Medias  
 C-COR Electronics, Inc.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Collins Television Services  
 Dyma Engineering, Inc.  
 The Finney Co.  
 Harris Corp. Broadcast Products Div.  
 International Communications &  
 Control Corp.  
 KVC Video Systems Inc. D 1,2  
 James B. Lansing Sound, Inc.  
 Marti Electronics  
 McMartin Industries, Inc.  
 Media Concepts, Inc. D 1-9  
 Merrill Cable Equipment Corp.  
 Microwave Assoc. Inc.  
 Modular Audio Products Unit of  
 Modular Devices, Inc.  
 Monroe Electronics, Inc.  
 Charles Moore  
 Rupert Neve, Inc.  
 Opamp Labs, Inc.  
 The Orange County Electronics Corp.  
 Ltd.  
 Pacific Recorders and Engrg. Corp.  
 Pulse Dynamics Mfg. Corp. (PDMC)  
 Quad-Eight Electronics  
 ROH Corporation  
 Ramko Research Inc.  
 Richmond Hill Laboratories Ltd.  
 Richmond Sound Design, Ltd.  
 Robins Broadcast & Sound Equip.  
 Corp.  
 Russco Electronics Mfg. Inc.  
 Sescom, Inc.  
 Shure Brothers Inc.  
 Sono-Mag Corp.  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Spectra Sonics  
 TM Systems, Inc.  
 Telatronics  
 Track Audio, Inc. D 1-9  
 Tri-Tronics Professional Electronics  
 United Recording Electronics  
 Industries  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Amplifiers, Masking**

Bogen Div. Lear Siegler, Inc.  
 Broadcast Communications Devices,  
 Inc. D9  
 Microwave Assoc. Inc.  
 Richmond Sound Design, Ltd.

**Amplifiers, Microphone**

See Adv. Page

**Broadcast Component**  
**Dist. Communication**  
**Medias..... 269**  
**Opamp Labs, Inc. .... 277**  
**Ramko Research Inc. .... 91**  
**Robins Broadcast &**  
**Sound Equip. Corp. .... 38**

Audio Designs & Mfg.  
 Autogram Corp.  
 Automated Processes, Inc.  
 Broadcast Communications Devices,  
 Inc. D9  
 Broadcast Component Dist.  
 Communication Medias D 1-9



Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors  
 Communication Medias  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Collins Television Services  
 dbx, Inc.  
 Dyma Engineering, Inc.  
 Gotham Audio Corp.  
 Holland Electronics  
 International Communications &  
 Control Corp.  
 KVC Video Systems Inc. D 1,2  
 Landy Associates Inc. D 1,2  
 McMartin Industries, Inc.  
 Media Concepts, Inc. D 1-9  
 Micro-Trak Corp.  
 Modular Audio Products Unit of  
 Modular Devices, Inc.  
 Nagra Magnetic Recorders, Inc.  
 Rupert Neve, Inc.  
 Norton Associates Inc.  
 Opamp Labs, Inc.  
 Oregon Sound D 9  
 Peirce-Phelps, Inc. D 2, 5  
 Quad-Eight Electronics  
 RTS Systems  
 Ramko Research Inc.  
 Richmond Sound Design, Ltd.  
 Robins Broadcast & Sound Equip.  
 Corp.  
 SESCO, Inc.  
 Shintron Co. Inc.  
 Sinai-Johnson  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Sphere Electronics  
 TEAC Corp of America  
 Track Audio, Inc. D 1-9  
 Ultra Audio Pixtec  
 Westlake Audio

**Amplifiers, Mixing**

See Adv. Page

**Broadcast Component  
 Dist. Communication  
 Medias.....269**  
**Robins Broadcast &  
 Sound Equip. Corp. .... 38**  
**Russco Electronics  
 Mfg. Inc. .... 18**

Allied Broadcast Equip. D 1-9  
 American Data Div. Philips Broadcast  
 Equip. Corp.  
 Ampro Broadcasting Inc.  
 Audio Designs & Mfg.  
 Autogram Corp.  
 Automated Processes, Inc.  
 Bell P/A Prod. Corp.  
 Bogen Div. Lear Siegler, Inc.  
 Broadcast Communications Devices,  
 Inc. D9  
 Broadcast Component Dist.  
 Communication Medias D 1-9  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors  
 Communication Medias  
 Broadcast Video Systems, Ltd.  
 Central Dynamics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Collins Television Services  
 Communications Technology, Inc.  
 Dage-MTI, Inc.  
 Dyma Engineering, Inc.  
 Grass Valley Group, Inc.  
 Holland Electronics  
 KVC Video Systems Inc. D 1,2  
 James B. Lansing Sound, Inc.  
 Mastertone Co., Inc.  
 McMartin Industries, Inc.  
 Media Concepts, Inc. D 1-9  
 Micro-Trak Corp.  
 Microwave Assoc. Inc.  
 Modular Audio Products Unit of  
 Modular Devices, Inc.  
 Charles Moore  
 Motorola Semiconductor Products, Inc.  
 Nagra Magnetic Recorders, Inc.  
 Rupert Neve, Inc.  
 Opamp Labs, Inc.  
 The Orange County Electronics Corp.  
 Ltd.  
 Oregon Sound D 9

Panasonic Video Systems Div.  
 Peirce-Phelps, Inc. D 2, 5  
 Pulse Dynamics Mfg. Corp. (PDMC)  
 Quad-Eight Electronics  
 RCA Broadcast Systems  
 ROH Corporation  
 Ramko Research Inc.  
 Richmond Hill Laboratories Ltd.  
 Richmond Sound Design, Ltd.  
 Robins Broadcast & Sound Equip.  
 Corp.  
 Russco Electronics Mfg. Inc.  
 Shure Brothers Inc.  
 Sinai-Johnson  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Spectra Sonics  
 TEAC Corp of America  
 Track Audio, Inc. D 1-9  
 Ultra Audio Pixtec  
 Westlake Audio

**Amplifiers, Monitor**

See Adv. Page

**Broadcast Component  
 Dist. Communication  
 Medias.....269**  
**Di-Tech Inc. ....263**  
**Robins Broadcast &  
 Sound Equip. Corp. .... 38**  
**Russco Electronics  
 Mfg. Inc. .... 18**  
**Wilkinson Electronics,  
 Inc. .... 62**

Allied Broadcast Equip. D 1-9  
 American Data Div. Philips Broadcast  
 Equip. Corp.  
 Ampro Broadcasting Inc.  
 Audio Designs & Mfg.  
 Autogram Corp.  
 Automated Processes, Inc.  
 Belar Electronics Lab., Inc.  
 Bell P/A Prod. Corp.  
 Bogen Div. Lear Siegler, Inc.  
 Broadcast Communications Devices,  
 Inc. D9  
 Broadcast Component Dist.  
 Communication Medias D 1-9  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors  
 Communication Medias  
 Broadcast Equipment & Supply Co. D  
 1-9  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Collins Television Services  
 Crown International, Inc.  
 dbx, Inc.  
 Di-Tech Inc.  
 Dyma Engineering, Inc.  
 Farinon Electric  
 Harris Corp. Broadcast Products Div.  
 International Communications &  
 Control Corp.  
 KVC Video Systems Inc. D 1,2  
 Landy Associates Inc. D 1,2  
 James B. Lansing Sound, Inc.  
 Logitek Electronic Systems  
 Marti Electronics  
 Mastertone Co., Inc.  
 McMartin Industries, Inc.  
 Media Concepts, Inc. D 1-9  
 Microwave Assoc. Inc.  
 Modular Audio Products Unit of  
 Modular Devices, Inc.  
 Charles Moore  
 Nagra Magnetic Recorders, Inc.  
 Narda Microwave Corp.  
 National Electrolab Ltd.  
 Rupert Neve, Inc.  
 Opamp Labs, Inc.  
 The Orange County Electronics Corp.  
 Ltd.  
 Panasonic Video Systems Div.  
 Quad-Eight Electronics  
 RCA Broadcast Systems  
 ROH Corporation  
 Ramko Research Inc.  
 Robins Broadcast & Sound Equip.  
 Corp.  
 Russco Electronics Mfg. Inc.  
 Scientific Systems, Inc.  
 Shintron Co. Inc.  
 Sound Genesis D8, 9

Sparta --see Cetec Broadcast Group  
 Spectra Sonics  
 Superscope, Inc.  
 TEAC Corp of America  
 Telatronics  
 TeleMation, Inc.  
 Television and Computer Corp.  
 Track Audio, Inc. D 1-9  
 Tri-Tronics Professional Electronics  
 Val-Tronics, Inc. D1-9  
 Ward-Beck Systems, Ltd.  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Amplifiers, Operational**

See Adv. Page

**Robins Broadcast &  
 Sound Equip. Corp. .... 38**

Amperex Electronic Corp.  
 Automated Processes, Inc.  
 Dyma Engineering, Inc.  
 Gotham Audio Corp.  
 Holland Electronics  
 Modular Audio Products Unit of  
 Modular Devices, Inc.  
 Charles Moore  
 Motorola Semiconductor Products, Inc.  
 Opamp Labs, Inc.  
 The Orange County Electronics Corp.  
 Ltd.  
 Quad-Eight Electronics  
 Richmond Sound Design, Ltd.  
 Robins Broadcast & Sound Equip.  
 Corp.  
 Singer Products Co., Inc.  
 Sphere Electronics  
 Tektronix Inc.  
 Track Audio, Inc. D 1-9

**Amplifiers, Power**

See Adv. Page

**BGW Systems Inc. .... 58, 59**  
**Broadcast Component  
 Dist. Communication  
 Medias.....269**  
**Opamp Labs, Inc.....277**  
**M. Palmer &  
 Associates.....274**  
**Robins Broadcast &  
 Sound Equip. Corp. .... 38**  
**Yamaha International  
 Corp. .... 78**

Acrodyne Industries Inc.  
 Aiken Industries Inc.  
 Ailtech  
 Allied Broadcast Equip. D 1-9  
 American Data Div. Philips Broadcast  
 Equip. Corp.  
 Automated Processes, Inc.  
 BGW Systems Inc.  
 Belar Electronics Lab., Inc.  
 Bell P/A Prod. Corp.  
 Bogen Div. Lear Siegler, Inc.  
 Broadcast Communications Devices,  
 Inc. D9  
 Broadcast Component Dist.  
 Communication Medias D 1-9  
 Broadcast Equipment Distributors  
 Communication Medias  
 Broadcast Equipment & Supply Co. D  
 1-9  
 CCA Electronics Corp.  
 C-COR Electronics, Inc.  
 Ceco Communications Inc.  
 Collins Radio Rockwell International  
 Continental Electronics Mfg. Co.  
 Crown International, Inc.  
 Dyma Engineering, Inc.  
 Electro Sound, Inc.  
 Farinon Electric  
 John Fluke Mfg. Co., Inc.  
 Harris Corp. Broadcast Products Div.  
 Harris Corp. PRD Electronics Div.  
 Holland Electronics  
 International Microwave Corp.  
 KVC Video Systems Inc. D 1,2  
 James B. Lansing Sound, Inc.  
 Martin Audio/Video D2  
 McMartin Industries, Inc.  
 Media Concepts, Inc. D 1-9

Modular Audio Products Unit of  
 Modular Devices, Inc.  
 Motorola Semiconductor Products, Inc.  
 Nagra Magnetic Recorders, Inc.  
 North American Radio Corp.  
 Opamp Labs, Inc.  
 The Orange County Electronics Corp.  
 Ltd.  
 Oregon Sound D 9  
 M. Palmer & Associates  
 Paso Sound Products Inc.  
 Precision Elect. Inc.  
 Pulse Dynamics Mfg. Corp. (PDMC)  
 Quad-Eight Electronics  
 RCA Broadcast Systems  
 ROH Corporation  
 Ram Audio Systems, Inc.  
 Ramko Research Inc.  
 Robins Broadcast & Sound Equip.  
 Corp.  
 SESCO, Inc.  
 Shure Brothers Inc.  
 Sinai-Johnson  
 Sound Genesis D8, 9  
 Spectra Sonics  
 Studer Revox America  
 Superscope, Inc.  
 TEAC Corp of America  
 Telex Communications, Inc.  
 Ward-Beck Systems, Ltd.  
 Westlake Audio  
 Yamaha International Corp.

**Amplifiers, Processing Audio**

See Adv. Page

**Inovonics..... 77**  
**International Electro-  
 Magnetics ..... 184**  
**M. Palmer &  
 Associates..... 276**

Inovonics  
 International Electro-Magnetics  
 M. Palmer & Associates

**Amplifiers, Processing Video**

See Adv. Page

**Central Dynamics  
 Corp. ....230**  
**Dynasciences ..... 14**  
**Elcom Engineering Co. ....275**  
**Lenco Inc. .... 19**

Broadcast Communications Devices,  
 Inc. D9  
 Broadcast Video Systems, Ltd.  
 Central Dynamics Corp.  
 Cohu, Inc. Electronics Div.  
 dbx, Inc.  
 Dage-MTI, Inc.  
 Dyma Engineering, Inc.  
 Dynasciences Div. Whitaker Corp.  
 Elcom Engineering Co.  
 Grass Valley Group, Inc.  
 Harris Corp. Broadcast Products Div.  
 Industrial Sciences  
 KVC Video Systems Inc. D 1,2  
 Landy Associates Inc. D 1,2  
 Leitch Video Ltd.  
 Lenco Inc. Electronics Div.  
 Marconi Electronics Inc.  
 Media Concepts, Inc. D 1-9  
 Microwave Assoc. Inc.  
 Charles Moore  
 Peirce-Phelps, Inc. D 2, 5  
 RCA Broadcast Systems  
 Richmond Hill Laboratories Ltd.  
 Roscor Corp. D3, 4  
 Shintron Co. Inc.  
 Sigma Electronics, Inc.  
 Tektronix Inc.  
 Teledynamics  
 TeleMation, Inc.  
 Thomson-CSF Laboratories, Inc.  
 3M Co. Mincom Div.  
 Vital Industries Inc.

**Amplifiers, Pulse**

See Adv. Page

**Central Dynamics  
 Corp. ....230**

<b>Collins Television Services</b> .....	194
<b>Di-Tech Inc.</b> .....	263
<b>Dynasciences</b> .....	14
<b>Lenco Inc.</b> .....	19
<b>Shintron Co. Inc.</b> .....	93

American Data Div. Philips Broadcast Equip. Corp.  
 Applied Video Electronics, Inc. D 1-9  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Video Systems, Ltd.  
 C-COR Electronics, Inc.  
 Central Dynamics Corp.  
 Cohu, Inc. Electronics Div.  
 Collins Television Services dbx, Inc.  
 Datatek Corp.  
 Di-Tech Inc.  
 Dyma Engineering, Inc.  
 Dynair Electronics, Inc.  
 Dynasciences Div. Whitaker Corp.  
 General Electric Co. Tubes/MW Devices  
 Grass Valley Group, Inc.  
 Harris Corp. Broadcast Products Div.  
 Industrial Sciences  
 International Nuclear Corp.  
 KVC Video Systems Inc. D 1,2  
 Kaitronics Corp.  
 Landy Associates Inc. D 1,2  
 Leitch Video Ltd.  
 Lenco Inc. Electronics Div.  
 Marconi Electronics Inc.  
 Microwave Assoc. Inc.  
 Charles Moore  
 Motorola Semiconductor Products, Inc.  
 Panasonic Video Systems Div.  
 Peirce-Phelps, Inc. D 2, 5  
 RCA Broadcast Systems  
 RHG Elect Labs, Inc.  
 Richmond Hill Laboratories Ltd.  
 Roscor Corp. D3, 4  
 Scientific Systems, Inc.  
 Shintron Co. Inc.  
 Sigma Electronics, Inc.  
 Tektronix Inc.  
 TeleMation, Inc.  
 Tele-Measurements, Inc. B-2  
 Telemet a Geotel Co.  
 Television and Computer Corp.  
 Thomson-CSF Laboratories, Inc.  
 3M Co. Mincom Div.  
 Video Aids Corp. of Colorado  
 Vital Industries Inc.

**Amplifiers, Pulse Delay**

See Adv. Page

<b>Collins Television Services</b> .....	194
<b>Di-Tech Inc.</b> .....	263
<b>Lenco Inc.</b> .....	19

American Data Div. Philips Broadcast Equip. Corp.  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Video Systems, Ltd.  
 Central Dynamics Corp.  
 Cohu, Inc. Electronics Div.  
 Collins Television Services  
 Di-Tech Inc.  
 Dyma Engineering, Inc.  
 Grass Valley Group, Inc.  
 Industrial Sciences  
 KVC Video Systems Inc. D 1,2  
 Leitch Video Ltd.  
 Lenco Inc. Electronics Div.  
 Microwave Assoc. Inc.  
 Peirce-Phelps, Inc. D 2, 5  
 Richmond Hill Laboratories Ltd.  
 Sigma Electronics, Inc.  
 TeleMation, Inc.  
 Tele-Measurements, Inc. B-2

**Amplifiers, Quad**

See Adv. Page

<b>Robins Broadcast &amp; Sound Equip. Corp.</b> .....	38
--	----

Dyma Engineering, Inc.

Robins Broadcast & Sound Equip. Corp.

**Amplifiers, Remote**

See Adv. Page

<b>Broadcast Consultants Corp.</b> .....	86
<b>Wilkinson Electronics, Inc.</b> .....	62

Allied Broadcast Equip. D 1-9  
 Belar Electronics Lab., Inc.  
 Broadcast Component Dist.  
 Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors  
 Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Dyma Engineering, Inc.  
 Martin Audio/Video D2  
 McMartin Industries, Inc.  
 Media Concepts, Inc. D 1-9  
 Micro-Trak Corp.  
 Microwave Assoc. Inc.  
 Pulse Dynamics Mfg. Corp. (PDMC)  
 RCA Broadcast Systems  
 Ramko Research Inc.  
 Richmond Sound Desgn, Ltd.  
 Shure Brothers Inc.  
 Sparta --see Cetec Broadcast Group  
 Tri-Tronics Professional Electronics  
 Ultra Audio Pixtec  
 Wilkinson Electronics, Inc.

**Amplifiers, RF General Purpose**

See Adv. Page

<b>National Electrolab Ltd.</b> .....	266
<b>Wilkinson Electronics, Inc.</b> .....	62

AEL, Inc.  
 Acrodyne Industries Inc.  
 Ailtech  
 Allied Broadcast Equip. D 1-9  
 Belar Electronics Lab., Inc.  
 Blonder-Tongue Labs.  
 C-COR Electronics, Inc.  
 CSI Electronics, Inc.  
 Continental Electronics Mfg. Co.  
 Fisher-Burke Broadcast Consultants  
 General Electric Co. Tubes/MW Devices  
 International Microwave Corp.  
 Kay Elemetrics Corp.  
 McMartin Industries, Inc.  
 Merrill Cable Equipment Corp.  
 Microwave Assoc. Inc.  
 Motorola Semiconductor Products, Inc.  
 Narda Microwave Corp.  
 National Electrolab Ltd.  
 North American Radio Corp.  
 RHG Elect Labs, Inc.  
 Rodelco Corp.  
 Rolane Sales Corp.  
 Singer Instrumentation  
 Singer Products Co., Inc.  
 Sound Genesis D8, 9  
 Television Technology Corp.  
 Wide Band Engineering Co., Inc.  
 Wilkinson Electronics, Inc.  
 Winegard Television Systems

**Amplifiers, RF Peak Limiting**

Broadcast Communications Devices, Inc. D9  
 Harris Corp. Broadcast Products Div.  
 International Microwave Corp.  
 Lauderdale Electronic Labs  
 Microwave Assoc. Inc.  
 Narda Microwave Corp.  
 RCA Broadcast Systems  
 Superscope, Inc.  
 Thomson-CSF Laboratories, Inc.  
 Track Audio, Inc. D 1-9  
 Wilkinson Electronics, Inc.

**Amplifiers, RF Power**

See Adv. Page

<b>Howe-Yin Research Co. Inc.</b> .....	259
<b>Moseley Assoc. Inc.</b> .....	69
<b>National Electrolab Ltd.</b> .....	266

AEL, Inc.  
 Acrodyne Industries Inc.  
 Ailtech  
 Belar Electronics Lab., Inc.  
 Blonder-Tongue Labs.  
 CCA Electronics Corp.  
 C-COR Electronics, Inc.  
 CSI Electronics, Inc.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Continental Electronics Mfg. Co.  
 EIMAC Div. of Varian  
 EMCEE Broadcast Products  
 Fisher-Burke Broadcast Consultants  
 Harris Corp. Broadcast Products Div.  
 Harris Corp. PRD Electronics Div.  
 Howe-Yin Research Co. Inc.  
 International Microwave Corp.  
 Marconi Communication Systems Ltd.  
 McMartin Industries, Inc.  
 Microwave Assoc. Inc.  
 Moseley Assoc. Inc.  
 Motorola Semiconductor Products, Inc.  
 National Electrolab Ltd.  
 North American Radio Corp.  
 QEI Corp.  
 Rohde & Schwarz Sales Co.  
 Rolane Sales Corp.  
 Scientific Radio Systems, Inc.  
 Singer Products Co., Inc.  
 Sintronic Corp.  
 Sparta --see Cetec Broadcast Group  
 Television Technology Corp.  
 Townsend Associates, Inc.  
 Wilkinson Electronics, Inc.  
 Winegard Television Systems

**Amplifiers, Sensing**

Broadcast Component Dist.  
 Communication Medias D 1-9  
 Broadcast Equipment Distributors  
 Communication Medias  
 Mastertone Co., Inc.  
 Microwave Assoc. Inc.  
 Moseley Assoc. Inc.  
 Motorola Semiconductor Products, Inc.

**Amplifiers, Stabilizing**

Central Dynamics Corp.  
 Dyma Engineering, Inc.  
 Grass Valley Group, Inc.  
 International Nuclear Corp.  
 KVC Video Systems Inc. D 1,2  
 Lenco Inc. Electronics Div.  
 Marconi Electronics Inc.  
 Microwave Assoc. Inc.  
 Telemet a Geotel Co.

**Amplifiers, Stereo Booster**

See Adv. Page

<b>Robins Broadcast &amp; Sound Equip. Corp.</b> .....	38
--	----

Dyma Engineering, Inc.  
 The Orange County Electronics Corp. Ltd.  
 Oregon Sound D 9  
 Ram Audio Systems, Inc.  
 Robins Broadcast & Sound Equip. Corp.

**Amplifiers, Stereo Limiter**

See Adv. Page

<b>Moseley Assoc. Inc.</b> .....	69
<b>Robins Broadcast &amp; Sound Equip. Corp.</b> .....	38

Allied Broadcast Equip. D 1-9  
 Automated Processes, Inc.  
 BGW Systems Inc.  
 Broadcast Automation Assoc. D 1,2,5,6

Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist.  
 Communication Medias D 1-9  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors  
 Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 Cetec Broadcast Group  
 Collins Radio Rockwell International dbx, Inc.  
 Dyma Engineering, Inc.  
 Fisher-Burke Broadcast Consultants  
 Gotham Audio Corp.  
 Harris Corp. Broadcast Products Div.  
 Inovonics  
 LPB Inc.  
 Landy Associates Inc. D 1,2  
 Martin Audio/Video D2  
 Mastertone Co., Inc.  
 Microwave Assoc. Inc.  
 Moseley Assoc. Inc.  
 Rupert Neve, Inc.  
 The Orange County Electronics Corp. Ltd.  
 Oregon Sound D 9  
 QEI Corp.  
 RCA Broadcast Systems  
 ROH Corporation  
 Ramko Research Inc.  
 Robins Broadcast & Sound Equip. Corp.  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Thomson-CSF Laboratories, Inc.  
 Track Audio, Inc. D 1-9  
 United Recording Electronics Industries  
 Val-Tronics, Inc. D1-9  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Amplifiers, TV Video**

See Adv. Page

<b>Acrodyne Industries Inc.</b> .....	188
<b>Lenco Inc.</b> .....	19

AEL, Inc.  
 Acrodyne Industries Inc.  
 Belar Electronics Lab., Inc.  
 Blonder-Tongue Labs.  
 Broadcast Video Systems, Ltd.  
 C-COR Electronics, Inc.  
 Central Dynamics Corp.  
 Collins Television Services dbx, Inc.  
 Dage-MTI, Inc.  
 Datatek Corp.  
 Delta Electronics Inc. (N.C.)  
 Dyma Engineering, Inc.  
 Dynair Electronics, Inc.  
 Dynasciences Div. Whitaker Corp.  
 Fung Engineering Inc.  
 Grass Valley Group, Inc.  
 Howe-Yin Research Co. Inc.  
 Industrial Sciences  
 International Nuclear Corp.  
 Javelin Electronics D9  
 KVC Video Systems Inc. D 1,2  
 Kay Elemetrics Corp.  
 Landy Associates Inc. D 1,2  
 Leitch Video Ltd.  
 Lenco Inc. Electronics Div.  
 Marconi Electronics Inc.  
 Media Concepts, Inc. D 1-9  
 Microwave Assoc. Inc.  
 Motorola Semiconductor Products, Inc.  
 Panasonic Video Systems Div.  
 Peirce-Phelps, Inc. D 2, 5  
 RCA Broadcast Systems  
 RCA Community Television Systems  
 Sigma Electronics, Inc.  
 Singer Products Co., Inc.  
 Tektronix Inc.  
 Telemet a Geotel Co.  
 Thomson-CSF Laboratories, Inc.  
 3M Co. Mincom Div.  
 Vamco Engineering  
 Video Aids Corp. of Colorado

**Amplifiers, Video Sweep**

C-COR Electronics, Inc.  
 KVC Video Systems Inc. D 1,2



Kay Elemetrics Corp.  
Lenco Inc. Electronics Div.  
Microwave Assoc. Inc.  
Tektronix Inc.

### Amplifiers, Zero Studio Delay

Grass Valley Group, Inc.  
Lenco Inc. Electronics Div.  
Microwave Assoc. Inc.  
Sigma Electronics, Inc.

### Analysis Forms

Lauderdale Electronic Labs

### Analzers, Audio System

See Adv. Page

**Potomac Instruments,  
Inc. .... 251**

*Potomac Instruments, Inc.*

### Analzers, Distortion

See Adv. Page

**The London Co. .... 256**  
**Sound Technology ..... 47**

Allied Broadcast Equip. D 1-9  
Amber Electro Design, Ltd.  
B & K Instruments Inc.  
Broadcast Electronics, Inc.  
Collins Radio Rockwell International  
Crown International, Inc.  
Dyma Engineering, Inc.  
Fisher-Burke Broadcast Consultants  
Frequency Devices Inc.  
Harris Corp. Broadcast Products Div.  
Heath Co.  
Ivie Electronics  
Leader Instruments Corp.  
The London Co.  
Marconi Instruments  
Potomac Instruments, Inc.  
Rohde & Schwarz Sales Co.  
Sound Technology  
TM Systems, Inc.  
Tektronix Inc.

### Analzers, Harmonic

See Adv. Page

**Sound Technology ..... 47**

Amber Electro Design, Ltd.  
B & K Instruments Inc.  
Fisher-Burke Broadcast Consultants  
Harris Corp. Broadcast Products Div.  
Ivie Electronics  
Leader Instruments Corp.  
The London Co.  
Marconi Instruments  
Potomac Instruments, Inc.  
Rohde & Schwarz Sales Co.  
Singer Instrumentation  
Sound Technology  
Tektronix Inc.

### Analzers, Insertion Signal

See Adv. Page

**Marconi Instruments ..... 11**

Marconi Instruments

### Analzers, Intermodulation

See Adv. Page

**The London Co. .... 256**  
**Sound Technology ..... 47**

Allied Broadcast Equip. D 1-9  
Amber Electro Design, Ltd.  
B & K Instruments Inc.  
Crown International, Inc.  
Fisher-Burke Broadcast Consultants  
Heath Co.  
The London Co.  
Marconi Instruments  
Potomac Instruments, Inc.  
Rohde & Schwarz Sales Co.

Sound Technology  
Tektronix Inc.

### Analzers, RF Network

Alford Mfg. Co.  
Harris Corp. PRD Electronics Div.  
Rohde & Schwarz Sales Co.  
Singer Instrumentation  
Singer Products Co., Inc.  
Tektronix Inc.  
Wide Band Engineering Co., Inc.

### Analzers, Sideband

See Adv. Page

**Telemet ..... 79**

Harris Corp. Broadcast Products Div.  
Kahn Communications, Inc.  
Marconi Instruments  
Rohde & Schwarz Sales Co.  
Singer Instrumentation  
Tektronix Inc.  
Telemet a Geotel Co.

### Analzers, Spectrum

See Adv. Page

**Telemet ..... 79**

Ailtech  
Altec Sound Products  
Amber Electro Design, Ltd.  
Audio Designs & Mfg.  
B & K Instruments Inc.  
Harris Corp. Broadcast Products Div.  
Ivie Electronics  
Kahn Communications, Inc.  
Kay Elemetrics Corp.  
Marconi Instruments  
Philips Test & Measuring Instruments,  
Inc.  
Ram Audio Systems, Inc.  
Rohde & Schwarz Sales Co.  
Singer Instrumentation  
Singer Products Co., Inc.  
Systron-Donner  
Tektronix Inc.  
Telemet a Geotel Co.  
Texscan Corp.  
Track Audio, Inc. D 1-9

### Analzers, Video

See Adv. Page

**Marconi Instruments ..... 11**

**Philips Test &  
Measuring  
Instruments, Inc. .... 15**

B & K Precision Dynascan Corp.  
Colorado Video Inc.  
Imero Fiorentino Associates, Inc.  
Harris Corp. Broadcast Products Div.  
Marconi Instruments  
Philips Test & Measuring Instruments,  
Inc.  
Rohde & Schwarz Sales Co.  
Sencore Inc.  
Tektronix Inc.  
Telemet a Geotel Co.

### Antenna Alignment Systems, Microwave

Innovative Television Equipment, Inc.  
Micro Communications, Inc.  
Nurad, Inc.  
Scientific-Atlanta, Inc.  
Varian/Beverly Micro-Link Products

### Antenna and Tower Guys

See Adv. Page

**Philadelphia Resins  
Corp. .... 20**

Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
G.C. Electronics  
Jampro --see Cetec Broadcast Group

Magnum Towers, Inc.  
Philadelphia Resins Corp.  
Stainless, Inc.  
Swager Tower Corp.  
Unarco-Rohn Div. of Unarco Ind., Inc.  
United Radio Supply Inc. D9

### Antenna and Tower Installation and Services

AEL, Inc.  
Broadcast Consultants Corp. D5, 6  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Fisher-Burke Broadcast Consultants  
Fort Worth Tower Co., Inc.  
Harris Corp. Broadcast Products Div.  
Jampro --see Cetec Broadcast Group  
Marconi Communication Systems Ltd.  
Micro Communications, Inc.  
Oldham Tower Systems  
Prodelin Inc.  
RCA Broadcast Systems  
Stainless, Inc.  
Swager Tower Corp.  
Tiner Communications Service, Inc.  
Unarco-Rohn Div. of Unarco Ind., Inc.

### Antenna Baluns, RF Dry

See Adv. Page

**Dielectric  
Communications Div.  
Sola Basic, Inc. .... 165**

**Electro Impulse, Inc. .... 268**

**Phelps Dodge  
Communications Co. .... 16**

Dielectric Communications Div. Sola  
Basic, Inc.  
Electro Impulse, Inc.  
Pacific Recorders and Engrg. Corp.  
Phelps Dodge Communications Co.  
Potomac Instruments, Inc.  
Scala Radio Corp.

### Antenna Dummy Loads

See Adv. Page

**CCA Electronics Corp. .. 99-106**

**Dielectric  
Communications Div.  
Sola Basic, Inc. .... 165**

**Electro Impulse, Inc. .... 268**

**Wilkinson Electronics,  
Inc. .... 62**

Bird Electronic Corp.  
Broadcast Consultants Corp. D5, 6  
CCA Electronics Corp.  
C. S. P. Inc.  
Collins Radio Rockwell International  
Continental Electronics Mfg. Co.  
Dielectric Communications Div. Sola  
Basic, Inc.  
Dyma Engineering, Inc.  
Electro Impulse, Inc.  
Fisher-Burke Broadcast Consultants  
Leader Instruments Corp.  
Marconi Communication Systems Ltd.  
Marconi Electronics Inc.  
Maury Microwave Corp.  
Micro Communications, Inc.  
Pacific Recorders and Engrg. Corp.  
RCA Broadcast Systems  
Rex Rheostat & Co., Inc.  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

### Antenna Heater Controls

Cetec Broadcast Group  
Collins Radio Rockwell International  
Fisher-Burke Broadcast Consultants  
Jampro --see Cetec Broadcast Group  
Micro-Trak Corp.  
Val-Tronics, Inc. D1-9

### Antenna Ice Warning Systems

Cetec Broadcast Group  
Collins Radio Rockwell International  
Jampro --see Cetec Broadcast Group  
Micro-Trak Corp.

RCA Broadcast Systems  
Val-Tronics, Inc. D1-9  
The Widget Works, Inc.

### Antenna Remote Indicators

See Adv. Page

**Dielectric  
Communications Div.  
Sola Basic, Inc. .... 165**

Collins Radio Rockwell International  
Dielectric Communications Div. Sola  
Basic, Inc.  
Fisher-Burke Broadcast Consultants

### Antenna RF Current Controllers

See Adv. Page

**Delta Electronics Inc.  
(Va.) .... 183**

Delta Electronics Inc. (Va.)

### Antenna Sampling Systems

C. S. P. Inc.  
Cablewave Systems Inc.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Delta Electronics Inc. (Va.)  
Elcom Engineering Co.  
Fisher-Burke Broadcast Consultants  
Geleco Electronics Ltd.  
Harris Corp. Broadcast Products Div.  
Moseley Assoc. Inc.  
Multronics, Inc.  
North American Radio Corp.

### Antenna Systems

See Adv. Page

**Collins Radio ..... 21**  
**Nurad, Inc. .... 221**

Alford Mfg. Co.  
Andrew Corp.  
Anixter-Mark  
Bogner Broadcast Equipment Corp.  
CCA Electronics Corp.  
C. S. P. Inc.  
Cablewave Systems Inc.  
Ceco Communications Inc.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Continental Electronics Mfg. Co.  
Delta Electronics Inc. (Va.)  
Dielectric Communications Div. Sola  
Basic, Inc.  
The Finney Co.  
Fisher-Burke Broadcast Consultants  
G.C. Electronics  
Geleco Electronics Ltd.  
Harris Corp. Broadcast Products Div.  
Jampro --see Cetec Broadcast Group  
KVC Video Systems Inc. D 1,2  
Marco Video Systems, Inc. D 2,5  
Marconi Communication Systems Ltd.  
Mastertone Co., Inc.  
Micro Communications, Inc.  
Microwave Assoc. Inc.  
Multronics, Inc.  
Nurad, Inc.  
Pacific Recorders and Engrg. Corp.  
Phelps Dodge Communications Co.  
Prodelin Inc.  
RCA Broadcast Systems  
RF Systems, Inc.  
Rohde & Schwarz Sales Co.  
Rolane Sales Corp.  
Scala Radio Corp.  
Shively Laboratories, Inc.  
Singer Products Co., Inc.  
Sitco Antenna Co.  
Winegard Television Systems

### Antenna Tuning Units

CCA Electronics Corp.  
CSI Electronics, Inc.  
C. S. P. Inc.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Continental Electronics Mfg. Co.

Dielectric Communications Div. Sola Basic, Inc.  
 Dyma Engineering, Inc.  
 Eicom Engineering Co.  
 G.C. Electronics  
 Geleco Electronics Ltd.  
 Harris Corp. Broadcast Products Div.  
 Jampro --see Cetec Broadcast Group  
 Maury Microwave Corp.  
 Micro Communications, Inc.  
 Multronics, Inc.  
 North American Radio Corp.  
 Pacific Recorders and Engrg. Corp.  
 RCA Broadcast Systems  
 Sintronic Corp.  
 Val-Tronics, Inc. D1-9  
 Wilkinson Electronics, Inc.

**Antenna VSWR Indicators**

See Adv. Page

**Dielectric Communications Div. Sola Basic, Inc. ....165**  
**Moseley Assoc. Inc. .... 69**

Bird Electronic Corp.  
 CSI Electronics, Inc.  
 Cetec Broadcast Group  
 Delta Electronics Inc. (Va.)  
 Dielectric Communications Div. Sola Basic, Inc.  
 Dyma Engineering, Inc.  
 Jampro --see Cetec Broadcast Group  
 Leader Instruments Corp.  
 Micro Communications, Inc.  
 Moseley Assoc. Inc.  
 Pacific Recorders and Engrg. Corp.  
 Sencore Inc.

**Antennas, Directional System**

See Adv. Page

**Nurad, Inc. ....221**

Alford Mfg. Co.  
 Bogner Broadcast Equipment Corp.  
 Broadcast Consultants Corp. D5, 6  
 CSI Electronics, Inc.  
 C. S. P. Inc.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Continental Electronics Mfg. Co.  
 Dielectric Communications Div. Sola Basic, Inc.  
 The Finney Co.  
 Fisher-Burke Broadcast Consultants  
 Geleco Electronics Ltd.  
 Harris Corp. Broadcast Products Div.  
 Innovative Television Equipment, Inc.  
 Jampro --see Cetec Broadcast Group  
 Magnum Towers, Inc.  
 Micro Communications, Inc.  
 Multronics, Inc.  
 Nurad, Inc.  
 Pacific Recorders and Engrg. Corp.  
 RCA Broadcast Systems  
 RF Systems, Inc.  
 Rohde & Schwarz Sales Co.  
 Scala Radio Corp.  
 Shively Laboratories, Inc.

**Antennas, Receiving FM**

See Adv. Page

**Communications, Ltd. ....270**  
**Sound Dynamics, Inc. ....226**

Anixter-Mark  
 Belar Electronics Lab., Inc.  
 Catel Div. United Scientific Corp.  
 Communications, Ltd.  
 The Finney Co.  
 G.C. Electronics  
 Harris Corp. Broadcast Products Div.  
 McMartin Industries, Inc.  
 Micro Communications, Inc.  
 RF Systems, Inc.  
 Rohde & Schwarz Sales Co.  
 Scala Radio Corp.  
 Scientific-Atlanta, Inc.  
 Sitco Antenna Co.  
 Sound Dynamics, Inc. D8, 9  
 Winegard Television Systems

**Antennas, Receiving LF**

Anixter-Mark  
 John Fluke Mfg. Co., Inc.  
 KVC Video Systems Inc. D 1,2  
 McKay Dymek Co.  
 Rohde & Schwarz Sales Co.

**Antennas, Receiving MF**

Anixter-Mark  
 Belar Electronics Lab., Inc.  
 KVC Video Systems Inc. D 1,2  
 McKay Dymek Co.  
 Rohde & Schwarz Sales Co.  
 Singer Products Co., Inc.

**Antennas, Receiving UHF**

See Adv. Page

**Nurad, Inc. ....221**

Anixter-Mark  
 Blonder-Tongue Labs.  
 EMCEE Broadcast Products  
 The Finney Co.  
 G.C. Electronics  
 Heath Co.  
 Micro Communications, Inc.  
 Nurad, Inc.  
 Peirce-Phelps, Inc. D 2, 5  
 Phelps Dodge Communications Co.  
 Prodelin Inc.  
 RF Systems, Inc.  
 Rohde & Schwarz Sales Co.  
 Rolane Sales Corp.  
 Scala Radio Corp.  
 Scientific-Atlanta, Inc.  
 Singer Products Co., Inc.  
 Sitco Antenna Co.  
 Winegard Television Systems

**Antennas, Receiving VHF**

See Adv. Page

**Nurad, Inc. ....221**

Anixter-Mark  
 Blonder-Tongue Labs.  
 Communications, Ltd.  
 EMCEE Broadcast Products  
 The Finney Co.  
 G.C. Electronics  
 Heath Co.  
 Micro Communications, Inc.  
 Nurad, Inc.  
 Peirce-Phelps, Inc. D 2, 5  
 Phelps Dodge Communications Co.  
 Prodelin Inc.  
 RF Systems, Inc.  
 Rohde & Schwarz Sales Co.  
 Rolane Sales Corp.  
 Scala Radio Corp.  
 Scientific-Atlanta, Inc.  
 Sitco Antenna Co.  
 Winegard Television Systems

**Antennas, Receiving Microwave**

See Adv. Page

**Anixter-Mark ....184**  
**Nurad, Inc. ....221**

Andrew Corp.  
 Anixter-Mark  
 Bogner Broadcast Equipment Corp.  
 Broadcast Consultants Corp. D5, 6  
 Cablewave Systems Inc.  
 Dyma Engineering, Inc.  
 Engineering Associates  
 Farinon Electric  
 Mastertone Co., Inc.  
 Maury Microwave Corp.  
 Micro Communications, Inc.  
 Microwave Assoc. Inc.  
 Nurad, Inc.  
 Prodelin Inc.  
 RF Systems, Inc.  
 Rohde & Schwarz Sales Co.  
 Scientific-Atlanta, Inc.  
 Singer Products Co., Inc.  
 TerraCom

**Antennas, Remote Pickup**

See Adv. Page

**CCA Electronics Corp. .. 99-106**

Allied Broadcast Equip. D 1-9  
 Andrew Corp.  
 Anixter-Mark  
 Belar Electronics Lab., Inc.  
 Bogner Broadcast Equipment Corp.  
 Broadcast Consultants Corp. D5, 6  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Dyma Engineering, Inc.  
 Farinon Electric  
 Mastertone Co., Inc.  
 McMartin Industries, Inc.  
 Micro Communications, Inc.  
 Moseley Assoc. Inc.  
 Nurad, Inc.  
 Scala Radio Corp.  
 Scientific-Atlanta, Inc.  
 Sparta --see Cetec Broadcast Group  
 Wilkinson Electronics, Inc.

**Antennas, Remote Transmitting, Radio**

See Adv. Page

**Broadcast Component Dist. Communication Medias.....269**  
**CCA Electronics Corp. .. 99-106**

Allied Broadcast Equip. D 1-9  
 Broadcast Component Dist.  
 Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 Dielectric Communications Div. Sola Basic, Inc.  
 Dyma Engineering, Inc.  
 Farinon Electric  
 Pacific Recorders and Engrg. Corp.  
 Sparta --see Cetec Broadcast Group  
 Winegard Television Systems

**Antennas, STL**

See Adv. Page

**Nurad, Inc. ....221**

Allied Broadcast Equip. D 1-9  
 Andrew Corp.  
 Anixter-Mark  
 Broadcast Consultants Corp. D5, 6  
 Cablewave Systems Inc.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Contel Mfg.  
 Dielectric Communications Div. Sola Basic, Inc.  
 Dyma Engineering, Inc.  
 Harris Corp. Broadcast Products Div.  
 Mastertone Co., Inc.  
 McMartin Industries, Inc.  
 Micro Communications, Inc.  
 Micro Control Associates, Inc.  
 Moseley Assoc. Inc.  
 Nurad, Inc.  
 Pacific Recorders and Engrg. Corp.  
 Prodelin Inc.  
 RCA Broadcast Systems  
 Scala Radio Corp.  
 Singer Products Co., Inc.  
 Sparta --see Cetec Broadcast Group  
 Swager Tower Corp.  
 TerraCom  
 Val-Tronics, Inc. D1-9  
 Wilkinson Electronics, Inc.

**Antennas, Transmitting FM**

See Adv. Page

**Bogner Broadcast Equipment Corp. ....212**  
**Broadcast Component Dist. Communication Medias.....269**  
**CCA Electronics Corp. .. 99-106**

**Phelps Dodge Communications Co. ....16**  
**Sound Dynamics, Inc. ....226**

Alford Mfg. Co.  
 Allied Broadcast Equip. D 1-9  
 Bogner Broadcast Equipment Corp.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Component Dist.  
 Communication Medias D 1-9  
 Broadcast Specialties  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Dielectric Communication's Div. Sola Basic, Inc.  
 Dyma Engineering, Inc.  
 Harris Corp. Broadcast Products Div.  
 Jampro --see Cetec Broadcast Group  
 LPB Inc.  
 Marconi Communication Systems Ltd.  
 Mastertone Co., Inc.  
 Maze Corp D6  
 McMartin Industries, Inc.  
 Micro Communications, Inc.  
 Pacific Recorders and Engrg. Corp.  
 Phelps Dodge Communications Co.  
 RCA Broadcast Systems  
 Rohde & Schwarz Sales Co.  
 Scala Radio Corp.  
 Shively Laboratories, Inc.  
 Singer Products Co., Inc.  
 Sintronic Corp.  
 Sound Dynamics, Inc. D8, 9  
 Val-Tronics, Inc. D1-9  
 Wilkinson Electronics, Inc.

**Antennas, Transmitting LF**

CCA Electronics Corp.  
 Cetec Broadcast Group  
 Continental Electronics Mfg. Co.  
 Dielectric Communications Div. Sola Basic, Inc.  
 Jampro --see Cetec Broadcast Group  
 Marconi Communication Systems Ltd.  
 Micro Communications, Inc.  
 Pacific Recorders and Engrg. Corp.  
 Stainless, Inc.

**Antennas, Transmitting MF**

Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Continental Electronics Mfg. Co.  
 Dielectric Communications Div. Sola Basic, Inc.  
 Dyma Engineering, Inc.  
 Jampro --see Cetec Broadcast Group  
 Marconi Communication Systems Ltd.  
 Marconi Electronics Inc.  
 McMartin Industries, Inc.  
 Pacific Recorders and Engrg. Corp.  
 Rohde & Schwarz Sales Co.  
 Shively Laboratories, Inc.

**Antennas, Transmitting UHF**

See Adv. Page

**Bogner Broadcast Equipment Corp. ....212**  
**Nurad, Inc. ....221**

Acrodyne Industries Inc.  
 Alford Mfg. Co.  
 Andrew Corp.  
 Anixter-Mark  
 Bogner Broadcast Equipment Corp.  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Dielectric Communications Div. Sola Basic, Inc.  
 Dyma Engineering, Inc.  
 EMCEE Broadcast Products  
 Harris Corp. Broadcast Products Div.  
 Jampro --see Cetec Broadcast Group  
 Marconi Communication Systems Ltd.  
 Marconi Electronics Inc.  
 Micro Communications, Inc.  
 Nurad, Inc.  
 Pacific Recorders and Engrg. Corp.  
 Phelps Dodge Communications Co.  
 Prodelin Inc.  
 RCA Broadcast Systems



Rohde & Schwarz Sales Co.  
 Rolane Sales Corp.  
 Scala Radio Corp.  
 Shively Laboratories, Inc.  
 Sitco Antenna Co.

**Antennas, Transmitting  
 UHF/VHF, Circularly Polarized**

See Adv. Page

**Bogner Broadcast  
 Equipment Corp. ....212**  
**CCA Electronics Corp. .. 99-106**  
**Cetec Broadcast Group ..... 5**

Alford Mfg. Co.  
 Bogner Broadcast Equipment Corp.  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 Dielectric Communications Div. Sola  
 Basic, Inc.  
 Dyma Engineering, Inc.  
 Jampro --see Cetec Broadcast Group  
 Pacific Recorders and Engrg. Corp.  
 RCA Broadcast Systems

**Antennas, Transmitting VHF**

See Adv. Page

**Bogner Broadcast  
 Equipment Corp. ....212**  
**CCA Electronics Corp. .. 99-106**  
**Nurad, Inc. ....221**

Acrodyne Industries Inc.  
 Alford Mfg. Co.  
 Anixter-Mark  
 Bogner Broadcast Equipment Corp.  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Dielectric Communications Div. Sola  
 Basic, Inc.  
 Dyma Engineering, Inc.  
 EMCEE Broadcast Products  
 Harris Corp. Broadcast Products Div.  
 Jampro --see Cetec Broadcast Group  
 Marconi Communication Systems Ltd.  
 Marconi Electronics Inc.  
 Micro Communications, Inc.  
 Nurad, Inc.  
 Pacific Recorders and Engrg. Corp.  
 Phelps Dodge Communications Co.  
 Prodelin Inc.  
 RCA Broadcast Systems  
 Rohde & Schwarz Sales Co.  
 Rolane Sales Corp.  
 Scala Radio Corp.  
 Shively Laboratories, Inc.  
 Singer Products Co., Inc.  
 Sitco Antenna Co.

**Antennas, Transmitting  
 Microwave**

See Adv. Page

**Anixter-Mark .....184**  
**Nurad, Inc. ....221**

Alford Mfg. Co.  
 Andrew Corp.  
 Anixter-Mark  
 Bogner Broadcast Equipment Corp.  
 Cablewave Systems Inc.  
 Collins Radio Rockwell International  
 Dyma Engineering, Inc.  
 Farinon Electric  
 Marconi Communication Systems Ltd.  
 Mastertone Co., Inc.  
 Micro Communications, Inc.  
 Micro Control Associates, Inc.  
 Microwave Assoc. Inc.  
 Nurad, Inc.  
 Prodelin Inc.  
 RF Systems, Inc.  
 Rohde & Schwarz Sales Co.  
 Scientific-Atlanta, Inc.  
 Singer Products Co., Inc.  
 TerraCom  
 Val-Tronics, Inc. D1-9

**Antennas, TV Earth Station**

See Adv. Page

**Nurad, Inc. ....221**

Andrew Corp.  
 Dyma Engineering, Inc.  
 Farinon Electric  
 Hughes Microwave Communication  
 Products  
 Marconi Communication Systems Ltd.  
 Nurad, Inc.  
 Prodelin Inc.  
 RF Systems, Inc.  
 Scientific-Atlanta, Inc.  
 TerraCom

**Arms, Tone**

See Adv. Page

**Broadcast Component  
 Dist. Communication  
 Medias.....269**  
**Broadcast Consultants  
 Corp. ....83, 84**  
**CCA Electronics Corp. .. 99-106**  
**McCurdy Radio Ind.  
 Inc. ....IBC**  
**Micro-Trak Corp. ....260**  
**Sound Dynamics, Inc. ....226**

Allied Broadcast Equip. D 1-9  
 Ampro Broadcasting Inc.  
 Broadcast Automation Assoc. D  
 1,2,5,6  
 Broadcast Communications Devices,  
 Inc. D9  
 Broadcast Component Dist.  
 Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors  
 Communication Medias  
 Broadcast Equipment & Supply Co. D  
 1-9  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Dyma Engineering, Inc.  
 EMT Franz VGmbH  
 Harris Corp. Broadcast Products Div.  
 LPB Inc.  
 Mastertone Co., Inc.  
 McCurdy Radio Ind. Inc.  
 Micro-Trak Corp.  
 Oregon Sound D 9  
 Peirce-Phelps, Inc. D 2, 5  
 Professional Audio Service  
 QRK Electronic Products  
 Rek-O-Kut Inc.  
 Russco Electronics Mfg. Inc.  
 Shure Brothers Inc.  
 Singer Products Co., Inc.  
 Sound Dynamics, Inc. D8, 9  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Stanton Magnetics Inc.  
 Val-Tronics, Inc. D1-9  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Attenuators, Audio**

See Adv. Page

**Shallco, Inc. ....263**  
**Tech Laboratories Inc. ....276**

Allen Avionics  
 Allied Broadcast Equip. D 1-9  
 Alltec Sound Products  
 Ampro Broadcasting Inc.  
 Audio Designs & Mfg.  
 Audio Distributor Inc. D 1-9  
 Automated Processes, Inc.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Duncan Electronics, Inc.  
 Dyma Engineering, Inc.  
 Gotham Audio Corp.  
 Harris Corp. Broadcast Products Div.  
 Kay Elemetrics Corp.  
 Kings Electronics Co., Inc.  
 Lauderdale Electronic Labs  
 Leader Instruments Corp.

Marconi Instruments  
 The Orange County Electronics Corp.  
 Ltd.

Potomac Instruments, Inc.  
 Quad-Eight Electronics  
 ROH Corporation  
 Richmond Sound Design, Ltd.  
 Roblins Broadcast & Sound Equip.  
 Corp.  
 Rohde & Schwarz Sales Co.  
 Sescom, Inc.  
 Shallco, Inc.  
 Shure Brothers Inc.  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Spectra Sonics  
 Tech Laboratories Inc.  
 Texscan Corp.  
 Waters Mfg. Inc.  
 Weinschel Engineering Co.  
 Westlake Audio

**Attenuators, Fixed**

See Adv. Page

**Electro Impulse, Inc. ....268**  
**Shallco, Inc. ....263**  
**Tech Laboratories Inc. ....276**

Allen Avionics  
 Bird Electronic Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Comark Industries Inc.  
 Dielectric Communications Div. Sola  
 Basic, Inc.  
 Electro Impulse, Inc.  
 The Finney Co.  
 Harris Corp. Broadcast Products Div.  
 Harris Corp. PRD Electronics Div.  
 Holland Electronics  
 Kay Elemetrics Corp.  
 Kings Electronics Co., Inc.  
 Lauderdale Electronic Labs  
 Maury Microwave Corp.  
 Merrill Cable Equipment Corp.  
 Narda Microwave Corp.  
 The Orange County Electronics Corp.  
 Ltd.  
 Pacific Recorders and Engrg. Corp.  
 Rohde & Schwarz Sales Co.  
 Shallco, Inc.  
 Sparta --see Cetec Broadcast Group  
 Tech Laboratories Inc.  
 Tektronix Inc.  
 Telonic Altair  
 Texscan Corp.  
 Trompeter Electronics  
 Waters Mfg. Inc.  
 Weinschel Engineering Co.

**Attenuators, Impedance  
 Matching**

See Adv. Page

**Electro Impulse, Inc. ....268**  
**Shallco, Inc. ....263**  
**Tech Laboratories Inc. ....276**

Alford Mfg. Co.  
 Allen Avionics  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Dielectric Communications Div. Sola  
 Basic, Inc.  
 Electro Impulse, Inc.  
 Harris Corp. Broadcast Products Div.  
 Holland Electronics  
 Kay Elemetrics Corp.  
 Lauderdale Electronic Labs  
 Maury Microwave Corp.  
 Merrill Cable Equipment Corp.  
 Narda Microwave Corp.  
 North Hills Electronics, Inc.  
 Pacific Recorders and Engrg. Corp.  
 Rohde & Schwarz Sales Co.  
 Sescom, Inc.  
 Shallco, Inc.  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Tech Laboratories Inc.  
 Tektronix Inc.  
 Texscan Corp.  
 Waters Mfg. Inc.  
 Weinschel Engineering Co.

**Attenuators, Microwave**

See Adv. Page

**Electro Impulse, Inc. ....268**  
**Shallco, Inc. ....263**  
**Tech Laboratories Inc. ....276**

Coaxial Dynamics  
 Comark Industries Inc.  
 Dielectric Communications Div. Sola  
 Basic, Inc.  
 Electro Impulse, Inc.  
 Harris Corp. PRD Electronics Div.  
 Kay Elemetrics Corp.  
 Kings Electronics Co., Inc.  
 Maury Microwave Corp.  
 Microwave Assoc. Inc.  
 Narda Microwave Corp.  
 Pacific Recorders and Engrg. Corp.  
 Rohde & Schwarz Sales Co.  
 Shallco, Inc.  
 Singer Instrumentation  
 Singer Products Co., Inc.  
 Systron-Donner  
 Tech Laboratories Inc.  
 Tektronix Inc.  
 Telonic Altair  
 Texscan Corp.  
 Waters Mfg. Inc.  
 Weinschel Engineering Co.

**Attenuators, RF**

See Adv. Page

**Electro Impulse, Inc. ....268**  
**Shallco, Inc. ....263**  
**Tech Laboratories Inc. ....276**

Alford Mfg. Co.  
 Bird Electronic Corp.  
 Coaxial Dynamics  
 Comark Industries Inc.  
 Dielectric Communications Div. Sola  
 Basic, Inc.  
 Electro Impulse, Inc.  
 Harris Corp. Broadcast Products Div.  
 Harris Corp. PRD Electronics Div.  
 Holland Electronics  
 Kahn Communications, Inc.  
 Kay Elemetrics Corp.  
 Kings Electronics Co., Inc.  
 Marconi Instruments  
 Merrill Cable Equipment Corp.  
 Micro Communications, Inc.  
 Microwave Assoc. Inc.  
 Pacific Recorders and Engrg. Corp.  
 Rohde & Schwarz Sales Co.  
 Shallco, Inc.  
 Singer Instrumentation  
 Singer Products Co., Inc.  
 Systron-Donner  
 Tech Laboratories Inc.  
 Tektronix Inc.  
 Telonic Altair  
 Texscan Corp.  
 Waters Mfg. Inc.  
 Weinschel Engineering Co.  
 Winegard Television Systems

**Audio Stacks, Rebuilt or  
 Rebuilding Services for VTR**

Computer Magnetics Corp.  
 International Electro-Magnetics  
 Minneapolis Magnetics, Inc.  
 Taber Mfg. & Engr. Co.  
 Videomax Div. Orrox Corp.

**Automated Transmission  
 Systems (ATS)**

See Adv. Page

**CCA Electronics Corp. .. 99-106**  
**Marti Electronics .....57**  
**Moseley Assoc. Inc. ....69**  
**Time & Frequency  
 Tech., Inc. ....43**

Automation Electronics, Inc.  
 Broadcast Communications Devices,  
 Inc. D9  
 Broadcast Consultants Corp. D5, 6  
 CCA Electronics Corp.  
 Cetec Broadcast Group



dbx, Inc.  
 Dyma Engineering, Inc.  
 Landy Associates Inc. D 1,2  
 Marti Electronics  
 Micro Control Associates, Inc.  
 Moseley Assoc. Inc.  
 Potomac Instruments, Inc.  
 QEI Corp.  
 Rivers Associates, Inc.  
 Eric Small & Associates  
 Sparta --see Cetec Broadcast Group  
 Time & Frequency Tech., Inc.  
 Val-Tronics, Inc. D1-9  
 The Widget Works, Inc.

**Automation, Camera Control**

dbx, Inc.  
 Landy Associates Inc. D 1,2  
 Marconi Communication Systems Ltd.  
 Power-Optics Inc.

**Automation, Color Corrector**

Broadcast Communications Devices, Inc. D9  
 Cohu, Inc. Electronics Div.  
 dbx, Inc.  
 Landy Associates Inc. D 1,2  
 Marconi Communication Systems Ltd.

**Automation, Data Processing**

See Adv. Page

**Automation Electronics, Inc.** .....225  
**Central Dynamics Corp.** .....230  
**Moseley Assoc. Inc.** .....69  
**VIF International** .....246

Automation Electronics, Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Consultants Corp. D5, 6  
 Central Dynamics Corp.  
 IGM Div. of Northwestern Tech.  
 Marconi Communication Systems Ltd.  
 Moseley Assoc. Inc.  
 PSI Paperwork Systems, Inc.  
 Quad-Eight Electronics  
 Sono-Mag Corp.  
 Studer Revox America  
 VIF International  
 Vital Industries Inc.

**Automation, Equipment Control, Radio**

See Adv. Page

**Automation Electronics, Inc.** .....225  
**Broadcast Component Dist. Communication Medias** .....269  
**CCA Electronics Corp. .. 99-106**  
**IGM** .....185  
**Moseley Assoc. Inc.** .....69  
**Sono-Mag Corp.** .....188  
**VIF International** .....246

Aitken Communications Inc.  
 Allied Broadcast Equip. D 1-9  
 Autogram Corp.  
 Automation Electronics, Inc.  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Datalogic-Rust Co.  
 Dyma Engineering, Inc.  
 Hallikainen & Friends, Inc.  
 IGM Div. of Northwestern Tech.  
 International Communications & Control Corp.  
 Moseley Assoc. Inc.  
 RCA Broadcast Systems

Rivers Associates, Inc.  
 Schafer --see Cetec Broadcast Group  
 Eric Small & Associates  
 Sono-Mag Corp.  
 VIF International

**Automation, Equipment Control, TV**

See Adv. Page

**Central Dynamics Corp.** .....230  
**Dytek Industries, Inc.** .....35  
**Moseley Assoc. Inc.** .....69  
**Sono-Mag Corp.** .....188

Broadcast Communications Devices, Inc. D9  
 CMX Systems Div. of Orrox Corp.  
 Central Dynamics Corp.  
 Chrono-Log Corp.  
 Datalogic-Rust Co.  
 Dytek Industries, Inc.  
 Grass Valley Group, Inc.  
 International Communications & Control Corp.  
 Kaitronics Corp.  
 Magna-Tech Electronic Co., Inc.  
 Marconi Communication Systems Ltd.  
 Microtime, Inc.  
 Moseley Assoc. Inc.  
 RCA Broadcast Systems  
 Richmond Hill Laboratories Ltd.  
 Eric Small & Associates  
 Sono-Mag Corp.  
 Video Aids Corp. of Colorado

**Automation, Film Chain**

Central Dynamics Corp.  
 KVC Video Systems Inc. D 1,2  
 Kaitronics Corp.  
 Laird Telemedia Inc.  
 Quad-Eight Electronics  
 RCA Broadcast Systems  
 Sound Genesis D8, 9

**Automation, Lighting Control**

Berkey-Colortran Inc.  
 Broadcast Communications Devices, Inc. D9  
 dbx, Inc.  
 General Electric Co. Tubes/MW Devices  
 Industrial Sciences  
 Landy Associates Inc. D 1,2  
 Lumitrol, Ltd.  
 Strand Century, Inc.  
 Studer Revox America

**Automation, Program Control**

See Adv. Page

**Automation Electronics, Inc.** .....225  
**Broadcast Component Dist. Communication Medias** .....269  
**CCA Electronics Corp. .. 99-106**  
**C.R.V. Systems, Inc.** .....274  
**Central Dynamics Corp.** .....230  
**Cetec Broadcast Group** .....5  
**Collins Radio** .....21  
**Dynasciences** .....14  
**Dytek Industries, Inc.** .....35  
**ESE** .....63, 65  
**IGM** .....185  
**Microtime, Inc.** .....55  
**Sono-Mag Corp.** .....188  
**VIF International** .....246  
**Vital Industries Inc.** .....BC

Aitken Communications Inc.  
 Allied Broadcast Equip. D 1-9  
 Autogram Corp.  
 Automation Electronics, Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Component Dist. Communication Medias D 1-9

Broadcast Consultants Corp. D5, 6  
 Broadcast Specialties  
 CCA Electronics Corp.  
 C.R.V. Systems, Inc.  
 Central Dynamics Corp.  
 Cetec Broadcast Group  
 Chrono-Log Corp.  
 Collins Radio Rockwell International  
 Consolidated Electronic Industries  
 Datatron, Inc.  
 Dyma Engineering, Inc.  
 Dynasciences Div. Whitaker Corp.  
 Dytek Industries, Inc.  
 ESE  
 Fung Engineering Inc.  
 Grass Valley Group, Inc.  
 Harris Corp. Broadcast Products Div.  
 IGM Div. of Northwestern Tech.  
 Kaitronics Corp.  
 Marconi Communication Systems Ltd.  
 Microtime, Inc.  
 Rupert Neve, Inc.  
 Quad-Eight Electronics  
 RCA Broadcast Systems  
 Richmond Hill Laboratories Ltd.  
 Schafer --see Cetec Broadcast Group  
 Sono-Mag Corp.  
 Studer Revox America  
 Tape-Athon Corp.  
 Tektronix Inc.  
 VIF International  
 Vital Industries Inc.  
 Ward-Beck Systems, Ltd.

**Automation, Program Logging**

See Adv. Page

**Automation Electronics, Inc.** .....225  
**Central Dynamics Corp.** .....230  
**IGM** .....185  
**Microtime, Inc.** .....55  
**Sono-Mag Corp.** .....188  
**VIF International** .....246

Allied Broadcast Equip. D 1-9  
 Autogram Corp.  
 Automation Electronics, Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Specialties  
 Central Dynamics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Consolidated Electronic Industries  
 Datatron, Inc.  
 Dyma Engineering, Inc.  
 Grass Valley Group, Inc.  
 Hallikainen & Friends, Inc.  
 Harris Corp. Broadcast Products Div.  
 IGM Div. of Northwestern Tech.  
 Lauderdale Electronic Labs  
 Mastertone Co., Inc.  
 McBee Laboratories  
 Microtime, Inc.  
 Richmond Hill Laboratories Ltd.  
 Schafer --see Cetec Broadcast Group  
 Eric Small & Associates  
 Sono-Mag Corp.  
 Studer Revox America  
 VIF International  
 Vital Industries Inc.

**Automation, Projector**

Central Dynamics Corp.  
 ESE  
 Kaitronics Corp.  
 Laird Telemedia Inc.  
 Magna-Tech Electronic Co., Inc.  
 Marconi Electronics Inc.  
 RCA Broadcast Systems  
 Splindler & Sauppe, Inc.

**Automation, Switching**

See Adv. Page

**Automation Electronics, Inc.** .....225  
**Broadcast Component Dist. Communication Medias** .....269

**CCA Electronics Corp. .. 99-106**  
**C.R.V. Systems, Inc.** .....274  
**Collins Radio** .....21  
**Dytek Industries, Inc.** .....35  
**Microtime, Inc.** .....55  
**Sono-Mag Corp.** .....188  
**VIF International** .....246  
**Vital Industries Inc.** .....BC

Allied Broadcast Equip. D 1-9  
 American Data Div. Philips Broadcast Equip. Corp.  
 Automation Electronics, Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 CCA Electronics Corp.  
 CMX Systems Div. of Orrox Corp.  
 C.R.V. Systems, Inc.  
 Central Dynamics Corp.  
 Cetec Broadcast Group  
 Chrono-Log Corp.  
 Collins Radio Rockwell International  
 dbx, Inc.  
 Dytek Industries, Inc.  
 Grass Valley Group, Inc.  
 IGM Div. of Northwestern Tech.  
 Landy Associates Inc. D 1,2  
 Marconi Electronics Inc.  
 Microtime, Inc.  
 RCA Broadcast Systems  
 Richmond Hill Laboratories Ltd.  
 Richmond Sound Design, Ltd.  
 Schafer --see Cetec Broadcast Group  
 Sono-Mag Corp.  
 Studer Revox America  
 VIF International  
 Vital Industries Inc.

**Automation, Tape Control, Cartridge**

See Adv. Page

**Automation Electronics, Inc.** .....225  
**CCA Electronics Corp. .. 99-106**  
**Cetec Broadcast Group** .....5  
**IGM** .....185  
**Sono-Mag Corp.** .....188  
**VIF International** .....246

Aitken Communications Inc.  
 Allied Broadcast Equip. D 1-9  
 Ampro Broadcasting Inc.  
 Autogram Corp.  
 Automation Electronics, Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 CCA Electronics Corp.  
 CMX Systems Div. of Orrox Corp.  
 Central Dynamics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Consolidated Electronic Industries  
 Delta Electronics Inc. (N.C.)  
 Dyma Engineering, Inc.  
 Harris Corp. Broadcast Products Div.  
 IGM Div. of Northwestern Tech.  
 Mastertone Co., Inc.  
 Professional Audio Service  
 RCA Broadcast Systems  
 Robins Broadcast & Sound Equip. Corp.  
 Schafer --see Cetec Broadcast Group  
 Sono-Mag Corp.  
 Sound Genesis D8, 9  
 Tapecaster TCM, Inc.  
 Telectro Systems Corp.  
 Track Audio, Inc. D 1-9  
 VIF International



**Automation, Tape Control, Reel***See Adv. Page*

<b>Automation Electronics, Inc.</b> .....	225
<b>Cetec Broadcast Group</b> .....	5
<b>Collins Radio</b> .....	21
<b>IGM</b> .....	185
<b>Sono-Mag Corp.</b> .....	188
<b>VIF International</b> .....	246

AEG-Telefunken Magnetic Tape Recorder Dept.  
 Allied Broadcast Equip. D 1-9  
 Autogram Corp.  
 Automation Electronics, Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Central Dynamics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Dyma Engineering, Inc.  
 IGM Div. of Northwestern Tech.  
 Mastertone Co., Inc.  
 Otari Corp.  
 RCA Broadcast Systems  
 Rivers Associates, Inc.  
 Robins Broadcast & Sound Equip. Corp.  
 Schafer --see Cetec Broadcast Group  
 Sono-Mag Corp.  
 Sound Genesis D8, 9  
 Studer Revox America  
 Tape-Athon Corp.  
 Telectro Systems Corp.  
 VIF International

**Automation, Transmitter Logging***See Adv. Page*

<b>Automation Electronics, Inc.</b> .....	225
<b>Moseley Assoc. Inc.</b> .....	69
<b>Philips Test &amp; Measuring Instruments, Inc.</b> .....	15
<b>Sono-Mag Corp.</b> .....	188
<b>VIF International</b> .....	246

Automation Electronics, Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Consultants Corp. D5, 6  
 Collins Radio Rockwell International  
 Datalogic-Rust Co.  
 Dielectric Communications Div. Sola Basic, Inc.  
 Marconi Instruments  
 McBee Laboratories  
 Moseley Assoc. Inc.  
 Pacific Recorders and Engrg. Corp.  
 Philips Test & Measuring Instruments, Inc.  
 Eric Small & Associates  
 Sono-Mag Corp.  
 Sound Genesis D8, 9  
 Telectro Systems Corp.  
 VIF International  
 The Widget Works, Inc.

**Automation, Video Tape Machine***See Adv. Page*

<b>Dynasciences</b> .....	14
---------------------------	----

Ampex Corp.  
 Broadcast Automation Assoc. D 1,2,5,6  
 CMX Systems Div. of Orrox Corp.  
 Central Dynamics Corp.  
 Dynasciences Div. Whitaker Corp.  
 ESE  
 Fernseh Group Robert Bosch Corp.  
 Kaitronics Corp.  
 Media Concepts, Inc. D 1-9  
 Merlin Engineering Works, Inc.  
 Microtime, Inc.  
 RCA Broadcast Systems

Recortec Inc.  
 Syste-Matics, Inc.

**Battery Pack Chargers***See Adv. Page*

<b>Alexander Mfg. Co.</b> .....	258
<b>ESE</b> .....	63, 65
<b>Frezzolini Electronics, Inc.</b> .....	88

Alexander Mfg. Co.  
 Christie Electric Corp.  
 Cine 60, Inc.  
 dbx, Inc.  
 ESE  
 Frezzolini Electronics, Inc.  
 KVC Video Systems Inc. D 1,2  
 Landy Associates Inc. D 1,2  
 Lauderdale Electronic Labs  
 Mountain West Alarm D8  
 Nagra Magnetic Recorders, Inc.  
 Peirce-Phelps, Inc. D 2, 5  
 Perrott Engineering  
 Sencore Inc.  
 Tele-Measurements, Inc. B-2  
 United Radio Supply Inc. D9  
 Video Components, Inc.

**Battery Packs, ENG***See Adv. Page*

<b>Alexander Mfg. Co.</b> .....	258
<b>Frezzolini Electronics, Inc.</b> .....	88

Alexander Mfg. Co.  
 Broadcast Communications Devices, Inc. D9  
 Christie Electric Corp.  
 Cine 60, Inc.  
 Comprehensive Video Supply Corp. D 1-9  
 dbx, Inc.  
 Frezzolini Electronics, Inc.  
 Harris Corp. Broadcast Products Div.  
 KVC Video Systems Inc. D 1,2  
 Landy Associates Inc. D 1,2  
 Mountain West Alarm D8  
 Peirce-Phelps, Inc. D 2, 5  
 Perrott Engineering  
 Sony Corp. of America VTR Div.  
 Tele-Measurements, Inc. B-2  
 United Radio Supply Inc. D9

**Blowers and Fans**

AMCO Engineering Co.  
 American-Standard  
 Ampro Broadcasting Inc.  
 Bud Industries, Inc.  
 Collins Radio Rockwell International  
 Javelin Electronics D9  
 Optima Enclosures  
 Stantron Div.  
 Tele-Measurements, Inc. B-2

**Bridges, Common Point***See Adv. Page*

<b>CCA Electronics Corp. ..</b>	99-106
<b>Delta Electronics Inc. (Va.)</b> .....	183
<b>Potomac Instruments, Inc.</b> .....	251

Broadcast Consultants Corp. D5, 6  
 CCA Electronics Corp.  
 Collins Radio Rockwell International  
 Delta Electronics Inc. (Va.)  
 Harris Corp. Broadcast Products Div.  
 Potomac Instruments, Inc.  
 Val-Tronics, Inc. D1-9

**Buzz Tone Eliminators, Videotape Edit***See Adv. Page*

<b>A. F. Associates, Inc.</b> .....	32
<b>A. F. Associates, Inc.</b> .....	

**Cabinets, Consoles and Racks (Enclosures Only)***See Adv. Page*

<b>AMCO Engineering Co.</b> .....	96
<b>Broadcast Component Dist. Communication Medias</b> .....	273
<b>CCA Electronics Corp. ..</b>	99-106
<b>Dyma Engineering, Inc.</b> .....	276
<b>Russ Lang Corp.</b> .....	265
<b>Sound Dynamics, Inc.</b> .....	226
<b>Stantron Div.</b> .....	190
<b>Winsted Corp.</b> .....	82

AMCO Engineering Co.  
 Ampro Broadcasting Inc.  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment & Supply Co. D 1-9  
 Bud Industries, Inc.  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Comprehensive Video Supply Corp. D 1-9  
 dbx, Inc.  
 Dyma Engineering, Inc.  
 Enclosure Corp.  
 Equipto Storage Systems  
 Fisher-Burke Broadcast Consultants  
 General Devices Co., Inc.  
 Harris Corp. Broadcast Products Div.  
 Javelin Electronics D9  
 KVC Video Systems Inc. D 1,2  
 Landy Associates Inc. D 1,2  
 Russ Lang Corp.  
 Mastertone Co., Inc.  
 McCurdy Radio Ind. Inc.  
 Micro-Trak Corp.  
 Charles Moore  
 Neumade Products Corp.  
 North American Radio Corp.  
 Optima Enclosures  
 Paso Sound Products Inc.  
 Quad-Eight Electronics  
 RCA Broadcast Systems  
 Research Technology, Inc.  
 SGL Waber Electric  
 Schafer --see Cetec Broadcast Group  
 Scientific-Atlanta, Inc.  
 Shintron Co. Inc.  
 Sound Dynamics, Inc. D8, 9  
 Sound Genesis D8, 9  
 Stantron Div.  
 Storeel Corp.  
 TRW Electronics Supply Co.  
 Tektronix Inc.  
 Tele-Measurements, Inc. B-2  
 United Radio Supply Inc. D9  
 Westlake Audio  
 Wilkinson Electronics, Inc.  
 Winsted Corp.

**Cable, Camera**

Belden Corp.  
 Boston Insulated Wire & Cable Co.  
 Brand-Rex Co.  
 dbx, Inc.  
 Fernseh Group Robert Bosch Corp.  
 GBC Closed Circuit TV Corp.  
 General Electric Co. ISO Div.  
 Harris Corp. Broadcast Products Div.  
 Javelin Electronics D9  
 KVC Video Systems Inc. D 1,2  
 Kings Electronics Co., Inc.  
 Landy Associates Inc. D 1,2  
 Media Concepts, Inc. D 1-9  
 Panasonic Video Systems Div.  
 RCA Broadcast Systems  
 Super8 Sound, Inc.  
 Tele-Measurements, Inc. B-2

**Cable, Coaxial Flexible***See Adv. Page*

<b>Andrew Corp.</b> .....	205
<b>CCA Electronics Corp. ..</b>	99-106

**Cablewave Systems**

<b>Inc.</b> .....	173
<b>Collins Radio</b> .....	21
<b>Nurad, Inc.</b> .....	221

AEL, Inc.  
 Allied Broadcast Equip. D 1-9  
 Andrew Corp.  
 A-Tel-A-Matic  
 Belden Corp.  
 Blender-Tongue Labs.  
 Brand-Rex Co.  
 CCA Electronics Corp.  
 Cablewave Systems Inc.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Comark Industries Inc.  
 Comm/Scope Co.  
 Comprehensive Video Supply Corp. D 1-9  
 Dyma Engineering, Inc.  
 Essex Group  
 The Finney Co.  
 GBC Closed Circuit TV Corp.  
 G.C. Electronics  
 General Cable Corp.  
 Harris Corp. Broadcast Products Div.  
 Jampro --see Cetec Broadcast Group  
 Javelin Electronics D9  
 KVC Video Systems Inc. D 1,2  
 LPB Inc.  
 Magnum Towers, Inc.  
 Mastertone Co., Inc.  
 Maury Microwave Corp.  
 Maze Corp D6  
 Media Concepts, Inc. D 1-9  
 Micro Communications, Inc.  
 Micro Control Associates, Inc.  
 Nurad, Inc.  
 Phelps Dodge Communications Co.  
 Plastoid Corp.  
 Prodelin Inc.  
 RCA Broadcast Systems  
 Saxton Products Inc.  
 Sinai-Johnson  
 Singer Products Co., Inc.  
 Sound Genesis D8, 9  
 Studer Revox America  
 Tele-Measurements, Inc. B-2  
 Times Wire and Cable  
 Trompeter Electronics  
 United Radio Supply Inc. D9  
 Val-Tronics, Inc. D1-9  
 Weinschel Engineering Co.  
 Wilkinson Electronics, Inc.  
 Winegard Television Systems

**Cable, Coaxial Rigid***See Adv. Page*

<b>Andrew Corp.</b> .....	205
<b>CCA Electronics Corp. ..</b>	99-106
<b>Cablewave Systems Inc.</b> .....	173
<b>Nurad, Inc.</b> .....	221

AEL, Inc.  
 Alford Mfg. Co.  
 Allied Broadcast Equip. D 1-9  
 Andrew Corp.  
 A-Tel-A-Matic  
 Belden Corp.  
 Broadcast Consultants Corp. D5, 6  
 CCA Electronics Corp.  
 Cablewave Systems Inc.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Comark Industries Inc.  
 Comm/Scope Co.  
 Dyma Engineering, Inc.  
 Essex Group  
 General Cable Corp.  
 Harris Corp. Broadcast Products Div.  
 Jampro --see Cetec Broadcast Group  
 Magnum Towers, Inc.  
 Mastertone Co., Inc.  
 Maury Microwave Corp.  
 Maze Corp D6  
 Micro Communications, Inc.  
 Nurad, Inc.  
 Phelps Dodge Communications Co.  
 Plastoid Corp.  
 Prodelin Inc.  
 RCA Broadcast Systems  
 Shively Laboratories, Inc.  
 Singer Products Co., Inc.

Times Wire and Cable  
Val-Tronics, Inc. D1-9  
Weinschel Engineering Co.  
Wilkinson Electronics, Inc.

### Cable, Direct Burial

See Adv. Page

### Cablewave Systems Inc. .... 173

AEL, Inc.  
A-Tel-A-Matic  
Belden Corp.  
Brand-Rex Co.  
Cablewave Systems Inc.  
Collins Radio Rockwell International  
Comm/Scope Co.  
Davis Mfg. Div. of J I Case  
Essex Group  
General Cable Corp.  
Lauderdale Electronic Labs  
Media Concepts, Inc. D 1-9  
Phelps Dodge Communications Co.  
Plastoid Corp.  
Sinai-Johnson  
Singer Products Co., Inc.  
Tele-Measurements, Inc. B-2  
Times Wire and Cable

### Cable, Microphone

AKG Acoustics  
A-Tel-A-Matic  
Belden Corp.  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Fisher-Burke Broadcast Consultants  
G.C. Electronics  
Gotham Audio Corp.  
Harris Corp. Broadcast Products Div.  
KVC Video Systems Inc. D 1,2  
Media Concepts, Inc. D 1-9  
Nagra Magnetic Recorders, Inc.  
Oregon Sound D 9  
Saxton Products Inc.  
Sescom, Inc.  
Sinai-Johnson  
Singer Products Co., Inc.  
Sound Genesis D8, 9  
Studer Revox America  
Switchcraft Inc.  
Tele-Measurements, Inc. B-2  
Times Wire and Cable  
United Radio Supply Inc. D9  
Whirlwind Music  
Wilkinson Electronics, Inc.

### Cable, Optical Fiber

General Cable Corp.  
Rank Precision Industries, Inc. (N.Y.)

### Cable, Shielded Audio

A-Tel-A-Matic  
Belden Corp.  
Boston Insulated Wire & Cable Co.  
Brand-Rex Co.  
Broadcast Equipment & Supply Co. D  
1-9  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Comm/Scope Co.  
Comprehensive Video Supply Corp. D  
1-9  
EMT Franz VGmbH  
Essex Group  
Fisher-Burke Broadcast Consultants  
G.C. Electronics  
General Cable Corp.  
Gotham Audio Corp.  
Harris Corp. Broadcast Products Div.  
Media Concepts, Inc. D 1-9  
Nortronics Co., Inc.  
Oregon Sound D 9  
Peirce-Phelps, Inc. D 2, 5  
Prestolite Wire Div.  
Quad-Eight Electronics  
Saxton Products Inc.  
Schafer --see Cetec Broadcast Group  
Sinai-Johnson  
Singer Products Co., Inc.  
Sound Genesis D8, 9  
Sparta --see Cetec Broadcast Group  
Studer Revox America

Tele-Measurements, Inc. B-2  
Times Wire and Cable  
United Radio Supply Inc. D9  
Whirlwind Music  
Wilkinson Electronics, Inc.

### Cable Laying Equipment

Davis Mfg. Div. of J I Case  
Ditch Witch  
Roll-A-Reel

### Cable Locators, Underground

Metrotech Corp.  
P. K. Neuses Inc.  
Rycom Instruments

### Cable Stripping Tools

Comprehensive Video Supply Corp. D  
1-9  
Lauderdale Electronic Labs  
P. K. Neuses Inc.  
Western Electronic Products Co.  
Winegard Television Systems

### Calibration Service, Instrument

Alford Mfg. Co.  
B & K Instruments Inc.  
Bird Electronic Corp.  
Commercial Radio Monitoring Co., Inc.  
National Electrolab Ltd.  
Potomac Instruments, Inc.  
Sadelco, Inc.  
Sencore Inc.  
Tektronix Inc.

### Calorimeters, RF

Belden Corp.  
Canon USA, Inc. Optics Div.  
Dyma Engineering, Inc.

### Camera Carrying Stabilizers, Operator Vest Mount

Cinema Products Corp.

### Camera Carrying Systems, Television Portapak

See Adv. Page

### The Camera Mart, Inc. .... 64

The Camera Mart, Inc.  
Cine 60, Inc.  
Comprehensive Video Supply Corp. D  
1-9  
dbx, Inc.  
Gruber Products Co.  
Harris Corp. Broadcast Products Div.  
JVC Industries, Inc.  
Javelin Electronics D9  
K & H Products, Ltd.  
Landy Associates Inc. D 1,2  
Peirce-Phelps, Inc. D 2, 5  
Sony Corp. of America VTR Div.  
Tele-Measurements, Inc. B-2  
Video Components, Inc.  
Videodetics Corp.

### Camera Dollies, Stands and Tripods

See Adv. Page

### The Camera Mart, Inc. .... 64

### O'Connor Eng. Labs. Inc. .... 209

### Quick-Set Inc. .... 268

Berkey-Colortran Inc.  
Broadcast Communications Devices,  
Inc. D9  
The Camera Mart, Inc.  
Cinema Products Corp.  
Cohu, Inc. Electronics Div.  
Comprehensive Video Supply Corp. D  
1-9  
Comquip, Inc.  
Cosmicar Lens Div. Asahi Precision  
Co., Ltd.  
dbx, Inc.

Davis & Sanford Co. Inc.  
Dyma Engineering, Inc.  
Editel Communications  
GBC Closed Circuit TV Corp.  
Harris Corp. Broadcast Products Div.  
Image Devices Inc.  
Innovative Television Equipment, Inc.  
JVC Industries, Inc.  
Javelin Electronics D9  
K & H Products, Ltd.  
KVC Video Systems Inc. D 1,2  
Landy Associates Inc. D 1,2  
Listec TV Equip. Corp.  
O'Connor Eng. Labs. Inc.  
Panasonic Video Systems Div.  
Peirce-Phelps, Inc. D 2, 5  
Quick-Set Inc.  
RCA Broadcast Systems  
SGL Waber Electric  
Tele-Measurements, Inc. B-2  
Television Products Co. Inc.  
Victor Duncan, Inc.  
Video Components, Inc.  
Weather Scan, Inc.

### Camera Housings, Environmental

Asaca Corp. of America  
Broadcast Communications Devices,  
Inc. D9  
Cohu, Inc. Electronics Div.  
GBC Closed Circuit TV Corp.  
General Electric Co. ISO Div.  
Image Devices Inc.  
Javelin Electronics D9  
KVC Video Systems Inc. D 1,2  
Media Concepts, Inc. D 1-9  
Peirce-Phelps, Inc. D 2, 5  
Power-Optics Inc.  
Quick-Set Inc.  
Tele-Cine Inc.  
Tele-Measurements, Inc. B-2

### Camera Pan and Tilt Heads

See Adv. Page

### O'Connor Eng. Labs. Inc. .... 209

### Quick-Set Inc. .... 268

Asaca Corp. of America  
Broadcast Communications Devices,  
Inc. D9  
Cinema Products Corp.  
Cohu, Inc. Electronics Div.  
Cosmicar Lens Div. Asahi Precision  
Co., Ltd.  
dbx, Inc.  
Dage-MTI, Inc.  
Davis & Sanford Co. Inc.  
Editel Communications  
GBC Closed Circuit TV Corp.  
General Electric Co. ISO Div.  
Image Devices Inc.  
Innovative Television Equipment, Inc.  
Javelin Electronics D9  
KVC Video Systems Inc. D 1,2  
Landy Associates Inc. D 1,2  
Listec TV Equip. Corp.  
O'Connor Eng. Labs. Inc.  
Peirce-Phelps, Inc. D 2, 5  
Power-Optics Inc.  
Quick-Set Inc.  
RCA Broadcast Systems  
Roscor Corp. D3, 4  
Tele-Cine Inc.  
Tele-Measurements, Inc. B-2  
Television Products Co. Inc.  
Victor Duncan, Inc.  
Video Components, Inc.  
Weather Scan, Inc.

### Camera Remote Control Equipment

See Adv. Page

### Moseley Assoc. Inc. .... 69

Broadcast Communications Devices,  
Inc. D9  
Catel Div. United Scientific Corp.  
Cohu, Inc. Electronics Div.  
Dage-MTI, Inc.  
Fernseh Group Robert Bosch Corp.  
General Electric Co. ISO Div.

Harris Corp. Broadcast Products Div.  
Innovative Television Equipment, Inc.  
Javelin Electronics D9  
KVC Video Systems Inc. D 1,2  
Marconi Communication Systems Ltd.  
Moseley Assoc. Inc.  
Panasonic Video Systems Div.  
Power-Optics Inc.  
Quick-Set Inc.  
Tektronix Inc.  
Tele-Cine Inc.  
TeleMation, Inc.  
Tele-Measurements, Inc. B-2

### Cameras, Closed Circuit B&W

See Adv. Page

### Asaca Corp. of America ..... 7

### NEC America, Inc. .... 215

ATV Research  
Akai America, Ltd.  
Asaca Corp. of America  
A-Tel-A-Matic  
Broadcast Communications Devices,  
Inc. D9  
Cohu, Inc. Electronics Div.  
Colorado Video Inc.  
Comquip, Inc.  
Dage-MTI, Inc.  
Denson Electronic Corp. D 1-9  
Editel Communications  
GBC Closed Circuit TV Corp.  
General Electric Co. ISO Div.  
General Electric Co. Tubes/MW  
Devices  
Harris Corp. Broadcast Products Div.  
Hitachi Denshi America, Ltd.  
Ikegami Electronics (USA) Inc.  
Javelin Electronics D9  
KVC Video Systems Inc. D 1,2  
Lenzar Optics Corp.  
Marconi Communication Systems Ltd.  
Media Concepts, Inc. D 1-9  
NEC America, Inc. Broadcasting Equip.  
Div.  
Panasonic Video Systems Div.  
Peirce-Phelps, Inc. D 2, 5  
Power-Optics Inc.  
RCA Distributor & Special Products  
Div.  
RCA Electro Optics and Devices  
Roscor Corp. D3, 4  
Sigma Electronics, Inc.  
Sony Corp. of America VTR Div.  
Systa-Matics, Inc.  
TEAC Corp of America  
TeleMation, Inc.  
Tele-Measurements, Inc. B-2  
Telescript, Inc.  
Teltron Inc.  
Temtron Electronics D 1-9  
Video Optics Inc.  
Videodetics Corp.  
Weather Scan, Inc.  
Westinghouse Ind. & Gov't Tube Div.

### Cameras, Closed Circuit Color

See Adv. Page

### Asaca Corp. of America ..... 7

### NEC America, Inc. .... 215

Akai America, Ltd.  
Asaca Corp. of America  
A-Tel-A-Matic  
Broadcast Communications Devices,  
Inc. D9  
Cohu, Inc. Electronics Div.  
Commercial Electronics, Inc.  
Comquip, Inc.  
dbx, Inc.  
Denson Electronic Corp. D 1-9  
Editel Communications  
Fernseh Group Robert Bosch Corp.  
GBC Closed Circuit TV Corp.  
General Electric Co. ISO Div.  
Harris Corp. Broadcast Products Div.  
Hitachi Denshi America, Ltd.  
Ikegami Electronics (USA) Inc.  
KVC Video Systems Inc. D 1,2  
Landy Associates Inc. D 1,2  
Marconi Communication Systems Ltd.  
Media Concepts, Inc. D 1-9



NEC America, Inc. Broadcasting Equip. Div.  
Panasonic Video Systems Div.  
Peirce-Phelps, Inc. D 2, 5  
Roscor Corp. D3, 4  
Sigma Electronics, Inc.  
Sony Corp. of America VTR Div.  
Tele-Measurements, Inc. B-2  
Telescript, Inc.  
Temtron Electronics D 1-9  
Videotetics Corp.  
Weather Scan, Inc.

**Cameras, Film Chain**

See Adv. Page

**Ikegami Electronics (USA) Inc. .... 36,37**

Broadcast Communications Devices, Inc. D9  
Cohu, Inc. Electronics Div.  
Commercial Electronics, Inc.  
Comquip, Inc.  
dbx, Inc.  
Fernseh Group Robert Bosch Corp.  
GBC Closed Circuit TV Corp.  
General Electric Co. ISO Div.  
General Electric Co. Tubes/MW Devices  
Harris Corp. Broadcast Products Div.  
Hitachi Denshi America, Ltd.  
Ikegami Electronics (USA) Inc.  
KVC Video Systems Inc. D 1,2  
Landy Associates Inc. D 1,2  
Marconi Communication Systems Ltd.  
Media Concepts, Inc. D 1-9  
Panasonic Video Systems Div.  
Peirce-Phelps, Inc. D 2, 5  
Philips Broadcast Equip Corp.  
RCA Broadcast Systems  
Rank Precision Industries, Inc. (III).  
Rank Cintel Div.  
Roscor Corp. D3, 4  
TeleMation, Inc.  
Tele-Measurements, Inc. B-2  
Temtron Electronics D 1-9  
Thomson-CSF Laboratories, Inc.  
Videotetics Corp.  
Weather Scan, Inc.

**Cameras, Film Cine**

Arriflex Co. of America  
Canon USA, Inc. Optics Div.  
Cinema Products Corp.  
Comquip, Inc.  
Eastman Kodak Co.  
Fernseh Group Robert Bosch Corp.  
Frezzolini Electronics, Inc.  
General Electric Co. Tubes/MW Devices  
Harris Corp. Broadcast Products Div.  
Image Devices Inc.  
KVC Video Systems Inc. D 1,2  
RCA Broadcast Systems  
Super8 Sound, Inc.  
Teledyne Camera Systems  
Victor Duncan, Inc.

**Cameras, Film Still**

Canon USA, Inc. Optics Div.  
Comquip, Inc.  
Eastman Kodak Co.  
General Electric Co. Tubes/MW Devices  
Image Devices Inc.

**Cameras, Image Motion Compensation**

Comquip, Inc.  
Dynamics Div. Whitaker Corp.

**Cameras, Surveillance**

See Adv. Page

**NEC America, Inc. .... 215**

ATV Research  
Asaca Corp. of America  
A-Tel-A-Matic  
Broadcast Communications Devices, Inc. D9

Cohu, Inc. Electronics Div.  
Comquip, Inc.  
Dage-MTI, Inc.  
Eastman Kodak Co.  
General Electric Co. ISO Div.  
General Electric Co. Tubes/MW Devices  
Harris Corp. Broadcast Products Div.  
Hitachi Denshi America, Ltd.  
Ikegami Electronics (USA) Inc.  
Image Devices Inc.  
Javelin Electronics D9  
KVC Video Systems Inc. D 1,2  
Lenco Inc. Electronics Div.  
Lenzar Optics Corp.  
Marconi Communication Systems Ltd.  
Media Concepts, Inc. D 1-9  
Mountain West Alarm D8  
NEC America, Inc. Broadcasting Equip. Div.  
Panasonic Video Systems Div.  
Peirce-Phelps, Inc. D 2, 5  
Power-Optics Inc.  
RCA Distributor & Special Products Div.  
RCA Electro Optics and Devices  
Teledyne Camera Systems  
TeleMation, Inc.  
Tele-Measurements, Inc. B-2  
Telescript, Inc.  
Teltron Inc.  
Victor Duncan, Inc.  
Videotetics Corp.  
Westinghouse Ind. & Govt't Tube Div.

**Cameras, TV Color Field**

See Adv. Page

**CCA Electronics Corp. .. 99-106 Commercial Electronics, Inc. .... 181 Hitachi Denshi America, Ltd. .... 67 Ikegami Electronics (USA) Inc. .... 36,37 Marconi Electronics Inc. .... 41 NEC America, Inc. .... 215 Philips Broadcast Equip Corp. .... 45**

Broadcast Communications Devices, Inc. D9  
CCA Electronics Corp.  
Cohu, Inc. Electronics Div.  
Commercial Electronics, Inc.  
dbx, Inc.  
Dyma Engineering, Inc.  
Hitachi Denshi America, Ltd.  
Ikegami Electronics (USA) Inc.  
KVC Video Systems Inc. D 1,2  
Landy Associates Inc. D 1,2  
Marconi Communication Systems Ltd.  
Marconi Electronics Inc.  
NEC America, Inc. Broadcasting Equip. Div.  
Peirce-Phelps, Inc. D 2, 5  
Philips Broadcast Equip Corp.  
RCA Broadcast Systems  
Sony Corp. of America VTR Div.  
Tele-Measurements, Inc. B-2  
Thomson-CSF Laboratories, Inc.

**Cameras, TV Color Studio Broadcast**

See Adv. Page

**All Mobile Video, Inc. .... 271 CCA Electronics Corp. .. 99-106 Commercial Electronics, Inc. .... 181 Ikegami Electronics (USA) Inc. .... 36,37 Marconi Electronics Inc. .... 41**

All Mobile Video, Inc.  
Ampex Corp.  
Broadcast Communications Devices, Inc. D9  
CCA Electronics Corp.  
Cohu, Inc. Electronics Div.  
Commercial Electronics, Inc.  
dbx, Inc.

Dyma Engineering, Inc.  
Fernseh Group Robert Bosch Corp.  
Harris Corp. Broadcast Products Div.  
Hitachi Denshi America, Ltd.  
Ikegami Electronics (USA) Inc.  
JVC Industries, Inc.  
KVC Video Systems Inc. D 1,2  
Landy Associates Inc. D 1,2  
Marconi Communication Systems Ltd.  
Marconi Electronics Inc.  
Panasonic Video Systems Div.  
Peirce-Phelps, Inc. D 2, 5  
Philips Broadcast Equip Corp.  
Systa-Matics, Inc.  
Roscor Corp. D3, 4  
Sony Corp. of America VTR Div.  
Systa-Matics, Inc.  
Tele-Measurements, Inc. B-2  
Temtron Electronics D 1-9  
Thomson-CSF Laboratories, Inc.

**Cameras, TV ENG**

See Adv. Page

**All Mobile Video, Inc. .... 271 Asaca Corp. of America .... 7 CCA Electronics Corp. .. 99-106 C.R.V. Systems, Inc. .... 274 The Camera Mart, Inc. .... 64 Commercial Electronics, Inc. .... 181 Hitachi Denshi America, Ltd. .... 67 Ikegami Electronics (USA) Inc. .... 36,37 NEC America, Inc. .... 215 Philips Broadcast Equip Corp. .... 45**

All Mobile Video, Inc.  
Ampex Corp.  
Asaca Corp. of America  
Broadcast Communications Devices, Inc. D9  
CCA Electronics Corp.  
C.R.V. Systems, Inc.  
The Camera Mart, Inc.  
Cinema Products Corp.  
Commercial Electronics, Inc.  
dbx, Inc.  
Dyma Engineering, Inc.  
Hitachi Denshi America, Ltd.  
Ikegami Electronics (USA) Inc.  
KVC Video Systems Inc. D 1,2  
Landy Associates Inc. D 1,2  
Media Concepts, Inc. D 1-9  
NEC America, Inc. Broadcasting Equip. Div.  
Peirce-Phelps, Inc. D 2, 5  
Philips Broadcast Equip Corp.  
RCA Broadcast Systems  
Roscor Corp. D3, 4  
Sony Corp. of America VTR Div.  
Tele-Measurements, Inc. B-2  
Thomson-CSF Laboratories, Inc.

**Cameras, TV Remote Control Broadcast**

See Adv. Page

**Ikegami Electronics (USA) Inc. .... 36,37**  
Broadcast Communications Devices, Inc. D9  
Commercial Electronics, Inc.  
dbx, Inc.  
Dyma Engineering, Inc.  
Fernseh Group Robert Bosch Corp.  
General Electric Co. Tubes/MW Devices  
Hitachi Denshi America, Ltd.  
Ikegami Electronics (USA) Inc.  
KVC Video Systems Inc. D 1,2  
Landy Associates Inc. D 1,2  
Marconi Communication Systems Ltd.  
Marconi Electronics Inc.  
Martin Audio/Video D2  
Peirce-Phelps, Inc. D 2, 5  
Philips Broadcast Equip Corp.  
Power-Optics Inc.  
RCA Broadcast Systems  
Roscor Corp. D3, 4

Teltron Inc.

**Capacitors, Transmitting, Mica and Vacuum**

See Adv. Page

**ITT Jennings ..... 206 Surcom Associates ..... 271**

C. S. P. Inc.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Corning Glass Works  
Harris Corp. Broadcast Products Div.  
ITT Jennings  
Sparta --see Cetec Broadcast Group  
Surcom Associates

**Cartridge Machine Alignment Tape**

Allied Broadcast Equip. D 1-9  
Ampro Broadcasting Inc.  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors  
Communication Medias  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Fidelipac  
Fisher-Burke Broadcast Consultants  
Joa Cartridge Service D2  
Lauderdale Electronic Labs  
Nortronics Co., Inc.  
Professional Audio Service  
Sparta --see Cetec Broadcast Group  
Taber Mfg. & Engr. Co.  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9

**Cartridge Machine Rebuilding Services**

Allied Broadcast Equip. D 1-9  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors  
Communication Medias  
Cetec Broadcast Group  
Communications, Ltd.  
Dyma Engineering, Inc.  
Lauderdale Electronic Labs  
Sparta --see Cetec Broadcast Group

**Cartridge Machines, Dual Deck**

See Adv. Page

**Broadcast Consultants Corp. .... 83 CCA Electronics Corp. .. 99-106 Collins Radio ..... 21**

Allied Broadcast Equip. D 1-9  
Ampro Broadcasting Inc.  
Automation Electronics, Inc.  
Beaucart Div. UMC Electronics Co.  
Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Communications Devices, Inc. D9  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.  
Broadcast Equipment & Supply Co. D 1-9  
CCA Electronics Corp.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Consolidated Electronic Industries  
Harris Corp. Broadcast Products Div.  
IGM Div. of Northwestern Tech.  
International Electro-Magnetics  
KVC Video Systems Inc. D 1,2  
Lauderdale Electronic Labs  
MacKenzie Laboratories, Inc.  
Martin Audio/Video D2  
Mastertone Co., Inc.  
Maze Corp D6  
McCurdy Radio Ind. Inc.  
RCA Broadcast Systems

Rapid-Q, Edco Products, Inc.  
Singer Products Co., Inc.  
Sono-Mag Corp.  
Sound Genesis D8, 9  
Sparta --see Cetec Broadcast Group  
Tapex Corp.  
Telectro Systems Corp.  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

### Cartridge Machines, Multiple Deck

See Adv. Page

**Broadcast Consultants Corp.** ..... 83  
**Collins Radio International** ..... 21  
**Tapetronics Corp.** ..... 54  
**McCurdy Radio Ind. Inc.** ..... IBC

Allied Broadcast Equip. D 1-9  
Ampro Broadcasting Inc.  
Automation Electronics, Inc.  
Beaucart Div. UMC Electronics Co.  
Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors Communication Medias  
Broadcast Equipment & Supply Co. D 1-9  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Consolidated Electronic Industries  
Dyma Engineering, Inc.  
Harris Corp. Broadcast Products Div.  
IGM Div. of Northwestern Tech.  
International Electro-Magnetics  
International Tapetronics Corp.  
KVC Video Systems Inc. D 1,2  
MacKenzie Laboratories, Inc.  
Martin Audio/Video D2  
Mastertone Co., Inc.  
Maze Corp D6  
McCurdy Radio Ind. Inc.  
RCA Broadcast Systems  
Rapid-Q, Edco Products, Inc.  
Singer Products Co., Inc.  
Sono-Mag Corp.  
Sound Genesis D8, 9  
Sparta --see Cetec Broadcast Group  
Telectro Systems Corp.  
Telex Communications, Inc.  
VIF International  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

### Cartridge Machines, Random Access

See Adv. Page

**Automation Electronics, Inc.** ..... 225  
**CCA Electronics Corp. ..** 99-106  
**Collins Radio**..... 21

Allied Broadcast Equip. D 1-9  
Ampro Broadcasting Inc.  
Autogram Corp.  
Automation Electronics, Inc.  
Beaucart Div. UMC Electronics Co.  
Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors Communication Medias  
Broadcast Equipment & Supply Co. D 1-9  
CCA Electronics Corp.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Consolidated Electronic Industries  
Harris Corp. Broadcast Products Div.  
IGM Div. of Northwestern Tech.  
KVC Video Systems Inc. D 1,2

MacKenzie Laboratories, Inc.  
Mastertone Co., Inc.  
Maze Corp D6  
McCurdy Radio Ind. Inc.  
RCA Broadcast Systems  
Schafer --see Cetec Broadcast Group  
Singer Products Co., Inc.  
Sono-Mag Corp.  
Telectro Systems Corp.  
Telex Communications, Inc.  
VIF International  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

### Cartridge Machines, Single Deck

See Adv. Page

**Ampro Broadcasting Inc.** ..... 70  
**Audio Distributor Inc.** ..... 247  
**Automation Electronics, Inc.** ..... 225  
**Beaucart Div. Broadcast Component Dist. Communication Medias** ..... 269  
**Broadcast Consultants Corp.** ..... 83  
**CCA Electronics Corp. ..** 99-106  
**C.R.V. Systems, Inc.** ..... 274  
**Cetec Broadcast Group** ..... 5  
**Collins Radio**..... 21  
**Contel Mfg. International** ..... 80  
**Tapetronics Corp.** ..... 54  
**McCurdy Radio Ind. Inc.** ..... IBC  
**Sound Dynamics, Inc.** ..... 226  
**Telex Communications, Inc.** ..... 192

Allied Broadcast Equip. D 1-9  
Ampro Broadcasting Inc.  
Audi-Cord Corp.  
Audio Distributor Inc. D 1-9  
Automation Electronics, Inc.  
Beaucart Div. UMC Electronics Co.  
Bell P/A Prod. Corp.  
Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors Communication Medias  
Broadcast Equipment & Supply Co. D 1-9  
Broadcast Specialties  
CCA Electronics Corp.  
C.R.V. Systems, Inc.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Consolidated Electronic Industries  
Contel Mfg. dbx, Inc.  
Dyma Engineering, Inc.  
EMT Franz VGmbH  
Harris Corp. Broadcast Products Div.  
IGM Div. of Northwestern Tech.  
International Tapetronics Corp.  
KVC Video Systems Inc. D 1,2  
LPB Inc.  
Landy Associates Inc. D 1,2  
MacKenzie Laboratories, Inc.  
Martin Audio/Video D2  
Mastertone Co., Inc.  
Maze Corp D6  
McCurdy Radio Ind. Inc.  
RCA Broadcast Systems  
Rapid-Q, Edco Products, Inc.  
Singer Products Co., Inc.  
Sono-Mag Corp.  
Sound Dynamics, Inc. D8, 9  
Sound Genesis D8, 9  
Sparta --see Cetec Broadcast Group  
Superscope, Inc.  
Tapecaster TCM, Inc.  
Tapex Corp.  
Telectro Systems Corp.  
Telex Communications, Inc.  
Track Audio, Inc. D 1-9

Val-Tronics, Inc. D1-9  
Westlake Audio  
Wilkinson Electronics, Inc.

### Cartridge Machines, Stereo

AEG-Telefunken Magnetic Tape Recorder Dept.  
Allied Broadcast Equip. D 1-9  
Ampro Broadcasting Inc.  
Automation Electronics, Inc.  
Beaucart Div. UMC Electronics Co.  
Broadcast Communications Devices, Inc. D9  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.  
Broadcast Equipment & Supply Co. D 1-9  
Cetec Broadcast Group  
Collins Radio Rockwell International dbx, Inc.  
Dyma Engineering, Inc.  
EMT Franz VGmbH  
Harris Corp. Broadcast Products Div.  
IGM Div. of Northwestern Tech.  
International Tapetronics Corp.  
KVC Video Systems Inc. D 1,2  
LPB Inc.  
Landy Associates Inc. D 1,2  
RCA Broadcast Systems  
Rapid-Q, Edco Products, Inc.  
Sound Genesis D8, 9  
Sparta --see Cetec Broadcast Group  
Track Audio, Inc. D 1-9  
VIF International  
Val-Tronics, Inc. D1-9  
Westlake Audio  
Wilkinson Electronics, Inc.

### Cartridge Reconditioning Services

Allied Broadcast Equip. D 1-9  
Broadcast Cartridge Service D 1-9  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors Communication Medias  
Harris Corp. Broadcast Products Div.  
Joa Cartridge Service D2  
Mastertone Co., Inc.  
Professional Audio Service  
Re-Play Video Cartridge Service  
Sound Dynamics, Inc. D8, 9  
Tapex Corp.  
Telectro Systems Corp.

### Cartridge Recording Services

Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Equipment Distributors Communication Medias  
Mastertone Co., Inc.  
Media Concepts, Inc. D 1-9  
Pentagon Industries, Inc.  
Professional Audio Service  
Tapex Corp.  
Telectro Systems Corp.

### Cartridge Reloading Services, Audio

See Adv. Page

**Professional Audio Service** ..... 274

Allied Broadcast Equip. D 1-9  
Aristocart Div. Western Broadcasting Co., Ltd.  
Broadcast Cartridge Service D 1-9  
Broadcast Electronics, Inc.  
Colorado Magnetics  
Harris Corp. Broadcast Products Div.  
Joa Cartridge Service D2  
Mastertone Co., Inc.  
Professional Audio Service  
Sound Genesis D8, 9  
Tapex Corp.

### Cartridge Reloading Services, Video

Professional Audio Service

Re-Play Video Cartridge Service

### Cartridge Splice Finder

Allied Broadcast Equip. D 1-9  
Ampro Broadcasting Inc.  
Beaucart Div. UMC Electronics Co.  
Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors Communication Medias  
Broadcast Equipment & Supply Co. D 1-9  
Cetec Broadcast Group  
Collins Radio Rockwell International dbx, Inc.  
Dyma Engineering, Inc.  
Harris Corp. Broadcast Products Div.  
IGM Div. of Northwestern Tech.  
International Tapetronics Corp.  
Landy Associates Inc. D 1,2  
RCA Broadcast Systems  
Sparta --see Cetec Broadcast Group  
Tapecaster TCM, Inc.  
Telectro Systems Corp.  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9

### Cartridges, Magnetic Tape

See Adv. Page

**Aristocart Div.** ..... 255  
**Audio Distributor Inc.** ..... 247  
**Broadcast Component Dist. Communication Medias** ..... 269  
**Broadcast Consultants Corp.** ..... 84  
**CCA Electronics Corp. ..** 99-106  
**Dimension 3 Recording Co.** ..... 277  
**Fidelipac** ..... 172  
**Idaho Magnetics** ..... 275  
**Professional Audio Service** ..... 274  
**Sound Dynamics, Inc.** ..... 226  
**Telex Communications, Inc.** ..... 8

Allied Broadcast Equip. D 1-9  
Ampex Corp.  
Ampro Broadcasting Inc.  
Aristocart Div. Western Broadcasting Co., Ltd.  
Audio Distributor Inc. D 1-9  
Audio Magnetics Corp.  
BSC Inc.  
Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Cartridge Service D 1-9  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors Communication Medias  
Broadcast Equipment & Supply Co. D 1-9  
CCA Electronics Corp.  
Capitol Magnetic Products  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Colorado Magnetics  
Contel Mfg. dbx, Inc.  
Dimension 3 Recording Co.  
Dyma Engineering, Inc.  
Fidelipac  
Fisher-Burke Broadcast Consultants  
Fuji Photo Film USA, Inc. Magnetic Products Dept.  
Gould Inc. Instrument Systems Div.  
Harris Corp. Broadcast Products Div.  
IGM Div. of Northwestern Tech.  
Idaho Magnetics  
Image Devices Inc.  
Joa Cartridge Service D2



LPB Inc.  
 Landy Associates Inc. D 1,2  
 MacKenzie Laboratories, Inc.  
 Mastertone Co., Inc.  
 Maxell Corp. of America  
 Media Concepts, Inc. D 1-9  
 Memorex Corp. Professional Products Group  
 Professional Audio Service  
 RCA Broadcast Systems  
 Re-Play Video Cartridge Service  
 Singer Products Co., Inc.  
 Sono-Mag Corp.  
 Sound Dynamics, Inc. D8, 9  
 Sound Genesis D8, 9  
 Sparta -see Cetec Broadcast Group  
 Tapecaster TCM, Inc.  
 Tapex Corp.  
 Telectro Systems Corp.  
 Telex Communications, Inc.  
 3M Co. Magnetic Audio/Video Prod. Div.  
 Track Audio, Inc. D 1-9  
 Val-Tronics, Inc. D1-9  
 Wilkinson Electronics, Inc.

**Cartridges, Phono**

See Adv. Page

**Broadcast Component Dist. Communication Medias** ..... 271  
**Broadcast Consultants Corp.** ..... 83,84,86  
**CCA Electronics Corp.** .. 99-106  
**Professional Audio Service** ..... 274  
**Stanton Magnetics Inc.** ..... 195

AKG Acoustics  
 Allied Broadcast Equip. D 1-9  
 Ampro Broadcasting Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International dbx, Inc.  
 Duotone Co. Inc.  
 Dyma Engineering, Inc.  
 EMT Franz VGmbH  
 Fisher-Burke Broadcast Consultants  
 Gotham Audio Corp.  
 Harris Corp. Broadcast Products Div.  
 LPB Inc.  
 Landy Associates Inc. D 1,2  
 Mastertone Co., Inc.  
 McCurdy Radio Ind. Inc.  
 Media Concepts, Inc. D 1-9  
 Micro-Trak Corp.  
 Professional Audio Service  
 QRK Electronic Products  
 RCA Broadcast Systems  
 Ram Audio Systems, Inc.  
 Rek-O-Kut Inc.  
 Shure Brothers Inc.  
 Singer Products Co., Inc.  
 Sound Genesis D8, 9  
 Sparta -see Cetec Broadcast Group  
 Stanton Magnetics Inc.  
 Track Audio, Inc. D 1-9  
 Val-Tronics, Inc. D1-9  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Cartridges, Stereo**

See Adv. Page

**Dimension 3 Recording Co.** ..... 277  
**Fidelipac** ..... 172  
**Telex Communications, Inc.** ..... 8

Allied Broadcast Equip. D 1-9

Ampro Broadcasting Inc.  
 Aristocart Div. Western Broadcasting Co., Ltd.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Cartridge Service D 1-9  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Cetec Broadcast Group  
 Collins Radio Rockwell International Communications, Ltd.  
 dbx, Inc.  
 Dimension 3 Recording Co.  
 Dyma Engineering, Inc.  
 EMT Franz VGmbH  
 Fidelipac  
 Fisher-Burke Broadcast Consultants  
 Harris Corp. Broadcast Products Div.  
 Landy Associates Inc. D 1,2  
 Mastertone Co., Inc.  
 Media Concepts, Inc. D 1-9  
 Micro-Trak Corp.  
 Professional Audio Service  
 RCA Broadcast Systems  
 Ram Audio Systems, Inc.  
 Rek-O-Kut Inc.  
 Shure Brothers Inc.  
 Sono-Mag Corp.  
 Sound Genesis D8, 9  
 Sparta -see Cetec Broadcast Group  
 Stanton Magnetics Inc.  
 Tapex Corp.  
 Telex Communications, Inc.  
 Track Audio, Inc. D 1-9  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Cartridges, Videotape**

Ampex Corp.  
 Audio Magnetics Corp.  
 Broadcast Communications Devices, Inc. D9  
 Capitol Magnetic Products Comquip, Inc.  
 Fuji Photo Film USA, Inc. Magnetic Products Dept.  
 KVC Video Systems Inc. D 1,2  
 Lauderdale Electronic Labs  
 Maxell Corp. of America  
 Media Concepts, Inc. D 1-9  
 Panasonic Video Systems Div.  
 Peirce-PHELPS, Inc. D 2, 5  
 Professional Audio Service  
 RCA Broadcast Systems  
 Recortec Inc.  
 Re-Play Video Cartridge Service  
 Sony Corp. of America VTR Div.  
 Tele-Measurements, Inc. B-2  
 3M Co. Magnetic Audio/Video Prod. Div.

**Cases, Film and Tape, Carrying and Shipping**

Thermodyne International Ltd.

**Cases, Video Equipment Transit**

See Adv. Page

**Thermodyne International Ltd.** ..... 190  
**Video Components, Inc.** ..... 190

Thermodyne International Ltd.  
 Video Components, Inc.

**Cassette Duplication Machines**

Allied Broadcast Equip. D 1-9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Equipment Distributors Communication Medias  
 Fisher-Burke Broadcast Consultants  
 KVC Video Systems Inc. D 1,2  
 Lauderdale Electronic Labs  
 Oregon Sound D 9  
 Pentagon Industries, Inc.

Sony Corp. of America VTR Div.  
 Track Audio, Inc. D 1-9  
 Triple I Inc. The Economy Co.

**Cassette Machines, Dual Deck**

Ampro Broadcasting Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Cetec Audio  
 KVC Video Systems Inc. D 1,2  
 Pentagon Industries, Inc.  
 Rapid-Q, Edco Products, Inc.  
 Sound Genesis D8, 9  
 Triple I Inc. The Economy Co.

**Cassette Machines, Multiple Deck**

Ampro Broadcasting Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 KVC Video Systems Inc. D 1,2  
 Rapid-Q, Edco Products, Inc.  
 Sound Genesis D8, 9  
 Triple I Inc. The Economy Co.

**Cassette Machines, Random Access**

Ampex Corp.  
 Ampro Broadcasting Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 CMX Systems Div. of Orrox Corp.  
 KVC Video Systems Inc. D 1,2  
 Triple I Inc. The Economy Co.  
 Videodetics Corp.

**Cassette Machines, Single Deck**

See Adv. Page

**Ramko Research Inc.** ..... 176

Akai America, Ltd.  
 Allied Broadcast Equip. D 1-9  
 Ampro Broadcasting Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Consultants Corp. D5, 6  
 Heath Co.  
 Oregon Sound D 9  
 Ramko Research Inc.  
 Rapid-Q, Edco Products, Inc.  
 Sound Genesis D8, 9  
 Superscope, Inc.  
 TEAC Corp of America  
 Tandberg of America, Inc.  
 Technics by Panasonic  
 Telex Communications, Inc.  
 Track Audio, Inc. D 1-9  
 Triple I Inc. The Economy Co.  
 Westlake Audio

**Character Generators**

See Adv. Page

**Kaitronics Corp.** ..... 211  
**Knox Ltd.** ..... 256  
**Shintron Co. Inc.** ..... 93  
**TeleMation, Inc.** ..... 97  
**3M Co.** ..... 33  
**Video Data Systems** ..... 275

The BTX Corp.  
 Beston Electronics Inc.  
 Broadcast Communications Devices, Inc. D9  
 Central Dynamics Corp.  
 Chrono-Log Corp.  
 Chyron Telesystems  
 dbx, Inc.  
 EECO  
 Gould, Inc. Control & Systems Div.  
 Harris Corp. Broadcast Products Div.  
 IGM Div. of Northwestern Tech.  
 International Communications & Control Corp.

KVC Video Systems Inc. D 1,2  
 Kaitronics Corp.  
 Knox Ltd.  
 Laird Telemedia Inc.  
 Landy Associates Inc. D 1,2  
 Motorola Semiconductor Products, Inc.  
 Peirce-PHELPS, Inc. D 2, 5  
 Roscor Corp. D3, 4  
 SPI-ITT Metrix Instruments Div.  
 Shintron Co. Inc.  
 Sigma Electronics, Inc.  
 System Concepts Inc.  
 Tektronix Inc.  
 TeleMation, Inc.  
 Tele-Measurements, Inc. B-2  
 Thomson-CSF Laboratories, Inc.  
 3M Co. Mincom Div.  
 Video Data Systems  
 Video Devices Co.

**Character Generators, Wire Service Memory System**

See Adv. Page

**Video Data Systems** ..... 275

Video Data Systems

**Choppers**

Comark Industries Inc.  
 Motorola Semiconductor Products, Inc.  
 Tektronix Inc.  
 Townsend Associates, Inc.

**Chroma Key Background Movement Devices**

Dyma Engineering, Inc.  
 Industrial Sciences  
 KVC Video Systems Inc. D 1,2  
 Marconi Communication Systems Ltd.  
 Peirce-PHELPS, Inc. D 2, 5  
 Power-Optics Inc.

**Chroma Kever-Decoders**

See Adv. Page

**Dynasciences** ..... 14  
**Lenco Inc.** ..... 19

Broadcast Video Systems, Ltd.  
 Central Dynamics Corp.  
 Dyma Engineering, Inc.  
 Dynasciences Div. Whitaker Corp.  
 Grass Valley Group, Inc.  
 Industrial Sciences  
 Lenco Inc. Electronics Div.  
 Marconi Communication Systems Ltd.  
 Peirce-PHELPS, Inc. D 2, 5  
 Telemet a Geotel Co.

**Chroma Keyers**

See Adv. Page

**Central Dynamics Corp.** ..... 230  
**Dynasciences** ..... 14

American Data Div. Philips Broadcast Equip. Corp.  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Video Systems, Ltd.  
 Central Dynamics Corp.  
 Computer Image Video Controllers  
 Dytek Industries, Inc.  
 Corning Glass Works  
 Dyma Engineering, Inc.  
 Dynair Electronics, Inc.  
 Dynasciences Div. Whitaker Corp.  
 Gentrion Ltd. D 1-9  
 Grass Valley Group, Inc.  
 Industrial Sciences  
 KVC Video Systems Inc. D 1,2  
 Marconi Communication Systems Ltd.  
 Peirce-PHELPS, Inc. D 2, 5  
 RCA Broadcast Systems  
 Richmond Hill Laboratories Ltd.  
 Roscor Corp. D3, 4  
 Shintron Co. Inc.  
 Tele-Measurements, Inc. B-2  
 Telemet a Geotel Co.  
 Thomson-CSF Laboratories, Inc.

3M Co. Mincom Div.  
Vamco Engineering  
Vital Industries Inc.

### Clamps, Equipment Mounting

See Adv. Page

**Suda Seisakusho Co., Ltd.**.....180

Suda Seisakusho Co., Ltd.

### Cleaner, Circuit Board

dbx, Inc.  
G.C. Electronics  
Landy Associates Inc. D 1,2  
Miller-Stephenson Chemical Co., Inc.  
Temtron Electronics D 1-9  
Westlake Audio

### Cleaner, Magnetic Tape Head

See Adv. Page

**Nova Corp.**.....268

Allied Broadcast Equip. D 1-9  
Ampex Corp.  
Ampro Broadcasting Inc.  
Audio Distributor Inc. D 1-9  
Audio Magnetics Corp.  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors  
Communication Medias  
Broadcast Equipment & Supply Co. D 1-9  
Comprehensive Video Supply Corp. D 1-9  
Duotone Co. Inc.  
Fidelipac  
G.C. Electronics  
Image Devices Inc.  
Joa Cartridge Service D2  
KVC Video Systems Inc. D 1,2  
P. R. Mallory & Co. Inc.  
Mastertone Co., Inc.  
Memorex Corp. Professional Products Group  
Miller-Stephenson Chemical Co., Inc.  
Nortronics Co., Inc.  
Nova Corp.  
Professional Audio Service  
Saxton Products Inc.  
Sono-Mag Corp.  
Sound Dynamics, Inc. D8, 9  
Sound Genesis D8, 9  
Studer Revox America  
TEAC Corp of America  
Telectro Systems Corp.  
Tele-Measurements, Inc. B-2  
Television Equipment Associates  
Texwipe Co.  
3M Co. Magnetic Audio/Video Prod. Div.  
Track Audio, Inc. D 1-9  
Tri-Tronics Professional Electronics  
United Recording Electronics Industries  
VIF International  
Westlake Audio

### Clocks and Chronographs

See Adv. Page

**Broadcast Component Dist. Communication Medias**.....273  
**CCA Electronics Corp.** .. 99-106  
**ESE**..... 63, 65  
**Leitch Video Ltd.**.....201

Allied Broadcast Equip. D 1-9  
Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.

Broadcast Equipment Distributors  
Communication Medias  
Broadcast Equipment & Supply Co. D 1-9  
CCA Electronics Corp.  
Chrono-Log Corp.  
Chronotron Systems, Inc.  
Collins Radio Rockwell International  
Digital Concepts Corp.  
ESE  
General Time Service  
Glentronix Ltd. D 1-9  
Heath Co.  
IGM Div. of Northwestern Tech.  
Image Devices Inc.  
Leitch Video Ltd.  
Jules Racine & Co., Inc.  
Radlo Time Service  
Sono-Mag Corp.  
Sound Genesis D8, 9  
Standard Electric Time  
Tapecaster TCM, Inc.  
Track Audio, Inc. D 1-9  
VIF International  
Val-Tronics, Inc. D1-9  
Vamco Engineering

### Clocks, Digital and Digital Driver

See Adv. Page

**Broadcast Component Dist. Communication Medias**.....273  
**ESE**..... 63, 65  
**Glentronix Ltd.**.....254  
**Leitch Video Ltd.**.....201  
**Sound Dynamics, Inc.**.....226

Applied Video Electronics, Inc. D 1-9  
Beta Technology, Inc.  
Boston Sound & Power Systems  
Broadcast Aids, Inc.  
Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.  
Cetec Broadcast Group  
Chrono-Log Corp.  
Comprehensive Video Supply Corp. D 1-9  
dbx, Inc.  
Datatron, Inc.  
Digital Concepts Corp.  
Dyma Engineering, Inc.  
ESE  
Glentronix Ltd. D 1-9  
Gould, Inc. Control & Systems Div.  
Harris Corp. Broadcast Products Div.  
Heath Co.  
IGM Div. of Northwestern Tech.  
Industrial Sciences  
Kaitronics Corp.  
Landy Associates Inc. D 1,2  
Leitch Video Ltd.  
Mastertone Co., Inc.  
Motorola Semiconductor Products, Inc.  
Pacific Recorders and Engrg. Corp.  
Ramko Research Inc.  
Schafer --see Cetec Broadcast Group  
Sound Dynamics, Inc. D8, 9  
Sound Genesis D8, 9  
Sparta --see Cetec Broadcast Group  
Stancil-Hoffman Corp.  
Standard Electric Time  
Systron-Donner  
Tapecaster TCM, Inc.  
Tele-Measurements, Inc. B-2  
Time & Frequency Tech., Inc.  
Track Audio, Inc. D 1-9  
United Systems Corp.  
Vamco Engineering  
Video Devices Co.  
Westlake Audio

### Clocks, Station Master Control

See Adv. Page

**ESE**..... 63, 65  
**Glentronix Ltd.**.....254  
**Leitch Video Ltd.**.....201

Beta Technology, Inc.  
Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Communications Devices, Inc. D9  
Broadcast Consultants Corp. D5, 6  
Chrono-Log Corp.  
Chronotron Systems, Inc.  
dbx, Inc.  
Digital Concepts Corp.  
Dyma Engineering, Inc.  
ESE  
Glentronix Ltd. D 1-9  
Gould, Inc. Control & Systems Div.  
IGM Div. of Northwestern Tech.  
Kaitronics Corp.  
Laird Telemedia Inc.  
Landy Associates Inc. D 1,2  
Leitch Video Ltd.  
Radio Time Service  
Sono-Mag Corp.  
Standard Electric Time  
Tapecaster TCM, Inc.  
Time & Frequency Tech., Inc.  
Track Audio, Inc. D 1-9  
Vamco Engineering  
Video Devices Co.

### Collimeters

See Adv. Page

**Electro Impulse, Inc.**.....268

Electro Impulse, Inc.  
Ramko Research Inc.  
Specialized Industries, Inc.  
Television Equipment Associates

### Color Correction Equipment

See Adv. Page

**Microtime, Inc.**..... 55

Ampex Corp.  
Broadcast Communications Devices, Inc. D9  
dbx, Inc.  
Datatek Corp.  
Editel Communications  
Fernseh Group Robert Bosch Corp.  
Glentronix Ltd. D 1-9  
Harris Corp. Broadcast Products Div.  
Landy Associates Inc. D 1,2  
Marconi Communication Systems Ltd.  
Marconi Electronics Inc.  
Microtime, Inc.  
Photo Research Div. of Kollmorgen Corp.  
Power-Optics Inc.  
Rank Precision Industries, Inc. (III).  
Rank Cintel Div.  
Tektronix Inc.  
TeleMation, Inc.  
Television Equipment Associates  
Thomson-CSF Laboratories, Inc.  
3M Co. Mincom Div.

### Colorizers --See Generators, Special Effect

### Combiners, Power

See Adv. Page

**CCA Electronics Corp.**..... 99-106

AEL, Inc.  
CCA Electronics Corp.  
C. S. P. Inc.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Comark Industries Inc.  
Continental Electronics Mfg. Co.  
Dielectric Communications Div. Sola Basic, Inc.  
Dyma Engineering, Inc.  
Electro Impulse, Inc.  
Geleco Electronics Ltd.  
Harris Corp. Broadcast Products Div.  
Micro Communications, Inc.  
Narda Microwave Corp.  
North American Radio Corp.  
North Hills Electronics, Inc.  
Shively Laboratories, Inc.  
Sparta --see Cetec Broadcast Group

### Common Point Bridges --See Bridges, Common Point

### Communication Systems, Land Mobile

See Adv. Page

**CCA Electronics Corp.** .. 99-106  
**Moseley Assoc. Inc.**..... 69

Allied Broadcast Equip. D 1-9  
American Microsignal Co.  
Atlantic Research Corp.  
CCA Electronics Corp.  
Comquip, Inc.  
Custom Audio Electronics  
Editel Communications  
General Electric Co. Mobile Radio Dept.  
Image Devices Inc.  
International Microwave Corp.  
KVC Video Systems Inc. D 1,2  
Marconi Communication Systems Ltd.  
Marconi Electronics Inc.  
Microwave Assoc. Inc.  
Moseley Assoc. Inc.  
Paso Sound Products Inc.  
Phelps Dodge Communications Co.  
RCA Broadcast Systems  
Scientific Systems, Inc.  
Singer Instrumentation  
Singer Products Co., Inc.  
Television and Computer Corp.  
Victor Duncan, Inc.

### Communication Systems, Microwave

See Adv. Page

**CCA Electronics Corp.** .. 99-106  
**Farinon Electric International** ..... 85  
**Microwave Corp.** .....266  
**Micro Control Associates, Inc.** .....257  
**Microwave Assoc. Inc.** .....227  
**Moseley Assoc. Inc.** ..... 69  
**Nurad, Inc.** .....221

Atlantic Research Corp.  
CCA Electronics Corp.  
Cablewave Systems Inc.  
Coastcom  
Collins Radio Rockwell International  
Comark Industries Inc.  
Dyma Engineering, Inc.  
Farinon Electric  
GTE Lenkurt, Inc.  
Hughes Microwave Communication Products  
Ikegami Electronics (USA) Inc.  
International Microwave Corp.  
Marconi Communication Systems Ltd.  
Micro Control Associates, Inc.  
Microwave Assoc. Inc.  
Moseley Assoc. Inc.  
North American Radio Corp.  
Nurad, Inc.  
RHG Elect Labs, Inc.  
Raytheon Data Systems Co.  
Singer Products Co., Inc.  
Teledynamics  
Tepco Corp.  
TerraCom  
Varian/Beverly Micro-Link Products

### Communication Systems, Multiplex

See Adv. Page

**Moseley Assoc. Inc.** ..... 69

Atlantic Research Corp.  
Beta Technology, Inc.  
Broadcast Consultants Corp. D5, 6  
Catel Div. United Scientific Corp.  
Coastcom  
Collins Radio Rockwell International  
Farinon Electric  
GTE Lenkurt, Inc.  
Image Devices Inc.  
International Microwave Corp.  
Marconi Communication Systems Ltd.  
Marconi Electronics Inc.  
Moseley Assoc. Inc.  
Singer Products Co., Inc.  
TerraCom



**Communication Systems, STL**

See Adv. Page

- CCA Electronics Corp. .. 99-106**
- Marti Electronics ..... 57**
- Micro Control Associates, Inc. .... 257**
- Moseley Assoc. Inc. .... 69**

- Audio Distributor Inc. D 1-9
- Broadcast Consultants Corp. D5, 6
- CCA Electronics Corp.
- Cablewave Systems Inc.
- Cetec Broadcast Group
- Coastcom
- Collins Radio Rockwell International
- Comark Industries Inc.
- Comm/Scope Co.
- Custom Audio Electronics
- Dyma Engineering, Inc.
- Farinon Electric
- GTE Lenkurt, Inc.
- Hughes Microwave Communication Products
- Ikegami Electronics (USA) Inc.
- International Microwave Corp.
- Marti Electronics
- Mastertone Co., Inc.
- Micro Control Associates, Inc.
- Microwave Assoc. Inc.
- Moseley Assoc. Inc.
- North American Radio Corp.
- QEI Corp.
- RHG Elect Labs, Inc.
- Singer Products Co., Inc.
- Sparta --see Cetec Broadcast Group
- Tele-Measurements, Inc. B-2
- Tepeco Corp.
- TerraCom
- Val-Tronics, Inc. D1-9
- Varian/Beverly Micro-Link Products

**Communication Systems, Teleprinter**

See Adv. Page

- Moseley Assoc. Inc. .... 69**

- Broadcast Automation Assoc. D 1,2,5,6
- GTE Lenkurt, Inc.
- General Electric Co. Mobile Radio Dept.
- Moseley Assoc. Inc.
- The Widget Works, Inc.

**Comparators, Video**

See Adv. Page

- The BTX Corp. .... 208**
- Time Tech Corp. .... 275**
- The BTX Corp.
- Time Tech Corp.

**Compensators, Dropout**

- Microtime, Inc.
- RCA Broadcast Systems
- Roscor Corp. D3, 4
- Tele-Measurements, Inc. B-2
- 3M Co. Mincom Div.

**Connectors, Cable**

See Adv. Page

- Broadcast Consultants Corp. .... 84**
- CCA Electronics Corp. .. 99-106**
- Switchcraft Inc. .... 72**
- A-Tel-A-Matic
- Blonder-Tongue Labs.
- Boston Insulated Wire & Cable Co.
- Broadcast Consultants Corp. D5, 6
- Broadcast Equipment & Supply Co. D 1-9
- CCA Electronics Corp.
- Dyma Engineering, Inc.
- The Finney Co.
- G.C. Electronics
- Javelin Electronics D9
- Kings Electronics Co., Inc.

- LRC Electronics
- Maury Microwave Corp.
- Merill Cable Equipment Corp.
- Micro Communications, Inc.
- Peirce-Phelps, Inc. D 2, 5
- Phelps Dodge Communications Co.
- Professional Audio Service
- Rex Rheostat & Co., Inc.
- Saxton Products Inc.
- Sescom, Inc.
- Sono-Mag Corp.
- Switchcraft Inc.
- TRW Electronics Supply Co.
- Tektronix Inc.
- Times Wire and Cable
- Trompeter Electronics
- Union Connector Co., Inc.
- Weinschel Engineering Co.
- Whirlwind Music

**Consoles, Audio AM**

See Adv. Page

- Audio Designs & Mfg. .... 27**
- Audio Distributor Inc. .... 247**
- Auditronics, Inc. .... 196**
- Broadcast Component Dist. Communication Medias ..... 269**
- Broadcast Consultants Corp. .... 83**
- CCA Electronics Corp. .. 99-106**
- Cetec Broadcast Group ..... 5**
- Collins Radio ..... 21**
- Dyma Engineering, Inc. .... 276**
- Industrial Sciences ..... 250**
- LPB Inc. .... 172**
- McCurdy Radio Ind. Inc. .... IBC**
- Micro-Trak Corp. .... 260**
- Modular Audio Products ..... 252**
- Rupert Neve, Inc. .... 169**
- Opamp Labs, Inc. .... 277**
- Quantum Audio Labs, Inc. .... 276**
- ROH Corporation ..... 259**
- Ramko Research Inc. .... 91**
- Robins Broadcast & Sound Equip. Corp. .... 38**
- Sound Dynamics, Inc. .... 226**
- Tangent Systems, Inc. .... 269**
- Ward-Beck Systems, Ltd. .... IFC**
- Wilkinson Electronics, Inc. .... 62**

- AMCO Engineering Co.
- Accurate Sound Co.
- Allied Broadcast Equip. D 1-9
- Ampro Broadcasting Inc.
- Audio Designs & Mfg.
- Audio Distributor Inc. D 1-9
- Auditronics, Inc.
- Autogram Corp.
- Automated Processes, Inc.
- Broadcast Automation Assoc. D 1,2,5,6
- Broadcast Communications Devices, Inc. D9
- Broadcast Component Dist. Communication Medias D 1-9
- Broadcast Consultants Corp. D5, 6
- Broadcast Electronics, Inc.
- Broadcast Equipment Distributors Communication Medias
- Broadcast Equipment & Supply Co. D 1-9
- Broadcast Specialties
- Bud Industries, Inc.
- CCA Electronics Corp.
- Ceco Communications Inc.
- Cetec Audio
- Cetec Broadcast Group
- Collins Radio Rockwell International
- Contel Mfg.
- Custom Audio Electronics dbx, Inc.
- Dyma Engineering, Inc.
- Fisher-Burke Broadcast Consultants
- Harris Corp. Broadcast Products Div.
- Industrial Sciences

- International Communications & Control Corp.
- LPB Inc.
- Landy Associates Inc. D 1,2
- Logitek Electronic Systems
- Martin Audio/Video D2
- Mastertone Co., Inc.
- Maze Corp D6
- McCurdy Radio Ind. Inc.
- McMartin Industries, Inc.
- Micro-Trak Corp.
- Modular Audio Products Unit of Modular Devices, Inc.
- Charles Moore
- Rupert Neve, Inc.
- Opamp Labs, Inc.
- Pacific Recorders and Engrg. Corp.
- Pulse Dynamics Mfg. Corp. (PDMC)
- Quad-Eight Electronics
- Quantum Audio Labs, Inc.
- RCA Broadcast Systems
- ROH Corporation
- Ramko Research Inc.
- Rek-O-Kut Inc.
- Richmond Sound Design, Ltd.
- Robins Broadcast & Sound Equip. Corp.
- Russco Electronics Mfg. Inc.
- Scientific Systems, Inc.
- Shure Brothers Inc.
- Singer Products Co., Inc.
- Sound Dynamics, Inc. D8, 9
- Sound Genesis D8, 9
- Spectra Sonics
- Sphere Electronics
- Studer Revox America
- Tangent Systems, Inc.
- Tele-Measurements, Inc. B-2
- Television and Computer Corp.
- Track Audio, Inc. D 1-9
- Tri-Tronics Professional Electronics
- United Radio Supply Inc. D9
- United Recording Electronics Industries
- VIF International
- Val-Tronics, Inc. D1-9
- Ward-Beck Systems, Ltd.
- Wilkinson Electronics, Inc.
- Yamaha International Corp.

**Consoles, Audio FM**

See Adv. Page

- Audio Designs & Mfg. .... 27**
- Audio Distributor Inc. .... 247**
- Auditronics, Inc. .... 196**
- Broadcast Component Dist. Communication Medias ..... 269**
- Broadcast Consultants Corp. .... 83**
- CCA Electronics Corp. .. 99-106**
- Cetec Broadcast Group ..... 5**
- Collins Radio ..... 21**
- Dyma Engineering, Inc. .... 276**
- Industrial Sciences ..... 250**
- LPB Inc. .... 172**
- McCurdy Radio Ind. Inc. .... IBC**
- Micro-Trak Corp. .... 260**
- Modular Audio Products ..... 252**
- Rupert Neve ..... 169**
- Quantum Audio Labs, Inc. .... 276**
- ROH Corporation ..... 259**
- Ramko Research Inc. .... 91**
- Robins Broadcast & Sound Equip. Corp. .... 38**
- Sound Dynamics, Inc. .... 226**
- Tangent Systems, Inc. .... 269**
- Ward-Beck Systems, Ltd. .... IFC**
- Wilkinson Electronics, Inc. .... 62**

- AMCO Engineering Co.
- Accurate Sound Co.
- Allied Broadcast Equip. D 1-9
- Ampro Broadcasting Inc.
- Audio Designs & Mfg.
- Audio Distributor Inc. D 1-9
- Auditronics, Inc.

- Autogram Corp.
- Automated Processes, Inc.
- Broadcast Automation Assoc. D 1,2,5,6
- Broadcast Communications Devices, Inc. D9
- Broadcast Component Dist. Communication Medias D 1-9
- Broadcast Consultants Corp. D5, 6
- Broadcast Electronics, Inc.
- Broadcast Equipment Distributors Communication Medias
- Broadcast Equipment & Supply Co. D 1-9
- Broadcast Specialties
- Bud Industries, Inc.
- CCA Electronics Corp.
- Cetec Audio
- Cetec Broadcast Group
- Collins Radio Rockwell International
- Contel Mfg.
- Custom Audio Electronics dbx, Inc.
- Dyma Engineering, Inc.
- Fisher-Burke Broadcast Consultants
- Harris Corp. Broadcast Products Div.
- Holland Electronics
- Industrial Sciences
- International Communications & Control Corp.
- LPB Inc.
- Landy Associates Inc. D 1,2
- Logitek Electronic Systems
- Martin Audio/Video D2
- Mastertone Co., Inc.
- Maze Corp D6
- McCurdy Radio Ind. Inc.
- McMartin Industries, Inc.
- Micro-Trak Corp.
- Modular Audio Products Unit of Modular Devices, Inc.
- Charles Moore
- Rupert Neve, Inc.
- Opamp Labs, Inc.
- Pacific Recorders and Engrg. Corp.
- Pulse Dynamics Mfg. Corp. (PDMC)
- Quad-Eight Electronics
- Quantum Audio Labs, Inc.
- RCA Broadcast Systems
- ROH Corporation
- Ramko Research Inc.
- Rek-O-Kut Inc.
- Richmond Sound Design, Ltd.
- Robins Broadcast & Sound Equip. Corp.
- Russco Electronics Mfg. Inc.
- Scientific Systems, Inc.
- Shure Brothers Inc.
- Singer Products Co., Inc.
- Sound Dynamics, Inc. D8, 9
- Sound Genesis D8, 9
- Sparta --see Cetec Broadcast Group
- Spectra Sonics
- Sphere Electronics
- Studer Revox America
- Tangent Systems, Inc.
- Tele-Measurements, Inc. B-2
- Television and Computer Corp.
- Tri-Tronics Professional Electronics
- United Radio Supply Inc. D9
- United Recording Electronics Industries
- VIF International
- Val-Tronics, Inc. D1-9
- Ward-Beck Systems, Ltd.
- Wilkinson Electronics, Inc.
- Yamaha International Corp.

**Consoles, Audio Portable**

See Adv. Page

- Audio Distributor Inc. .... 247**
- Broadcast Consultants Corp. .... 83**
- CCA Electronics Corp. .. 99-106**
- Collins Radio ..... 21**
- Dyma Engineering, Inc. .... 276**
- Industrial Sciences ..... 250**
- LPB Inc. .... 172**
- McCurdy Radio Ind. Inc. .... IBC**
- Micro-Trak Corp. .... 260**
- Quantum Audio Labs, Inc. .... 276**
- Ramko Research Inc. .... 91**



**Robins Broadcast & Sound Equip. Corp. .... 38**

AMCO Engineering Co.  
 Allied Broadcast Equip. D 1-9  
 Ampro Broadcasting Inc.  
 Audio Designs & Mfg.  
 Audio Distributor Inc. D 1-9  
 Auditronics, Inc.  
 Automated Processes, Inc.  
 BSC Inc.  
 Boston Sound & Power Systems  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 Broadcast Specialties  
 Bud Industries, Inc.  
 CCA Electronics Corp.  
 Central Dynamics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Collins Television Services  
 Custom Audio Electronics dbx, Inc.  
 Dyma Engineering, Inc.  
 Fisher-Burke Broadcast Consultants  
 Harris Corp. Broadcast Products Div.  
 Industrial Sciences  
 International Communications & Control Corp.  
 LPB Inc.  
 Landy Associates Inc. D 1,2  
 Martin Audio/Video D2  
 Mastertone Co., Inc.  
 Maze Corp D6  
 McCurdy Radio Ind. Inc.  
 McMartin Industries, Inc.  
 Media Concepts, Inc. D 1-9  
 Micro-Trak Corp.  
 Modular Audio Products Unit of Modular Devices, Inc.  
 Charles Moore  
 Rupert Neve, Inc.  
 Opamp Labs, Inc.  
 Oregon Sound D 9  
 Pulse Dynamics Mfg. Corp. (PDMC)  
 Quad-Eight Electronics  
 Quantum Audio Labs, Inc.  
 RCA Broadcast Systems  
 Ramko Research Inc.  
 Rek-O-Kut Inc.  
 Richmond Sound Design, Ltd.  
 Robins Broadcast & Sound Equip. Corp.  
 Russco Electronics Mfg. Inc.  
 Scientific Systems, Inc.  
 Shure Brothers Inc.  
 Singer Products Co., Inc.  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Spectra Sonics  
 Sphere Electronics  
 Studer Revox America  
 Superscope, Inc.  
 TEAC Corp of America  
 Tele-Measurements, Inc. B-2  
 Television and Computer Corp.  
 Track Audio, Inc. D 1-9  
 Tri-Tronics Professional Electronics  
 Ultra Audio Pixtec  
 Val-Tronics, Inc. D1-9  
 Ward-Beck Systems, Ltd.  
 Westlake Audio  
 Yamaha International Corp.

**Consoles, Audio Recording**

**See Adv. Page**

**Audio Designs & Mfg. .... 27**  
**Auditronics, Inc. .... 196**  
**Broadcast Consultants Corp. .... 83**  
**Cetec Audio .... 217**  
**Collins Radio .... 21**  
**Dyma Engineering, Inc. .... 276**  
**Industrial Sciences .... 250**  
**LPB Inc. .... 172**

**McCurdy Radio Ind. Inc. .... IBC**  
**Modular Audio Products .... 252**  
**Rupert Neve, Inc. .... 169**  
**Quantum Audio Labs, Inc. .... 276**  
**Ramko Research Inc. .... 91**  
**Robins Broadcast & Sound Equip. Corp. .... 38**  
**Tangent Systems, Inc. .... 269**  
**Ward-Beck Systems, Ltd. .... IFC**

AMCO Engineering Co.  
 Accurate Sound Co.  
 Allied Broadcast Equip. D 1-9  
 Altec Sound Products  
 Ampro Broadcasting Inc.  
 Audio Designs & Mfg.  
 Audio Distributor Inc. D 1-9  
 Auditronics, Inc.  
 Autogram Corp.  
 Automated Processes, Inc.  
 BSC Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Bud Industries, Inc.  
 Cetec Audio  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Custom Audio Electronics dbx, Inc.  
 Dyma Engineering, Inc.  
 Fisher-Burke Broadcast Consultants  
 Gotham Audio Corp.  
 Harris Corp. Broadcast Products Div.  
 Holland Electronics  
 Industrial Sciences  
 International Communications & Control Corp.  
 LPB Inc.  
 Landy Associates Inc. D 1,2  
 MCI, Inc.  
 Magna-Tech Electronic Co., Inc.  
 Martin Audio/Video D2  
 Maze Corp D6  
 McCurdy Radio Ind. Inc.  
 McMartin Industries, Inc.  
 Media Concepts, Inc. D 1-9  
 Micro-Trak Corp.  
 Modular Audio Products Unit of Modular Devices, Inc.  
 Charles Moore  
 Rupert Neve, Inc.  
 Opamp Labs, Inc.  
 Oregon Sound D 9  
 Quad-Eight Electronics  
 Quantum Audio Labs, Inc.  
 RCA Broadcast Systems  
 Ramko Research Inc.  
 Richmond Sound Design, Ltd.  
 Robins Broadcast & Sound Equip. Corp.  
 Russco Electronics Mfg. Inc.  
 Scientific Systems, Inc.  
 Shure Brothers Inc.  
 Singer Products Co., Inc.  
 Sound Dynamics, Inc. D8, 9  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Spectra Sonics  
 Sphere Electronics  
 Studer Revox America  
 TEAC Corp of America  
 Tele-Measurements, Inc. B-2  
 Television and Computer Corp.  
 Track Audio, Inc. D 1-9  
 Tri-Tronics Professional Electronics  
 United Radio Supply Inc. D9  
 VIF International  
 Val-Tronics, Inc. D1-9  
 Ward-Beck Systems, Ltd.  
 Westlake Audio  
 Yamaha International Corp.

**Consoles, Audio TV**

**See Adv. Page**

**American Data Div. .... 197**  
**Broadcast Consultants Corp. .... 83**  
**C.R.V. Systems, Inc. .... 274**  
**Cetec Audio .... 217**  
**Dyma Engineering, Inc. .... 276**  
**Dytek Industries, Inc. .... 35**  
**Glentronix Ltd. .... 222**  
**Industrial Sciences .... 250**  
**LPB Inc. .... 172**  
**McCurdy Radio Ind. Inc. .... IBC**  
**Modular Audio Products .... 252**  
**Rupert Neve, Inc. .... 169**  
**Ramko Research Inc. .... 91**  
**Tangent Systems, Inc. .... 269**  
**Ward-Beck Systems, Ltd. .... IFC**

AMCO Engineering Co.  
 Allied Broadcast Equip. D 1-9  
 American Data Div. Philips Broadcast Equip. Corp.  
 Ampro Broadcasting Inc.  
 Audio Designs & Mfg.  
 Auditronics, Inc.  
 Autogram Corp.  
 Automated Processes, Inc.  
 BSC Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Bud Industries, Inc.  
 C.R.V. Systems, Inc.  
 Central Dynamics Corp.  
 Cetec Audio  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Collins Television Services  
 dbx, Inc.  
 Dyma Engineering, Inc.  
 Dytek Industries, Inc.  
 Fisher-Burke Broadcast Consultants  
 Glentronix Ltd. D 1-9  
 Harris Corp. Broadcast Products Div.  
 Holland Electronics  
 Industrial Sciences  
 International Communications & Control Corp.  
 KVC Video Systems Inc. D 1,2  
 LPB Inc.  
 Landy Associates Inc. D 1,2  
 Marconi Electronics Inc.  
 Maze Corp D6  
 McCurdy Radio Ind. Inc.  
 McMartin Industries, Inc.  
 Micro-Trak Corp.  
 Modular Audio Products Unit of Modular Devices, Inc.  
 Charles Moore  
 Rupert Neve, Inc.  
 Opamp Labs, Inc.  
 Pacific Recorders and Engrg. Corp.  
 Quad-Eight Electronics  
 Quantum Audio Labs, Inc.  
 RCA Broadcast Systems  
 Ramko Research Inc.  
 Rek-O-Kut Inc.  
 Richmond Sound Design, Ltd.  
 Robins Broadcast & Sound Equip. Corp.  
 Scientific Systems, Inc.  
 Shintron Co. Inc.  
 Singer Products Co., Inc.  
 Sound Dynamics, Inc. D8, 9  
 Sparta --see Cetec Broadcast Group  
 Spectra Sonics  
 Sphere Electronics  
 Tangent Systems, Inc.  
 Tele-Measurements, Inc. B-2  
 Television and Computer Corp.  
 Track Audio, Inc. D 1-9  
 Tri-Tronics Professional Electronics  
 Ultra Audio Pixtec  
 United Recording Electronics Industries

Ward-Beck Systems, Ltd.  
 Yamaha International Corp.

**Consoles, Routing --See Switchers, Routing**

**Consoles, Stereo**

**See Adv. Page**

**Audio Designs & Mfg. .... 27**  
**Audio Distributor Inc. .... 247**  
**Auditronics, Inc. .... 196**  
**Broadcast Component Dist. Communication Medias .... 269**  
**Broadcast Consultants Corp. .... 83**  
**CCA Electronics Corp. .... 99-106**  
**Cetec Audio .... 217**  
**Cetec Broadcast Group .... 5**  
**Dyma Engineering, Inc. .... 276**  
**Industrial Sciences .... 250**  
**LPB Inc. .... 172**  
**McCurdy Radio Ind. Inc. .... IBC**  
**Modular Audio Products .... 252**  
**Quantum Audio Labs, Inc. .... 276**  
**Ramko Research Inc. .... 91**  
**Robins Broadcast & Sound Equip. Corp. .... 38**  
**Tangent Systems, Inc. .... 269**  
**Ward-Beck Systems, Ltd. .... IFC**

AMCO Engineering Co.  
 Allied Broadcast Equip. D 1-9  
 Ampro Broadcasting Inc.  
 Audio Designs & Mfg.  
 Audio Distributor Inc. D 1-9  
 Auditronics, Inc.  
 Autogram Corp.  
 Automated Processes, Inc.  
 BSC Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 Broadcast Specialties  
 Bud Industries, Inc.  
 CCA Electronics Corp.  
 Cetec Audio  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Custom Audio Electronics dbx, Inc.  
 Dyma Engineering, Inc.  
 Electrohome Ltd.  
 Fisher-Burke Broadcast Consultants  
 Harris Corp. Broadcast Products Div.  
 Industrial Sciences  
 International Communications & Control Corp.  
 LPB Inc.  
 Landy Associates Inc. D 1,2  
 Logitek Electronic Systems  
 Martin Audio/Video D2  
 Mastertone Co., Inc.  
 Maze Corp D6  
 McCurdy Radio Ind. Inc.  
 McMartin Industries, Inc.  
 Media Concepts, Inc. D 1-9  
 Micro-Trak Corp.  
 Modular Audio Products Unit of Modular Devices, Inc.  
 Charles Moore  
 Rupert Neve, Inc.  
 Opamp Labs, Inc.  
 Oregon Sound D 9  
 Pacific Recorders and Engrg. Corp.  
 Quad-Eight Electronics  
 Quantum Audio Labs, Inc.  
 RCA Broadcast Systems  
 Ramko Research Inc.



Rek-O-Kut Inc.  
 Richmond Sound Design, Ltd.  
 Robins Broadcast & Sound Equip. Corp.  
 Russco Electronics Mfg. Inc.  
 Scientific Systems, Inc.  
 Sound Dynamics, Inc. D8, 9  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Spectra Sonics  
 Sphere Electronics  
 Studer Revox America  
 Tangent Systems, Inc.  
 Tele-Measurements, Inc. B-2  
 Telex Communications, Inc.  
 Track Audio, Inc. D 1-9  
 Tri-Tronics Professional Electronics  
 United Recording Electronics Industries  
 VIF International  
 Val-Tronics, Inc. D1-9  
 Ward-Beck Systems, Ltd.  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Consoles, Video Portable**

See Adv. Page

American Data Div. .... 197  
 C.R.V. Systems, Inc. .... 274  
 Central Dynamics Corp. .... 230  
 Dynasciences .... 14  
 Dytek Industries, Inc. .... 35  
 Shintron Co. Inc. .... 93  
 Winsted Corp. .... 82

AMCO Engineering Co.  
 American Data Div. Philips Broadcast Equip. Corp.  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Video Systems, Ltd.  
 Bud Industries, Inc.  
 C.R.V. Systems, Inc.  
 Central Dynamics Corp.  
 Computer Image Video Controllers Dytek Industries, Inc.  
 Dyma Engineering, Inc.  
 Dynasciences Div. Whitaker Corp.  
 Dytek Industries, Inc.  
 GBC Closed Circuit TV Corp.  
 International Nuclear Corp.  
 J&D Electronics Div.  
 Peirce-Phelps, Inc. D 2, 5  
 RCA Broadcast Systems  
 Richmond Hill Laboratories Ltd.  
 Roscor Corp. D3, 4  
 Shintron Co. Inc.  
 Sony Corp. of America VTR Div.  
 Tele-Measurements, Inc. B-2  
 Telemet a Geotel Co.  
 Ultra Audio Pixtec  
 Video Components, Inc.  
 Videodetics Corp.  
 Vital Industries Inc.  
 Weather Scan, Inc.  
 Winsted Corp.

**Consoles, Video Studio**

See Adv. Page

American Data Div. .... 197  
 C.R.V. Systems, Inc. .... 274  
 Central Dynamics Corp. .... 230  
 Dynasciences .... 14  
 Dytek Industries, Inc. .... 35  
 Glentronix Ltd. .... 218,222  
 Grass Valley Group, Inc. .... 3  
 Shintron Co. Inc. .... 93  
 Vital Industries Inc. .... BC  
 Winsted Corp. .... 82

AMCO Engineering Co.  
 American Data Div. Philips Broadcast Equip. Corp.  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Video Systems, Ltd.  
 Bud Industries, Inc.  
 C.R.V. Systems, Inc.  
 Central Dynamics Corp.

Computer Image Video Controllers Dytek Industries, Inc.  
 Dage-MTI, Inc.  
 Dyma Engineering, Inc.  
 Dynasciences Div. Whitaker Corp.  
 Dytek Industries, Inc.  
 GBC Closed Circuit TV Corp.  
 Glentronix Ltd. D 1-9  
 Grass Valley Group, Inc.  
 Industrial Sciences  
 International Nuclear Corp.  
 J&D Electronics Div.  
 Marconi Electronics Inc.  
 Peirce-Phelps, Inc. D 2, 5  
 RCA Broadcast Systems  
 Richmond Hill Laboratories Ltd.  
 Roscor Corp. D3, 4  
 Ross Broadcast Products Ltd.  
 Shintron Co. Inc.  
 Singer Products Co., Inc.  
 Sony Corp. of America VTR Div.  
 Tele-Measurements, Inc. B-2  
 Telemet a Geotel Co.  
 Video Components, Inc.  
 Videodetics Corp.  
 Viscount Industries Ltd.  
 Vital Industries Inc.  
 Ward-Beck Systems, Ltd.  
 Weather Scan, Inc.  
 Winsted Corp.

**Controllers, Equipment, Network Tone Activated**

Ampro Broadcasting Inc.  
 Broadcast Consultants Corp. D5, 6  
 Cetec Broadcast Group  
 Rivers Associates, Inc.  
 Schafer --see Cetec Broadcast Group  
 The Widget Works, Inc.

**Converters, A/D and D/a**

See Adv. Page

Computer Labs ..... 81

Computer Labs

**Converters, Frequency**

See Adv. Page

Kay Industries, Inc. .... 220

AEL, Inc.  
 Aiken Industries Inc.  
 Catal Div. United Scientific Corp.  
 The Finney Co.  
 Fung Engineering Inc.  
 Kay Industries, Inc.  
 Marconi Electronics Inc.  
 Motorola Semiconductor Products, Inc.  
 North Hills Electronics, Inc.  
 Oak Industries, Inc.  
 Philips Test & Measuring Instruments, Inc.  
 Telemet a Geotel Co.

**Converters, Phase --See Phase Converters, Single to Three-Phase**

**Counter-Timers**

See Adv. Page

Artist's Engineering ..... 275  
 Broadcast Consultants Corp. .... 83  
 ESE ..... 63, 65  
 Glentronix Ltd. .... 254  
 Sound Dynamics, Inc. .... 226

Allied Broadcast Equip. D 1-9  
 Ampro Broadcasting Inc.  
 Artist's Engineering Visual Communications Div.  
 Broadcast Aids, Inc.  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Collins Radio Rockwell International  
 Conrac Corp. Cramer Div.  
 Dana Laboratories, Inc.

Digi-Tech  
 Dyma Engineering, Inc.  
 EIP, Inc.  
 ESE  
 John Fluke Mfg. Co., Inc.  
 Glentronix Ltd. D 1-9  
 Gotham Audio Corp.  
 Harris Corp. Broadcast Products Div.  
 Hickok Elect. Instrument  
 Laird Telemedia Inc.  
 Lectrotech Inc.  
 Motorola Semiconductor Products, Inc.  
 Pacific Recorders and Engrg. Corp.  
 Philips Test & Measuring Instruments, Inc.  
 Ramko Research Inc.  
 Sigma Electronics, Inc.  
 Sound Dynamics, Inc. D8, 9  
 Sound Genesis D8, 9  
 Specialized Industries, Inc.  
 Systron-Donner  
 Tapecaster TCM, Inc.  
 Tektronix Inc.  
 Time & Frequency Tech., Inc.  
 Track Audio, Inc. D 1-9  
 United Systems Corp.  
 Val-Tronics, Inc. D1-9  
 Vamco Engineering

**Counters, Frequency**

See Adv. Page

Idaho Magnetics ..... 275

Broadcast Communications Devices, Inc. D9  
 Collins Radio Rockwell International  
 Dana Laboratories, Inc.  
 Dyma Engineering, Inc.  
 EIP, Inc.  
 Elcom Engineering Co.  
 Heath Co.  
 Hickok Elect. Instrument  
 Idaho Magnetics  
 Lauderdale Electronic Labs  
 Leader Instruments Corp.  
 Scientific-Atlanta, Inc.  
 Sencore Inc.  
 Tektronix Inc.  
 United Radio Supply Inc. D9  
 United Systems Corp.

**Couplers, Hybrid**

See Adv. Page

Broadcast Consultants Corp. .... 84

Alford Mfg. Co.  
 Arvin CATV  
 Broadcast Consultants Corp. D5, 6  
 Coaxial Dynamics  
 Comark Industries Inc.  
 Dyma Engineering, Inc.  
 Electro Impulse, Inc.  
 Harris Corp. Broadcast Products Div.  
 Holland Electronics  
 Maury Microwave Corp.  
 Micro Communications, Inc.  
 Microwave Assoc. Inc.  
 Monroe Electronics, Inc.  
 Narda Microwave Corp.  
 North Hills Electronics, Inc.  
 Saxton Products Inc.  
 Shively Laboratories, Inc.  
 Wide Band Engineering Co., Inc.

**Crystals, Quartz**

Eldon Electronic Co.  
 Harris Corp. Broadcast Products Div.  
 Marconi Communication Systems Ltd.

**Custom Control Systems**

See Adv. Page

Accurate Sound Co. .... 223  
 Ampro Broadcasting Inc. .... 70  
 Audio Designs & Mfg. .... 27  
 Communications, Ltd. .... 270  
 Dytek Industries, Inc. .... 35  
 Industrial Sciences ..... 250  
 Micro-Trak Corp. .... 260

**Modular Audio Products ..... 252**  
**Rupert Neve, Inc. .... 169**

A. F. Associates, Inc.  
 Accurate Sound Co.  
 American Data Div. Philips Broadcast Equip. Corp.  
 Ampro Broadcasting Inc.  
 Audio Designs & Mfg.  
 BJA Systems, Inc.  
 Broadcast Consultants Corp. D5, 6  
 C. S. P. Inc.  
 Central Dynamics Corp.  
 Cetec Broadcast Group  
 Communications, Ltd.  
 Custom Audio Electronics  
 Datalogic-Rust Co.  
 Dyma Engineering, Inc.  
 Dytek Industries, Inc.  
 Imero Fiorentino Associates, Inc.  
 Fisher-Burke Broadcast Consultants  
 Holland Electronics  
 IGM Div. of Northwestern Tech.  
 Industrial Sciences  
 Micro-Trak Corp.  
 Modular Audio Products Unit of Modular Devices, Inc.  
 Moseley Assoc. Inc.  
 Rupert Neve, Inc.  
 The Orange County Electronics Corp. Ltd.  
 Quad-Eight Electronics  
 ROH Corporation  
 Richmond Sound Design, Ltd.  
 Rivers Associates, Inc.  
 Schafer --see Cetec Broadcast Group  
 Scientific Systems, Inc.  
 Tangent Systems, Inc.  
 Television and Computer Corp.  
 Vamco Engineering  
 Wilkinson Electronics, Inc.

**Cyclorama, Studio Drapery**

Janson Industries  
 Kliegl Bros. Lighting  
 Lumitrol, Ltd.  
 Roscor Corp. D3, 4

**Data Receivers --See Receivers, Data**

**Data Transmitters**

See Adv. Page

Moseley Assoc. Inc. .... 69

Boston Sound & Power Systems  
 Bristol Div. of Acco  
 Marconi Communication Systems Ltd.  
 Moseley Assoc. Inc.  
 TerraCom  
 The Widget Works, Inc.

**Decoders, Digital Sync**

See Adv. Page

The BTX Corp. .... 208

The BTX Corp.  
 Digital Video Systems  
 Television Research International

**Decoders, Four Channel Stereo**

Motorola Semiconductor Products, Inc.  
 Sansui Electronics Corp.  
 Sound Genesis D8, 9  
 Technics by Panasonic

**Decoders, Tone**

See Adv. Page

Broadcast Component Dist. Communication Medias ..... 273  
 Frequency Devices Inc. 222,273

American Microsignal Co.  
 Ampro Broadcasting Inc.  
 Broadcast Component Dist. Communication Medias D 1-9  
 Di-Tech Inc.

Frequency Devices Inc.  
Fung Engineering Inc.  
Gorman Relich Mfg. Co.  
IGM Div. of Northwestern Tech.  
Monroe Electronics, Inc.  
Motorola Semiconductor Products, Inc.  
Rivers Associates, Inc.  
Val-Tronics, Inc. D1-9  
Vega Div. of Cetec Corp.

**Decoders, Tone, EBS**

Allied Broadcast Equip. D 1-9  
Broadcast Communications Devices, Inc. D9  
Broadcast Consultants Corp. D5, 6  
Collins Radio Rockwell International dbx, Inc.  
ESE  
Elcom Engineering Co.  
Gorman Relich Mfg. Co.  
Landy Associates Inc. D 1,2  
Logitek Electronic Systems  
Monroe Electronics, Inc.  
Rivers Associates, Inc.  
Sound Genesis D8, 9  
Tape City, Inc.  
Time & Frequency Tech., Inc.  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

**Delay Cartridges, Audio**

See Adv. Page

**Broadcast Component Dist. Communication Medias ..... 269**

Allied Broadcast Equip. D 1-9  
Ampro Broadcasting Inc.  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors Communication Medias  
Cetec Broadcast Group  
Dyma Engineering, Inc.  
Fidelipac  
International Tapetronics Corp.  
Joa Cartridge Service D2  
LPB Inc.  
Mastertone Co., Inc.  
Professional Audio Service  
Sound Dynamics, Inc. D8, 9  
Sparta --see Cetec Broadcast Group  
Studer Revox America

**Delay Lines**

See Adv. Page

**Allen Avionics ..... 274  
Broadcast Video Systems, Ltd. .... 214**

Allen Avionics  
Altec Sound Products  
Amperex Electronic Corp.  
Broadcast Communications Devices, Inc. D9  
Broadcast Video Systems, Ltd.  
Cablewave Systems Inc.  
Corning Glass Works  
Dielectric Communications Div. Sola Basic, Inc.  
Dyma Engineering, Inc.  
EMT Franz VGmbH  
ESC Electronics Corp.  
Edison Electronics Div.  
Eventide Clock Works Inc.  
Gotham Audio Corp.  
Kappa Networks, Inc.  
MIC-MIX Audio Products, Inc.  
Marconi Communication Systems Ltd.  
Maury Microwave Corp.  
Microtime, Inc.  
Motorola Semiconductor Products, Inc.  
Pacific Recorders and Engrg. Corp.  
Phelps Dodge Communications Co.  
Quad-Eight Electronics  
Singer Products Co., Inc.  
Sound Genesis D8, 9

Tasker Systems  
Tektronix Inc.  
Tele-Measurements, Inc. B-2  
Television Equipment Associates  
Thomson-CSF Electron Tubes  
Times Wire and Cable  
Walther M. A. Andersen & Assoc., Inc.

**Delay Measuring Sets, Envelope**

See Adv. Page

**Telemet ..... 79**

Broadcast Communications Devices, Inc. D9  
Datatek Corp.  
Dragnet Engineering Labs., Inc.  
Rohde & Schwarz Sales Co.  
Tektronix Inc.  
Telemet a Geotel Co.  
Television Equipment Associates

**Delay Units, Video**

See Adv. Page

**Broadcast Video Systems, Ltd. .... 214  
Lenco Inc. .... 19**

Allen Avionics  
Broadcast Video Systems, Ltd.  
Corning Glass Works  
ESC Electronics Corp.  
Edison Electronics Div.  
Kappa Networks, Inc.  
Lenco Inc. Electronics Div.  
TeleMation, Inc.  
Television Equipment Associates  
Walther M. A. Andersen & Assoc., Inc.

**Demagnetizers, Bulk Tape**

See Adv. Page

**Beucart Div. .... 28  
Broadcast Component Dist. Communication Medias ..... 269  
Broadcast Consultants Corp. .... 83  
CCA Electronics Corp. .. 99-106  
Garner Industries ..... 264  
Optek ..... 196  
Sound Dynamics, Inc. .... 226  
Taber Mfg. & Engr. Co. .... 174  
Wide Range Electronics ..... 255**

Allied Broadcast Equip. D 1-9  
Audio Distributor Inc. D 1-9  
Beucart Div. UMC Electronics Co.  
Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors Communication Medias  
Broadcast Equipment & Supply Co. D 1-9  
CCA Electronics Corp.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Fidelipac  
G.C. Electronics  
Garner Industries  
Glentronix Ltd. D 1-9  
Harris Corp. Broadcast Products Div.  
International Tapetronics Corp.  
Joa Cartridge Service D2  
Magnasync/Moviola Corp.  
Mastertone Co., Inc.  
Microtran Co., Inc.  
Nortronics Co., Inc.  
Optek  
Pentagon Industries, Inc.  
Professional Audio Service  
Robins Broadcast & Sound Equip. Corp.

Sound Dynamics, Inc. D8, 9  
Sound Genesis D8, 9  
Sparta --see Cetec Broadcast Group  
TEAC Corp of America  
Taber Mfg. & Engr. Co.  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9  
Victor Duncan, Inc.  
Wide Range Electronics

**Demagnetizers, Limited Area**

See Adv. Page

**Wide Range Electronics .. 255**

**Demagnetizers, Videotape**

See Adv. Page

**Garner Industries ..... 264**

**Demodulators, Optical**

Telemet a Geotel Co.  
Video Aids Corp. of Colorado

**Demodulators, Video**

See Adv. Page

**Philips Test & Measuring Instruments, Inc. .... 15  
Telemet ..... 79**

Belar Electronics Lab., Inc.  
Broadcast Communications Devices, Inc. D9  
Catel Div. United Scientific Corp.  
Coastcom  
Comark Industries Inc.  
Conrac Div. Conrac Corp.  
Dyma Engineering, Inc.  
Dynair Electronics, Inc.  
Fung Engineering Inc.  
Glentronix Ltd. D 1-9  
Harris Corp. Broadcast Products Div.  
Javelin Electronics D9  
Kahn Communications, Inc.  
Marconi Instruments  
Optek  
Peirce-Phelps, Inc. D 2, 5  
Phlips Test & Measuring Instruments, Inc.  
RCA Community Television Systems  
RHG Elect Labs, Inc.  
Rohde & Schwarz Sales Co.  
SC Electronics, Inc.  
Scientific-Atlanta, Inc.  
Technics by Panasonic  
Tektronix Inc.  
Tele-Measurements, Inc. B-2  
Telemet a Geotel Co.  
Townsend Associates, Inc.  
Unimedia Corp.  
Video Aids Corp. of Colorado

**Detectors, Microwave**

Alford Mfg. Co.  
Coaxial Dynamics  
Comark Industries Inc.  
Dielectric Communications Div. Sola Basic, Inc.  
General Electric Co. Tubes/MW Devices  
Harris Corp. PRD Electronics Div.  
Kay Elemetrics Corp.  
Maury Microwave Corp.  
Microwave Assoc. Inc.  
Motorola Semiconductor Products, Inc.  
Mountain West Alarm D8  
Narda Microwave Corp.  
Pacific Recorders and Engrg. Corp.  
Singer Instrumentation  
Singer Products Co., Inc.  
Systron-Donner  
Tektronix Inc.  
Texscan Corp.  
Thomson-CSF Electron Tubes  
Weinschel Engineering Co.

**Detectors, RF**

See Adv. Page

**Moseley Assoc. Inc. .... 69  
Potomac Instruments, Inc. .... 251**

Alford Mfg. Co.  
Bird Electronic Corp.  
Blonder-Tongue Labs.

CCA Electronics Corp.  
Coaxial Dynamics  
Comark Industries Inc.  
Dielectric Communications Div. Sola Basic, Inc.  
Harris Corp. Broadcast Products Div.  
Harris Corp. PRD Electronics Div.  
Heath Co.  
Kaitronics Corp.  
Kay Elemetrics Corp.  
Maury Microwave Corp.  
Micro Communications, Inc.  
Microwave Assoc. Inc.  
Moseley Assoc. Inc.  
Motorola Semiconductor Products, Inc.  
Narda Microwave Corp.  
North American Radio Corp.  
Pacific Recorders and Engrg. Corp.  
Potomac Instruments, Inc.  
Singer Products Co., Inc.  
Systron-Donner  
Tektronix Inc.  
Telemet a Geotel Co.  
Television Technology Corp.  
Telonic Altair  
Texscan Corp.  
Thomson-CSF Electron Tubes  
Tri-Tronics Professional Electronics  
Weinschel Engineering Co.  
Wide Band Engineering Co., Inc.

**Detectors, Standing Wave**

See Adv. Page

**Moseley Assoc. Inc. .... 69  
Potomac Instruments, Inc. .... 251**

Bird Electronic Corp.  
Coaxial Dynamics  
Collins Radio Rockwell International  
Dielectric Communications Div. Sola Basic, Inc.  
Dyma Engineering, Inc.  
Harris Corp. PRD Electronics Div.  
Maury Microwave Corp.  
Micro Communications, Inc.  
Moseley Assoc. Inc.  
Pacific Recorders and Engrg. Corp.  
Potomac Instruments, Inc.  
Rohde & Schwarz Sales Co.  
Telonic Altair  
Texscan Corp.  
Weinschel Engineering Co.

**Detectors, Transmitter Quadrature Distortion**

See Adv. Page

**Telemet ..... 79**

Telemet a Geotel Co.

**Detectors, Video Presence**

See Adv. Page

**Di-Tech Inc. .... 263**

Colorado Video Inc.  
Comark Industries Inc.  
Di-Tech Inc.  
Dyma Engineering, Inc.  
Javelin Electronics D9  
Lenco Inc. Electronics Div.  
Peirce-Phelps, Inc. D 2, 5  
RCA Electro Optics and Devices  
Richmond Hill Laboratories Ltd.  
Rivers Associates, Inc.  
Sigma Electronics, Inc.  
Telemet a Geotel Co.  
Vitek Electronics Inc.

**Differential Phase/Gain Measuring Sets**

Broadcast Communications Devices, Inc. D9  
dbx, Inc.  
Datatek Corp.  
Harris Corp. Broadcast Products Div.  
Landy Associates Inc. D 1,2  
Potomac Instruments, Inc.  
Tektronix Inc.  
Tele-Measurements, Inc. B-2  
Telemet a Geotel Co.



## Digitizers, Color Video

BJA Systems, Inc.  
Central Dynamics Corp.  
Dyma Engineering, Inc.  
Micro Consultants  
Tektronix Inc.  
Thomson-CSF Laboratories, Inc.

## Diplexers

Alford Mfg. Co.  
CCA Electronics Corp.  
C. S. P. Inc.  
Cetec Broadcast Group  
Coastcom  
Collins Radio Rockwell International  
Comark Industries Inc.  
Continental Electronics Mfg. Co.  
Dielectric Communications Div. Sola  
Basic, Inc.  
Dyma Engineering, Inc.  
Jampro --see Cetec Broadcast Group  
Laird Telemedia Inc.  
Micro Communications, Inc.  
Microwave Assoc. Inc.  
Multronics, Inc.  
North American Radio Corp.  
Pacific Recorders and Engrg. Corp.  
Phelps Dodge Communications Co.  
RCA Broadcast Systems  
RCA Community Television Systems  
Shively Laboratories, Inc.  
Singer Products Co., Inc.  
Telonic Altair  
Vitek Electronics Inc.  
Wide Band Engineering Co., Inc.

## Discs, Video

See Adv. Page

## Computer Magnetics

Corp. .... 248,249

Ampex Corp.  
Arvin/Echo Co.  
Chyron Telesystems  
Computer Magnetics Corp.  
dbx, Inc.  
Eigen Video  
Glentronix Ltd. D 1-9  
Landy Associates Inc. D 1,2  
Peirce-Phelps, Inc. D 2, 5  
Roscor Corp. D3, 4  
Teknekron/TRAX

## Display Equipment, Titling

BJA Systems, Inc.  
Broadcast Communications Devices,  
Inc. D9  
Chyron Telesystems  
Comquip, Inc.  
dbx, Inc.  
General Television Ntwk. D 3  
Landy Associates Inc. D 1,2  
Photo Research Div. of Kollmorgen  
Corp.  
Reynolds/Leteron Co.  
Tektronix Inc.  
TeleMation, Inc.  
Telescript, Inc.  
Thomson-CSF Laboratories, Inc.  
3M Co. Mincom Div.  
Ultra Audio Pixtec  
Video Data Systems

## Display Units, Digital

See Adv. Page

**The BTX Corp.**..... 208  
**ESE** ..... 63, 65  
**Moseley Assoc. Inc.** ..... 69

BJA Systems, Inc.  
The BTX Corp.  
Beta Technology, Inc.  
Broadcast Communications Devices,  
Inc. D9  
Cetec Broadcast Group  
Convergence Corp.  
ESE  
G.C. Electronics  
Ikegami Electronics (USA) Inc.  
Javelin Electronics D9

Kallman Associates, Inc.  
Moseley Assoc. Inc.  
SC Electronics, Inc.  
Schafer --see Cetec Broadcast Group  
Scientific-Atlanta, Inc.  
Tektronix Inc.  
Thomson-CSF Laboratories, Inc.  
3M Co. Mincom Div.  
Vamco Engineering  
Video Data Systems

## Display Units, Time-Temperature-ID

Boston Sound & Power Systems  
Broadcast Communications Devices,  
Inc. D9  
ESE  
IGM Div. of Northwestern Tech.  
Javelin Electronics D9  
Laird Telemedia Inc.  
Merill Cable Equipment Corp.  
Thomson-CSF Laboratories, Inc.  
3M Co. Mincom Div.  
Time & Frequency Tech., Inc.  
Track Audio, Inc. D 1-9  
Video Data Systems

## Dividers, Frequency

Broadcast Communications Devices,  
Inc. D9  
General Electric Co. Tubes/MW  
Devices  
Maury Microwave Corp.  
Microwave Assoc. Inc.  
Motorola Semiconductor Products, Inc.  
Sound Genesis D8, 9

## Dividers, Power

See Adv. Page  
**Moseley Assoc. Inc.** ..... 69

Alford Mfg. Co.  
Bird Electronic Corp.  
Cetec Broadcast Group  
Comark Industries Inc.  
Dielectric Communications Div. Sola  
Basic, Inc.  
Dyma Engineering, Inc.  
Harris Corp. Broadcast Products Div.  
Harris Corp. PRD Electronics Div.  
Maury Microwave Corp.  
Micro Communications, Inc.  
Microwave Assoc. Inc.  
Moseley Assoc. Inc.  
Multronics, Inc.  
Narda Microwave Corp.  
North American Radio Corp.  
North Hills Electronics, Inc.  
Pacific Recorders and Engrg. Corp.  
Phelps Dodge Communications Co.  
Scala Radio Corp.  
Shively Laboratories, Inc.  
Singer Products Co., Inc.  
Sparta --see Cetec Broadcast Group  
Tektronix Inc.  
Trompeter Electronics  
Weinschel Engineering Co.  
Wide Band Engineering Co., Inc.

## Dividers, Voltage

John Fluke Mfg. Co., Inc.  
General Electric Co. Tubes/MW  
Devices  
Hickok Elect. Instrument  
ITT Jennings  
North Hills Electronics, Inc.  
Shalco, Inc.  
Tech Laboratories Inc.

## Earth Station Antennas --See Antennas, TV Earth Station

## Earth Stations, Down Terminal

Hughes Microwave Communication  
Products

## Earth Stations, Up Terminal

Hughes Microwave Communication  
Products

## Edit Code Generators

See Adv. Page

**The BTX Corp.**..... 208  
**Central Dynamics Corp.** ..... 230  
**Gould, Inc.** ..... 44  
**Kaitronics Corp.**..... 211  
**Time Tech Corp.** ..... 275

Automated Processes, Inc.  
The BTX Corp.  
Beta Technology, Inc.  
Broadcast Communications Devices,  
Inc. D9  
CMX Systems Div. of Orrox Corp.  
Central Dynamics Corp.  
Chrono-Log Corp.  
dbx, Inc.  
Datatron, Inc.  
Dyma Engineering, Inc.  
EECO  
Glentronix Ltd. D 1-9  
Gould, Inc. Control & Systems Div.  
International Communications &  
Control Corp.  
Kaitronics Corp.  
Landy Associates Inc. D 1,2  
Recortec Inc.  
Shintron Co. Inc.  
Skotel  
Television Research International  
Time Tech Corp.  
Westlake Audio

## Edit Code Receivers

See Adv. Page

**The BTX Corp.**..... 208  
**Central Dynamics Corp.** ..... 230  
**Gould, Inc.** ..... 44  
**Kaitronics Corp.**..... 211  
**Shintron Co. Inc.** ..... 93  
**Time Tech Corp.** ..... 275

The BTX Corp.  
Beta Technology, Inc.  
Broadcast Communications Devices,  
Inc. D9  
CMX Systems Div. of Orrox Corp.  
Central Dynamics Corp.  
Chrono-Log Corp.  
dbx, Inc.  
Datatron, Inc.  
Dyma Engineering, Inc.  
EECO  
ESE  
Glentronix Ltd. D 1-9  
Gould, Inc. Control & Systems Div.  
International Communications &  
Control Corp.  
Kaitronics Corp.  
Landy Associates Inc. D 1,2  
Shintron Co. Inc.  
Skotel  
Television Research International  
Time Tech Corp.  
Westlake Audio

## Editors, Audio Tape

See Adv. Page

**Sound Dynamics, Inc.** ..... 226

AEG-Telefunken Magnetic Tape  
Recorder Dept.  
Automated Processes, Inc.  
Broadcast Communications Devices,  
Inc. D9  
Broadcast Electronics, Inc.  
CMX Systems Div. of Orrox Corp.  
Central Dynamics Corp.  
Comquip, Inc.  
dbx, Inc.  
Datatron, Inc.  
Dyma Engineering, Inc.  
ELPA Marketing Industries, Inc.  
Fidelipac  
Landy Associates Inc. D 1,2  
Sound Dynamics, Inc. D8, 9  
Sound Genesis D8, 9  
Track Audio, Inc. D 1-9  
Triple I Inc. The Economy Co.

## Editors, Film

See Adv. Page

**Lipsner-Smith Corp.** ..... 60  
**Research Technology, Inc.** ..... 60

Broadcast Communications Devices,  
Inc. D9  
Comquip, Inc.  
Image Devices Inc.  
Kalart Victor Corp.  
Lipsner-Smith Corp.  
Magnasync/Moviola Corp.  
Neumade Products Corp.  
Research Technology, Inc.  
Sound Genesis D8, 9  
Super8 Sound, Inc.  
Victor Duncan, Inc.

## Editors, Video Tape

See Adv. Page

**Artist's Engineering**..... 275  
**CMX Systems**..... 9  
**Central Dynamics Corp.** ..... 230  
**Convergence Corp.** ..... 39  
**Kaitronics Corp.** ..... 211  
**Panasonic Video Systems Div.**..... 30, 31  
**Vamco Engineering** ..... 198

Ampex Corp.  
Artist's Engineering Visual  
Communications Div.  
Beta Technology, Inc.  
Broadcast Communications Devices,  
Inc. D9  
CMX Systems Div. of Orrox Corp.  
Central Dynamics Corp.  
Computer Image Video Controllers  
Dytek Industries, Inc.  
Comquip, Inc.  
Convergence Corp.  
dbx, Inc.  
Datatron, Inc.  
Dyma Engineering, Inc.  
EECO  
ELPA Marketing Industries, Inc.  
JVC Industries, Inc.  
Kaitronics Corp.  
Landy Associates Inc. D 1,2  
Panasonic Video Systems Div.  
Peirce-Phelps, Inc. D 2, 5  
RCA Broadcast Systems  
Recortec Inc.  
Roscor Corp. D3, 4  
Sony Corp. of America VTR Div.  
Spectra-Vision Corp.  
Tele-Measurements, Inc. B-2  
Television Research International  
Vamco Engineering  
Video Aids Corp. of Colorado  
Video Associates  
Video Devices Co.

## Educational Courses, Electronic

See Adv. Page

**Heath Co.** ..... 48-51

Heath Co.

## Enclosures, Module Card Tray

Dyma Engineering, Inc.  
Modular Audio Products Unit of  
Modular Devices, Inc.  
Monroe Electronics, Inc.  
The Orange County Electronics Corp.  
Ltd.  
Quad-Eight Electronics  
ROH Corporation  
Robins Broadcast & Sound Equip.  
Corp.  
Tele-Measurements, Inc. B-2

## Encoding Systems, Quad

Sansui Electronics Corp.

## Encoders, Color Video

Amtron Corp.  
Broadcast Video Systems, Ltd.  
Chyron Telesystems  
Cohu, Inc. Electronics Div.  
dbx, Inc.  
Dyma Engineering, Inc.  
Glentronix Ltd. D 1-9  
Harris Corp. Broadcast Products Div.  
Landy Associates Inc. D 1,2  
Lenco Inc. Electronics Div.  
Marconi Electronics Inc.  
Panasonic Video Systems Div.  
Peirce-Phelps, Inc. D 2, 5  
Philips Test & Measuring Instruments, Inc.  
Rank Precision Industries, Inc. (III).  
Rank Cintel Div.  
Sigma Electronics, Inc.  
Sony Corp. of America VTR Div.  
TeleMation, Inc.  
Tele-Measurements, Inc. B-2  
3M Co. Mincom Div.

## Encoders, Four Channel Stereo

Collins Radio Rockwell International  
Sound Genesis D8, 9

## Encoders, Tone

See Adv. Page

### Frequency Devices Inc. 222,273

American Microsignal Co.  
Cetec Broadcast Group  
Di-Tech Inc.  
Frequency Devices Inc.  
Gorman Relich Mfg. Co.  
IGM Div. of Northwestern Tech.  
Lampkin Lab. Inc.  
Monroe Electronics, Inc.  
Moseley Assoc. Inc.  
Motorola Semiconductor Products, Inc.  
Rivers Associates, Inc.  
Sansui Electronics Corp.  
Schafer --see Cetec Broadcast Group  
Television Research International  
Vega Div. of Cetec Corp.

## Encoder-Decoders, EBS

Allied Broadcast Equip. D 1-9  
American Microsignal Co.  
Broadcast Communications Devices, Inc. D9  
dbx, Inc.  
ESE  
Gorman Relich Mfg. Co.  
Landy Associates Inc. D 1,2  
Logitek Electronic Systems  
Rivers Associates, Inc.  
Sound Genesis D8, 9  
Time & Frequency Tech., Inc.  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

## Enhancers, Stereo Phase

See Adv. Page

### Sound Dynamics, Inc. 226

Allied Broadcast Equip. D 1-9  
Cetec Broadcast Group  
Rapid-Q, Edco Products, Inc.  
Sound Dynamics, Inc. D8, 9  
Sparta --see Cetec Broadcast Group  
Westlake Audio

## Enhancers, TV Image

See Adv. Page

### Dynasciences 14 Microtime, Inc. 55

Broadcast Communications Devices, Inc. D9  
Cohu, Inc. Electronics Div.  
Corning Glass Works  
dbx, Inc.  
Dynasciences Div. Whitaker Corp.  
Glentronix Ltd. D 1-9  
Harris Corp. Broadcast Products Div.

Landy Associates Inc. D 1,2  
Microtime, Inc.  
Peirce-Phelps, Inc. D 2, 5  
Rank Precision Industries, Inc. (III).  
Rank Cintel Div.  
Roscor Corp. D3, 4  
Teledynamics  
Tele-Measurements, Inc. B-2  
Telemet a Geotel Co.  
Television Research International  
Thomson-CSF Laboratories, Inc.  
3M Co. Mincom Div.

## Equalizers, Audio Emphasis

See Adv. Page

**Broadcast Component  
Dist. Communication  
Medias 269**  
**International Electro-  
Magnetics 184**  
**Opamp Labs, Inc. 277**  
**M. Palmer &  
Associates 276**  
**Pulse Techniques Inc. 274**  
**Ramko Research Inc. 91, 176**  
**Sound Dynamics, Inc. 226**

Accurate Sound Co.  
Allied Broadcast Equip. D 1-9  
Altec Sound Products  
Audio Designs & Mfg.  
Audio Distributor Inc. D 1-9  
Auditronics, Inc.  
Automated Processes, Inc.  
Beli P/A Prod. Corp.  
Bogen Div. Lear Siegler, Inc.  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors  
Communication Medias  
Broadcast Equipment & Supply Co. D 1-9  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
ESC Electronics Corp.  
Gotham Audio Corp.  
Holland Electronics  
International Electro-Magnetics  
Kahn Communications, Inc.  
Landy Associates Inc. D 1,2  
Maze Corp D6  
McCurdy Radio Ind. Inc.  
Micro-Trak Corp.  
Modular Audio Products Unit of  
Modular Devices, Inc.  
Rupert Neve, Inc.  
Opamp Labs, Inc.  
The Orange County Electronics Corp.  
Ltd.  
Orban/Parasound  
Oregon Magnetics  
Oregon Sound D 9  
M. Palmer & Associates  
Pulse Techniques Inc.  
Quad-Eight Electronics  
ROH Corporation  
Ramko Research Inc.  
Richmond Sound Design, Ltd.  
Robins Broadcast & Sound Equip.  
Corp.  
Sescom, Inc.  
Shure Brothers Inc.  
Sinai-Johnson  
Sound Dynamics, Inc. D8, 9  
Sound Genesis D8, 9  
Sparta --see Cetec Broadcast Group  
Spectra Sonics  
Sphere Electronics  
Super8 Sound, Inc.  
TM Systems, Inc.  
TT Electronics, Inc.  
Technics by Panasonic  
Tele-Measurements, Inc. B-2  
Thomson-CSF Laboratories, Inc.  
Track Audio, Inc. D 1-9  
United Recording Electronics  
Industries  
Val-Tronics, Inc. D1-9  
Ward-Beck Systems, Ltd.  
Westlake Audio

## Equalizers, Vertical Aperature

See Adv. Page

### Microtime, Inc. 55

Broadcast Communications Devices, Inc. D9  
dbx, Inc.  
Dynasciences Div. Whitaker Corp.  
ESC Electronics Corp.  
Landy Associates Inc. D 1,2  
Microtime, Inc.  
Peirce-Phelps, Inc. D 2, 5  
Tele-Measurements, Inc. B-2  
Thomson-CSF Laboratories, Inc.

## Equalizers, Video

See Adv. Page

### Computer Magnetics Corp. 248,249

### Microtime, Inc. 55

Allen Avionics  
Broadcast Communications Devices, Inc. D9  
Broadcast Video Systems, Ltd.  
Central Dynamics Corp.  
Collins Television Services  
Communications Technology, Inc.  
Computer Magnetics Corp.  
dbx, Inc.  
Datatek Corp.  
Di-Tech Inc.  
Dyma Engineering, Inc.  
Dynair Electronics, Inc.  
ESC Electronics Corp.  
Grass Valley Group, Inc.  
Industrial Sciences  
International Communications &  
Control Corp.  
Kappa Networks, Inc.  
Landy Associates Inc. D 1,2  
Leitch Video Ltd.  
Lenco Inc. Electronics Div.  
Microtime, Inc.  
Oregon Magnetics  
Peirce-Phelps, Inc. D 2, 5  
Richmond Hill Laboratories Ltd.  
TeleMation, Inc.  
Tele-Measurements, Inc. B-2  
Telemet a Geotel Co.  
Thomson-CSF Laboratories, Inc.

### Erasers, Magnetic --See Demagnetizers, Bulk Tape, and Heads, Erase Magnetic

## Exciters, AM

See Adv. Page

### Broadcast Component Dist. Communication Medias 271

AEL, Inc.  
Allied Broadcast Equip. D 1-9  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
CCA Electronics Corp.  
CSI Electronics, Inc.  
Collins Radio Rockwell International  
Continental Electronics Mfg. Co.  
Harris Corp. Broadcast Products Div.  
Kahn Communications, Inc.  
Marconi Communication Systems Ltd.  
Maze Corp D6  
Phillips Test & Measuring Instruments, Inc.  
RCA Broadcast Systems  
Singer Products Co., Inc.  
Sintronic Corp.  
Sound Genesis D8, 9  
Wilkinson Electronics, Inc.

## Exciters, FM

See Adv. Page

**Broadcast Component  
Dist. Communication  
Medias 271**  
**Harris Corp. 191**  
**Wilkinson Electronics,  
Inc. 182**

AEL, Inc.  
Allied Broadcast Equip. D 1-9  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Equipment Distributors  
Communication Medias  
Broadcast Equipment & Supply Co. D 1-9  
Broadcast Specialties  
CCA Electronics Corp.  
CSI Electronics, Inc.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Fung Engineering Inc.  
Harris Corp. Broadcast Products Div.  
Marconi Communication Systems Ltd.  
Mastertone Co., Inc.  
Maze Corp D6  
McMartin Industries, Inc.  
North American Radio Corp.  
QEI Corp.  
RCA Broadcast Systems  
Rohde & Schwarz Sales Co.  
Singer Products Co., Inc.  
Sintronic Corp.  
Sound Genesis D8, 9  
Sparta --see Cetec Broadcast Group  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

## Exciters, SCA

See Adv. Page

### Harris Corp. 191 Moseley Assoc. Inc. 69

AEL, Inc.  
Allied Broadcast Equip. D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Equipment & Supply Co. D 1-9  
Broadcast Specialties  
CCA Electronics Corp.  
CSI Electronics, Inc.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Harris Corp. Broadcast Products Div.  
Mastertone Co., Inc.  
Maze Corp D6  
McMartin Industries, Inc.  
Moseley Assoc. Inc.  
QEI Corp.  
RCA Broadcast Systems  
Sintronic Corp.  
Sound Genesis D8, 9  
Sparta --see Cetec Broadcast Group  
The Widget Works, Inc.  
Wilkinson Electronics, Inc.

## Exciters, Stereo

See Adv. Page

**Broadcast Component  
Dist. Communication  
Medias 271**  
**Harris Corp. 191**  
**Moseley Assoc. Inc. 69**  
**Wilkinson Electronics,  
Inc. 182**

AEL, Inc.  
Allied Broadcast Equip. D 1-9  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Equipment Distributors  
Communication Medias  
Broadcast Equipment & Supply Co. D 1-9  
CCA Electronics Corp.  
CSI Electronics, Inc.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Harris Corp. Broadcast Products Div.  
Kahn Communications, Inc.  
Marconi Communication Systems Ltd.  
Mastertone Co., Inc.  
Maze Corp D6  
McMartin Industries, Inc.  
Moseley Assoc. Inc.  
QEI Corp.



RCA Broadcast Systems  
Sintronic Corp.  
Sound Genesis DB, 9  
Sparta --see Cetec Broadcast Group  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

**Faders, Studio Lighting Control**

See Adv. Page

**Waters Mfg. Inc. ....252**

Waters Mfg. Inc.

**Film Cleaner/Conditioner Equipment**

See Adv. Page

**Lipsner-Smith Corp. .... 60**  
**Research Technology, Inc. .... 60**

Lipsner-Smith Corp.  
Research Technology, Inc.

**Film Inspection and Cleaning Equipment**

See Adv. Page

**Lipsner-Smith Corp. .... 60**  
**Research Technology, Inc. .... 60**

Lipsner-Smith Corp.  
Research Technology, Inc.

**Film, Photographic**

Agfa-Gevaert Inc.  
Comquip, Inc.  
Eastman Kodak Co.  
Image Devices Inc.

**Film Chain Light Level Controls**

Beston Electronics Inc.  
Cohu, Inc. Electronics Div.  
Comquip, Inc.  
dbx, Inc.  
Harris Corp. Broadcast Products Div.  
Industrial Sciences  
Laird Telemedia Inc.  
Landy Associates Inc. D 1,2  
Specialized Industries, Inc.  
The Zei-Mark Corp.

**Film Chain Systems**

See Adv. Page

**Buhl Optical Co. ....272**  
**Rank Precision Industries, Inc. (III)..... 90**

Bell & Howell Audio Visual Div.  
Blonder-Tongue Labs.  
Broadcast Communications Devices, Inc. D9  
Buhl Optical Co.  
Cohu, Inc. Electronics Div.  
Comquip, Inc.  
dbx, Inc.  
Fernseh Group Robert Bosch Corp.  
GBC Closed Circuit TV Corp.  
General Electric Co. ISO Div.  
Harris Corp. Broadcast Products Div.  
Kalart Victor Corp.  
Laird Telemedia Inc.  
Landy Associates Inc. D 1,2  
Marconi Communication Systems Ltd.  
Marconi Electronics Inc.  
Peirce-Phelps, Inc. D 2, 5  
Philips Broadcast Equip Corp.  
RCA Broadcast Systems  
Rank Precision Industries, Inc. (III).  
Rank Cintel Div.  
Roscor Corp. D3, 4  
Sony Corp. of America VTR Div.  
Specialized Industries, Inc.  
TeleMation, Inc.  
Thomson-CSF Laboratories, Inc.  
Weather Scan, Inc.  
The Zei-Mark Corp.

**Film Processing Chemicals, Color**

Agfa-Gevaert Inc.  
Eastman Kodak Co.  
Phillip A. Hunt Chemical Corp.

**Film Processing Services**

Eastman Kodak Co.  
Lipsner-Smith Corp.  
W. A. Palmer Films, Inc.

**Film Production, Videotape Transfer**

Image Transform, Inc.

**Film Sound Transfer Equipment**

Comquip, Inc.  
Magna-Tech Electronic Co., Inc.  
W. A. Palmer Films, Inc.  
Quad-Eight Electronics  
Super8 Sound, Inc.  
Victor Duncan, Inc.  
Wide Range Electronics

**Filters, Active**

See Adv. Page

**Frequency Devices Inc. 222,273**  
**Pulse Techniques Inc. ....274**  
**Robins Broadcast & Sound Equip. Corp. .... 38**  
**TT Electronics, Inc. ....275**

Allied Broadcast Equip. D 1-9  
American Microsignal Co.  
Ampere Electronic Corp.  
Comark Industries Inc.  
Crown International, Inc.  
Custom Audio Electronics  
Frequency Devices Inc.  
Gotham Audio Corp.  
The Orange County Electronics Corp. Ltd.  
Oregon Sound D 9  
Pulse Techniques Inc.  
ROH Corporation  
Richmond Sound Design, Ltd.  
Robins Broadcast & Sound Equip. Corp.  
Shure Brothers Inc.  
Spectra Sonics  
TT Electronics, Inc.  
Technics by Panasonic  
Track Audio, Inc. D 1-9  
United Recording Electronics Industries  
The Widget Works, Inc.

**Filters, Antenna**

See Adv. Page

**Nurad, Inc. .... 221**

Allen Avionics  
Bird Electronic Corp.  
Cetec Broadcast Group  
Coaxial Dynamics  
Collins Radio Rockwell International  
Comark Industries Inc.  
Continental Electronics Mfg. Co.  
Dielectric Communications Div. Sola Basic, Inc.  
Dyma Engineering, Inc.  
The Finney Co.  
G.C. Electronics  
Harris Corp. Broadcast Products Div.  
Jampro --see Cetec Broadcast Group  
Merill Cable Equipment Corp.  
Micro Communications, Inc.  
Microwave Assoc. Inc.  
North American Radio Corp.  
Nurad, Inc.  
Pacific Recorders and Engrg. Corp.  
Shively Laboratories, Inc.  
TT Electronics, Inc.  
Television Equipment Associates  
Telonic Altair  
Varian/Beverly Micro-Link Products  
Wide Band Engineering Co., Inc.  
Winegard Television Systems

**Filters, Audio**

See Adv. Page

**Frequency Devices Inc. ....222**  
**Pulse Techniques Inc. ....274**  
**Robins Broadcast & Sound Equip. Corp. .... 38**  
**TT Electronics, Inc. ....275**

Allen Avionics  
Allied Broadcast Equip. D 1-9  
Amber Electro Design, Ltd.  
Audio Designs & Mfg.  
Automated Processes, Inc.  
Broadcast Automation Assoc. D 1,2,5,6  
Cetec Broadcast Group  
Coastcom  
Comark Industries Inc.  
Crown International, Inc.  
Custom Audio Electronics  
Dyma Engineering, Inc.  
ESC Electronics Corp.  
Frequency Devices Inc.  
Gotham Audio Corp.  
IGM Div. of Northwestern Tech.  
Kappa Networks, Inc.  
Monroe Electronics, Inc.  
Rupert Neve, Inc.  
The Orange County Electronics Corp. Ltd.  
Oregon Sound D 9  
Pulse Techniques Inc.  
QEI Corp.  
Quad-Eight Electronics  
RCA Broadcast Systems  
ROH Corporation  
Richmond Sound Design, Ltd.  
Robins Broadcast & Sound Equip. Corp.  
Rohde & Schwarz Sales Co.  
Sescom, Inc.  
Shure Brothers Inc.  
Sound Dynamics, Inc. D8, 9  
Sparta --see Cetec Broadcast Group  
Spectra Sonics  
TT Electronics, Inc.  
Track Audio, Inc. D 1-9  
United Recording Electronics Industries  
Val-Tronics, Inc. D1-9  
Westlake Audio  
The Widget Works, Inc.

**Filters, Noise**

See Adv. Page

**Frequency Devices Inc. ....222**  
**Pulse Techniques Inc. ....274**  
**TT Electronics, Inc. ....275**

Allied Broadcast Equip. D 1-9  
Audio Designs & Mfg.  
Boston Sound & Power Systems  
Comark Industries Inc.  
Dyma Engineering, Inc.  
EMT Franz VGmbH  
ESC Electronics Corp.  
The Finney Co.  
Frequency Devices Inc.  
G.C. Electronics  
Gotham Audio Corp.  
Kahn Communications, Inc.  
North Hills Electronics, Inc.  
The Orange County Electronics Corp. Ltd.  
Pulse Techniques Inc.  
Quad-Eight Electronics  
Shure Brothers Inc.  
TT Electronics, Inc.  
Tektronix Inc.

**Filters, Passive**

See Adv. Page

**Frequency Devices Inc. ....222**  
**Pulse Techniques Inc. ....274**  
**Robins Broadcast & Sound Equip. Corp. .... 38**  
**TT Electronics, Inc. ....275**

Allen Avionics  
Audio-Video Engineering Co.  
Broadcast Video Systems, Ltd.

Coastcom  
Coaxial Dynamics  
Comark Industries Inc.  
ESC Electronics Corp.  
The Finney Co.  
Frequency Devices Inc.  
Kappa Networks, Inc.  
Maury Microwave Corp.  
Merill Cable Equipment Corp.  
Microwave Assoc. Inc.  
Multronics, Inc.  
North Hills Electronics, Inc.  
The Orange County Electronics Corp. Ltd.  
Oregon Sound D 9  
Pulse Techniques Inc.  
QEI Corp.  
Quad-Eight Electronics  
Robins Broadcast & Sound Equip. Corp.  
Shively Laboratories, Inc.  
Shure Brothers Inc.  
Singer Products Co., Inc.  
TT Electronics, Inc.  
Tektronix Inc.  
Television Equipment Associates  
Telonic Altair  
Varian/Beverly Micro-Link Products  
Vitek Electronics Inc.  
Wide Band Engineering Co., Inc.

**Filters, Sound Effect**

See Adv. Page

**Pulse Techniques Inc. ....274**

Allied Broadcast Equip. D 1-9  
Audio Designs & Mfg.  
Automated Processes, Inc.  
Rupert Neve, Inc.  
The Orange County Electronics Corp. Ltd.  
Pulse Techniques Inc.  
Richmond Sound Design, Ltd.  
TT Electronics, Inc.  
Track Audio, Inc. D 1-9

**Filters, Variable and Fixed Tuned**

See Adv. Page

**Frequency Devices Inc. ....222**  
**Robins Broadcast & Sound Equip. Corp. .... 38**  
**TT Electronics, Inc. ....275**

Amber Electro Design, Ltd.  
Automated Processes, Inc.  
Coaxial Dynamics  
Comark Industries Inc.  
Dyma Engineering, Inc.  
The Finney Co.  
Frequency Devices Inc.  
Gotham Audio Corp.  
Maury Microwave Corp.  
Merill Cable Equipment Corp.  
Microwave Assoc. Inc.  
Multronics, Inc.  
North American Radio Corp.  
The Orange County Electronics Corp. Ltd.  
Pulse Techniques Inc.  
Quad-Eight Electronics  
Robins Broadcast & Sound Equip. Corp.  
Shure Brothers Inc.  
Spectra Sonics  
Systron-Donner  
TT Electronics, Inc.  
Technics by Panasonic  
Telonic Altair  
United Recording Electronics Industries  
Winegard Television Systems

**Filters, Video**

See Adv. Page

**Allen Avionics ....274**  
**Audio-Video Engineering Co. .... 82**

Allen Avionics  
Audio-Video Engineering Co.  
Broadcast Video Systems, Ltd.  
Coastcom

Comark Industries Inc.  
Datatek Corp.  
ESC Electronics Corp.  
Kappa Networks, Inc.  
TT Electronics, Inc.  
Tektronix Inc.  
Television Equipment Associates  
Temtron Electronics D 1-9  
The Zei-Mark Corp.

**Frame Storers, Digital**

See Adv. Page

**Adda Corp.** ..... 167  
**Micro Consultants** ..... 187  
**NEC America, Inc.** ..... 215

Adda Corp.  
Micro Consultants  
NEC America, Inc. Broadcasting Equip. Div.

**Frame Storers, Floppy Disc**

See Adv. Page

**Arvin/Echo Co.** ..... 29

Arvin/Echo Co.  
dbx, Inc.  
Landy Associates Inc. D 1,2  
Teknekron/TRAX

**Framer, Color**

A. F. Associates, Inc.  
Central Dynamics Corp.

**Frequency Standards**

John Fluke Mfg. Co., Inc.  
Maury Microwave Corp.  
Rohde & Schwarz Sales Co.  
Tracor, Inc. Instruments Group

**Generators, Audio Sine**

See Adv. Page

**Dynasciences** ..... 14

Altec Sound Products  
Amber Electro Design, Ltd.  
Autogram Corp.  
Automated Processes, Inc.  
B & K Precision Dynascan Corp.  
Broadcast Communications Devices, Inc. D9  
Collins Radio Rockwell International  
Collins Television Services  
Dyma Engineering, Inc.  
Dynasciences Div. Whitaker Corp.  
Frequency Devices Inc.  
Harris Corp. Broadcast Products Div.  
Hickok Elect. Instrument  
Lauderdale Electronic Labs  
Leader Instruments Corp.  
Marconi Instruments  
Modular Audio Products Unit of Modular Devices, Inc.  
Opamp Labs, Inc.  
Phillips Test & Measuring Instruments, Inc.  
Potomac Instruments, Inc.  
Quad-Eight Electronics  
Rohde & Schwarz Sales Co.  
SPI-ITT Matrix Instruments Div.  
Sencore Inc.  
Sinai-Johnson  
Sound Technology  
Spectra Sonics  
TEAC Corp of America  
Tektronix Inc.  
Val-Tronics, Inc. Q1-9  
Westlake Audio

**Generators, Audio Sweep**

Altec Sound Products  
Amber Electro Design, Ltd.  
B & K Instruments Inc.  
Broadcast Communications Devices, Inc. D9  
Dyma Engineering, Inc.  
Heath Co.  
Hickok Elect. Instrument

Lauderdale Electronic Labs  
Leader Instruments Corp.  
Marconi Instruments  
Phillips Test & Measuring Instruments, Inc.  
Rohde & Schwarz Sales Co.  
Tektronix Inc.  
Telonic Altair  
United Recording Electronics Industries

**Generators, Background Color**

See Adv. Page

**Lenco Inc.** ..... 19  
**Shintron Co. Inc.** ..... 93

American Data Div. Philips Broadcast Equip. Corp.  
Broadcast Communications Devices, Inc. D9  
Broadcast Video Systems, Ltd.  
Central Dynamics Corp.  
Communications Technology, Inc.  
Computer Image Video Controllers  
Dytek Industries, Inc.  
Digital Video Systems  
Dyma Engineering, Inc.  
Dynasciences Div. Whitaker Corp.  
Grass Valley Group, Inc.  
Harris Corp. Broadcast Products Div.  
Industrial Sciences  
Lenco Inc. Electronics Div.  
Phillips Test & Measuring Instruments, Inc.  
Richmond Hill Laboratories Ltd.  
Shintron Co. Inc.  
Sigma Electronics, Inc.  
Tektronix Inc.  
TeleMation, Inc.  
Thomson-CSF Laboratories, Inc.  
Video Data Systems

**Generators, Burst**

See Adv. Page

**Dynasciences** ..... 14  
**Lenco Inc.** ..... 19  
**Shintron Co. Inc.** ..... 93  
**Video Aids Corp. of Colorado** ..... 95

Amber Electro Design, Ltd.  
American Microsignal Co.  
Broadcast Communications Devices, Inc. D9  
Broadcast Video Systems, Ltd.  
Communications Technology, Inc.  
Digital Video Systems  
Dragnet Engineering Labs., Inc.  
Dyma Engineering, Inc.  
Dynasciences Div. Whitaker Corp.  
Grass Valley Group, Inc.  
Harris Corp. Broadcast Products Div.  
Industrial Sciences  
Leitch Video Ltd.  
Lenco Inc. Electronics Div.  
Phillips Test & Measuring Instruments, Inc.  
Richmond Hill Laboratories Ltd.  
Rohde & Schwarz Sales Co.  
Sencore Inc.  
Shintron Co. Inc.  
Tektronix Inc.  
Teledynamics  
TeleMation, Inc.  
Thomson-CSF Laboratories, Inc.  
Video Aids Corp. of Colorado

**Generators, Color Bar**

See Adv. Page

**Dynasciences** ..... 14  
**Lenco Inc.** ..... 19  
**Shintron Co. Inc.** ..... 93

B & K Precision Dynascan Corp.  
Broadcast Communications Devices, Inc. D9  
Broadcast Video Systems, Ltd.  
Cohu, Inc. Electronics Div.  
Digital Video Systems  
Dyma Engineering, Inc.  
Dynasciences Div. Whitaker Corp.

General Electric Co. ISO Div.  
Harris Corp. Broadcast Products Div.  
Heath Co.  
Hickok Elect. Instrument  
Leader Instruments Corp.  
Lectrotech Inc.  
Leitch Video Ltd.  
Lenco Inc. Electronics Div.  
Marconi Electronics Inc.  
Phillips Test & Measuring Instruments, Inc.  
Roscor Corp. D3, 4  
SPI-ITT Metrix Instruments Div.  
Sencore Inc.  
Shintron Co. Inc.  
Sigma Electronics, Inc.  
Sinai-Johnson  
Tektronix Inc.  
Teledynamics  
TeleMation, Inc.  
Tele-Measurements, Inc. B-2  
Telemet a Geotel Co.  
Thomson-CSF Laboratories, Inc.  
3M Co. Mincom Div.  
Ultra Audio Pixtec  
Video Data Systems

**Generators, Color Sync**

See Adv. Page

**Lenco Inc.** ..... 19  
**Shintron Co. Inc.** ..... 93  
**Video Aids Corp. of Colorado** ..... 95

Broadcast Communications Devices, Inc. D9  
Broadcast Video Systems, Ltd.  
dbx, Inc.  
Digital Video Systems  
Dyma Engineering, Inc.  
Dynasciences Div. Whitaker Corp.  
Grass Valley Group, Inc.  
Harris Corp. Broadcast Products Div.  
International Communications & Control Corp.  
Javelin Electronics D9  
Landy Associates Inc. D 1,2  
Leitch Video Ltd.  
Lenco Inc. Electronics Div.  
Marconi Communication Systems Ltd.  
Panasonic Video Systems Div.  
Phillips Test & Measuring Instruments, Inc.  
RCA Broadcast Systems  
Richmond Hill Laboratories Ltd.  
Rohde & Schwarz Sales Co.  
Roscor Corp. D3, 4  
Sencore Inc.  
Shintron Co. Inc.  
Sigma Electronics, Inc.  
Tektronix Inc.  
Teledynamics  
TeleMation, Inc.  
Tele-Measurements, Inc. B-2  
Telemet a Geotel Co.  
Thomson-CSF Laboratories, Inc.  
3M Co. Mincom Div.  
Ultra Audio Pixtec  
Video Aids Corp. of Colorado  
Video Components, Inc.  
Viscount Industries Ltd.  
Vital Industries Inc.

**Generators, Convergence**

See Adv. Page

**Dynasciences** ..... 14

Broadcast Video Systems, Ltd.  
Digital Video Systems  
Dyma Engineering, Inc.  
Dynasciences Div. Whitaker Corp.  
Grass Valley Group, Inc.  
Harris Corp. Broadcast Products Div.  
Kallman Associates, Inc.  
Leader Instruments Corp.  
Lectrotech Inc.  
Leitch Video Ltd.  
Lenco Inc. Electronics Div.  
Phillips Test & Measuring Instruments, Inc.  
Richmond Hill Laboratories Ltd.  
SPI-ITT Matrix Instruments Div.  
Sencore Inc.  
Sigma Electronics, Inc.

Sinai-Johnson  
Tektronix Inc.  
Ultra Audio Pixtec

**Generators, Cross Pulse**

Broadcast Communications Devices, Inc. D9  
Dyma Engineering, Inc.  
Harris Corp. Broadcast Products Div.  
Leitch Video Ltd.  
Sigma Electronics, Inc.  
Tektronix Inc.  
Tele-Measurements, Inc. B-2  
Thomson-CSF Laboratories, Inc.  
3M Co. Mincom Div.  
Ultra Audio Pixtec  
Video Aids Corp. of Colorado  
Video Components, Inc.

**Generators, Digital Sync**

Broadcast Communications Devices, Inc. D9  
Broadcast Video Systems, Ltd.  
Central Dynamics Corp.  
dbx, Inc.  
Digital Video Systems  
Dyma Engineering, Inc.  
Harris Corp. Broadcast Products Div.  
Industrial Sciences  
International Communications & Control Corp.  
Landy Associates Inc. D 1,2  
Leitch Video Ltd.  
Lenco Inc. Electronics Div.  
Marconi Communication Systems Ltd.  
Marconi Electronics Inc.  
RCA Broadcast Systems  
Richmond Hill Laboratories Ltd.  
Rohde & Schwarz Sales Co.  
Sigma Electronics, Inc.  
Teledynamics  
TeleMation, Inc.  
Video Data Systems  
Vital Industries Inc.

**Generators, Error Insertion**

National Electrolab Ltd.

**Generators, FM Subcarrier**

See Adv. Page

**Moseley Assoc. Inc.** ..... 69

AEL, Inc.  
Allied Broadcast Equip. D 1-9  
CCA Electronics Corp.  
CSI Electronics, Inc.  
Catel Div. United Scientific Corp.  
Cetec Broadcast Group  
Coastcom  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Harris Corp. Broadcast Products Div.  
Marti Electronics  
Mastertone Co., Inc.  
McMartin Industries, Inc.  
Moseley Assoc. Inc.  
QEI Corp.  
RCA Broadcast Systems  
Singer Products Co., Inc.  
Sintronic Corp.  
Sparta - see Cetec Broadcast Group  
Tektronix Inc.  
Tele-Measurements, Inc. B-2  
The Widget Works, Inc.  
Wilkinson Electronics, Inc.

**Generators, Monoscope**

Telemet a Geotel Co.

**Generators, NTSC Signal Test**

See Adv. Page

**Lenco Inc.** ..... 19  
**Phillips Test & Measuring Instruments, Inc.** ..... 15

Asaca Corp. of America  
Broadcast Communications Devices, Inc. D9



Broadcast Video Systems, Ltd.  
Comquip, Inc.  
dbx, Inc.  
Digital Video Systems  
Dyma Engineering, Inc.  
Dynamics Div. Whitaker Corp.  
Harris Corp. Broadcast Products Div.  
International Communications &  
Control Corp.  
Landy Associates Inc. D 1,2  
Leader Instruments Corp.  
Leitch Video Ltd.  
Lenco Inc. Electronics Div.  
Marconi Electronics Inc.  
Marconi Instruments  
Philips Test & Measuring Instruments,  
Inc.  
Richmond Hill Laboratories Ltd.  
Rohde & Schwarz Sales Co.  
Sigma Electronics, Inc.  
Tektronix Inc.  
TeleMation, Inc.  
Telemet a Geotel Co.  
Thomson-CSF Laboratories, Inc.  
Ultra Audio Pixtec

### Generators, Powered (Electric Motor)

Dyma Engineering, Inc.  
General Electric Co. Tubes/MW  
Devices  
Kay Industries, Inc.  
Lampkin Lab. Inc.  
North Wind Power Co.  
Singer Products Co., Inc.

### Generators, Powered (Gasoline Engine)

See Adv. Page

### CCA Electronics Corp. ... 99-106

Broadcast Consultants Corp. D5, 6  
CCA Electronics Corp.  
Collins Radio Rockwell International  
Comquip, Inc.  
Dyma Engineering, Inc.  
J&D Electronics Div.  
Lampkin Lab. Inc.  
Onan  
Singer Products Co., Inc.  
Val-Tronics, Inc. D1-9

### Generators, SCA

See Adv. Page

### Moseley Assoc. Inc. .... 69 Wilkinson Electronics, Inc. .... 62

AEL, Inc.  
Allied Broadcast Equip. D 1-9  
Broadcast Consultants Corp. D5, 6  
CCA Electronics Corp.  
CSI Electronics, Inc.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Harris Corp. Broadcast Products Div.  
Leader Instruments Corp.  
Mastertone Co., Inc.  
McMartin Industries, Inc.  
Micro Control Associates, Inc.  
Moseley Assoc. Inc.  
QEI Corp.  
Sencore Inc.  
Singer Products Co., Inc.  
Sparta -- see Cetec Broadcast Group  
Tektronix Inc.  
Val-Tronics, Inc. D1-9  
The Widget Works, Inc.  
Wilkinson Electronics, Inc.

### Generators, Signal AF

See Adv. Page

### Delta Electronics Inc. (Va.) ..... 183

Ailtech  
Altec Sound Products  
Amber Electro Design, Ltd.  
Automated Processes, Inc.

B & K Precision Dynascan Corp.  
Collins Radio Rockwell International  
Delta Electronics Inc. (N.C.)  
Delta Electronics Inc. (Va.)  
Dranetz Engineering Labs., Inc.  
Dyma Engineering, Inc.  
Edison Electronics Div.  
Heath Co.  
Hickok Elect. Instrument  
Ivie Electronics  
Kay Elemetrics Corp.  
Lampkin Lab. Inc.  
Leader Instruments Corp.  
Modular Audio Products Unit of  
Modular Devices, Inc.  
Opamp Labs, Inc.  
Philips Test & Measuring Instruments,  
Inc.  
Potomac Instruments, Inc.  
Rohde & Schwarz Sales Co.  
SPI-ITT Metrix Instruments Div.  
Sencore Inc.  
Sinai-Johnson  
Spectra Sonics  
Tektronix Inc.  
Texscan Corp.  
Val-Tronics, Inc. D1-9

### Generators, Signal Dot Bar

See Adv. Page

### Lenco Inc. .... 19

Asaca Corp. of America  
Broadcast Communications Devices,  
Inc. D9  
Broadcast Video Systems, Ltd.  
Colorado Video Inc.  
Dyma Engineering, Inc.  
Grass Valley Group, Inc.  
Heath Co.  
Hickok Elect. Instrument  
Kallman Associates, Inc.  
Leader Instruments Corp.  
Lectrotech Inc.  
Leitch Video Ltd.  
Lenco Inc. Electronics Div.  
Philips Test & Measuring Instruments,  
Inc.  
Richmond Hill Laboratories Ltd.  
SPI-ITT Metrix Instruments Div.  
Sencore Inc.  
Sinai-Johnson  
Tektronix Inc.  
TeleMation, Inc.  
Telemet a Geotel Co.  
Thomson-CSF Laboratories, Inc.

### Generators, Signal Marker

B & K Precision Dynascan Corp.  
Blonder-Tongue Labs.  
Lectrotech Inc.  
SPI-ITT Metrix Instruments Div.  
Sencore Inc.  
Singer Instrumentation  
Tektronix Inc.

### Generators, Signal Pulse

See Adv. Page

### Lenco Inc. .... 19 Philips Test & Measuring Instruments, Inc. .... 15

Delta Electronics Inc. (Va.)  
Dranetz Engineering Labs., Inc.  
Dynamics Div. Whitaker Corp.  
Leitch Video Ltd.  
Lenco Inc. Electronics Div.  
Marconi Electronics Inc.  
Philips Test & Measuring Instruments,  
Inc.  
Richmond Hill Laboratories Ltd.  
Rohde & Schwarz Sales Co.  
Ryder Magnetic Sales Corp.  
Systron-Donner  
TM Systems, Inc.  
Tasker Systems  
Tektronix Inc.

### Generators, Signal RF

See Adv. Page

### Delta Electronics Inc. (Va.) ..... 183

Ailtech  
B & K Precision Dynascan Corp.  
Blonder-Tongue Labs.  
Boonton Electronics  
Collins Radio Rockwell International  
Delta Electronics Inc. (Va.)  
Dyma Engineering, Inc.  
Edison Electronics Div.  
Engineering Associates  
Harris Corp. PRD Electronics Div.  
Heath Co.  
Hickok Elect. Instrument  
Lampkin Lab. Inc.  
Leader Instruments Corp.  
The London Co.  
Marconi Instruments  
Philips Test & Measuring Instruments,  
Inc.  
Potomac Instruments, Inc.  
Rohde & Schwarz Sales Co.  
SPI-ITT Metrix Instruments Div.  
Sadjelco, Inc.  
Scientific-Atlanta, Inc.  
Sencore Inc.  
Sinai-Johnson  
Singer Instrumentation  
Tasker Systems  
Tektronix Inc.  
Telonic Altair  
Texscan Corp.  
Val-Tronics, Inc. D1-9  
Weinschel Engineering Co.

### Generators, Signal Square Wave

See Adv. Page

### Philips Test & Measuring Instruments, Inc. .... 15

Amber Electro Design, Ltd.  
B & K Precision Dynascan Corp.  
Broadcast Communications Devices,  
Inc. D9  
Dyma Engineering, Inc.  
Heath Co.  
Hickok Elect. Instrument  
Leitch Video Ltd.  
Philips Test & Measuring Instruments,  
Inc.  
Rohde & Schwarz Sales Co.  
SPI-ITT Metrix Instruments Div.  
Sencore Inc.  
Sinai-Johnson  
Systron-Donner  
Tektronix Inc.  
Weinschel Engineering Co.

### Generators, Signal TV Synchronizing

Asaca Corp. of America  
Broadcast Video Systems, Ltd.  
Colorado Video Inc.  
dbx, Inc.  
Dage-MTI, Inc.  
Dyma Engineering, Inc.  
Dynamics Div. Whitaker Corp.  
Grass Valley Group, Inc.  
Industrial Sciences  
Landy Associates Inc. D 1,2  
Leitch Video Ltd.  
Lenco Inc. Electronics Div.  
Marconi Communication Systems Ltd.  
Marconi Electronics Inc.  
Philips Test & Measuring Instruments,  
Inc.  
Rohde & Schwarz Sales Co.  
Sencore Inc.  
Shintron Co. Inc.  
Sigma Electronics, Inc.  
Tektronix Inc.  
TeleMation, Inc.  
Telemet a Geotel Co.  
Texscan Corp.  
Thomson-CSF Laboratories, Inc.  
Ultra Audio Pixtec  
Video Aids Corp. of Colorado

### Generators, Signal VITS

See Adv. Page

### Philips Test & Measuring Instruments, Inc. .... 15

Beta Technology, Inc.  
Broadcast Communications Devices,  
Inc. D9  
Harris Corp. Broadcast Products Div.  
Industrial Sciences  
Lenco Inc. Electronics Div.  
Marconi Instruments  
Philips Test & Measuring Instruments,  
Inc.  
Rohde & Schwarz Sales Co.  
Tektronix Inc.  
Telemet a Geotel Co.

### Generators, Special Effect

See Adv. Page

### Dynamics ..... 14 Dytek Industries, Inc. .... 35 MIC-MIX Audio Products, Inc. .... 200 Shintron Co. Inc. .... 93

American Data Div. Philips Broadcast  
Equip. Corp.  
BJA Systems, Inc.  
Beta Technology, Inc.  
Broadcast Communications Devices,  
Inc. D9  
Broadcast Video Systems, Ltd.  
Central Dynamics Corp.  
Chyron Telesystems  
Colorado Video Inc.  
Communications Technology, Inc.  
Computer Image Video Controllers  
Dytek Industries, Inc.  
Dage-MTI, Inc.  
Digital Video Systems  
Dyma Engineering, Inc.  
Dynair Electronics, Inc.  
Dynamics Div. Whitaker Corp.  
Dytek Industries, Inc.  
Ikegami Electronics (USA) Inc.  
Industrial Sciences  
Interand Corp. Telestrator Div.  
MIC-MIX Audio Products, Inc.  
Marconi Communication Systems Ltd.  
Marconi Electronics Inc.  
Micro Consultants  
Panasonic Video Systems Div.  
Richmond Hill Laboratories Ltd.  
Roscor Corp. D3, 4  
Shintron Co. Inc.  
Sigma Electronics, Inc.  
Tektronix Inc.  
3M Co. Mincorn Div.  
Video Components, Inc.  
Video Data Systems  
Viscount Industries Ltd.  
Weather Scan, Inc.

### Generators, Staircase

See Adv. Page

### Lenco Inc. .... 19 Philips Test & Measuring Instruments, Inc. .... 15

Broadcast Communications Devices,  
Inc. D9  
Broadcast Video Systems, Ltd.  
Colorado Video Inc.  
Dyma Engineering, Inc.  
International Communications &  
Control Corp.  
Leader Instruments Corp.  
Leitch Video Ltd.  
Lenco Inc. Electronics Div.  
Philips Test & Measuring Instruments,  
Inc.  
Richmond Hill Laboratories Ltd.  
Rohde & Schwarz Sales Co.  
Tektronix Inc.  
TeleMation, Inc.  
Telemet a Geotel Co.  
Thomson-CSF Laboratories, Inc.  
Ultra Audio Pixtec

## Generators, Stereo

See Adv. Page

**CCA Electronics Corp. .. 99-106**  
**Moseley Assoc. Inc. .... 69**  
**Wilkinson Electronics,**  
**Inc. .... 62, 182**

AEL, Inc.  
Allied Broadcast Equip. D 1-9  
Broadcast Automation Assoc. D  
1,2,5,6  
Broadcast Consultants Corp. D5, 6  
CCA Electronics Corp.  
CSI Electronics, Inc.  
Catel Div. United Scientific Corp.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Fung Engineering Inc.  
Harris Corp. Broadcast Products Div.  
Heath Co.  
Leader Instruments Corp.  
The London Co.  
Mastertone Co., Inc.  
Maze Corp D6  
McMartin Industries, Inc.  
Moseley Assoc. Inc.  
Orban/Broadcast  
Philips Test & Measuring Instruments,  
Inc.  
QEI Corp.  
Rohde & Schwarz Sales Co.  
Sencore Inc.  
Sintronic Corp.  
Sound Technology  
Sparta --see Cetec Broadcast Group  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

## Generators, Subcarrier

See Adv. Page

**Moseley Assoc. Inc. .... 69**  
**Philips Test &**  
**Measuring**  
**Instruments, Inc. .... 15**

ATV Research  
Allied Broadcast Equip. D 1-9  
Broadcast Automation Assoc. D  
1,2,5,6  
Broadcast Consultants Corp. D5, 6  
CCA Electronics Corp.  
CSI Electronics, Inc.  
Cetec Broadcast Group  
Cohu, Inc. Electronics Div.  
Communications Technology, Inc.  
Dyma Engineering, Inc.  
Grass Valley Group, Inc.  
Harris Corp. Broadcast Products Div.  
Industrial Sciences  
Leitch Video Ltd.  
Lenco Inc. Electronics Div.  
McMartin Industries, Inc.  
Merill Cable Equipment Corp.  
Moseley Assoc. Inc.  
Philips Test & Measuring Instruments,  
Inc.  
Richmond Hill Laboratories Ltd.  
Rohde & Schwarz Sales Co.  
Shintron Co. Inc.  
Sigma Electronics, Inc.  
Sintronic Corp.  
Sparta --see Cetec Broadcast Group  
TeleMation, Inc.  
Tracor, Inc. Instruments Group

## Generators, Sync

See Adv. Page

**Dynasciences .... 14**  
**Lenco Inc. .... 19**  
**Shintron Co. Inc. .... 93**  
**Video Aids Corp. of**  
**Colorado .... 95**

Broadcast Communications Devices,  
Inc. D9  
Broadcast Video Systems, Ltd.  
Ceco Communications Inc.  
Cohu, Inc. Electronics Div.  
Colorado Video Inc.  
dbx, Inc.

Digital Video Systems  
Dyma Engineering, Inc.  
Dynasciences Div. Whitaker Corp.  
GBC Closed Circuit TV Corp.  
Grass Valley Group, Inc.  
Harris Corp. Broadcast Products Div.  
Hitachi Denshi America, Ltd.  
Ikegami Electronics (USA) Inc.  
Image Devices Inc.  
Industrial Sciences  
International Communications &  
Control Corp.  
Javelin Electronics D9  
Landy Associates Inc. D 1,2  
Leitch Video Ltd.  
Lenco Inc. Electronics Div.  
Nagra Magnetic Recorders, Inc.  
Philips Test & Measuring Instruments,  
Inc.  
Richmond Hill Laboratories Ltd.  
Rohde & Schwarz Sales Co.  
Roscor Corp. D3, 4  
Sencore Inc.  
Shintron Co. Inc.  
Sigma Electronics, Inc.  
Tektronix Inc.  
TeleMation, Inc.  
Teletelnet a Geotel Co.  
Thomson-CSF Laboratories, Inc.  
3M Co. Mincom Div.  
Video Aids Corp. of Colorado  
Weather Scan, Inc.

## Generators, Thermoelectric

See Adv. Page

**Teledyne Energy**  
**Systems..... 228**

Mastertone Co., Inc.  
Prodelin Inc.  
Teledyne Energy Systems

## Generators, Time Code (Reader)

See Adv. Page

**The BTX Corp. .... 208**  
**ESE .... 63, 65**  
**Glentronix Ltd. .... 254**  
**Time Tech Corp. .... 275**

The BTX Corp.  
Beta Technology, Inc.  
Broadcast Communications Devices,  
Inc. D9  
CMX Systems Div. of Orrox Corp.  
Central Dynamics Corp.  
Chrono-Log Corp.  
dbx, Inc.  
Datatron, Inc.  
Dyma Engineering, Inc.  
EECO  
ESE  
Glentronix Ltd. D 1-9  
Gould, Inc. Control & Systems Div.  
International Communications &  
Control Corp.  
Kaitronics Corp.  
Lalrd Telemedia Inc.  
Landy Associates Inc. D 1,2  
Recortec Inc.  
Roscor Corp. D3, 4  
Scully Recording Instruments Div. of  
Dictaphone Corp.  
Shintron Co. Inc.  
Sigma Electronics, Inc.  
Skotel  
Stancil-Hoffman Corp.  
Systron-Donner  
Tektronix Inc.  
Television Research International  
Time Tech Corp.

## Generators, Tone

See Adv. Page

**Broadcast Component**  
**Dist. Communication**  
**Medias ..... 273**  
**Di-Tech Inc. .... 263**  
**Robins Broadcast &**  
**Sound Equip. Corp. .... 38**  
Allied Broadcast Equip. D 1-9

Amber Electro Design, Ltd.  
American Microsignal Co.  
Autogram Corp.  
Broadcast Communications Devices,  
Inc. D9  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Equipment Distributors  
Communication Medias  
Consolidated Electronic Industries  
Di-Tech Inc.  
Dyma Engineering, Inc.  
Edison Electronics Div.  
Frequency Devices Inc.  
Gorman Relich Mfg. Co.  
IGM Div. of Northwestern Tech.  
Ivie Electronics  
Mastertone Co., Inc.  
Moseley Assoc. Inc.  
Opamp Labs, Inc.  
Rivers Associates, Inc.  
Robins Broadcast & Sound Equip.  
Corp.  
Shure Brothers Inc.  
Singer Instrumentation  
Westlake Audio

## Generators, Tone, EBS

Allied Broadcast Equip. D 1-9  
Broadcast Communications Devices,  
Inc. D9  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Equipment Distributors  
Communication Medias  
Collins Radio Rockwell International  
dbx, Inc.  
ESE  
Elcom Engineering Co.  
Gorman Relich Mfg. Co.  
Landy Associates Inc. D 1,2  
Logitek Electronic Systems  
McMartin Industries, Inc.  
Rivers Associates, Inc.  
Time & Frequency Tech., Inc.  
Track Audio, Inc. D 1-9  
Wilkinson Electronics, Inc.

## Generators, Video Carrier

See Adv. Page

**Philips Test &**  
**Measuring**  
**Instruments, Inc. .... 15**  
Merill Cable Equipment Corp.  
Philips Test & Measuring Instruments,  
Inc.  
Rohde & Schwarz Sales Co.  
Sencore Inc.  
Tektronix Inc.  
Tracor, Inc. Instruments Group

## Generators, Video Sweep

See Adv. Page

**Lenco Inc. .... 19**  
**Philips Test &**  
**Measuring**  
**Instruments, Inc. .... 15**  
**Teletelnet ..... 79**  
Asaca Corp. of America  
Broadcast Communications Devices,  
Inc. D9  
dbx, Inc.  
Datatek Corp.  
Harris Corp. Broadcast Products Div.  
Landy Associates Inc. D 1,2  
Leader Instruments Corp.  
Lectrotech Inc.  
Lenco Inc. Electronics Div.  
Marconi Instruments  
Philips Test & Measuring Instruments,  
Inc.  
Rohde & Schwarz Sales Co.  
SPI-ITT Metrix Instruments Div.  
Sencore Inc.  
Tektronix Inc.  
Teletelnet a Geotel Co.  
Telonic Altair  
Texscan Corp.

## Ground Straps

Millard Metal Service Center, Inc.

## Hand Trucks, ENG Equipment

See Adv. Page

**The Camera Mart, Inc. .... 64**

The Camera Mart, Inc.

## Head Alignment Gauges

Ampro Broadcasting Inc.  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors  
Communication Medias  
Broadcast Equipment & Supply Co. D  
1-9  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Fidelipac  
Harris Corp. Broadcast Products Div.  
Joa Cartridge Service D2  
Mastertone Co., Inc.  
Merlin Engineering Works, Inc.  
Nagra Magnetic Recorders, Inc.  
Professional Audio Service  
Sound Dynamics, Inc. D8, 9  
Sparta --see Cetec Broadcast Group  
Videomagnetics, Inc.

## Head Cleaning Products, Video

Broadcast Communications Devices,  
Inc. D9  
Comprehensive Video Supply Corp. D  
1-9  
Memorex Corp. Professional Products  
Group  
Nortronics Co., Inc.  
Sony Corp. of America VTR Div.  
3M Co. Magnetic Audio/Video Prod.  
Div.  
VIF International  
Westlake Audio

## Head Nest Rebuilding Services

Accurate Sound Co.  
International Electro-Magnetics  
Lipps Inc.  
Mastertone Co., Inc.  
Minneapolis Magnetics, Inc.  
Taber Mfg. & Engr. Co.

## Headphones, Announcers Earpiece

See Adv. Page

**Broadcast Consultants**  
**Corp. .... 84**

AKG Acoustics  
Allied Broadcast Equip. D 1-9  
Broadcast Automation Assoc. D  
1,2,5,6  
Broadcast Communications Devices,  
Inc. D9  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors  
Communication Medias  
Cetec Broadcast Group  
David Clark Co., Inc.  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Electro-Voice Inc.  
Fisher-Burke Broadcast Consultants  
Harris Corp. Broadcast Products Div.  
Image Devices Inc.  
Mastertone Co., Inc.  
Media Concepts, Inc. D 1-9  
Sennheiser Electronic  
Sound Dynamics, Inc. D8, 9  
Sparta --see Cetec Broadcast Group  
Studer Revox America  
Television Equipment Associates  
Telex Communications, Inc.



Track Audio, Inc. D 1-9  
 United Radio Supply Inc. D9  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Headphones, Broadcast Monitoring**

See Adv. Page

**Broadcast Component Dist. Communication Medias**.....271  
**Broadcast Consultants Corp.**..... 84, 86  
**Maze Corp.**.....270  
**Sound Dynamics, Inc.**.....226

AKG Acoustics  
 Allied Broadcast Equip. D 1-9  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 David Clark Co., Inc.  
 Collins Radio Rockwell International  
 Duotone Co. Inc.  
 Dyma Engineering, Inc.  
 Fisher-Burke Broadcast Consultants  
 Harris Corp. Broadcast Products Div.  
 Image Devices Inc.  
 Koss Corp  
 LPB Inc.  
 Mastertone Co., Inc.  
 Maze Corp D6  
 Media Concepts, Inc. D 1-9  
 Oregon Sound D 9  
 Professional Audio Service  
 Sennheiser Electronic  
 Sound Dynamics, Inc. D8, 9  
 Stanton Magnetics Inc.  
 Studer Revox America  
 Television Equipment Associates  
 Telex Communications, Inc.  
 Track Audio, Inc. D 1-9  
 United Radio Supply Inc. D9  
 VIF International  
 Val-Tronics, Inc. D1-9  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Headphones, Mono**

See Adv. Page

**Broadcast Consultants Corp.**..... 84  
**CCA Electronics Corp. .. 99-106**

Allied Broadcast Equip. D 1-9  
 Bell & Howell Audio Visual Div.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 CCA Electronics Corp.  
 Calitone International, Inc.  
 Cetec Broadcast Group  
 G.C. Electronics  
 Harris Corp. Broadcast Products Div.  
 Heath Co.  
 Image Devices Inc.  
 Koss Corp  
 Mastertone Co., Inc.  
 Media Concepts, Inc. D 1-9  
 Nagra Magnetic Recorders, Inc.  
 Oregon Sound D 9  
 Professional Audio Service  
 Ryder Magnetic Sales Corp.  
 Sennheiser Electronic  
 Singer Products Co., Inc.  
 Sound Dynamics, Inc. D8, 9  
 Sparta --see Cetec Broadcast Group

Stanton Magnetics Inc.  
 Studer Revox America  
 Superscope, Inc.  
 Television Equipment Associates  
 Telex Communications, Inc.  
 Track Audio, Inc. D 1-9  
 VIF International  
 Val-Tronics, Inc. D1-9  
 Victor Duncan, Inc.  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Headphones, Stereo**

See Adv. Page

**Broadcast Consultants Corp.**..... 84, 86

AKG Acoustics  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Cetec Broadcast Group  
 David Clark Co., Inc.  
 Duotone Co. Inc.  
 Dyma Engineering, Inc.  
 G.C. Electronics  
 Harris Corp. Broadcast Products Div.  
 Heath Co.  
 Image Devices Inc.  
 Jensen Sound Laboratories  
 Koss Corp  
 LPB Inc.  
 Mastertone Co., Inc.  
 Media Concepts, Inc. D 1-9  
 Nagra Magnetic Recorders, Inc.  
 Oregon Sound D 9  
 Professional Audio Service  
 Ryder Magnetic Sales Corp.  
 Sansui Electronics Corp.  
 Sennheiser Electronic  
 Sinai-Johnson  
 Singer Products Co., Inc.  
 Sound Dynamics, Inc. D8, 9  
 Sparta --see Cetec Broadcast Group  
 Stanton Magnetics Inc.  
 Studer Revox America  
 Superscope, Inc.  
 Television Equipment Associates  
 Telex Communications, Inc.  
 Track Audio, Inc. D 1-9  
 VIF International  
 Val-Tronics, Inc. D1-9  
 Victor Duncan, Inc.  
 Weather Scan, Inc.  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Headphones with Announcers Microphone**

See Adv. Page

**Broadcast Consultants Corp.**..... 84, 86  
**CCA Electronics Corp. .. 99-106**

AKG Acoustics  
 Allied Broadcast Equip. D 1-9  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Equipment Distributors Communication Medias  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Dyma Engineering, Inc.  
 Fisher-Burke Broadcast Consultants  
 Hitachi Denshi America, Ltd.  
 Koss Corp  
 Lauderdale Electronic Labs  
 Oregon Sound D 9  
 Sparta --see Cetec Broadcast Group  
 Television Equipment Associates  
 Track Audio, Inc. D 1-9  
 United Radio Supply Inc. D9  
 VIF International

Val-Tronics, Inc. D1-9  
 Wilkinson Electronics, Inc.

**Heads, Audio Stack**

See Adv. Page

**Saki Magnetics, Inc.**..... 214

Accurate Sound Co.  
 Ampro Broadcasting Inc.  
 Broadcast Communications Devices, Inc. D9  
 Computer Magnetics Corp.  
 International Electro-Magnetics  
 Lipps Inc.  
 Norton Associates Inc.  
 Nortronics Co., Inc.  
 Professional Audio Service  
 Saki Magnetics, Inc.  
 Taber Mfg. & Engr. Co.  
 Track Audio, Inc. D 1-9  
 VIF International  
 Val-Tronics, Inc. D1-9  
 Westlake Audio

**Heads, Contactor**

See Adv. Page

**Nortronics Co., Inc.**..... 68

Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Equipment Distributors Communication Medias  
 Lauderdale Electronic Labs  
 Lipps Inc.  
 Nortronics Co., Inc.  
 Professional Audio Service

**Heads, Erase Magnetic**

See Adv. Page

**Beaucart Div.**..... 28  
**Saki Magnetics, Inc.**..... 214

Ampro Broadcasting Inc.  
 Beaucart Div. UMC Electronics Co.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Canon USA, Inc. Optics Div.  
 Computer Magnetics Corp.  
 International Electro-Magnetics  
 Joa Cartridge Service D2  
 Lipps Inc.  
 Magna-Tech Electronic Co., Inc.  
 Magnuson Devices Inc.  
 Mastertone Co., Inc.  
 Minneapolis Magnetics, Inc.  
 Norton Associates Inc.  
 Nortronics Co., Inc.  
 Professional Audio Service  
 Robins Broadcast & Sound Equip. Corp.  
 Saki Magnetics, Inc.  
 Spin Physics, Inc.  
 Taber Mfg. & Engr. Co.  
 Track Audio, Inc. D 1-9  
 VIF International  
 Val-Tronics, Inc. D1-9

**Heads, Film Stripe**

Canon USA, Inc. Optics Div.  
 Image Devices Inc.  
 International Electro-Magnetics  
 Lipps Inc.  
 Magna-Tech Electronic Co., Inc.  
 Norton Associates Inc.  
 Nortronics Co., Inc.  
 Saki Magnetics, Inc.  
 Victor Duncan, Inc.

**Heads, Reconditioned or Reconditioning Services for Audio and/or VTR Audio**

See Adv. Page

**Computer Magnetics Corp.**..... 248,249  
**Taber Mfg. & Engr. Co.**..... 224

Accurate Sound Co.  
 Audio Distributor Inc. D 1-9  
 Broadcast Automation Assoc. D 1,2,5,6  
 Computer Magnetics Corp.  
 Electro Sound, Inc.  
 International Electro-Magnetics  
 Lipps Inc.  
 Minneapolis Magnetics, Inc.  
 Nagra Magnetic Recorders, Inc.  
 Norton Associates Inc.  
 Saki Magnetics, Inc.  
 Sound Dynamics, Inc. D8, 9  
 Taber Mfg. & Engr. Co.  
 VIF International  
 Victor Duncan, Inc.

**Heads, Reconditioned or Reconditioning Services for Video**

See Adv. Page

**Computer Magnetics Corp.**..... 248,249  
**Spin Physics, Inc.**..... 171  
**Videomagnetics, Inc.**..... 178,179  
**Videomax Div.**..... 1

Ampex Corp.  
 Computer Magnetics Corp.  
 Comquip, Inc.  
 Glentronix Ltd. D 1-9  
 Saki Magnetics, Inc.  
 Spin Physics, Inc.  
 Taber Mfg. & Engr. Co.  
 Videomagnetics, Inc.  
 Videomax Div. Orrox Corp.

**Heads, Recorder Replacement**

See Adv. Page

**Audio Distributor Inc.**..... 247  
**Beaucart Div.**..... 28  
**Broadcast Component Dist. Communication Medias**..... 271  
**Nortronics Co., Inc.**..... 68  
**Professional Audio Service**..... 274  
**Saki Magnetics, Inc.**..... 214  
**Taber Mfg. & Engr. Co.**..... 224

Accurate Sound Co.  
 Ampex Corp.  
 Ampro Broadcasting Inc.  
 Audio Distributor Inc. D 1-9  
 Beaucart Div. UMC Electronics Co.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 Computer Magnetics Corp.  
 Electro Sound, Inc.  
 Glentronix Ltd. D 1-9  
 International Electro-Magnetics  
 Joa Cartridge Service D2  
 Lipps Inc.  
 Minneapolis Magnetics, Inc.  
 Norton Associates Inc.  
 Nortronics Co., Inc.  
 Professional Audio Service  
 Saki Magnetics, Inc.  
 Sound Dynamics, Inc. D8, 9  
 Spin Physics, Inc.  
 Taber Mfg. & Engr. Co.  
 Tapex Corp.

VIF International  
Val-Tronics, Inc. D1-9  
Videomagnetics, Inc.  
Videomax Div. Orrox Corp.

## Heads, Recording Magnetic

See Adv. Page

**Beaucart Div.** ..... 28  
**International Electro-**  
**Magnetics** ..... 184  
**Nortronics Co., Inc.** ..... 68  
**Saki Magnetics, Inc.** ..... 214  
**Sound Dynamics, Inc.** ..... 226  
**Taber Mfg. & Engr.**  
**Co.** ..... 224

AEG-Telefunken Magnetic Tape Recorder Dept.  
Accurate Sound Co.  
Beaucart Div. UMC Electronics Co. Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors Communication Medias  
Broadcast Equipment & Supply Co. D 1-9  
Canon USA, Inc. Optics Div.  
Collins Radio Rockwell International Computer Magnetics Corp.  
Electro Sound, Inc.  
Glenatron Ltd. D 1-9  
Hitachi Denshi America, Ltd.  
International Electro-Magnetics  
Joa Cartridge Service D2  
Lipps Inc.  
Magna-Tech Electronic Co., Inc.  
Magnasonic Devices Inc.  
Mastertone Co., Inc.  
Minneapolis Magnetics, Inc.  
Nagra Magnetic Recorders, Inc.  
Norton Associates Inc.  
Nortronics Co., Inc.  
Professional Audio Service  
Saki Magnetics, Inc.  
Sound Dynamics, Inc. D8, 9  
Spin Physics, Inc.  
Taber Mfg. & Engr. Co.  
Tapecaster TCM, Inc.  
Track Audio, Inc. D 1-9  
VIF International  
Val-Tronics, Inc. D1-9  
Videomagnetics, Inc.  
Videomax Div. Orrox Corp.  
Vikron

## Heads, Video Recorder

See Adv. Page

**Computer Magnetics**  
**Corp.** ..... 248,249

Ampex Corp.  
Asaca Corp. of America  
Computer Magnetics Corp.  
Comquip, Inc.  
Glenatron Ltd. D 1-9  
Javelin Electronics D9  
Lipps Inc.  
Minneapolis Magnetics, Inc.  
RCA Broadcast Systems  
Roscor Corp. D3, 4  
Spin Physics, Inc.  
Taber Mfg. & Engr. Co.  
Videomagnetics, Inc.  
Videomax Div. Orrox Corp.

## Heat Exchangers

Bird Electronic Corp.  
Electro Impulse, Inc.  
Harris Corp. Broadcast Products Div.  
Townsend Associates, Inc.

## Heaters, Station Van

Valad Electric Heating Corp.

## Hum Stop Coils, Video

See Adv. Page

**Audio-Video**  
**Engineering Co.** ..... 82

Audio-Video Engineering Co.  
Broadcast Communications Devices, Inc. D9  
Dyma Engineering, Inc.  
North Hills Electronics, Inc.  
Pleasantville Labs  
TeleMation, Inc.  
Video Aids Corp. of Colorado

## Image Repositioners, Video

See Adv. Page

**All Mobile Video, Inc.** ..... 271

All Mobile Video, Inc.

## Industrial TV Systems --See also TV Systems, Closed Circuit

ATV Research  
Berkey-Colortran Inc.  
Blonder-Tongue Labs.  
Boston Insulated Wire & Cable Co.  
Broadcast Video Systems, Ltd.  
C-COR Electronics, Inc.  
Catel Div. United Scientific Corp.  
Central Dynamics Corp.  
Cohu, Inc. Electronics Div.  
Colorado Video Inc.  
Communications Technology, Inc.  
Comquip, Inc.  
Dage-MTI, Inc.  
Dynair Electronics, Inc.  
Fernseh Group Robert Bosch Corp.  
Imero Fiorentino Associates, Inc.  
General Television Ntwk. D 3  
Hitachi Denshi America, Ltd.  
International Nuclear Corp.  
Javelin Electronics D9  
Laird Telemedia Inc.  
Leitch Video Ltd.  
Lenzar Optics Corp.  
Marco Video Systems, Inc. D 2,5  
Media Concepts, Inc. D 1-9  
Panasonic Video Systems Div.  
Peirce-Phelps, Inc. D 2, 5  
Power-Optics Inc.  
SC Electronics, Inc.  
Scientific Systems, Inc.  
Sony Corp. of America VTR Div.  
Tektronix Inc.  
Tele-Cine Inc.  
Tele-Measurements, Inc. B-2  
Television and Computer Corp.  
Teltron Inc.  
Varian/Beverly Micro-Link Products  
Videotetics Corp.

## Isolators, Electro-Optical

See Adv. Page

**Unimedia Corp.** ..... 89  
**Video Aids Corp. of**  
**Colorado** ..... 95

Comprehensive Video Supply Corp. D 1-9  
Motorola Semiconductor Products, Inc.  
Unimedia Corp.  
Video Aids Corp. of Colorado

## Insulators, Antenna Base

See Adv. Page

**Decca Austin**  
**Insulators** ..... 262

Cetec Broadcast Group  
Collins Radio Rockwell International  
Continental Electronics Mfg. Co.  
Decca Austin Insulators  
Jampro --see Cetec Broadcast Group  
Magnum Towers, Inc.  
Tiner Communications Service, Inc.

## Insulators, Guy Strain

See Adv. Page

**Decca Austin**  
**Insulators** ..... 262

Cetec Broadcast Group  
Collins Radio Rockwell International  
Continental Electronics Mfg. Co.  
Decca Austin Insulators  
Jampro --see Cetec Broadcast Group  
Magnum Towers, Inc.  
Tiner Communications Service, Inc.

## Integrated Circuits --See also Semiconductors

Amperex Electronic Corp.  
A-Tel-A-Matic  
English Electric Valve North America Ltd.  
Harris Corp. Broadcast Products Div.  
P. R. Mallory & Co. Inc.  
Microwave Assoc. Inc.  
Motorola Semiconductor Products, Inc.  
Temtron Electronics D 1-9  
Thor Electronics Corp.

## Intercom Systems

See Adv. Page

**Industrial Sciences** ..... 250  
**RTS Systems** ..... 228  
**Video Aids Corp. of**  
**Colorado** ..... 95

Atlas Sound  
Audio Designs & Mfg.  
Automated Processes, Inc.  
Bogen Div. Lear Siegler, Inc.  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Equipment Distributors Communication Medias  
David Clark Co., Inc.  
Clear-Com  
Collins Television Services  
Custom Audio Electronics dbx, Inc.  
Dyma Engineering, Inc.  
Electro-Voice Inc.  
Emerson-Rittenhouse  
Fisher Berkeley Corp.  
Fisher-Burke Broadcast Consultants  
G.C. Electronics  
Holland Electronics  
Industrial Sciences  
Landy Associates Inc. D 1,2  
McMartin Industries, Inc.  
Charles Moore  
Paso Sound Products Inc.  
ROH Corporation  
RTS Systems  
Rivers Associates, Inc.  
Scientific Systems, Inc.  
Sinai-Johnson  
Telectro Systems Corp.  
Tele-Measurements, Inc. B-2  
Television and Computer Corp.  
Television Equipment Associates  
Video Aids Corp. of Colorado  
Ward-Beck Systems, Ltd.

## Isocouplers

See Adv. Page

**Moseley Assoc. Inc.** ..... 69

C. S. P. Inc.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Jampro --see Cetec Broadcast Group  
Mastertone Co., Inc.  
Moseley Assoc. Inc.  
Motorola Semiconductor Products, Inc.  
RCA Broadcast Systems  
Shively Laboratories, Inc.  
Sintronic Corp.  
Val-Tronics, Inc. D1-9  
Video Aids Corp. of Colorado  
Video Components, Inc.

Wilkinson Electronics, Inc.

## ITFS Systems

Alford Mfg. Co.  
EMCEE Broadcast Products  
Varian/Beverly Micro-Link Products

## Jack Panel Assemblies

A-Tel-A-Matic  
Audio Accessories Inc.  
Audio Designs & Mfg.  
Audio Distributor Inc. D 1-9  
Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Consultants Corp. D5, 6  
Broadcast Equipment & Supply Co. D 1-9  
Bud Industries, Inc.  
Collins Radio Rockwell International  
Cooke Engineering Co. See Dynatech Data Systems  
dbx, Inc.  
Delta Electronics Inc. (Va.)  
Dyma Engineering, Inc.  
Dynatech Data Systems  
Harris Corp. Broadcast Products Div.  
Landy Associates Inc. D 1,2  
Mastertone Co., Inc.  
McCurdy Radio Ind. Inc.  
Peirce-Phelps, Inc. D 2, 5  
Potomac Instruments, Inc.  
RCA Broadcast Systems  
Rex Rheostat & Co., Inc.  
Switchcraft Inc.  
Trompeter Electronics  
Union Connector Co., Inc.  
United Radio Supply Inc. D9  
Ward-Beck Systems, Ltd.

## Jacks, Meter Line

Collins Radio Rockwell International  
Delta Electronics Inc. (Va.)

## Keyers, Video Insert

American Data Div. Philips Broadcast Equip. Corp.  
Broadcast Communications Devices, Inc. D9  
Broadcast Video Systems, Ltd.  
Central Dynamics Corp.  
Chyron Telesystems  
Communications Technology, Inc.  
Computer Image Video Controllers  
Dytek Industries, Inc.  
Grass Valley Group, Inc.  
Roscor Corp. D3, 4  
Shintron Co. Inc.  
Thomson-CSF Laboratories, Inc.  
3M Co. Mincom Div.  
Video Devices Co.

## Kits, Amplifier --See Amplifier Kits

## Kits, Transmitter --See Transmitter Kits

## Knobs, Control

See Adv. Page

**Alco Electronic**  
**Products, Inc.** ..... 92

Alco Electronic Products, Inc.  
G.C. Electronics  
P. R. Mallory & Co. Inc.  
Quad-Eight Electronics  
Singer Products Co., Inc.

## Lamps, Stage and Studio Replacement

See Adv. Page

**Electronics Diversified,**  
**Inc.** ..... 219  
**Sitler's Supplies, Inc.** ..... 272  
**Temtron Electronics** ..... 273

Barbizon Electre



Berkey-Colortran Inc.  
Electronics Diversified, Inc.  
GTE Sylvania Inc. Lighting Products Group  
Kliegl Bros. Lighting  
Lauderdale Electronic Labs  
Lumitrol, Ltd.  
Sitler's Supplies, Inc.  
Strand Century, Inc.  
Temtron Electronics D 1-9

### Leased Broadcast Equipment

See Adv. Page

All Mobile Video ..... 271  
Broadcast Component  
Dist. Communication  
Medias.....271  
NEC America, Inc.....215

All Mobile Video  
Ampro Broadcasting Inc.  
Angenieux Corp. of America  
Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Equipment Distributors  
Communication Medias  
Broadcast Equip. Leasing Co.  
CSI Electronics, Inc.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Comquip, Inc.  
D and S Corley Ltd.  
Editel Communications  
Harris Corp. Broadcast Products Div.  
Industrial Sciences  
International Tapetronics Corp.  
Jampro --see Cetec Broadcast Group  
NEC America, Inc. Broadcasting Equip.  
Div.  
The Orange County Electronics Corp.  
Ltd.  
RCA Broadcast Systems  
Ramko Research Inc.  
Schafer --see Cetec Broadcast Group  
Sintronic Corp.  
Sparta --see Cetec Broadcast Group  
Spectra Sonics  
Tele-Cine Inc.  
Wilkinson Electronics, Inc.

### Lens Repair Services

See Adv. Page

Angenieux Corp. of America..... 277

Achro-Video Ltd.  
Angenieux Corp. of America  
Rank Precision Industries, Inc. (N.Y.)  
Tele-Cine Inc.

### Lenses, Optical Fixed

See Adv. Page

Angenieux Corp. of America..... 246,247  
C.R.V. Systems, Inc. ....274  
Canon USA, Inc. ....177  
Fujinon Optical, Inc.....253  
Temtron Electronics .....273

ATV Research  
Angenieux Corp. of America  
Anixter-Mark  
Arriflex Co. of America  
Broadcast Communications Devices, Inc. D9  
Buhl Optical Co.  
C.R.V. Systems, Inc.  
Canon USA, Inc. Optics Div.  
Cohu, Inc. Electronics Div.  
Comprehensive Video Supply Corp. D 1-9  
Comquip, Inc.  
Cosmicar Lens Div. Asahi Precision Co., Ltd.  
Dage-MTI, Inc.  
Denson Electronic Corp. D 1-9  
Fujinon Optical, Inc.  
Image Devices Inc.  
Javelin Electronics D9  
Lenzar Optics Corp.

Panasonic Video Systems Div.  
Power-Optics Inc.  
Rank Precision Industries, Inc. (N.Y.)  
Schneider Corp. of America  
Specialized Industries, Inc.  
Tele-Cine Inc.  
Temtron Electronics D 1-9  
Victor Duncan, Inc.  
Weather Scan, Inc.

### Lenses, Optical Fixed Relay

See Adv. Page

Angenieux Corp. of America..... 246,247  
C.R.V. Systems, Inc. ....274  
Canon USA, Inc. ....177  
Fujinon Optical, Inc.....253

Angenieux Corp. of America  
Broadcast Communications Devices, Inc. D9  
C.R.V. Systems, Inc.  
Canon USA, Inc. Optics Div.  
Cohu, Inc. Electronics Div.  
Comquip, Inc.  
Fujinon Optical, Inc.  
Javelin Electronics D9  
Lenzar Optics Corp.  
Rank Precision Industries, Inc. (N.Y.)  
Jos. Schneider & Co. P.O. Box 947  
Specialized Industries, Inc.  
Tele-Cine Inc.

### Lenses, Optical Zoom

See Adv. Page

Angenieux Corp. of America..... 246,247  
C.R.V. Systems, Inc. ....274  
Canon USA, Inc. ....177  
Fujinon Optical, Inc.....253  
Temtron Electronics .....273

ATV Research  
Angenieux Corp. of America  
Anixter-Mark  
Arriflex Co. of America  
Broadcast Communications Devices, Inc. D9  
Buhl Optical Co.  
C.R.V. Systems, Inc.  
Canon USA, Inc. Optics Div.  
Cohu, Inc. Electronics Div.  
Comprehensive Video Supply Corp. D 1-9  
Comquip, Inc.  
Cosmicar Lens Div. Asahi Precision Co., Ltd.  
Dage-MTI, Inc.  
Denson Electronic Corp. D 1-9  
Frezolini Electronics, Inc.  
Fujinon Optical, Inc.  
Harris Corp. Broadcast Products Div.  
Image Devices Inc.  
Javelin Electronics D9  
Lenzar Optics Corp.  
Listec TV Equip. Corp.  
Panasonic Video Systems Div.  
Power-Optics Inc.  
Rank Precision Industries, Inc. (N.Y.)  
Schneider Corp. of America  
Jos. Schneider & Co. P.O. Box 947  
Specialized Industries, Inc.  
Tele-Cine Inc.  
Tele-Measurements, Inc. B-2  
Temtron Electronics D 1-9  
Victor Duncan, Inc.  
Weather Scan, Inc.

### Lighting, Preset Dimmer

See Adv. Page

Electronics Diversified, Inc.....219  
Strand Century, Inc. ....193  
Waters Mfg. Inc. ....252

Berkey-Colortran Inc.  
Broadcast Communications Devices, Inc. D9  
Custom Audio Electronics  
dbx, Inc.  
Electronics Diversified, Inc.

Janson Industries  
Kliegl Bros. Lighting  
Landy Associates Inc. D 1,2  
Lumitrol, Ltd.  
Strand Century, Inc.  
Tele-Measurements, Inc. B-2  
Waters Mfg. Inc.

### Lighting, TV Controls

See Adv. Page

Electronics Diversified, Inc.....219  
Strand Century, Inc. ....193  
Waters Mfg. Inc. ....252

Berkey-Colortran Inc.  
Broadcast Communications Devices, Inc. D9  
dbx, Inc.  
Dyma Engineering, Inc.  
Electronics Diversified, Inc.  
Janson Industries  
Kliegl Bros. Lighting  
Landy Associates Inc. D 1,2  
Lumitrol, Ltd.  
Peirce-Phelps, Inc. D 2, 5  
SGL Waber Electric  
Strand Century, Inc.  
Tele-Measurements, Inc. B-2  
Video Components, Inc.  
Waters Mfg. Inc.

### Lighting, TV Portable System

See Adv. Page

Electronics Diversified, Inc.....219  
Strand Century, Inc. ....193

Berkey-Colortran Inc.  
Broadcast Communications Devices, Inc. D9  
Cine 60, Inc.  
Comprehensive Video Supply Corp. D 1-9  
Comquip, Inc.  
dbx, Inc.  
Dyma Engineering, Inc.  
Electronics Diversified, Inc.  
Frezolini Electronics, Inc.  
GTE Sylvania Inc. Lighting Products Group  
Image Devices Inc.  
Janson Industries  
Kliegl Bros. Lighting  
Landy Associates Inc. D 1,2  
Lowel-Light  
Lumitrol, Ltd.  
Peirce-Phelps, Inc. D 2, 5  
Strand Century, Inc.  
Super8 Sound, Inc.  
Tele-Measurements, Inc. B-2  
Union Connector Co., Inc.  
Victor Duncan, Inc.  
Video Components, Inc.  
Weather Scan, Inc.

### Lighting, TV Studio System

See Adv. Page

Electronics Diversified, Inc.....219  
Strand Century, Inc. ....193

Bardwell & McAlister  
Berkey-Colortran Inc.  
Broadcast Communications Devices, Inc. D9  
Comquip, Inc.  
dbx, Inc.  
Dyma Engineering, Inc.  
Electronics Diversified, Inc.  
Imero Fiorentino Associates, Inc.  
Harris Corp. Broadcast Products Div.  
Image Devices Inc.  
Janson Industries  
KVC Video Systems Inc. D 1,2  
Kliegl Bros. Lighting  
Landy Associates Inc. D 1,2  
Lumitrol, Ltd.  
Oregon Sound D 9  
Peirce-Phelps, Inc. D 2, 5  
Roscor Corp. D3, 4

Strand Century, Inc.  
Tele-Measurements, Inc. B-2  
Union Connector Co., Inc.  
Victor Duncan, Inc.  
Video Components, Inc.  
Weather Scan, Inc.

### Lighting Hangers, Studio

Berkey-Colortran Inc.  
Broadcast Communications Devices, Inc. D9  
dbx, Inc.  
Kliegl Bros. Lighting  
Landy Associates Inc. D 1,2  
Lowel-Light  
Peirce-Phelps, Inc. D 2, 5  
Strand Century, Inc.  
Victor Duncan, Inc.  
Video Components, Inc.

### Lighting Transformers

See Adv. Page

Decca Austin Insulators .....262  
Hughes & Phillips Inc. ....200

Broadcast Communications Devices, Inc. D9  
Decca Austin Insulators  
Harris Corp. Broadcast Products Div.  
Hughes & Phillips Inc.  
MCG Electronics Inc.

### Lightning Arresters

See Adv. Page

Wilkinson Electronics, Inc. ....62

Collins Radio Rockwell International  
Cook Electric Co.  
Dielectric Communications Div. Sola Basic, Inc.  
Dyma Engineering, Inc.  
G.C. Electronics  
General Electric Co. Tubes/MW Devices  
Harris Corp. Broadcast Products Div.  
Joslyn Electronic Sys.  
MCG Electronics Inc.  
Pacific Recorders and Engrg. Corp.  
Saxton Products Inc.  
T.H. Corp.  
Transtector Systems Div. Konic International Corp.  
Wilkinson Electronics, Inc.

### Lightning Protection Systems

Collins Radio Rockwell International  
Cook Electric Co.  
Joslyn Electronic Sys.  
Lightning Elimination Assoc., Inc.  
MCG Electronics Inc.  
Singer Products Co., Inc.  
Sintronic Corp.  
Transtector Systems Div. Konic International Corp.  
Wilkinson Electronics, Inc.

### Lights, HMI Ballast

Berkey-Colortran Inc.  
Kliegl Bros. Lighting

### Lights, On Air

See Adv. Page

Broadcast Component Dist. Communication Medias.....273

Ampro Broadcasting Inc.  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Collins Radio Rockwell International Communications, Ltd.  
Comprehensive Video Supply Corp. D 1-9  
Fidelipac  
Kliegl Bros. Lighting

LPB Inc.  
Lauderdale Electronic Labs  
Rek-O-Kut Inc.

### Lights, Portable, Battery and AC

See Adv. Page

### C.R.V. Systems, Inc. ....274

Berkey-Colortran Inc.  
C.R.V. Systems, Inc.  
Cine 60, Inc.  
Cinema Products Corp.  
Frezolini Electronics, Inc.  
KVC Video Systems Inc. D 1,2  
Lauderdale Electronic Labs  
Lowel-Light

### Lights, Portable, Kit

See Adv. Page

### Electronics Diversified, Inc. ....219

Berkey-Colortran Inc.  
Cine 60, Inc.  
Cinema Products Corp.  
Comprehensive Video Supply Corp. D 1-9  
Custom Audio Electronics dbx, Inc.  
Electronics Diversified, Inc.  
Harris Corp. Broadcast Products Div.  
Kliegl Bros. Lighting  
Landy Associates Inc. D 1,2  
Lowel-Light  
Strand Century, Inc.

### Lights, Studio Set

See Adv. Page

### Electronics Diversified, Inc. ....219

Bardwell & McAlister  
Berkey-Colortran Inc.  
Cinema Products Corp.  
Comquip, Inc.  
Dyma Engineering, Inc.  
Electronics Diversified, Inc.  
GTE Sylvania Inc. Lighting Products Group  
Harris Corp. Broadcast Products Div.  
KVC Video Systems Inc. D 1,2  
Kliegl Bros. Lighting  
Lumitrol, Ltd.  
Sittler's Supplies, Inc.  
Strand Century, Inc.  
Studer Revox America  
Union Connector Co., Inc.  
Victor Duncan, Inc.  
Video Components, Inc.  
Weather Scan, Inc.

### Lights, Tower Control

See Adv. Page

### Elcom Engineering Co. ....275 Hughey & Phillips Inc. ....200

Cetec Broadcast Group  
Collins Radio Rockwell International  
Crouse Hinds Co.  
Elcom Engineering Co.  
Harris Corp. Broadcast Products Div.  
Hughey & Phillips Inc.  
Jampro --see Cetec Broadcast Group  
Magnum Towers, Inc.  
Mastertone Co., Inc.  
Eric Small & Associates  
Tiner Communications Service, Inc.

### Lights, Tower Flasher --See Tower Beacon Light Flashers

### Lights, Tower Obstruction, Red --See also Tower Lights, High Intensity Obstruction

See Adv. Page

### CCA Electronics Corp. ... 99-106 Elcom Engineering Co. ....275

Broadcast Equipment & Supply Co. D 1-9  
CCA Electronics Corp.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Crouse Hinds Co.  
Elcom Engineering Co.  
Flash Technology Corp. of America  
Fort Worth Tower Co., Inc.  
Harris Corp. Broadcast Products Div.  
Hughey & Phillips Inc.  
Jampro --see Cetec Broadcast Group  
Magnum Towers, Inc.  
Mastertone Co., Inc.  
Swager Tower Corp.  
Tiner Communications Service, Inc.  
Unarco-Rohn Div. of Unarco Ind., Inc.

### Limiter Compressors

See Adv. Page

### Audio Distributor Inc. ....247 Broadcast Component Dist. Communication

Medias .....269  
CCA Electronics Corp. ... 99-106  
Collins Radio.....21  
Elcom Engineering Co. ....27  
Inovonics .....77  
International Electro-  
Magnetics .....184  
Marti Electronics .....57  
Maze Corp .....270  
Moseley Assoc. Inc. ....69  
Orban/Broadcast .....189  
Pacific Recorders and  
Engrg. Corp. ....210  
Ramko Research Inc. ....91  
Robins Broadcast &  
Sound Equip. Corp. ....38  
Wilkinson Electronics,  
Inc. ....62

Audio Distributor Inc. D 1-9  
Automated Processes, Inc.  
Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors Communication Medias  
Broadcast Equipment & Supply Co. D 1-9  
CCA Electronics Corp.  
Cetec Broadcast Group  
Collins Radio Rockwell International dbx, Inc.  
Dyma Engineering, Inc.  
EMT Franz VGmbH  
Elcom Engineering Co.  
Gotham Audio Corp.  
Harris Corp. Broadcast Products Div.  
Inovonics  
International Communications & Control Corp.  
International Electro-Magnetics LPB Inc.  
Lauderdale Electronic Labs  
Marti Electronics  
Mastertone Co., Inc.  
Maze Corp D6  
Modular Audio Products Unit of Modular Devices, Inc.  
Moseley Assoc. Inc.  
Rupert Neve, Inc.  
Opamp Labs, Inc.  
The Orange County Electronics Corp. Ltd.  
Orban/Broadcast  
Orban/Parasound  
Pacific Recorders and Engrg. Corp. QEI Corp.  
RCA Broadcast Systems  
Ramko Research Inc.  
Robins Broadcast & Sound Equip. Corp.  
Russco Electronics Mfg. Inc.  
Schafer --see Cetec Broadcast Group  
Sound Dynamics, Inc. D8, 9  
Sparta --see Cetec Broadcast Group  
Spectra Sonics

Thomson-CSF Laboratories, Inc.  
Track Audio, Inc. D 1-9  
United Recording Electronics Industries  
VIF International  
Val-Tronics, Inc. D1-9  
Ward-Beck Systems, Ltd.  
Westlake Audio  
Wilkinson Electronics, Inc.

### Line Surge Protectors

See Adv. Page

### Wilkinson Electronics, Inc. ....62

Boston Sound & Power Systems  
Broadcast Consultants Corp. D5, 6  
C-COR Electronics, Inc.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Cook Electric Co.  
Dielectric Communications Div. Sola Basic, Inc.  
Dyma Engineering, Inc.  
Harris Corp. Broadcast Products Div.  
Lauderdale Electronic Labs  
Lightning Elimination Assoc., Inc.  
MCG Electronics Inc.  
Mastertone Co., Inc.  
Philips Test & Measuring Instruments, Inc.  
Ramko Research Inc.  
Slntronic Corp.  
Sparta --see Cetec Broadcast Group  
T.I.I. Corp.  
Temtron Electronics D 1-9  
Transtector Systems Div. Konic International Corp.  
Wilkinson Electronics, Inc.

### Load Resistors, Coaxial

Alford Mfg. Co.  
Bird Electronic Corp.  
C. S. P. Inc.  
Coaxial Dynamics  
Collins Radio Rockwell International  
Dielectric Communications Div. Sola Basic, Inc.  
Dyma Engineering, Inc.  
Electro Impulse, Inc.  
Harris Corp. PRD Electronics Div.  
Maury Microwave Corp.  
Micro Communications, Inc.  
Pacific Recorders and Engrg. Corp.  
Rohde & Schwarz Sales Co.  
Weinschel Engineering Co.

### Maintenance Services, AM

Applied Video Electronics, Inc. D 1-9  
Atlantic Research Corp.  
CSI Electronics, Inc.  
Collins Radio Rockwell International  
Communications, Ltd.  
Fisher-Burke Broadcast Consultants  
Hallikainen & Friends, Inc.  
Magnum Towers, Inc.  
Charles Moore  
North American Radio Corp.  
Professional Audio Service  
RCA Broadcast Systems  
Telatronics  
Tri-Tronics Professional Electronics

### Maintenance Services, Cartridge Tape

Ampro Broadcasting Inc.  
Broadcast Cartridge Service D 1-9  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors Communication Medias  
Communications, Ltd.  
Joa Cartridge Service D2  
Mastertone Co., Inc.  
Professional Audio Service  
RCA Broadcast Systems  
Taber Mfg. & Engr. Co.  
Tapex Corp.

### Maintenance Services, FM

Applied Video Electronics, Inc. D 1-9  
Atlantic Research Corp.  
CSI Electronics, Inc.  
Collins Radio Rockwell International  
Comark Industries Inc.  
Communications, Ltd.  
Fisher-Burke Broadcast Consultants  
Fort Worth Tower Co., Inc.  
Hallikainen & Friends, Inc.  
Magnum Towers, Inc.  
Charles Moore  
North American Radio Corp.  
Professional Audio Service  
RCA Broadcast Systems  
Telatronics  
Tri-Tronics Professional Electronics

### Maintenance Services, Microwave

Atlantic Research Corp.  
Collins Radio Rockwell International  
Comark Industries Inc.  
Farinon Electric  
Fort Worth Tower Co., Inc.  
Microwave Assoc. Inc.  
Prodelin Inc.  
Telatronics

### Maintenance Services, TV

Applied Video Electronics, Inc. D 1-9  
Atlantic Research Corp.  
Comark Industries Inc.  
Fort Worth Tower Co., Inc.  
KVC Video Systems Inc. D 1,2  
Magnum Towers, Inc.  
Charles Moore  
Pelrice-Phelps, Inc. D 2, 5  
RCA Broadcast Systems  
Townsend Associates, Inc.

### MDS Equipment, 2150 MHz

Alford Mfg. Co.  
Varian/Beverly Micro-Link Products

### Meters, Antenna Base

See Adv. Page

### Delta Electronics Inc. (Va.) ....183

C. S. P. Inc.  
Collins Radio Rockwell International  
Delta Electronics Inc. (Va.)

### Meters, Antenna Impedance

Alford Mfg. Co.  
Delta Electronics Inc. (Va.)  
Leader Instruments Corp.  
Potomac Instruments, Inc.  
Val-Tronics, Inc. D1-9

### Meters, Burst Phase

See Adv. Page

### Video Aids Corp. of Colorado .....95

Beta Technology, Inc.  
Dragnet Engineering Labs., Inc.  
Dyma Engineering, Inc.  
Video Aids Corp. of Colorado

### Meters, Field Strength AM and FM

See Adv. Page

### CCA Electronics Corp. ... 99-106 Potomac Instruments, Inc. ....251

Arvin CATV  
Broadcast Specialties  
CCA Electronics Corp.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Engineering Associates  
Harris Corp. Broadcast Products Div.



Heath Co.  
 Potomac Instruments, Inc.  
 Rohde & Schwarz Sales Co.  
 SPI-ITT Metrix Instruments Div.  
 Sencore Inc.  
 Singer Instrumentation  
 Sparta --see Cetec Broadcast Group  
 Val-Tronics, Inc. D1-9  
 Wilkinson Electronics, Inc.

**Meters, Field Strength TV-UHF**

See Adv. Page

**CCA Electronics Corp. .. 99-106**  
**Potomac Instruments,**  
**Inc. ....251**

AEL, Inc.  
 Arvin CATV  
 B & K Instruments Inc.  
 Blonder-Tongue Labs.  
 CCA Electronics Corp.  
 Dyma Engineering, Inc.  
 Engineering Associates  
 The Finney Co.  
 Fung Engineering Inc.  
 Merrill Cable Equipment Corp.  
 Potomac Instruments, Inc.  
 Rohde & Schwarz Sales Co.  
 SPI-ITT Metrix Instruments Div.  
 Sadelco, Inc.  
 Sencore Inc.  
 Singer Instrumentation  
 Tekscon Corp.  
 Val-Tronics, Inc. D1-9

**Meters, Flutter and Wow**

See Adv. Page

**Fidelipac .....261**

B & K Instruments Inc.  
 Broadcast Communications Devices,  
 Inc. D9  
 Collins Radio Rockwell International  
 Dyma Engineering, Inc.  
 EMT Franz VGmbH  
 Fidelipac  
 Gotham Audio Corp.  
 Kay Elemetrics Corp.  
 Lauderdale Electronic Labs  
 Leader Instruments Corp.  
 Potomac Instruments, Inc.  
 Professional Audio Service  
 Val-Tronics, Inc. D1-9  
 Video Research Corp.

**Meters, Frequency AF**

Amber Electro Design, Ltd.  
 Collins Radio Rockwell International  
 Dyma Engineering, Inc.  
 Elcom Engineering Co.  
 Engineering Associates  
 General Electric Co. Tubes/MW  
 Devices  
 Heath Co.  
 Hickok Elect. Instrument  
 Ivie Electronics  
 Lampkin Lab. Inc.  
 Rohde & Schwarz Sales Co.  
 SPI-ITT Metrix Instruments Div.  
 Singer Instrumentation  
 Eric Small & Associates  
 Temtron Electronics D 1-9  
 United Systems Corp.  
 Val-Tronics, Inc. D1-9

**Meters, Frequency RF**

B & K Precision Dynascan Corp.  
 Belar Electronics Lab., Inc.  
 Dyma Engineering, Inc.  
 EIP, Inc.  
 Edison Electronics Div.  
 Elcom Engineering Co.  
 Engineering Associates  
 General Electric Co. Tubes/MW  
 Devices  
 Harris Corp. PRD Electronics Div.  
 Heath Co.  
 Hickok Elect. Instrument  
 Lampkin Lab. Inc.  
 Rohde & Schwarz Sales Co.  
 SPI-ITT Metrix Instruments Div.

Singer Instrumentation  
 Singer Products Co., Inc.  
 Systron-Donner  
 United Systems Corp.  
 Val-Tronics, Inc. D1-9

**Meters, Frequency Calibrating**

Eidson Electronic Co.  
 Elcom Engineering Co.  
 Hitachi Denshi America, Ltd.  
 Lampkin Lab. Inc.  
 Philips Test & Measuring Instruments,  
 Inc.

**Meters, Grid Dip**

Heath Co.  
 Leader Instruments Corp.  
 Singer Products Co., Inc.

**Meters, Internodulation**

Amber Electro Design, Ltd.  
 Collins Radio Rockwell International  
 Dyma Engineering, Inc.  
 Edison Electronics Div.  
 Heath Co.  
 Marconi Instruments  
 Potomac Instruments, Inc.  
 Sound Technology

**Meters, Line Voltage**

Alco Electronic Products, Inc.  
 Dranetz Engineering Labs., Inc.  
 Gralex Industries  
 Hickok Elect. Instrument  
 International Instrument Div.  
 Philips Test & Measuring Instruments,  
 Inc.  
 Sencore Inc.  
 United Radio Supply Inc. D9

**Meters, Modulation**

See Adv. Page

**The London Co. ....258**

Belar Electronics Lab., Inc.  
 Boonton Electronics  
 Collins Radio Rockwell International  
 Gotham Audio Corp.  
 The London Co.  
 Marconi Instruments  
 SPI-ITT Metrix Instruments Div.

**Meters, Panel Replacement**

See Adv. Page

**Ramko Research Inc. .... 91**

A-Tel-A-Matic  
 G.C. Electronics  
 Gralex Industries  
 Ramko Research Inc.

**Meters, Phase Angle**

B & K Instruments Inc.  
 Collins Radio Rockwell International  
 Dranetz Engineering Labs., Inc.  
 General Electric Co. Tubes/MW  
 Devices  
 Gorman Relch Mfg. Co.  
 Harris Corp. PRD Electronics Div.  
 Potomac Instruments, Inc.  
 SPI-ITT Metrix Instruments Div.  
 Singer Instrumentation  
 Video Aids Corp. of Colorado

**Meters, Power**

See Adv. Page

**CCA Electronics Corp. .. 99-106**

**Dielectric**  
**Communications Div.**  
**Sola Basic, Inc. ....165**  
**Electro Impulse, Inc. ....268**

A-Tel-A-Matic  
 Bird Electronic Corp.  
 Boonton Electronics

CCA Electronics Corp.  
 Coaxial Dynamics  
 Collins Radio Rockwell International  
 Comprehensive Video Supply Corp. D  
 1-9  
 Dielectric Communications Div. Sola  
 Basic, Inc.  
 Dranetz Engineering Labs., Inc.  
 Electro Impulse, Inc.  
 Engineering Associates  
 Harris Corp. PRD Electronics Div.  
 Hickok Elect. Instrument  
 Lampkin Lab. Inc.  
 Leader Instruments Corp.  
 Narda Microwave Corp.  
 National Electrolab Ltd.  
 Quad-Eight Electronics  
 Rohde & Schwarz Sales Co.  
 Singer Products Co., Inc.  
 Systron-Donner  
 Weinschel Engineering Co.

**Meters, RF**

See Adv. Page

**Delta Electronics Inc.**  
**(Va.) .....183**

Delta Electronics Inc. (Va.)

**Meters, Signal Level**

See Adv. Page

**Pacific Recorders and**  
**Engg. Corp. ....210**

Belar Electronics Lab., Inc.  
 Edison Electronics Div.  
 International Instrument Div.  
 G.C. Electronics  
 Gotham Audio Corp.  
 Merrill Cable Equipment Corp.  
 Pacific Recorders and Engg. Corp.  
 Pulse Dynamics Mfg. Corp. (PDMC)  
 Quad-Eight Electronics  
 Ramko Research Inc.  
 Sadelco, Inc.  
 Sencore Inc.  
 Singer Instrumentation  
 Eric Small & Associates  
 TEAC Corp of America  
 TM Systems, Inc.

**Meters, Standing Wave**

See Adv. Page

**Dielectric**  
**Communications Div.**  
**Sola Basic, Inc. ....165**

Bird Electronic Corp.  
 CCA Electronics Corp.  
 Coaxial Dynamics  
 Collins Radio Rockwell International  
 Dielectric Communications Div. Sola  
 Basic, Inc.  
 Dyma Engineering, Inc.  
 G.C. Electronics  
 Harris Corp. PRD Electronics Div.  
 Hickok Elect. Instrument  
 Leader Instruments Corp.  
 Micro Communications, Inc.  
 Rohde & Schwarz Sales Co.  
 SPI-ITT Metrix Instruments Div.  
 Telonic Altair  
 Weinschel Engineering Co.

**Meters, Tape --See Tape Meters**

**Meters, Video Noise**

Broadcast Communications Devices,  
 Inc. D9  
 Lenco Inc. Electronics Div.  
 Rohde & Schwarz Sales Co.

**Meters, Volt Ohm**

See Adv. Page

**CCA Electronics Corp. .. 99-106**  
**Pacific Recorders and**  
**Engg. Corp. ....210**

Aiken Industries Inc.

B & K Precision Dynascan Corp.  
 CCA Electronics Corp.  
 Collins Radio Rockwell International  
 Comprehensive Video Supply Corp. D  
 1-9  
 Dana Laboratories, Inc.  
 Dyma Engineering, Inc.  
 G.C. Electronics  
 Heath Co.  
 Hickok Elect. Instrument  
 International Instrument Div.  
 Leader Instruments Corp.  
 Pacific Recorders and Engg. Corp.  
 Rohde & Schwarz Sales Co.  
 SPI-ITT Metrix Instruments Div.  
 Sencore Inc.  
 Sinai-Johnson  
 Systron-Donner  
 Tektronix Inc.  
 United Radio Supply Inc. D9  
 United Systems Corp.

**Meters, VU**

See Adv. Page

**MIC-MIX Audio**  
**Products, Inc. ....200**  
**Pacific Recorders and**  
**Engg. Corp. ....210**

Amber Electro Design, Ltd.  
 Audio Designs & Mfg.  
 Collins Radio Rockwell International  
 Dyma Engineering, Inc.  
 Edison Electronics Div.  
 G.C. Electronics  
 Gotham Audio Corp.  
 Harris Corp. Broadcast Products Div.  
 Image Devices Inc.  
 International Instrument Div.  
 MIC-MIX Audio Products, Inc.  
 Pacific Recorders and Engg. Corp.  
 Pulse Dynamics Mfg. Corp. (PDMC)  
 Quad-Eight Electronics  
 Ramko Research Inc.  
 SPI-ITT Metrix Instruments Div.  
 TEAC Corp of America  
 TM Systems, Inc.  
 Tapecaster TCM, Inc.  
 Ward-Beck Systems, Ltd.

**Microphone Boom Reconditioning Services**

Television Products Co. Inc.

**Microphone Cable Testers**

Image Devices Inc.  
 Lauderdale Electronic Labs  
 Sescom, Inc.  
 Shure Brothers Inc.  
 Switchcraft Inc.  
 United Radio Supply Inc. D9  
 Whirlwind Music

**Microphone Splitters**

Broadcast Communications Devices,  
 Inc. D9  
 KVC Video Systems Inc. D 1,2  
 Lauderdale Electronic Labs  
 Oregon Sound D 9  
 Whirlwind Music

**Microphone Stands and Booms**

See Adv. Page

**Broadcast Component**  
**Dist. Communication**  
**Medias .....271**  
**Broadcast Consultants**  
**Corp. .... 83**

AKG Acoustics  
 Accurate Sound Co.  
 Altec Sound Products  
 Ampro Broadcasting Inc.  
 Atlas Sound  
 Audio Distributor Inc. D 1-9  
 BSC Inc.  
 Bogen Div. Lear Siegler, Inc.  
 Broadcast Automation Assoc. D  
 1,2,5,6

Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 Cetec Broadcast Group  
 Collins Radio Rockwell International Comquip, Inc.  
 dbx, Inc.  
 Dyma Engineering, Inc.  
 Fisher-Burke Broadcast Consultants  
 G.C. Electronics  
 Gotham Audio Corp.  
 Harris Corp. Broadcast Products Div.  
 Image Devices Inc.  
 KVC Video Systems Inc. D 1,2  
 LPB Inc.  
 Landy Associates Inc. D 1,2  
 Maze Corp D6  
 Media Concepts, Inc. D 1-9  
 Oregon Sound D 9  
 Paso Sound Products Inc.  
 RCA Broadcast Systems  
 Sennheiser Electronic  
 Shure Brothers Inc.  
 Singer Products Co., Inc.  
 Sparta --see Cetec Broadcast Group  
 Strand Century, Inc.  
 Studer Revox America  
 Tapex Corp.  
 Television Products Co. Inc.  
 Track Audio, Inc. D 1-9  
 Turner Div. Conrac Corp.  
 United Radio Supply Inc. D9  
 Val-Tronics, Inc. D1-9  
 Victor Duncan, Inc.  
 Weather Scan, Inc.  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Microphones, Boom**

See Adv. Page

**Broadcast Consultants Corp. .... 83, 84**  
**CCA Electronics Corp. .. 99-106**  
**Maze Corp ..... 270**  
**Sennheiser Electronic ..... 168**

AKG Acoustics  
 Accurate Sound Co.  
 Altec Sound Products  
 Applied Video Electronics, Inc. D 1-9  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International Comquip, Inc.  
 dbx, Inc.  
 Dyma Engineering, Inc.  
 Electro-Voice Inc.  
 Fisher-Burke Broadcast Consultants  
 G.C. Electronics  
 Gotham Audio Corp.  
 Harris Corp. Broadcast Products Div.  
 Image Devices Inc.  
 LPB Inc.  
 Landy Associates Inc. D 1,2  
 Martin Audio/Video D2  
 Maze Corp D6  
 Media Concepts, Inc. D 1-9  
 Oregon Sound D 9  
 Paso Sound Products Inc.  
 Peirce-Phelps, Inc. D 2, 5  
 RCA Broadcast Systems  
 Ryder Magnetic Sales Corp.  
 Sennheiser Electronic  
 Shure Brothers Inc.  
 Singer Products Co., Inc.  
 Sony Corp. of America VTR Div.  
 Sound Dynamics, Inc. D8, 9  
 Sparta --see Cetec Broadcast Group  
 Studer Revox America  
 Superscope, Inc.  
 TEAC Corp of America  
 Tapex Corp.  
 Tele-Measurements, Inc. B-2  
 Track Audio, Inc. D 1-9  
 Turner Div. Conrac Corp.  
 Val-Tronics, Inc. D1-9  
 Victor Duncan, Inc.  
 Weather Scan, Inc.  
 Westlake Audio  
 Wilkinson Electronics, Inc.

Studer Revox America  
 Technics by Panasonic  
 Tele-Measurements, Inc. B-2  
 Telex Communications, Inc.  
 Track Audio, Inc. D 1-9  
 Turner Div. Conrac Corp.  
 Val-Tronics, Inc. D1-9  
 Victor Duncan, Inc.  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Microphones, Desk**

See Adv. Page

**Audio Distributor Inc. .... 247**  
**Broadcast Component Dist. Communication Medias ..... 271**  
**Broadcast Consultants Corp. .... 83, 84**  
**CCA Electronics Corp. .. 99-106**  
**Collins Radio..... 21**  
**Maze Corp ..... 270**  
**Sennheiser Electronic ..... 168**  
**Sound Dynamics, Inc. .... 226**

AKG Acoustics  
 Accurate Sound Co.  
 Altec Sound Products  
 Ampro Broadcasting Inc.  
 Applied Video Electronics, Inc. D 1-9  
 Audio Distributor Inc. D 1-9  
 Bogen Div. Lear Siegler, Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International Comquip, Inc.  
 dbx, Inc.  
 Dyma Engineering, Inc.  
 Electro-Voice Inc.  
 Fisher-Burke Broadcast Consultants  
 G.C. Electronics  
 Gotham Audio Corp.  
 Harris Corp. Broadcast Products Div.  
 Image Devices Inc.  
 KVC Video Systems Inc. D 1,2  
 LPB Inc.  
 Landy Associates Inc. D 1,2  
 Martin Audio/Video D2  
 Mastertone Co., Inc.  
 Maze Corp D6  
 Media Concepts, Inc. D 1-9  
 Micro-Trak Corp.  
 Oregon Sound D 9  
 Paso Sound Products Inc.  
 Peirce-Phelps, Inc. D 2, 5  
 Professional Audio Service  
 RCA Broadcast Systems  
 Ryder Magnetic Sales Corp.  
 Sennheiser Electronic  
 Shure Brothers Inc.  
 Sinai-Johnson  
 Singer Products Co., Inc.  
 Sony Corp. of America VTR Div.  
 Sound Dynamics, Inc. D8, 9  
 Sparta --see Cetec Broadcast Group  
 Studer Revox America  
 Superscope, Inc.  
 TEAC Corp of America  
 Tapex Corp.  
 Tele-Measurements, Inc. B-2  
 Track Audio, Inc. D 1-9  
 Turner Div. Conrac Corp.  
 Val-Tronics, Inc. D1-9  
 Victor Duncan, Inc.  
 Weather Scan, Inc.  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Microphones, Floor**

See Adv. Page

**Broadcast Consultants Corp. .... 83**  
**Maze Corp ..... 270**  
**Sennheiser Electronic ..... 168**

AKG Acoustics  
 Altec Sound Products  
 Ampro Broadcasting Inc.  
 Audio Distributor Inc. D 1-9  
 Bogen Div. Lear Siegler, Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Dyma Engineering, Inc.  
 Electro-Voice Inc.  
 Fisher-Burke Broadcast Consultants  
 G.C. Electronics  
 Gotham Audio Corp.  
 Harris Corp. Broadcast Products Div.  
 Image Devices Inc.  
 KVC Video Systems Inc. D 1,2  
 Landy Associates Inc. D 1,2  
 Martin Audio/Video D2  
 Mastertone Co., Inc.  
 Maze Corp D6  
 Media Concepts, Inc. D 1-9  
 Oregon Sound D 9  
 Paso Sound Products Inc.  
 Peirce-Phelps, Inc. D 2, 5  
 Professional Audio Service  
 RCA Broadcast Systems  
 Ryder Magnetic Sales Corp.  
 Sennheiser Electronic  
 Shure Brothers Inc.  
 Sinai-Johnson  
 Sound Dynamics, Inc. D8, 9  
 Sparta --see Cetec Broadcast Group  
 Studer Revox America  
 Superscope, Inc.  
 TEAC Corp of America  
 Tapex Corp.  
 Technics by Panasonic  
 Tele-Measurements, Inc. B-2  
 Track Audio, Inc. D 1-9  
 Turner Div. Conrac Corp.  
 VIF International  
 Val-Tronics, Inc. D1-9  
 Victor Duncan, Inc.  
 Weather Scan, Inc.  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Microphones, Hand Held**

See Adv. Page

**Audio Distributor Inc. .... 247**  
**Broadcast Component Dist. Communication Medias ..... 271**  
**Broadcast Consultants Corp. .... 83**  
**CCA Electronics Corp. .. 99-106**  
**Maze Corp ..... 270**  
**Sennheiser Electronic ..... 168**  
**Sound Dynamics, Inc. .... 226**

AKG Acoustics  
 Accurate Sound Co.  
 Altec Sound Products  
 Ampro Broadcasting Inc.  
 Applied Video Electronics, Inc. D 1-9  
 Audio Distributor Inc. D 1-9  
 Bogen Div. Lear Siegler, Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Comprehensive Video Supply Corp. D 1-9  
 Comquip, Inc.  
 dbx, Inc.  
 Dyma Engineering, Inc.  
 Electro-Voice Inc.  
 Fisher-Burke Broadcast Consultants  
 G.C. Electronics  
 Gotham Audio Corp.  
 Harris Corp. Broadcast Products Div.  
 Image Devices Inc.  
 KVC Video Systems Inc. D 1,2  
 Landy Associates Inc. D 1,2  
 Martin Audio/Video D2  
 Mastertone Co., Inc.  
 Media Concepts, Inc. D 1-9  
 Nagra Magnetic Recorders, Inc.  
 Oregon Sound D 9

Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 CCA Electronics Corp.  
 Califone International, Inc.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International Comquip, Inc.  
 dbx, Inc.  
 Dyma Engineering, Inc.  
 Electro-Voice Inc.  
 Fisher-Burke Broadcast Consultants  
 G.C. Electronics  
 Gotham Audio Corp.  
 Harris Corp. Broadcast Products Div.  
 Image Devices Inc.  
 KVC Video Systems Inc. D 1,2  
 Landy Associates Inc. D 1,2  
 Martin Audio/Video D2  
 Mastertone Co., Inc.  
 Maze Corp D6  
 Media Concepts, Inc. D 1-9  
 Oregon Sound D 9  
 Panasonic Video Systems Div.  
 Paso Sound Products Inc.  
 Peirce-Phelps, Inc. D 2, 5  
 Professional Audio Service  
 Pulse Dynamics Mfg. Corp. (PDMC)  
 RCA Broadcast Systems  
 Ryder Magnetic Sales Corp.  
 Sennheiser Electronic  
 Shure Brothers Inc.  
 Sinai-Johnson  
 Singer Products Co., Inc.  
 Sound Dynamics, Inc. D8, 9  
 Sparta --see Cetec Broadcast Group  
 Studer Revox America  
 Superscope, Inc.  
 TEAC Corp of America  
 Tapex Corp.  
 Tele-Measurements, Inc. B-2  
 Telex Communications, Inc.  
 Track Audio, Inc. D 1-9  
 Turner Div. Conrac Corp.  
 United Radio Supply Inc. D9  
 VIF International  
 Val-Tronics, Inc. D1-9  
 Victor Duncan, Inc.  
 Weather Scan, Inc.  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Microphones, Lavalier**

See Adv. Page

**Broadcast Consultants Corp. .... 83**  
**CCA Electronics Corp. .. 99-106**

AKG Acoustics  
 Altec Sound Products  
 Ampro Broadcasting Inc.  
 Bogen Div. Lear Siegler, Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Comprehensive Video Supply Corp. D 1-9  
 Comquip, Inc.  
 dbx, Inc.  
 Dyma Engineering, Inc.  
 Electro-Voice Inc.  
 Fisher-Burke Broadcast Consultants  
 G.C. Electronics  
 Gotham Audio Corp.  
 Harris Corp. Broadcast Products Div.  
 Image Devices Inc.  
 KVC Video Systems Inc. D 1,2  
 Landy Associates Inc. D 1,2  
 Martin Audio/Video D2  
 Mastertone Co., Inc.  
 Media Concepts, Inc. D 1-9  
 Nagra Magnetic Recorders, Inc.  
 Oregon Sound D 9



Paso Sound Products Inc.  
 Peirce-Phelps, Inc. D 2, 5  
 Professional Audio Service  
 RCA Broadcast Systems  
 Ryder Magnetic Sales Corp.  
 Sennheiser Electronic  
 Sescom, Inc.  
 Shure Brothers Inc.  
 Sinai-Johnson  
 Singer Products Co., Inc.  
 Sony Corp. of America VTR Div.  
 Sound Dynamics, Inc. D8, 9  
 Sparta --see Cetec Broadcast Group  
 Studer Revox America  
 Superscope, Inc.  
 Tele-Measurements, Inc. B-2  
 Track Audio, Inc. D 1-9  
 Turner Div. Conrac Corp.  
 United Radio Supply Inc. D9  
 Val-Tronics, Inc. D1-9  
 Victor Duncan, Inc.  
 Weather Scan, Inc.  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Microphones, Parabolic and Shotgun**

See Adv. Page

**Broadcast Consultants Corp.** ..... 83  
**Sennheiser Electronic** ..... 168

AKG Acoustics  
 Audio Distributor Inc. D 1-9  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 Collins Radio Rockwell International Comquip, Inc.  
 Dyma Engineering, Inc.  
 Electro-Voice Inc.  
 Fisher-Burke Broadcast Consultants  
 Image Devices Inc.  
 KVC Video Systems Inc. D 1,2  
 Mastertone Co., Inc.  
 Oregon Sound D 9  
 Peirce-Phelps, Inc. D 2, 5  
 RCA Broadcast Systems  
 Ryder Magnetic Sales Corp.  
 Sennheiser Electronic  
 Superscope, Inc.  
 Track Audio, Inc. D 1-9  
 VIF International  
 Val-Tronics, Inc. D1-9  
 Victor Duncan, Inc.  
 Westlake Audio

**Microphones, Wireless**

See Adv. Page

**Audio Distributor Inc.** ..... 247  
**Sound Dynamics, Inc.** ..... 226  
**Thomson-CSF Laboratories, Inc.** ..... 202  
**Vega** ..... 198

AKG Acoustics  
 Audio Distributor Inc. D 1-9  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 Cetec Broadcast Group  
 Collins Radio Rockwell International Comquip, Inc.  
 Comrex Corp.  
 Dyma Engineering, Inc.  
 Eddor Div. of P.A.C.  
 Electro-Voice Inc.  
 HM Electronics, Inc.  
 Ikegami Electronics (USA) Inc.  
 Image Devices Inc.

KVC Video Systems Inc. D 1,2  
 LPB Inc.  
 Landy Associates Inc. D 1,2  
 Oregon Sound D 9  
 Paso Sound Products Inc.  
 Peirce-Phelps, Inc. D 2, 5  
 Ryder Magnetic Sales Corp.  
 Sennheiser Electronic  
 Sound Dynamics, Inc. D8, 9  
 Sparta --see Cetec Broadcast Group  
 Studer Revox America  
 Television Equipment Associates  
 Telex Communications, Inc.  
 Thomson-CSF Laboratories, Inc.  
 Track Audio, Inc. D 1-9  
 VIF International  
 Val-Tronics, Inc. D1-9  
 Vega Div. of Cetec Corp.  
 Victor Duncan, Inc.  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Microwave Antenna Towers, ENG Van**

See Adv. Page

**VanLadder, Inc.** ..... 204

VanLadder, Inc.

**Microwave Systems, ENG**

See Adv. Page

**All Mobile Video, Inc.** ..... 271  
**Farinon Electric International Microwave Corp.** ..... 266  
**Microwave Assoc. Inc.** ..... 227

All Mobile Video, Inc.  
 Broadcast Communications Devices, Inc. D9  
 dbx, Inc.  
 Dyma Engineering, Inc.  
 Farinon Electric  
 Hughes Microwave Communication Products  
 International Microwave Corp.  
 Landy Associates Inc. D 1,2  
 Microwave Assoc. Inc.  
 Nurad, Inc.  
 Pleasantville Labs  
 Prodelin Inc.  
 RCA Broadcast Systems  
 Tele-Measurements, Inc. B-2  
 TerraCom  
 Val-Tronics, Inc. D1-9  
 Weinschel Engineering Co.

**Microwave Systems, STL**

See Adv. Page

**Moseley Assoc. Inc.** ..... 69  
**Nurad, Inc.** ..... 221

Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Consultants Corp. D5, 6  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Comark Industries Inc.  
 Dyma Engineering, Inc.  
 Farinon Electric  
 GTE Lenkurt, Inc.  
 Harris Corp. Broadcast Products Div.  
 Hughes Microwave Communication Products  
 Ikegami Electronics (USA) Inc.  
 International Microwave Corp.  
 Mastertone Co., Inc.  
 Micro Communications, Inc.  
 Micro Control Associates, Inc.  
 Microwave Assoc. Inc.  
 Moseley Assoc. Inc.  
 Nurad, Inc.  
 QEI Corp.  
 Singer Products Co., Inc.  
 Sparta --see Cetec Broadcast Group  
 Tele-Measurements, Inc. B-2  
 Telonix Altair  
 Tepco Corp.  
 TerraCom  
 Val-Tronics, Inc. D1-9

Varian/Beverly Micro-Link Products  
 Wilkinson Electronics, Inc.

**Mixers --See also Consoles**

See Adv. Page

**Broadcast Component Dist. Communication Medias** ..... 273  
**Broadcast Consultants Corp.** ..... 83,84,86  
**Cetec Audio** ..... 217  
**Collins Radio** ..... 21  
**LPB Inc.** ..... 172  
**M. Palmer & Associates** ..... 260  
**Quantum Audio Labs, Inc.** ..... 276  
**ROH Corporation** ..... 259  
**Russco Electronics Mfg. Inc.** ..... 18  
**Wilkinson Electronics, Inc.** ..... 62

Accurate Sound Co.  
 Altec Sound Products  
 Ampro Broadcasting Inc.  
 Audio Designs & Mfg.  
 Auditronics, Inc.  
 Automated Processes, Inc.  
 BSC Inc.  
 Bogen Div. Lear Siegler, Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Central Dynamics Corp.  
 Cetec Audio  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Collins Television Services  
 Computer Image Video Controllers Dytex Industries, Inc.  
 Custom Audio Electronics  
 Dage-MTI, Inc.  
 Delta Electronics Inc. (N.C.)  
 Dyma Engineering, Inc.  
 Grass Valley Group, Inc.  
 KVC Video Systems Inc. D 1,2  
 LPB Inc.  
 James B. Lansing Sound, Inc.  
 Lauderdale Electronic Labs  
 Martin Audio/Video D2  
 McCurdy Radio Ind. Inc.  
 McMartin Industries, Inc.  
 Media Concepts, Inc. D 1-9  
 Modular Audio Products Unit of Modular Devices, Inc.  
 Charles Moore  
 Nagra Magnetic Recorders, Inc.  
 Rupert Neve, Inc.  
 Oregon Magnetics  
 Oregon Sound D 9  
 Pacific Recorders and Engrg. Corp.  
 M. Palmer & Associates  
 Paso Sound Products Inc.  
 Peirce-Phelps, Inc. D 2, 5  
 Pulse Dynamics Mfg. Corp. (PDMC)  
 Pulse Techniques Inc.  
 Quad-Eight Electronics  
 Quantum Audio Labs, Inc.  
 ROH Corporation  
 Ramko Research Inc.  
 Rek-O-Kut Inc.  
 Richmond Hill Laboratories Ltd.  
 Richmond Sound Design, Ltd.  
 Robins Broadcast & Sound Equip. Corp.  
 Ross Broadcast Products Ltd.  
 Russco Electronics Mfg. Inc.  
 Ryder Magnetic Sales Corp.  
 Shure Brothers Inc.  
 Sinai-Johnson  
 Singer Products Co., Inc.  
 Sono-Mag Corp.  
 Sound Dynamics, Inc. D8, 9  
 Sparta --see Cetec Broadcast Group  
 Spectra Sonics  
 Sphere Electronics

Studer Revox America  
 Superscope, Inc.  
 Switchcraft Inc.  
 TEAC Corp of America  
 Tele-Measurements, Inc. B-2  
 Track Audio, Inc. D 1-9  
 Ultra Audio Pixtec  
 United Radio Supply Inc. D9  
 United Recording Electronics Industries  
 VIF International  
 Viscount Industries Ltd.  
 Ward-Beck Systems, Ltd.  
 Weather Scan, Inc.  
 Weinschel Engineering Co.  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Mobile Communication Vans, TV**

See Adv. Page

**CCA Electronics Corp.** .. 99-106

A. F. Associates, Inc.  
 Atlantic Research Corp.  
 CCA Electronics Corp.  
 Comquip, Inc.  
 Editel Communications  
 International Microwave Corp.  
 KVC Video Systems Inc. D 1,2  
 Marconi Communication Systems Ltd.  
 Microwave Assoc. Inc.  
 Peirce-Phelps, Inc. D 2, 5  
 Tele-Measurements, Inc. B-2  
 TerraCom  
 Ultra Audio Pixtec

**Modulators, TV**

See Adv. Page

**Belar Electronics Lab., Inc.** ..... 264  
**Philips Test & Measuring Instruments, Inc.** ..... 15

Acrodyne Industries Inc.  
 Belar Electronics Lab., Inc.  
 Broadcast Communications Devices, Inc. D9  
 CCA Electronics Corp.  
 Catel Div. United Scientific Corp.  
 Dynair Electronics, Inc.  
 EMCEE Broadcast Products  
 Fung Engineering Inc.  
 Harris Corp. Broadcast Products Div.  
 Javelin Electronics D9  
 KVC Video Systems Inc. D 1,2  
 Lenco Inc. Electronics Div.  
 Marconi Communication Systems Ltd.  
 Media Concepts, Inc. D 1-9  
 Merrill Cable Equipment Corp.  
 Motorola Semiconductor Products, Inc.  
 Peirce-Phelps, Inc. D 2, 5  
 Philips Test & Measuring Instruments, Inc.  
 RCA Community Television Systems  
 Rohde & Schwarz Sales Co.  
 Rolane Sales Corp.  
 Roscor Corp. D3, 4  
 Scientific-Atlanta, Inc.  
 Tele-Measurements, Inc. B-2  
 Telemet a Geotel Co.  
 Video Components, Inc.

**Monitor Controls, Remote**

See Adv. Page

**Gorman-Redlich Mfg. Co.** ..... 262  
**Image Magnification, Inc.** ..... 206  
**Unimedia Corp.** ..... 89

Gorman Relich Mfg. Co.  
 Image Magnification, Inc.  
 Unimedia Corp.

**Monitors, AM System**

See Adv. Page

**Belar Electronics Lab., Inc.** ..... 264

**Broadcast Component  
Dist. Communication  
Medias .....273  
ROH Corporation .....259**

Belar Electronics Lab., Inc.  
Broadcast Automation Assoc. D  
1,2,5,6  
Broadcast Communications Devices,  
Inc. D9  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Equipment & Supply Co. D  
1-9  
Broadcast Specialties  
CCA Electronics Corp.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Eidson Electronic Co.  
Gorman Relich Mfg. Co.  
Harris Corp. Broadcast Products Div.  
Lampkin Lab. Inc.  
Mastertone Co., Inc.  
Maze Corp D6  
McKay Dymek Co.  
McMartin Industries, Inc.  
National Electrolab Ltd.  
North American Radio Corp.  
QEI Corp.  
RCA Broadcast Systems  
ROH Corporation  
Singer Products Co., Inc.  
Sono-Mag Corp.  
Sparta --see Cetec Broadcast Group  
Telemet a Geotel Co.  
Time & Frequency Tech., Inc.  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9

**Monitors, FM System**

See Adv. Page

**Belar Electronics Lab.,  
Inc. ....264  
Broadcast Component  
Dist. Communication  
Medias .....273  
CCA Electronics Corp. .. 99-106  
ROH Corporation .....259**

Belar Electronics Lab., Inc.  
Broadcast Automation Assoc. D  
1,2,5,6  
Broadcast Communications Devices,  
Inc. D9  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Equipment & Supply Co. D  
1-9  
Broadcast Specialties  
CCA Electronics Corp.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Eidson Electronic Co.  
Fix Tune Solid State Electronics, Inc.  
Harris Corp. Broadcast Products Div.  
Lampkin Lab. Inc.  
Mastertone Co., Inc.  
Maze Corp D6  
McMartin Industries, Inc.  
North American Radio Corp.  
QEI Corp.  
RCA Broadcast Systems  
ROH Corporation  
Singer Products Co., Inc.  
Sono-Mag Corp.  
Sparta --see Cetec Broadcast Group  
Studer Revox America  
Time & Frequency Tech., Inc.  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9

**Monitors, FM System SCA**

See Adv. Page

**Belar Electronics Lab.,  
Inc. ....264**  
Belar Electronics Lab., Inc.  
Broadcast Automation Assoc. D  
1,2,5,6

Broadcast Communications Devices,  
Inc. D9  
Broadcast Consultants Corp. D5, 6  
CCA Electronics Corp.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Fix Tune Solid State Electronics, Inc.  
Harris Corp. Broadcast Products Div.  
Mastertone Co., Inc.  
Maze Corp D6  
McMartin Industries, Inc.  
RCA Broadcast Systems  
Singer Products Co., Inc.  
Sparta --see Cetec Broadcast Group  
Time & Frequency Tech., Inc.  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9

**Monitors, Antenna Base Current**

See Adv. Page

**Delta Electronics Inc.  
(Va.) .....183  
Potomac Instruments,  
Inc. ....251**

Collins Radio Rockwell International  
Delta Electronics Inc. (Va.)  
Gorman Relich Mfg. Co.  
Potomac Instruments, Inc.  
Val-Tronics, Inc. D1-9

**Monitors, Antenna Sampling**

See Adv. Page

**Delta Electronics Inc.  
(Va.) .....183  
Gorman-Redlich Mfg.  
Co. ....262  
Potomac Instruments,  
Inc. ....251**

Broadcast Specialties  
CCA Electronics Corp.  
Collins Radio Rockwell International  
Delta Electronics Inc. (Va.)  
Dyma Engineering, Inc.  
Fisher-Burke Broadcast Consultants  
Gorman Relich Mfg. Co.  
Harris Corp. Broadcast Products Div.  
Potomac Instruments, Inc.  
Val-Tronics, Inc. D1-9  
Wide Band Engineering Co., Inc.

**Monitors, Directional Antenna**

See Adv. Page

**Gorman-Redlich Mfg.  
Co. ....262**

Broadcast Consultants Corp. D5, 6  
Broadcast Specialties  
Collins Radio Rockwell International  
Comark Industries Inc.  
Delta Electronics Inc. (Va.)  
Dyma Engineering, Inc.  
Fisher-Burke Broadcast Consultants  
Gorman Relich Mfg. Co.  
Harris Corp. Broadcast Products Div.  
Micro Communications, Inc.  
Potomac Instruments, Inc.  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9

**Monitors, Frequency**

See Adv. Page

**Belar Electronics Lab.,  
Inc. ....264  
Elcom Engineering Co. ....275**

Belar Electronics Lab., Inc.  
Broadcast Automation Assoc. D  
1,2,5,6  
Broadcast Consultants Corp. D5, 6  
Broadcast Equipment & Supply Co. D  
1-9  
Broadcast Specialties  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Eidson Electronic Co.

Elcom Engineering Co.  
Harris Corp. Broadcast Products Div.  
Heath Co.  
Lampkin Lab. Inc.  
Mastertone Co., Inc.  
McMartin Industries, Inc.  
RCA Broadcast Systems  
Singer Instrumentation  
Sparta --see Cetec Broadcast Group  
Time & Frequency Tech., Inc.  
Track Audio, Inc. D 1-9  
Wilkinson Electronics, Inc.

**Monitors, Modulation**

See Adv. Page

**Belar Electronics Lab.,  
Inc. ....264  
Wilkinson Electronics,  
Inc. ....62**

Belar Electronics Lab., Inc.  
Broadcast Automation Assoc. D  
1,2,5,6  
Broadcast Communications Devices,  
Inc. D9  
Broadcast Consultants Corp. D5, 6  
Broadcast Equipment & Supply Co. D  
1-9  
Broadcast Specialties  
CCA Electronics Corp.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Fisher-Burke Broadcast Consultants  
Harris Corp. Broadcast Products Div.  
Lampkin Lab. Inc.  
Marconi Instruments  
Mastertone Co., Inc.  
Maze Corp D6  
McMartin Industries, Inc.  
QEI Corp.  
RCA Broadcast Systems  
Singer Products Co., Inc.  
Sparta --see Cetec Broadcast Group  
Time & Frequency Tech., Inc.  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

**Monitors, Phase**

See Adv. Page

**Belar Electronics Lab.,  
Inc. ....264  
CCA Electronics Corp. .. 99-106**

Belar Electronics Lab., Inc.  
Broadcast Specialties  
CCA Electronics Corp.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Delta Electronics Inc. (Va.)  
Dranetz Engineering Labs., Inc.  
Dyma Engineering, Inc.  
Fisher-Burke Broadcast Consultants  
Gorman Relich Mfg. Co.  
Harris Corp. Broadcast Products Div.  
Mastertone Co., Inc.  
North American Radio Corp.  
Potomac Instruments, Inc.  
Sparta --see Cetec Broadcast Group  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9

**Monitors, Power**

See Adv. Page

**Belar Electronics Lab.,  
Inc. ....264  
Moseley Assoc. Inc. ....69**

B & I Electronics, Inc.  
Belar Electronics Lab., Inc.  
Bird Electronic Corp.  
Cetec Broadcast Group  
Coaxial Dynamics  
Delta Electronics Inc. (Va.)  
Dranetz Engineering Labs., Inc.  
Dyma Engineering, Inc.  
Fisher-Burke Broadcast Consultants  
Harris Corp. Broadcast Products Div.  
Harris Corp. PRD Electronics Div.  
Holland Electronics

Maze Corp D6  
Moseley Assoc. Inc.  
Sparta --see Cetec Broadcast Group  
Wide Band Engineering Co., Inc.

**Monitors, Program Audio**

See Adv. Page

**Belar Electronics Lab.,  
Inc. ....264  
ROH Corporation .....259**

Altec Sound Products  
Amber Electro Design, Ltd.  
Audio Designs & Mfg.  
Audio Distributor Inc. D 1-9  
Autogram Corp.  
Automated Processes, Inc.  
B & I Electronics, Inc.  
Belar Electronics Lab., Inc.  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Equipment Distributors  
Communication Medias  
Cetec Broadcast Group  
Collins Television Services  
Comrex Corp.  
Crown International, Inc.  
Digi-Tech  
Di-Tech Inc.  
Dyma Engineering, Inc.  
Electro-Voice Inc.  
Gotham Audio Corp.  
Harris Corp. Broadcast Products Div.  
James B. Lansing Sound, Inc.  
Marconi Communication Systems Ltd.  
Marti Electronics  
Maze Corp D6  
Modular Audio Products Unit of  
Modular Devices, Inc.  
Rupert Neve, Inc.  
The Orange County Electronics Corp.  
Ltd.  
ROH Corporation  
Robins Broadcast & Sound Equip.  
Corp.  
Scientific Systems, Inc.  
Sennheiser Electronic  
Sparta --see Cetec Broadcast Group  
Studer Revox America  
Telemet a Geotel Co.  
Television and Computer Corp.  
Track Audio, Inc. D 1-9  
The Widget Works, Inc.

**Monitors, RF Level**

See Adv. Page

**Belar Electronics Lab.,  
Inc. ....264  
Sound Dynamics, Inc. ....226**

B & I Electronics, Inc.  
Belar Electronics Lab., Inc.  
Bird Electronic Corp.  
Coaxial Dynamics  
Electro Impulse, Inc.  
Fisher-Burke Broadcast Consultants  
Harris Corp. Broadcast Products Div.  
North American Radio Corp.  
Sound Dynamics, Inc. D8, 9  
Tektronix Inc.  
Vitek Electronics Inc.  
Wide Band Engineering Co., Inc.  
The Widget Works, Inc.

**Monitors, Set-up and Matching  
Equipment**

B & I Electronics, Inc.  
Power-Optics Inc.

**Monitors, Stereo**

See Adv. Page

**Belar Electronics Lab.,  
Inc. ....264  
Broadcast Component  
Dist. Communication  
Medias .....273**

Belar Electronics Lab., Inc.  
Broadcast Component Dist.  
Communication Medias D 1-9



Broadcast Consultants Corp. D5, 6  
 Broadcast Specialties  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Dyma Engineering, Inc.  
 Harris Corp. Broadcast Products Div.  
 Mastertone Co., Inc.  
 Maze Corp D6  
 McMartin Industries, Inc.  
 Modular Audio Products Unit of  
 Modular Devices, Inc.  
 QEI Corp.  
 Sono-Mag Corp.  
 Sparta --see Cetec Broadcast Group  
 Time & Frequency Tech., Inc.  
 Track Audio, Inc. D 1-9  
 Val-Tronics, Inc. D1-9  
 Wilkinson Electronics, Inc.

**Monitors, TV System**

See Adv. Page

**Belar Electronics Lab., Inc.**.....264  
**Gould, Inc.** ..... 44

Belar Electronics Lab., Inc.  
 Broadcast Communications Devices, Inc. D9  
 Cohu, Inc. Electronics Div.  
 dbx, Inc.  
 Dyma Engineering, Inc.  
 Electrohome Ltd.  
 General Electric Co. ISO Div.  
 Gould, Inc. Control & Systems Div.  
 Javelin Electronics D9  
 KVC Video Systems Inc. D 1,2  
 Landy Associates Inc. D 1,2  
 Marconi Communication Systems Ltd.  
 Marconi Instruments  
 Peirce-Phelps, Inc. D 2, 5  
 Tektronix Inc.  
 Tele-Measurements, Inc. B-2  
 Track Audio, Inc. D 1-9  
 World Video Inc.

**Monitors, Video B&W**

See Adv. Page

**C.R.V. Systems, Inc.** .....274  
**Electrohome Ltd.**..... 40  
**Gould, Inc.** ..... 44  
**Industrial Sciences** .....250  
**Temtron Electronics** .....273  
**Unimedia Corp.** ..... 89

Amtron Corp.  
 Asaca Corp. of America  
 Ball Bros. Research Corp. Electronic Display Div.  
 Beta Technology, Inc.  
 Broadcast Communications Devices, Inc. D9  
 C.R.V. Systems, Inc.  
 Cohu, Inc. Electronics Div.  
 Comquip, Inc.  
 Conrac Div. Conrac Corp.  
 dbx, Inc.  
 Dyma Engineering, Inc.  
 Editel Communications  
 Electrohome Ltd.  
 Fernseh Group Robert Bosch Corp.  
 GBC Closed Circuit TV Corp.  
 General Electric Co. ISO Div.  
 Gould, Inc. Control & Systems Div.  
 Harris Corp. Broadcast Products Div.  
 Hitachi Denshi America, Ltd.  
 Ikegami Electronics (USA) Inc.  
 Industrial Sciences  
 Javelin Electronics D9  
 KVC Video Systems Inc. D 1,2  
 Kallman Associates, Inc.  
 Landy Associates Inc. D 1,2  
 Media Concepts, Inc. D 1-9  
 Panasonic Video Systems Div.  
 Peirce-Phelps, Inc. D 2, 5  
 RCA Broadcast Systems  
 RCA Electro Optics and Devices  
 Rohde & Schwarz Sales Co.  
 Roscor Corp. D3, 4  
 SC Electronics, Inc.  
 Sony Corp. of America VTR Div.  
 Tektronix Inc.  
 Tele-Measurements, Inc. B-2  
 Telescript, Inc.

Temtron Electronics D 1-9  
 Unimedia Corp.  
 Video Aids Corp. of Colorado  
 Videodetics Corp.  
 Weather Scan, Inc.

**Monitors, Video Color**

See Adv. Page

**Amtron Corp.**.....257  
**CCA Electronics Corp.** .. 99-106  
**C.R.V. Systems, Inc.**.....274  
**Electrohome Ltd.**..... 40  
**Gould, Inc.** ..... 44  
**Image Magnification, Inc.**.....206  
**Pleasantville Labs** .....186  
**Unimedia Corp.** ..... 89  
**World Video Inc.** .....272

Amtron Corp.  
 Asaca Corp. of America  
 Ball Bros. Research Corp. Electronic Display Div.  
 Beta Technology, Inc.  
 Broadcast Communications Devices, Inc. D9  
 CCA Electronics Corp.  
 C.R.V. Systems, Inc.  
 Cohu, Inc. Electronics Div.  
 Commercial Electronics, Inc.  
 Comquip, Inc.  
 Conrac Div. Conrac Corp.  
 Dyma Engineering, Inc.  
 Editel Communications  
 Electrohome Ltd.  
 Fernseh Group Robert Bosch Corp.  
 GBC Closed Circuit TV Corp.  
 General Electric Co. ISO Div.  
 Gould, Inc. Control & Systems Div.  
 Harris Corp. Broadcast Products Div.  
 Hitachi Denshi America, Ltd.  
 Ikegami Electronics (USA) Inc.  
 Image Magnification, Inc.  
 KVC Video Systems Inc. D 1,2  
 Kallman Associates, Inc.  
 Landy Associates Inc. D 1,2  
 Media Concepts, Inc. D 1-9  
 Panasonic Video Systems Div.  
 Peirce-Phelps, Inc. D 2, 5  
 Pleasantville Labs  
 RCA Broadcast Systems  
 Rohde & Schwarz Sales Co.  
 Roscor Corp. D3, 4  
 SC Electronics, Inc.  
 Sony Corp. of America VTR Div.  
 Tektronix Inc.  
 Tele-Measurements, Inc. B-2  
 Unimedia Corp.  
 Video Aids Corp. of Colorado  
 Videodetics Corp.  
 Videotek, Inc.  
 Weather Scan, Inc.  
 World Video Inc.

**Monitors, Video Pulse Cross**

See Adv. Page

**Unimedia Corp.** ..... 89

Amtron Corp.  
 Broadcast Communications Devices, Inc. D9  
 Dyma Engineering, Inc.  
 Electrohome Ltd.  
 KVC Video Systems Inc. D 1,2  
 Panasonic Video Systems Div.  
 Peirce-Phelps, Inc. D 2, 5  
 Tektronix Inc.  
 Tele-Measurements, Inc. B-2  
 Ultra Audio Pixtec  
 Unimedia Corp.  
 Video Aids Corp. of Colorado  
 World Video Inc.

**Monitors, Waveform**

Broadcast Communications Devices, Inc. D9  
 Colorado Video Inc.  
 Dyma Engineering, Inc.  
 Harris Corp. Broadcast Products Div.  
 Ikegami Electronics (USA) Inc.  
 KVC Video Systems Inc. D 1,2  
 Landy Associates Inc. D 1,2

Marconi Communication Systems Ltd.  
 Rohde & Schwarz Sales Co.  
 Tektronix Inc.  
 Tele-Measurements, Inc. B-2  
 Ultra Audio Pixtec  
 Weather Scan, Inc.

**Multicarrier Systems, FM**

See Adv. Page

**Moseley Assoc. Inc.** ..... 69

Coastcom  
 GTE Lenkurt, Inc.  
 Moseley Assoc. Inc.  
 Tele-Measurements, Inc. B-2

**Multiplexers**

Alford Mfg. Co.  
 Buhl Optical Co.  
 Cetec Broadcast Group  
 Coastcom  
 Cohu, Inc. Electronics Div.  
 Collins Radio Rockwell International  
 Comark Industries Inc.  
 Comquip, Inc.  
 Dielectric Communications Div. Sola Basic, Inc.  
 GTE Lenkurt, Inc.  
 Jampro --see Cetec Broadcast Group  
 KVC Video Systems Inc. D 1,2  
 Kajart Victor Corp.  
 Laird Telemedia Inc.  
 Micro Communications, Inc.  
 Moseley Assoc. Inc.  
 Motorola Semiconductor Products, Inc.  
 Pacific Recorders and Engrg. Corp.  
 RCA Broadcast Systems  
 Jos. Schneider & Co. P.O. Box 947  
 Shively Laboratories, Inc.  
 TT Electronics, Inc.  
 Tektronix Inc.  
 TeleMation, Inc.  
 Tele-Measurements, Inc. B-2  
 Video Components, Inc.  
 Weather Scan, Inc.  
 The Zei-Mark Corp.

**Narrow Band FM Equipment**

See Adv. Page

**Moseley Assoc. Inc.** ..... 69

CSI Electronics, Inc.  
 Coastcom  
 Dielectric Communications Div. Sola Basic, Inc.  
 McMartin Industries, Inc.  
 Moseley Assoc. Inc.  
 Pacific Recorders and Engrg. Corp.  
 Singer Products Co., Inc.

**Network Joiners**

Automation Electronics, Inc.  
 Broadcast Consultants Corp. D5, 6  
 Cetec Broadcast Group  
 ESE  
 IGM Div. of Northwestern Tech.  
 Schafer --see Cetec Broadcast Group

**Networks, Matching Audio**

Altec Sound Products  
 Collins Radio Rockwell International  
 Dyma Engineering, Inc.  
 Fisher-Burke Broadcast Consultants  
 Charles Moore  
 The Orange County Electronics Corp. Ltd.  
 Quad-Eight Electronics  
 Robins Broadcast & Sound Equip. Corp.  
 TT Electronics, Inc.  
 Tech Laboratories Inc.

**Networks, Matching RF**

Alford Mfg. Co.  
 CSI Electronics, Inc.  
 C. S. P. Inc.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Comark Industries Inc.

Continental Electronics Mfg. Co.  
 Dielectric Communications Div. Sola Basic, Inc.  
 Dyma Engineering, Inc.  
 ESC Electronics Corp.  
 Edison Electronics Div.  
 Electro Impulse, Inc.  
 Fisher-Burke Broadcast Consultants  
 Micro Communications, Inc.  
 Multronics, Inc.  
 North American Radio Corp.  
 North Hills Electronics, Inc.  
 Pacific Recorders and Engrg. Corp.  
 Sparta --see Cetec Broadcast Group  
 TT Electronics, Inc.  
 Wide Band Engineering Co., Inc.

**Networks, Mixing**

Dielectric Communications Div. Sola Basic, Inc.  
 Dyma Engineering, Inc.  
 The Orange County Electronics Corp. Ltd.  
 Pacific Recorders and Engrg. Corp.  
 Quad-Eight Electronics  
 ROH Corporation  
 Robins Broadcast & Sound Equip. Corp.  
 Tech Laboratories Inc.

**Networks, Phasing --See also Phasing Units**

See Adv. Page

**Geleco Electronics Ltd.**.....277

AEL, Inc.  
 Alford Mfg. Co.  
 A-Tel-A-Matic  
 CSI Electronics, Inc.  
 C. S. P. Inc.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Comark Industries Inc.  
 Continental Electronics Mfg. Co.  
 Dielectric Communications Div. Sola Basic, Inc.  
 Dyma Engineering, Inc.  
 Fisher-Burke Broadcast Consultants  
 Geleco Electronics Ltd.  
 Jampro --see Cetec Broadcast Group  
 Kahn Communications, Inc.  
 Multronics, Inc.  
 North American Radio Corp.  
 Pacific Recorders and Engrg. Corp.  
 SIntronic Corp.  
 TT Electronics, Inc.

**Noise Reduction Systems**

See Adv. Page

**Broadcast Component Dist. Communication Medias**.....273  
**CCA Electronics Corp.** .. 99-106  
**Sound Dynamics, Inc.** .....226

Accurate Sound Co.  
 Allied Broadcast Equip. D 1-9  
 Audio Designs & Mfg.  
 BSC Inc.  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 CCA Electronics Corp.  
 Collins Radio Rockwell International  
 Dolby Laboratories, Inc.  
 Dyma Engineering, Inc.  
 Gotham Audio Corp.  
 Heath Co.  
 Inovonics  
 Kahn Communications, Inc.  
 Landy Associates Inc. D 1,2  
 Lauderdale Electronic Labs  
 Microtime, Inc.  
 Oregon Sound D 9  
 Sound Dynamics, Inc. D8, 9  
 Track Audio, Inc. D 1-9  
 Val-Tronics, Inc. D1-9  
 Westlake Audio

## Oscillator Transformers

Nortronics Co., Inc.  
TT Electronics, Inc.

## Oscillators, AM

See Adv. Page

**Frequency Devices Inc. .... 273**  
**Opamp Labs, Inc. .... 277**

Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Engineering Associates  
John Fluke Mfg. Co., Inc.  
Frequency Devices Inc.  
Heath Co.  
International Microwave Corp.  
Lampkin Lab. Inc.  
Leader Instruments Corp.  
Marconi Instruments  
Microwave Assoc. Inc.  
Opamp Labs, Inc.  
Philips Test & Measuring Instruments, Inc.  
Rohde & Schwarz Sales Co.  
Singer Products Co., Inc.  
Val-Tronics, Inc. D1-9

## Oscillators, FM

See Adv. Page

**Frequency Devices Inc. .... 273**

Collins Radio Rockwell International  
John Fluke Mfg. Co., Inc.  
Frequency Devices Inc.  
Heath Co.  
Kay Elemetrics Corp.  
Marconi Instruments  
Microwave Assoc. Inc.  
Rohde & Schwarz Sales Co.  
Singer Products Co., Inc.

## Oscillators, Tone

See Adv. Page

**Di-Tech Inc. .... 263**  
**Frequency Devices Inc. .... 222**  
**Robins Broadcast & Sound Equip. Corp. .... 38**

Broadcast Communications Devices, Inc. D9  
Di-Tech Inc.  
Dyma Engineering, Inc.  
Frequency Devices Inc.  
Gorman Relich Mfg. Co.  
IGM Div. of Northwestern Tech.  
Microwave Assoc. Inc.  
Modular Audio Products Unit of Modular Devices, Inc.  
Monroe Electronics, Inc.  
Rupert Neve, Inc.  
Opamp Labs, Inc.  
Pulse Dynamics Mfg. Corp. (PDMC)  
Quad-Eight Electronics  
Rivers Associates, Inc.  
Robins Broadcast & Sound Equip. Corp.  
Spectra Sonics  
Sphere Electronics  
TM Systems, Inc.  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9

## Oscillators, TV

ATV Research  
Asaca Corp. of America  
Heath Co.  
Kay Elemetrics Corp.  
Landy Associates Inc. D 1,2  
Lectrotech Inc.  
Leitch Video Ltd.  
Marconi Instruments  
Microwave Assoc. Inc.  
Rohde & Schwarz Sales Co.  
Tektronix Inc.

## Oscilloscope Cameras

Comquip, Inc.  
Harris Corp. Broadcast Products Div.

Lenzar Optics Corp.  
Philips Test & Measuring Instruments, Inc.  
Tektronix Inc.

## Oscilloscope Vector Displays

Alford Mfg. Co.  
B & K Precision Dynascan Corp.  
Beston Electronics Inc.  
Broadcast Communications Devices, Inc. D9  
Comprehensive Video Supply Corp. D 1-9  
dbx, Inc.  
Dyma Engineering, Inc.  
Harris Corp. Broadcast Products Div.  
Heath Co.  
Landy Associates Inc. D 1,2  
Leader Instruments Corp.  
Lectrotech Inc.  
Sencore Inc.  
Technics by Panasonic  
Tektronix Inc.  
Ultra Audio Pixtec

## Oscilloscopes, Dual Trace

See Adv. Page

**Philips Test & Measuring Instruments, Inc. .... 15**

B & K Precision Dynascan Corp.  
Broadcast Communications Devices, Inc. D9  
Collins Radio Rockwell International  
Comquip, Inc.  
dbx, Inc.  
Dyma Engineering, Inc.  
Harris Corp. Broadcast Products Div.  
Heath Co.  
Hickok Elect. Instrument  
Hitachi Denshi America, Ltd.  
Landy Associates Inc. D 1,2  
Lauderdale Electronic Labs  
Leader Instruments Corp.  
Lectrotech Inc.  
Philips Test & Measuring Instruments, Inc.  
SPI-ITT Metrix Instruments Div.  
Sencore Inc.  
Sinai-Johnson  
Tektronix Inc.  
Telonic Altair  
Texscan Corp.  
Vu-Data Corp.

## Oscilloscopes, Rack Type

See Adv. Page

**Philips Test & Measuring Instruments, Inc. .... 15**

Aiken Industries Inc.  
Broadcast Communications Devices, Inc. D9  
Dyma Engineering, Inc.  
Harris Corp. Broadcast Products Div.  
Hickok Elect. Instrument  
Landy Associates Inc. D 1,2  
Lauderdale Electronic Labs  
Leader Instruments Corp.  
Philips Test & Measuring Instruments, Inc.  
Tektronix Inc.  
Vu-Data Corp.

## Oscilloscopes, Triggered Sweep

See Adv. Page

**Philips Test & Measuring Instruments, Inc. .... 15**

B & K Precision Dynascan Corp.  
Broadcast Communications Devices, Inc. D9  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Harris Corp. Broadcast Products Div.  
Heath Co.  
Hickok Elect. Instrument

Lauderdale Electronic Labs  
Leader Instruments Corp.  
Lectrotech Inc.  
Philips Test & Measuring Instruments, Inc.  
SPI-ITT Metrix Instruments Div.  
Sencore Inc.  
Sinai-Johnson  
Tektronix Inc.  
United Radio Supply Inc. D9  
Vu-Data Corp.

## Oscilloscopes, Wideband

See Adv. Page

**Philips Test & Measuring Instruments, Inc. .... 15**

Broadcast Communications Devices, Inc. D9  
Dyma Engineering, Inc.  
Harris Corp. Broadcast Products Div.  
Heath Co.  
Hickok Elect. Instrument  
Lectrotech Inc.  
Philips Test & Measuring Instruments, Inc.  
SPI-ITT Metrix Instruments Div.  
Sencore Inc.  
Sinai-Johnson  
Tektronix Inc.  
Vu-Data Corp.

## Oscilloscopes with Plug-ins

See Adv. Page

**Philips Test & Measuring Instruments, Inc. .... 15**

Comquip, Inc.  
Philips Test & Measuring Instruments, Inc.  
SPI-ITT Metrix Instruments Div.  
Tektronix Inc.

## Parts and Components, Electronic Equipment

See Adv. Page

**Geleco Electronics Ltd. .... 277**

Geleco Electronics Ltd.

## Patch Panels

See Adv. Page

**Dynatech Data Systems. .... 192**  
**Sound Dynamics, Inc. .... 226**

Audio Accessories Inc.  
Audio Designs & Mfg.  
Auditronics, Inc.  
Berkey-Colortran Inc.  
Broadcast Consultants Corp. D5, 6  
Broadcast Equipment & Supply Co. D 1-9  
Collins Radio Rockwell International  
Comark Industries Inc.  
Cooke Engineering Co. See Dynatech Data Systems  
Dielectric Communications Div. Sola Basic, Inc.  
Dyma Engineering, Inc.  
Dynatech Data Systems  
Gientronix Ltd. D 1-9  
Harris Corp. Broadcast Products Div.  
KVC Video Systems Inc. D 1,2  
LPB Inc.  
Lumitrol, Ltd.  
Micro Communications, Inc.  
Pacific Recorders and Engr. Corp.  
Peirce-Phelps, Inc. D 2, 5  
Phelps Dodge Communications Co.  
Potomac Instruments, Inc.  
Prodelin Inc.  
Quad-Eight Electronics  
Rex Rheostat & Co., Inc.  
Shively Laboratories, Inc.  
Sound Dynamics, Inc. D8, 9  
Strand Century, Inc.  
Switchcraft Inc.

TEAC Corp of America  
Trompeter Electronics  
Unlon Connector Co., Inc.  
Val-Tronics, Inc. D1-9

## Phase Converters, Single to Three Phase

See Adv. Page

**Kay Industries, Inc. .... 220**

Aiken Industries Inc.  
Dyma Engineering, Inc.  
Kay Industries, Inc.  
Val-Tronics, Inc. D1-9

## Phase Enhancers, Stereo

Broadcast Automation Assoc. D 1,2,5,6  
Dyma Engineering, Inc.  
EDCO Products, Inc.  
Rapid-Q, Edco Products, Inc.  
Sound Dynamics, Inc. D8, 9

## Phasing Units -- See also Networks, Phasing

See Adv. Page

**Geleco Electronics Ltd. .... 277**

Alford Mfg. Co.  
A-Tel-A-Matic  
CSI Electronics, Inc.  
C. S. P. Inc.  
Collins Radio Rockwell International  
Comark Industries Inc.  
Continental Electronics Mfg. Co.  
Dielectric Communications Div. Sola Basic, Inc.  
Dyma Engineering, Inc.  
Eventide Clock Works Inc.  
Fisher-Burke Broadcast Consultants  
Geleco Electronics Ltd.  
Harris Corp. Broadcast Products Div.  
Kahn Communications, Inc.  
Multronics, Inc.  
North American Radio Corp.  
Pacific Recorders and Engr. Corp.  
Sintronic Corp.  
TT Electronics, Inc.  
Wilkinson Electronics, Inc.

## Plans, Broadcast Equipment Construction

Don Britton Enterprises  
Broadcast Consultants Corp. D5, 6  
Broadcast Specialties  
Dyma Engineering, Inc.  
Charles Moore  
Tele-Measurements, Inc. B-2  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9

## Pointers, Video Screen

See Adv. Page

**Shintron Co. Inc. .... 93**

Shintron Co. Inc.

## Power Supplies, AC

See Adv. Page

**Kay Industries, Inc. .... 220**  
**Opamp Labs, Inc. .... 277**  
**Robins Broadcast & Sound Equip. Corp. .... 38**  
**Russco Electronics Mfg. Inc. .... 18**

AEL, Inc.  
Aiken Industries Inc.  
Altec Sound Products  
A-Tel-A-Matic  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Delta Electronics Inc. (N.C.)  
Dyma Engineering, Inc.  
Engineering Associates  
The Finney Co.  
John Fluke Mfg. Co., Inc.



G.C. Electronics  
 General Electric Co. Tubes/MW  
 Devices  
 Heath Co.  
 KVC Video Systems Inc. D 1,2  
 Kay Industries, Inc.  
 Merill Cable Equipment Corp.  
 Motorola Semiconductor Products, Inc.  
 Nagra Magnetic Recorders, Inc.  
 Opamp Labs, Inc.  
 Philips Test & Measuring Instruments,  
 Inc.  
 Quad-Eight Electronics  
 Robins Broadcast & Sound Equip.  
 Corp.  
 Russco Electronics Mfg. Inc.  
 Sencore Inc.  
 Tektronix Inc.  
 Tele-Measurements, Inc. B-2  
 Wilmore Electronics Co., Inc.

**Power Supplies, Precision**

See Adv. Page

**Opamp Labs, Inc. .... 277**  
**Robins Broadcast &  
 Sound Equip. Corp. .... 38**

Aiken Industries Inc.  
 Altec Sound Products  
 A-Tel-A-Matic  
 B & K Precision Dynascan Corp.  
 Boston Sound & Power Systems  
 Collins Radio Rockwell International  
 Engineering Associates  
 Frequency Devices Inc.  
 G.C. Electronics  
 Harris Corp. PRD Electronics Div.  
 Heath Co.  
 Lectrotech Inc.  
 Modular Audio Products Unit of  
 Modular Devices, Inc.  
 North Hills Electronics, Inc.  
 Opamp Labs, Inc.  
 Philips Test & Measuring Instruments,  
 Inc.  
 Robins Broadcast & Sound Equip.  
 Corp.  
 Spectra Sonics  
 Tektronix Inc.  
 Tele-Measurements, Inc. B-2  
 Track Audio, Inc. D 1-9  
 Ward-Beck Systems, Ltd.

**Power Supplies, Standby**

See Adv. Page

**Kay Industries, Inc. .... 220**  
**Robins Broadcast &  
 Sound Equip. Corp. .... 38**

Dyma Engineering, Inc.  
 Kay Industries, Inc.  
 Robins Broadcast & Sound Equip.  
 Corp.  
 Tech Laboratories Inc.  
 Tele-Measurements, Inc. B-2  
 Wilmore Electronics Co., Inc.

**Preamplifiers, Audio**

See Adv. Page

**Kaitronics Corp. .... 211**  
**Robins Broadcast &  
 Sound Equip. Corp. .... 38**  
**Telex Communications,  
 Inc. .... 8**

Accurate Sound Co.  
 Altec Sound Products  
 American Data Div. Philips Broadcast  
 Equip. Corp.  
 Ampro Broadcasting Inc.  
 Audio Designs & Mfg.  
 Autogram Corp.  
 Automated Processes, Inc.  
 BGW Systems Inc.  
 Bell P/A Prod. Corp.  
 Bogen Div. Lear Siegler, Inc.  
 Boston Sound & Power Systems  
 Broadcast Communications Devices,  
 Inc. D9  
 Broadcast Component Dist.  
 Communication Medias D 1-9

Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors  
 Communication Medias  
 Broadcast Equipment & Supply Co. D  
 1-9  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Collins Television Services  
 Comquip, Inc.  
 Crown International, Inc.  
 Delta Electronics Inc. (N.C.)  
 Dyma Engineering, Inc.  
 Dynair Electronics, Inc.  
 Elcom Engineering Co.  
 Electro Sound, Inc.  
 G.C. Electronics  
 Harris Corp. Broadcast Products Div.  
 Heath Co.  
 Holland Electronics  
 International Communications &  
 Control Corp.  
 International Nuclear Corp.  
 Kaitronics Corp.  
 LPB Inc.

James B. Lansing Sound, Inc.  
 Mastertone Co., Inc.  
 Maze Corp D6  
 McCurdy Radio Ind. Inc.  
 McMartin Industries, Inc.  
 Micro-Trak Corp.  
 Modular Audio Products Unit of  
 Modular Devices, Inc.  
 Charles Moore  
 Motorola Semiconductor Products, Inc.  
 Nagra Magnetic Recorders, Inc.  
 Rupert Neve, Inc.  
 Opamp Labs, Inc.  
 The Orange County Electronics Corp.  
 Ltd.

Paso Sound Products Inc.  
 Precision Elect. Inc.  
 Pulse Dynamics Mfg. Corp. (PDMC)  
 QRK Electronic Products  
 Quad-Eight Electronics  
 RCA Broadcast Systems  
 ROH Corporation  
 RTS Systems  
 Ram Audio Systems, Inc.  
 Ramko Research Inc.  
 Richmond Sound Design, Ltd.  
 Robins Broadcast & Sound Equip.  
 Corp.

Russco Electronics Mfg. Inc.  
 Scientific Systems, Inc.  
 Sescom, Inc.  
 Shure Brothers Inc.  
 Sinar-Johnson  
 Sono-Mag Corp.  
 Sound Dynamics, Inc. D8, 9  
 Sparta --see Cetec Broadcast Group  
 Spectra Sonics  
 Sphere Electronics  
 Stanton Magnetics Inc.  
 Studer Revox America  
 Superscope, Inc.  
 TEAC Corp of America  
 Tape-Athon Corp.  
 Tele-Measurements, Inc. B-2  
 Television and Computer Corp.  
 Telex Communications, Inc.  
 Track Audio, Inc. D 1-9  
 Triple I Inc. The Economy Co.  
 Tri-Tronics Professional Electronics  
 United Recording Electronics  
 Industries  
 VIF International  
 Val-Tronics, Inc. D1-9  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Preamplifiers, Limiter-  
 Compressor**

See Adv. Page

**Kaitronics Corp. .... 211**  
**Robins Broadcast &  
 Sound Equip. Corp. .... 38**  
**Russco Electronics  
 Mfg. Inc. .... 18**

Allied Broadcast Equip. D 1-9  
 Broadcast Communications Devices,  
 Inc. D9  
 Broadcast Component Dist.  
 Communication Medias D 1-9

Broadcast Equipment Distributors  
 Communication Medias  
 Dyma Engineering, Inc.  
 International Communications &  
 Control Corp.  
 Kaitronics Corp.  
 Modular Audio Products Unit of  
 Modular Devices, Inc.  
 The Orange County Electronics Corp.  
 Ltd.  
 Quad-Eight Electronics  
 Ramko Research Inc.  
 Richmond Sound Design, Ltd.  
 Robins Broadcast & Sound Equip.  
 Corp.  
 Russco Electronics Mfg. Inc.  
 Track Audio, Inc. D 1-9  
 Ultra Audio Pixtec

**Preamplifiers, Microphone**

See Adv. Page

**CCA Electronics Corp. .. 99-106**  
**Kaitronics Corp. .... 211**  
**Robins Broadcast &  
 Sound Equip. Corp. .... 38**  
**Russco Electronics  
 Mfg. Inc. .... 18**

Allied Broadcast Equip. D 1-9  
 Audio Designs & Mfg.  
 Autogram Corp.  
 Broadcast Communications Devices,  
 Inc. D9  
 Broadcast Component Dist.  
 Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Equipment Distributors  
 Communication Medias  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Collins Television Services  
 Dyma Engineering, Inc.  
 Holland Electronics  
 International Communications &  
 Control Corp.  
 Kaitronics Corp.  
 Lauderdale Electronic Labs  
 Media Concepts, Inc. D 1-9  
 Modular Audio Products Unit of  
 Modular Devices, Inc.  
 Charles Moore  
 Opamp Labs, Inc.  
 The Orange County Electronics Corp.  
 Ltd.  
 Quad-Eight Electronics  
 ROH Corporation  
 RTS Systems  
 Ramko Research Inc.  
 Richmond Sound Design, Ltd.  
 Robins Broadcast & Sound Equip.  
 Corp.  
 Russco Electronics Mfg. Inc.  
 Sescom, Inc.  
 Sparta --see Cetec Broadcast Group  
 TEAC Corp of America  
 Tele-Measurements, Inc. B-2  
 Track Audio, Inc. D 1-9  
 United Recording Electronics  
 Industries  
 Val-Tronics, Inc. D1-9

**Preamplifiers, Stereo**

See Adv. Page

**Robins Broadcast &  
 Sound Equip. Corp. .... 38**  
**Russco Electronics  
 Mfg. Inc. .... 18**

Allied Broadcast Equip. D 1-9  
 Ampro Broadcasting Inc.  
 Broadcast Communications Devices,  
 Inc. D9  
 Broadcast Component Dist.  
 Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Equipment Distributors  
 Communication Medias  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Dyma Engineering, Inc.  
 Heath Co.

International Communications &  
 Control Corp.  
 Lauderdale Electronic Labs  
 Modular Audio Products Unit of  
 Modular Devices, Inc.  
 Charles Moore  
 The Orange County Electronics Corp.  
 Ltd.  
 Ram Audio Systems, Inc.  
 Ramko Research Inc.  
 Richmond Sound Design, Ltd.  
 Robins Broadcast & Sound Equip.  
 Corp.  
 Russco Electronics Mfg. Inc.  
 Sparta --see Cetec Broadcast Group  
 TEAC Corp of America  
 Tele-Measurements, Inc. B-2  
 Track Audio, Inc. D 1-9  
 Triple I Inc. The Economy Co.  
 Val-Tronics, Inc. D1-9

**Preamplifiers, Turntable**

See Adv. Page

**Broadcast Component  
 Dist. Communication  
 Medias .... 271**  
**Broadcast Consultants  
 Corp. .... 83, 84**  
**CCA Electronics Corp. .. 99-106**  
**Kaitronics Corp. .... 211**  
**Ramko Research Inc. .... 91**  
**Russco Electronics  
 Mfg. Inc. .... 18**  
**Sound Dynamics, Inc. .... 226**  
**Wilkinson Electronics,  
 Inc. .... 62**

Ampro Broadcasting Inc.  
 Audio Distributor Inc. D 1-9  
 Automated Processes, Inc.  
 BGW Systems Inc.  
 Broadcast Automation Assoc. D  
 1,2,5,6  
 Broadcast Communications Devices,  
 Inc. D9  
 Broadcast Component Dist.  
 Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors  
 Communication Medias  
 Broadcast Equipment & Supply Co. D  
 1-9  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Dyma Engineering, Inc.  
 Elcom Engineering Co.  
 Harris Corp. Broadcast Products Div.  
 International Communications &  
 Control Corp.  
 Kaitronics Corp.  
 LPB Inc.  
 Logitek Electronic Systems  
 Mastertone Co., Inc.  
 Maze Corp D6  
 McCurdy Radio Ind. Inc.  
 McMartin Industries, Inc.  
 Micro-Trak Corp.  
 Modular Audio Products Unit of  
 Modular Devices, Inc.  
 Charles Moore  
 Rupert Neve, Inc.  
 Opamp Labs, Inc.  
 The Orange County Electronics Corp.  
 Ltd.  
 Professional Audio Service  
 Pulse Dynamics Mfg. Corp. (PDMC)  
 QRK Electronic Products  
 Quad-Eight Electronics  
 ROH Corporation  
 Ram Audio Systems, Inc.  
 Ramko Research Inc.  
 Rek-O-Kut Inc.  
 Robins Broadcast & Sound Equip.  
 Corp.  
 Russco Electronics Mfg. Inc.  
 Sescom, Inc.  
 Shure Brothers Inc.  
 Sound Dynamics, Inc. D8, 9  
 Sparta --see Cetec Broadcast Group  
 Stanton Magnetics Inc.  
 Tele-Measurements, Inc. B-2  
 Track Audio, Inc. D 1-9

Tri-Tronics Professional Electronics  
VIF International  
Val-Tronics, Inc. D1-9  
Westlake Audio  
Wilkinson Electronics, Inc.

**Preamplifiers, Video**

See Adv. Page

**Kaltronics Corp.** .....211

C-COR Electronics, Inc.  
Collins Television Services  
International Nuclear Corp.  
Kaitronics Corp.  
Microwave Assoc. Inc.  
Peirce-Phelps, Inc. D 2, 5  
Tele-Measurements, Inc. B-2

**Pressurization Equipment,  
Transmission Line**

Andrew Corp.  
Broadcast Consultants Corp. D5, 6  
Cablewave Systems Inc.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dielectric Communications Div. Sola  
Basic, Inc.  
Dyma Engineering, Inc.  
General Cable Corp.  
Harris Corp. Broadcast Products Div.  
Jampro --see Cetec Broadcast Group  
Micro Communications, Inc.  
Moseley Assoc. Inc.  
Prodelin Inc.  
Wilkinson Electronics, Inc.

**Probes, Oscilloscope**

See Adv. Page

**Philips Test &  
Measuring  
Instruments, Inc.** ..... 15

B & K Precision Dynascan Corp.  
Broadcast Communications Devices,  
Inc. D9  
Collins Radio Rockwell International  
Heath Co.  
Hickok Elect. Instrument  
Lauderdale Electronic Labs  
Leader Instruments Corp.  
Lectrotech Inc.  
Phillips Test & Measuring Instruments,  
Inc.  
SPI-ITT Metrix Instruments Div.  
Tektronix Inc.  
Texscan Corp.  
Vu-Data Corp.

**Processors, Bleach Regeneration**

CPAC, Inc.  
Houston Photo Products, Inc.

**Processors, Electronic Still**

See Adv. Page

**Adda Corp.** .....167

Adda Corp.

**Processors, Film Color**

See Adv. Page

**Jamieson Film Co.** .....170

Comquip, Inc.  
Eastman Kodak Co.  
Houston Fearless 76  
Houston Photo Products, Inc.  
Jamieson Film Co.

**Processors, Pollution Control**

CPAC, Inc.  
Houston Photo Products, Inc.

**Processors, Silver Recovery Unit**

Arriflex Co. of America  
CPAC, Inc.

Eastman Kodak Co.  
Houston Fearless 76  
Houston Photo Products, Inc.

**Processors, VTR**

Convergence Corp.  
Dyma Engineering, Inc.  
Dynamics Div. Whitaker Corp.  
Leitch Video Ltd.  
Temtron Electronics D 1-9  
3M Co. Mincom Div.

**Production Systems, AM or FM  
Remote or Studio**

Ampro Broadcasting Inc.  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.  
Broadcast Equipment & Supply Co. D  
1-9  
Broadcast Specialties  
Cetec Broadcast Group  
Dyma Engineering, Inc.  
Imero Fiorentino Associates, Inc.  
Fisher-Burke Broadcast Consultants  
Harris Corp. Broadcast Products Div.  
Image Devices Inc.  
LPB Inc.  
Mastertone Co., Inc.  
Maze Corp D6  
Micro-Trak Corp.  
Moseley Assoc. Inc.  
The Orange County Electronics Corp.  
Ltd.  
Robins Broadcast & Sound Equip.  
Corp.  
Sparta --see Cetec Broadcast Group  
Track Audio, Inc. D 1-9  
Tri-Tronics Professional Electronics  
Val-Tronics, Inc. D1-9

**Programmed Music**

Broadcast Consultants Corp. D5, 6  
The CnB Studios  
CaVox Stereo Productions  
Cetec Broadcast Group  
Schafer --see Cetec Broadcast Group  
Tape-Athon Corp.  
VIF International

**Programmer/Comparators**

See Adv. Page

**ESE** ..... 63, 65

The BTX Corp.  
Dyma Engineering, Inc.  
ESE

**Programmers,  
Patchboard/Thumbwheel**

Dyma Engineering, Inc.  
ESE  
Harris Corp. Broadcast Products Div.  
IGM Div. of Northwestern Tech.

**Projector Lamps**

Barbizon Electric  
GTE Sylvania Inc. Lighting Products  
Group  
Image Devices Inc.  
Schneider Corp. of America  
Sitler's Supplies, Inc.  
Strand Century, Inc.

**Projectors, Film**

See Adv. Page

**Image Magnification,  
Inc.** .....206  
**L-W International** ..... 46

Arriflex Co. of America  
Bell & Howell Audio Visual Div.  
Canon USA, Inc. Optics Div.  
Cohu, Inc. Electronics Div.  
Comquip, Inc.  
dbx, Inc.  
Eastman Kodak Co.  
GBC Closed Circuit TV Corp.

Harris Corp. Broadcast Products Div.  
Image Devices Inc.  
Image Magnification, Inc.  
KVC Video Systems Inc. D 1,2  
Kalart Victor Corp.  
L-W International  
Laird Telemedia Inc.  
Landy Associates Inc. D 1,2  
Magna-Tech Electronic Co., Inc.  
W. A. Palmer Films, Inc.  
RCA Broadcast Systems  
Rank Precision Industries, Inc. (III).  
Rank Cintel Div.  
Schneider Corp. of America  
Super8 Sound, Inc.  
Video Components, Inc.  
Weather Scan, Inc.  
The Zei-Mark Corp.

**Projectors, Film Cassette  
Loading**

Comquip, Inc.  
RCA Broadcast Systems

**Projectors, Film Rear**

See Adv. Page

**Image Magnification,  
Inc.** .....206

Comquip, Inc.  
Image Devices Inc.  
Image Magnification, Inc.  
The Olesen Co.

**Projectors, Slide**

Buhl Optical Co.  
Comquip, Inc.  
Eastman Kodak Co.  
Harris Corp. Broadcast Products Div.  
Image Devices Inc.  
KVC Video Systems Inc. D 1,2  
Kliegl Bros. Lighting  
Laird Telemedia Inc.  
Listec TV Equip. Corp.  
RCA Broadcast Systems  
Rank Precision Industries, Inc. (III).  
Rank Cintel Div.  
Schneider Corp. of America  
Spindler & Sauppe, Inc.  
Weather Scan, Inc.  
The Zei-Mark Corp.

**Projectors, TV Large Screen**

See Adv. Page

**General Electric Co.** ..... 87  
**Image Magnification,  
Inc.** .....206

Comquip, Inc.  
Electrohome Ltd.  
GBC Closed Circuit TV Corp.  
General Electric Co. Video Display  
Equip. Op.  
General Television Ntwk. D 3  
Ikegami Electronics (USA) Inc.  
Image Magnification, Inc.  
KVC Video Systems Inc. D 1,2  
Kalart Victor Corp.  
Peirce-Phelps, Inc. D 2, 5  
Sony Corp. of America VTR Div.  
Tele-Measurements, Inc. B-2

**Projectors, Video Test Slide**

Comquip, Inc.  
Spindler & Sauppe, Inc.

**Prompters**

KVC Video Systems Inc. D 1,2  
Listec TV Equip. Corp.  
Telescript, Inc.  
Ultra Audio Pixtec

**Proof Workbook (For FCC test  
requirements)**

See Adv. Page

**Communications, Ltd.** .....270

Communications, Ltd.  
Intertec Publishing Corp.

**Pulse Assignment Systems**

See Adv. Page

**Central Dynamics  
Corp.** .....230

Central Dynamics Corp.  
Television Research International

**Purchasing Services, Broadcast  
Equipment**

See Adv. Page

**Industrial Marketing  
Advisory Services,  
Inc.** .....107

Broadcast Consultants Corp. D5, 6  
Industrial Marketing Advisory  
Services, Inc.  
Track Audio, Inc. D 1-9

**Quadraphonic Systems**

Audio Designs & Mfg.  
Belar Electronics Lab., Inc.  
Catel Div. United Scientific Corp.  
Cetec Audio  
Heath Co.  
KVC Video Systems Inc. D 1,2  
Rupert Neve, Inc.  
Quad-Eight Electronics  
Richmond Sound Design, Ltd.  
Technics by Panasonic  
Westlake Audio

**Radar, Weather**

Marconi Communication Systems Ltd.  
Microwave Assoc. Inc.

**Radomes**

See Adv. Page

**Nurad, Inc.** .....221

Andrew Corp.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Harris Corp. Broadcast Products Div.  
Jampro --see Cetec Broadcast Group  
Micro Communications, Inc.  
Nurad, Inc.  
Prodelin Inc.  
RF Systems, Inc.  
Shively Laboratories, Inc.

**Receivers, AM**

See Adv. Page

**Broadcast Component  
Dist. Communication  
Medias** .....273  
**Delta Electronics Inc.  
(Va.)** .....183  
**McKay Dymek Co.** .....254

Bell P/A Prod. Corp.  
Bogen Div. Lear Siegler, Inc.  
Broadcast Component Dist.  
Communication Medias D 1-9  
Collins Radio Rockwell International  
Delta Electronics Inc. (Va.)  
Dyma Engineering, Inc.  
Elcom Engineering Co.  
Heath Co.  
Kahn Communications, Inc.  
Marconi Instruments  
McKay Dymek Co.  
McMartin Industries, Inc.  
Micro Communications, Inc.  
National Electrolab Ltd.  
Precision Elect. Inc.  
RHG Elect Labs, Inc.  
Rivers Associates, Inc.  
Singer Products Co., Inc.  
Tandberg of America, Inc.  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9



## Receivers, Data

See Adv. Page

**Industrial Sciences** .....250

Bristol Div. of Acco  
Industrial Sciences  
Moseley Assoc. Inc.  
The Widget Works, Inc.

## Receivers, EBS

See Adv. Page

**CCA Electronics Corp.** .. 99-106

American Microsignal Co.  
Broadcast Consultants Corp. D5, 6  
CCA Electronics Corp.  
Collins Radio Rockwell International  
Elcom Engineering Co.  
Gorman Relich Mfg. Co.  
Landy Associates Inc. D 1,2  
Logitek Electronic Systems  
Mastertone Co., Inc.  
McMartin Industries, Inc.  
Rivers Associates, Inc.  
Time & Frequency Tech., Inc.  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

## Receivers, FM

See Adv. Page

**Broadcast Component  
Dist. Communication  
Medias**.....273  
**CCA Electronics Corp.** .. 99-106  
**Delta Electronics Inc.  
(Va.)** .....183

Altec Sound Products  
Bell P/A Prod. Corp.  
Bogen Div. Lear Siegler, Inc.  
Broadcast Component Dist.  
Communication Medias D 1-9  
CCA Electronics Corp.  
Catel Div. United Scientific Corp.  
Collins Radio Rockwell International  
Delta Electronics Inc. (Va )  
Electrohome Ltd.  
Fix Tune Solid State Electronics, Inc.  
GTE Lenkurt, Inc.  
Heath Co.  
Image Devices Inc.  
Lauderdale Electronic Labs  
Marconi Instruments  
McMartin Industries, Inc.  
Merill Cable Equipment Corp.  
Micro Communications, Inc.  
Precision Elect. Inc.  
RHG Elect Labs, Inc.  
Ram Audio Systems, Inc.  
Ramko Research Inc.  
Rohde & Schwarz Sales Co.  
Sansui Electronics Corp.  
Scientific Radio Systems, Inc.  
Singer Products Co., Inc.  
Studer Revox America  
Superscope, Inc.  
Tandberg of America, Inc.  
Technics by Panasonic  
Temtron Electronics D 1-9  
Tri-Tronics Professional Electronics  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

## Receivers, HF

Collins Radio Rockwell International  
Engineering Associates  
Heath Co.  
Kahn Communications, Inc.  
Marconi Electronics Inc.  
Marconi Instruments  
McKay Dymek Co.  
RHG Elect Labs, Inc.  
Rohde & Schwarz Sales Co.  
Scientific Radio Systems, Inc.  
Singer Products Co., Inc.

## Receivers, Microwave

See Adv. Page

**Microwave Assoc. Inc.** .....227  
**Sound Dynamics, Inc.** .....226

Broadcast Consultants Corp. D5, 6  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Engineering Associates  
Farinon Electric  
Hughes Microwave Communication  
Products  
International Microwave Corp.  
Micro Control Associates, Inc.  
Microwave Assoc. Inc.  
Moseley Assoc. Inc.  
Narda Microwave Corp.  
RHG Elect Labs, Inc.  
Scientific-Atlanta, Inc.  
Sound Dynamics, Inc. D8, 9  
Tepeco Corp.  
TerraCom  
Val-Tronics, Inc. D1-9  
Varian/Beverly Micro-Link Products  
Weinschel Engineering Co.

## Receivers, Multiplex

See Adv. Page

**CCA Electronics Corp.** .. 99-106

Altec Sound Products  
Beta Technology, Inc.  
CCA Electronics Corp.  
Coastcom  
Dynair Electronics, Inc.  
GTE Lenkurt, Inc.  
Heath Co.  
McMartin Industries, Inc.  
Moseley Assoc. Inc.  
Singer Products Co., Inc.  
Superscope, Inc.  
Track Audio, Inc. D 1-9

## Receivers, SCA

See Adv. Page

**CCA Electronics Corp.** .. 99-106

CCA Electronics Corp.  
Contel Mfg.  
Fix Tune Solid State Electronics, Inc.  
Fung Engineering Inc.  
Mastertone Co., Inc.  
McMartin Industries, Inc.  
Moseley Assoc. Inc.  
Rivers Associates, Inc.  
Singer Products Co., Inc.  
Track Audio, Inc. D 1-9

## Receivers, Time Signal

Catel Div. United Scientific Corp.  
ESE  
Elcom Engineering Co.  
Electrohome Ltd.  
Time & Frequency Tech., Inc.

## Receivers, TV Color

See Adv. Page

**Electrohome Ltd.**..... 40  
**Image Magnification,  
Inc.**.....206  
**Pleasantville Labs** .....186

Broadcast Communications Devices,  
Inc. D9  
Comquip, Inc.  
Conrac Div. Conrac Corp.  
dbx, Inc.  
Dyma Engineering, Inc.  
Electrohome Ltd.  
Heath Co.  
Image Devices Inc.  
Image Magnification, Inc.  
KVC Video Systems Inc. D 1,2  
Landy Associates Inc. D 1,2  
Media Concepts, Inc. D 1-9  
Panasonic Video Systems Div.  
Pleasantville Labs  
Rohde & Schwarz Sales Co.  
Roscor Corp. D3, 4

Sony Corp. of America VTR Div.  
Tele-Measurements, Inc. B-2  
Telescript, Inc.  
Videodetics Corp.  
Weather Scan, Inc.

## Receivers, TV Monochrome

Broadcast Communications Devices,  
Inc. D9  
Conrac Div. Conrac Corp.  
dbx, Inc.  
Dyma Engineering, Inc.  
Electrohome Ltd.  
Heath Co.  
Landy Associates Inc. D 1,2  
Media Concepts, Inc. D 1-9  
Panasonic Video Systems Div.  
Sony Corp. of America VTR Div.  
Telescript, Inc.  
Videodetics Corp.  
Weather Scan, Inc.

## Receivers, 162.55 MHz Weather

See Adv. Page

**Scientific Radio  
Systems, Inc.** .....208

Catel Div. United Scientific Corp.  
Fung Engineering Inc.  
Heath Co.  
Scientific Radio Systems, Inc.

## Recorder Amplifiers

See Adv. Page

**International  
Tapetronics Corp.** ..... 54  
**Telex Communications,  
Inc.** ..... 8

AEG-Telefunken Magnetic Tape  
Recorder Dept.  
Accurate Sound Co.  
Gould Inc. Instrument Systems Div.  
Inovonics  
International Tapetronics Corp.  
Lauderdale Electronic Labs  
Telex Communications, Inc.  
Track Audio, Inc. D 1-9  
Triple I Inc. The Economy Co.  
Val-Tronics, Inc. D1-9

## Recorder Care Kits, Video

Broadcast Communications Devices,  
Inc. D9  
Comprehensive Video Supply Corp. D  
1-9  
Lauderdale Electronic Labs  
Nortronics Co., Inc.

## Recorder Carrying Systems, Videotape Portable

Comquip, Inc.  
Gruber Products Co.  
Javelln Electronics D9  
K & H Products, Ltd.  
KVC Video Systems Inc. D 1,2

## Recorder Clean Air Hoods, Videotape

Envirco Div. Bio Dynamics

## Recorder Drive Motor Power Supply Units

VIF International

## Recorder Modifications, Reel Servo

Accurate Sound Co.  
Inovonics  
Merlin Engineering Works, Inc.  
Recortec Inc.  
Scully Recording Instruments Div. of  
Dictaphone Corp.  
VIF International

## Recorder Reconditioning, Videotape

A. F. Associates, Inc.  
Applied Video Electronics, Inc. D 1-9  
Comquip, Inc.  
Merlin Engineering Works, Inc.  
RCA Broadcast Systems  
Tele-Measurements, Inc. B-2  
Ultra Audio Pixtec

## Recorder Replacement Electronics

See Adv. Page

**Accurate Sound Co.** .....223  
**Broadcast Component  
Dist. Communication  
Medias**.....273  
**Inovonics**..... 77  
**Sound Dynamics, Inc.**.....226  
**Telex Communications,  
Inc.**..... 8

Accurate Sound Co.  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Equipment Distributors  
Communication Medias  
Computer Magnetics Corp.  
Dyma Engineering, Inc.  
Inovonics  
Lauderdale Electronic Labs  
Merlin Engineering Works, Inc.  
Opamp Labs, Inc.  
The Orange County Electronics Corp.  
Ltd.  
Recortec Inc.  
Scully Recording Instruments Div. of  
Dictaphone Corp.  
Sound Dynamics, Inc. D8, 9  
Sound Genesis D8, 9  
Tele-Measurements, Inc. B-2  
Telex Communications, Inc.  
Track Audio, Inc. D 1-9  
VIF International  
Val-Tronics, Inc. D1-9  
Video Memory Corp. c/o Recortec, Inc.  
Westlake Audio

## Recorder Replacement Motors

See Adv. Page

**Beaucart Div.** ..... 28

Beaucart Div. UMC Electronics Co.  
Broadcast Automation Assoc. D  
1,2,5,6  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.  
Dyma Engineering, Inc.  
Mastertone Co., Inc.  
Merlin Engineering Works, Inc.  
Scully Recording Instruments Div. of  
Dictaphone Corp.  
Sound Dynamics, Inc. D8, 9  
Tapecaster TCM, Inc.  
Telectro Systems Corp.  
VIF International  
Westlake Audio

## Recorder Tape Tension Controls, Audio

See Adv. Page

**Inovonics**..... 77  
inovonics

## Recorder Tape Tension Controls, VTR

See Adv. Page

**Accurate Sound Co.** .....223

Accurate Sound Co.  
Merlin Engineering Works, Inc.  
Microtime, Inc.  
Recortec Inc.  
Tentel

## Recorder Tape Tension Gauges

See Adv. Page

Sound Dynamics, Inc. ....226  
Tentel ..... 88

Comprehensive Video Supply Corp. D  
1-9

Lauderdale Electronic Labs  
Sound Dynamics, Inc. D8, 9  
Sound Genesis D8, 9  
Tentel  
VIF International

## Recorder Velocity Error Correctors

See Adv. Page

Computer Magnetics  
Corp. .... 248,249

Computer Magnetics Corp.

## Recorder V-Lock Helical Attachments

See Adv. Page

Oregon Magnetics .....277

Merlin Engineering Works, Inc.  
Oregon Magnetics

## Recorders, Audio Cartridge

See Adv. Page

Ampro Broadcasting  
Inc. .... 70

Beaucart Div. .... 28, 92

Broadcast Component  
Dist. Communication  
Medias ..... 273

Broadcast Consultants  
Corp. .... 83

CCA Electronics Corp. .. 99-106

Contel Mfg. .... 80

McCurdy Radio Ind.  
Inc. .... IBC

Sound Dynamics, Inc. .... 226

Telex Communications,  
Inc. .... 192

AEG-Telefunken Magnetic Tape  
Recorder Dept.

Allied Broadcast Equip. D 1-9

Ampro Broadcasting Inc.

Automation Electronics, Inc.

Beaucart Div. UMC Electronics Co.

Broadcast Communications Devices,  
Inc. D9

Broadcast Component Dist.

Communication Medias D 1-9

Broadcast Consultants Corp. D5, 6

Broadcast Electronics, Inc.

Broadcast Equipment Distributors  
Communication Medias

CCA Electronics Corp.

Cetec Broadcast Group

Collins Radio Rockwell International

Consolidated Electronic Industries

Contel Mfg.

Dyma Engineering, Inc.

EDCO Products, Inc.

IGM Div. of Northwestern Tech.

International Electro-Magnetics

KVC Video Systems Inc. D 1,2

LPB Inc.

Landy Associates Inc. D 1,2

Lauderdale Electronic Labs

Maze Corp D6

McCurdy Radio Ind. Inc.

Professional Audio Service

RCA Broadcast Systems

Sound Dynamics, Inc. D8, 9

Sparta --see Cetec Broadcast Group

Telex Communications, Inc.

Track Audio, Inc. D 1-9

VIF International

Val-Tronics, Inc. D1-9

Video Research Corp.

Videodetics Corp.

Wilkinson Electronics, Inc.

## Recorders, Audio Cassette

See Adv. Page

Accurate Sound Co. ....223  
Allied Broadcast Equip. ....226

Broadcast Component  
Dist. Communication  
Medias ..... 273

Ramko Research Inc. ....176

Sound Dynamics, Inc. ....226

Accurate Sound Co.

Allied Broadcast Equip. D 1-9

Ampro Broadcasting Inc.

Automation Electronics, Inc.

Broadcast Communications Devices,  
Inc. D9

Broadcast Component Dist.

Communication Medias D 1-9

Broadcast Consultants Corp. D5, 6

Califone International, Inc.

Collins Radio Rockwell International

Dyma Engineering, Inc.

EDCO Products, Inc.

Heath Co.

KVC Video Systems Inc. D 1,2

Professional Audio Service

Ramko Research Inc.

Rapid-Q, Edo Products, Inc.

Sound Dynamics, Inc. D8, 9

Super8 Sound, Inc.

TEAC Corp of America

Track Audio, Inc. D 1-9

Triple I Inc. The Economy Co.

Victor Duncan, Inc.

Video Research Corp.

Accurate Sound Co.

Allied Broadcast Equip. D 1-9

Ampro Broadcasting Inc.

Automation Electronics, Inc.

Broadcast Communications Devices,  
Inc. D9

Broadcast Component Dist.

Communication Medias D 1-9

Broadcast Consultants Corp. D5, 6

Califone International, Inc.

Collins Radio Rockwell International

Dyma Engineering, Inc.

EDCO Products, Inc.

Heath Co.

KVC Video Systems Inc. D 1,2

Professional Audio Service

Ramko Research Inc.

Rapid-Q, Edo Products, Inc.

Sound Dynamics, Inc. D8, 9

Super8 Sound, Inc.

TEAC Corp of America

Track Audio, Inc. D 1-9

Triple I Inc. The Economy Co.

Victor Duncan, Inc.

Video Research Corp.

Accurate Sound Co.

Allied Broadcast Equip. D 1-9

Ampro Broadcasting Inc.

Automation Electronics, Inc.

Broadcast Communications Devices,  
Inc. D9

Broadcast Component Dist.

Communication Medias D 1-9

Broadcast Consultants Corp. D5, 6

Broadcast Equipment Distributors  
Communication Medias

CCA Electronics Corp.

Cetec Broadcast Group

Collins Radio Rockwell International

Consolidated Electronic Industries

Contel Mfg.

Dyma Engineering, Inc.

Gotham Audio Corp.

International Electro-Magnetics

Landy Associates Inc. D 1,2

Lauderdale Electronic Labs

MCI, Inc.

Victor Duncan, Inc.  
Video Research Corp.

## Recorders, Two and Four Track Reel

See Adv. Page

AEG-Telefunken ..... 71, 73

Accurate Sound Co. ....223

Audio Distributor Inc. ....247

Broadcast Component  
Dist. Communication  
Medias ..... 271

Broadcast Consultants  
Corp. .... 83, 84

CCA Electronics Corp. .. 99-106

International  
Tapetronics Corp. .... 54

MCI, Inc. .... 74, 75

McCurdy Radio Ind.  
Inc. .... IBC

Otari Corp. ....207

M. Palmer &  
Associates.....260

Ramko Research Inc. .... 91, 176

Scully Recording  
Instruments..... 94,245

Sound Dynamics, Inc. ....226

Studer Revox America ..... 17

VIF International .....246

AEG-Telefunken Magnetic Tape  
Recorder Dept.

Accurate Sound Co.

Allied Broadcast Equip. D 1-9

Ampex Corp.

Audio Distributor Inc. D 1-9

Automation Electronics, Inc.

Broadcast Communications Devices,  
Inc. D9

Broadcast Component Dist.

Communication Medias D 1-9

Broadcast Consultants Corp. D5, 6

Broadcast Equipment Distributors  
Communication Medias

CCA Electronics Corp.

Cetec Broadcast Group

Collins Radio Rockwell International

Consolidated Electronic Industries  
dbx, Inc.

Dyma Engineering, Inc.

Fisher-Burke Broadcast Consultants

Gotham Audio Corp.

International Electro-Magnetics

International Tapetronics Corp.

LPB Inc.

Landy Associates Inc. D 1,2

Lauderdale Electronic Labs

MCI, Inc.

McCurdy Radio Ind. Inc.

Nagra Magnetic Recorders, Inc.

Oregon Sound D 9

Otari Corp.

M. Palmer & Associates

Professional Audio Service

Ramko Research Inc.

Roscor Corp. D3, 4

Schafer --see Cetec Broadcast Group

Scully Recording Instruments Div. of  
Dictaphone Corp.

Sound Dynamics, Inc. D8, 9

Sparta --see Cetec Broadcast Group

Studer Revox America

TEAC Corp of America

Tandberg of America, Inc.

Track Audio, Inc. D 1-9

VIF International

Val-Tronics, Inc. D1-9

Victor Duncan, Inc.

Video Research Corp.

Wilkinson Electronics, Inc.

Accurate Sound Co.

Allied Broadcast Equip. D 1-9

Ampro Broadcasting Inc.

Automation Electronics, Inc.

Broadcast Communications Devices,  
Inc. D9

Broadcast Component Dist.

Communication Medias D 1-9

Broadcast Consultants Corp. D5, 6

Broadcast Equipment Distributors  
Communication Medias

## Recorders, Film Magnetic

Comquip, Inc.  
Image Devices Inc.  
Magnasync/Moviola Corp.  
Magna-Tech Electronic Co., Inc.  
Opamp Labs, Inc.  
W. A. Palmer Films, Inc.  
Quad-Eight Electronics  
RCA Broadcast Systems  
Roscor Corp. D3, 4  
Sound Genesis D8, 9  
Super8 Sound, Inc.  
Victor Duncan, Inc.  
Wide Range Electronics

## Recorders, Film Optical Sound

Opamp Labs, Inc.  
Roscor Corp. D3, 4  
Wide Range Electronics

## Recorders, Magnetic Tape Logging

See Adv. Page

CCA Electronics Corp. .. 99-106

Scully Recording  
Instruments.....245

Sound Dynamics, Inc. ....226

Accurate Sound Co.

Allied Broadcast Equip. D 1-9

Automation Electronics, Inc.

B & K Instruments Inc.

Broadcast Automation Assoc. D  
1,2,5,6

Broadcast Communications Devices,  
Inc. D9

Broadcast Component Dist.

Communication Medias D 1-9

Broadcast Consultants Corp. D5, 6

Broadcast Equipment Distributors  
Communication Medias

CCA Electronics Corp.

Cetec Broadcast Group

Collins Radio Rockwell International

Dyma Engineering, Inc.

Gotham Audio Corp.

Gould Inc. Instrument Systems Div.

Harris Corp. Broadcast Products Div.

IGM Div. of Northwestern Tech.

International Electro-Magnetics

LPB Inc.

Lauderdale Electronic Labs

Magnasync/Moviola Corp.

Masterstone Co., Inc.

Nagra Magnetic Recorders, Inc.

Philips Test & Measuring Instruments,  
Inc.

Professional Audio Service

Schafer --see Cetec Broadcast Group

Scully Recording Instruments Div. of  
Dictaphone Corp.

Singer Products Co., Inc.

Sono-Mag Corp.

Sound Dynamics, Inc. D8, 9

Sound Genesis D8, 9

Stancil-Hoffman Corp.

Studer Revox America

TEAC Corp of America

Telectro Systems Corp.

Telex Communications, Inc.

Triple I Inc. The Economy Co.

VIF International

Val-Tronics, Inc. D1-9

Video Research Corp.

Videodetics Corp.

Accurate Sound Co.

Allied Broadcast Equip. D 1-9

Ampro Broadcasting Inc.

Automation Electronics, Inc.

B & K Instruments Inc.

Bristol Div. of Acco

Collins Radio Rockwell International

Datalogic-Rust Co.

John Fluke Mfg. Co., Inc.



General Electric Co. Tubes/MW Devices  
 Gould Inc. Instrument Systems Div.  
 Harris Corp. Broadcast Products Div.  
 Heath Co.  
 Moseley Assoc. Inc.  
 Philips Test & Measuring Instruments, Inc.  
 Rohde & Schwarz Sales Co.  
 Scientific-Atlanta, Inc.  
 Sono-Mag Corp.  
 Vitek Electronics Inc.

**Recorders, Program Logging**

See Adv. Page

**Broadcast Component Dist. Communication Medias.....271**

**Scully Recording Instruments.....245**

Accurate Sound Co.  
 Applied Video Electronics, Inc. D 1-9  
 Automation Electronics, Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Equipment Distributors Communication Medias  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Dyma Engineering, Inc.  
 Harris Corp. Broadcast Products Div.  
 IGM Div. of Northwestern Tech.  
 LPB Inc.  
 Lauderdale Electronic Labs  
 RCA Broadcast Systems  
 Roscor Corp. D3, 4  
 Schafer --see Cetec Broadcast Group  
 Scully Recording Instruments Div. of Dictaphone Corp.  
 Stancil-Hoffman Corp.  
 TEAC Corp of America  
 Telectro Systems Corp.  
 VIF International  
 Val-Tronics, Inc. D1-9  
 Videodetics Corp.

**Recorders, Time Base Corrector**

Ampex Corp.  
 Broadcast Communications Devices, Inc. D9  
 dbx, Inc.  
 Dyma Engineering, Inc.  
 KVC Video Systems Inc. D 1,2  
 Landy Associates Inc. D 1,2  
 Merlin Engineering Works, Inc.  
 Microtime, Inc.  
 NEC America, Inc. Broadcasting Equip. Div.  
 Peirce-Phelps, Inc. D 2, 5  
 RCA Broadcast Systems  
 Roscor Corp. D3, 4

**Recorders, Video Disc**

See Adv. Page

**Oktel Corp. ....274**

Ampex Corp.  
 Arvin/Echo Co.  
 Eigen Video  
 Motorola Semiconductor Products, Inc.  
 Oktel Corp.  
 Peirce-Phelps, Inc. D 2, 5  
 Roscor Corp. D3, 4  
 Teknekron/TRAX

**Recorders, Video Kinescope**

Comquip, Inc.  
 W. A. Palmer Films, Inc.  
 Teledyne Camera Systems

**Recorders, Video Slow Motion**

See Adv. Page

**Oktel Corp. ....274**

A. F. Associates, Inc.  
 Ampex Corp.  
 Arvin/Echo Co.  
 dbx, Inc.  
 Eigen Video  
 Javelin Electronics D9  
 KVC Video Systems Inc. D 1,2  
 Landy Associates Inc. D 1,2  
 Oktel Corp.  
 Panasonic Video Systems Div.  
 Peirce-Phelps, Inc. D 2, 5  
 Recortec Inc.  
 Roscor Corp. D3, 4  
 TEAC Corp of America  
 Teknekron/TRAX  
 Tele-Measurements, Inc. B-2  
 Telescript, Inc.  
 Video Memory Corp. c/o Recortec, Inc.

**Recorders, Videotape Cartridge**

See Adv. Page

**All Mobile Video, Inc. ....271**

All Mobile Video, Inc.  
 Comquip, Inc.  
 Image Devices Inc.  
 JVC Industries, Inc.  
 KVC Video Systems Inc. D 1,2  
 NEC America, Inc. Broadcasting Equip. Div.  
 Panasonic Video Systems Div.  
 Peirce-Phelps, Inc. D 2, 5  
 RCA Broadcast Systems  
 Tele-Measurements, Inc. B-2  
 Videodetics Corp.

**Recorders, Videotape Cassette**

See Adv. Page

**Panasonic Video Systems Div..... 30, 31**

Ampex Corp.  
 Broadcast Communications Devices, Inc. D9  
 dbx, Inc.  
 KVC Video Systems Inc. D 1,2  
 Landy Associates Inc. D 1,2  
 Media Concepts, Inc. D 1-9  
 Panasonic Video Systems Div.  
 Peirce-Phelps, Inc. D 2, 5  
 RCA Broadcast Systems  
 Roscor Corp. D3, 4  
 Sony Corp. of America VTR Div.  
 TEAC Corp of America  
 Tele-Measurements, Inc. B-2  
 Telescript, Inc.  
 Videodetics Corp.  
 Weather Scan, Inc.

**Recorders, Videotape Helical**

See Adv. Page

**All Mobile Video, Inc. ....271**  
**The Camera Mart, Inc. .... 64**  
**Panasonic Video Systems Div..... 30, 31**  
**Sony Corp. of America.... 12, 13**

A. F. Associates, Inc.  
 Akai America, Ltd.  
 All Mobile Video, Inc.  
 Ampex Corp.  
 Broadcast Communications Devices, Inc. D9  
 The Camera Mart, Inc.  
 Comquip, Inc.  
 Fernseh Group Robert Bosch Corp.  
 GBC Closed Circuit TV Corp.  
 Hitachi Denshi America, Ltd.  
 Ikegami Electronics (USA) Inc.  
 JVC Industries, Inc.  
 Javelin Electronics D9  
 KVC Video Systems Inc. D 1,2  
 Martin Audio/Video D2  
 Media Concepts, Inc. D 1-9  
 NEC America, Inc. Broadcasting Equip. Div.  
 Panasonic Video Systems Div.  
 Peirce-Phelps, Inc. D 2, 5  
 RCA Broadcast Systems  
 Recortec Inc.  
 Roscor Corp. D3, 4  
 Sony Corp. of America VTR Div.

TEAC Corp of America  
 Tele-Measurements, Inc. B-2  
 Video Memory Corp. c/o Recortec, Inc.  
 Videodetics Corp.

**Recorders, Videotape Quad**

See Adv. Page

**A. F. Associates, Inc. .... 98**  
**All Mobile Video, Inc. ....271**  
**Ampex Corp. .... 22, 23**  
**Recortec Inc. ....266**

A. F. Associates, Inc.  
 All Mobile Video, Inc.  
 Ampex Corp.  
 Asaca Corp. of America  
 Comquip, Inc.  
 KVC Video Systems Inc. D 1,2  
 Martin Audio/Video D2  
 Merlin Engineering Works, Inc.  
 RCA Broadcast Systems  
 Recortec Inc.

**Recording Services, Audio Tape**

Accurate Sound Co.  
 Audio Magnetics Corp.  
 The CnB Studios  
 Mastertone Co., Inc.  
 Media Concepts, Inc. D 1-9  
 W. A. Palmer Films, Inc.  
 Pentagon Industries, Inc.  
 Professional Audio Service  
 Superscope, Inc.  
 Tape-Athon Corp.  
 Westlake Audio

**Recording Services, Videotape to Film**

KVC Video Systems Inc. D 1,2  
 W. A. Palmer Films, Inc.

**Recording Synchronizers**

AEG-Telefunken Magnetic Tape Recorder Dept.  
 Broadcast Communications Devices, Inc. D9  
 Central Dynamics Corp.  
 Dyma Engineering, Inc.  
 EECO  
 Magna-Tech Electronic Co., Inc.  
 Nagra Magnetic Recorders, Inc.  
 Ryder Magnetic Sales Corp.  
 Westlake Audio

**Reel Storage/Retrieval Systems, Film and VTR**

See Adv. Page

**Storeel Corp. ....176**

Comprehensive Video Supply Corp. D 1-9  
 Project Support Systems  
 Research Technology, Inc.  
 Storeel Corp.  
 Winsted Corp.

**Reels, Cable and Mike**

Clifford B. Hannay & Son, Inc.  
 Image Devices Inc.  
 Media Concepts, Inc. D 1-9  
 Ryder Magnetic Sales Corp.  
 Westlake Audio

**Reels, Magnetic Tape**

See Adv. Page

**Recording Supply Co. ....250**

Ampex Corp.  
 Audio Distributor Inc. D 1-9  
 Audio Magnetics Corp.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Equipment Distributors Communication Medias

Capitol Magnetic Products  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Duotone Co. Inc.  
 Dyma Engineering, Inc.  
 Fuji Photo Film USA, Inc. Magnetic Products Dept.  
 Image Devices Inc.  
 Irish Magnetic Recording Tape  
 KVC Video Systems Inc. D 1,2  
 Mastertone Co., Inc.  
 Maxell Corp. of America  
 Media Concepts, Inc. D 1-9  
 Memorex Corp. Professional Products Group  
 Nagra Magnetic Recorders, Inc.  
 Peirce-Phelps, Inc. D 2, 5  
 Pentagon Industries, Inc.  
 Professional Audio Service  
 Recording Supply Co.  
 Schafer --see Cetec Broadcast Group  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 TEAC Corp of America  
 Tele-Measurements, Inc. B-2  
 3M Co. Magnetic Audio/Video Prod. Div.  
 Track Audio, Inc. D 1-9  
 Weather Scan, Inc.  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Reels, Video Tape**

Audio Magnetics Corp.  
 Comquip, Inc.  
 Fuji Photo Film USA, Inc. Magnetic Products Dept.  
 Irish Magnetic Recording Tape  
 Javelin Electronics D9  
 KVC Video Systems Inc. D 1,2  
 Maxell Corp. of America  
 Media Concepts, Inc. D 1-9  
 Memorex Corp. Professional Products Group  
 Panasonic Video Systems Div.  
 Peirce-Phelps, Inc. D 2, 5  
 Recording Supply Co.  
 Sony Corp. of America VTR Div.  
 Studio Tape Exchange D2  
 Tele-Measurements, Inc. B-2  
 3M Co. Magnetic Audio/Video Prod. Div.  
 Weather Scan, Inc.

**Reflectors, Passive**

Collins Radio Rockwell International  
 Fort Worth Tower Co., Inc.  
 Image Devices Inc.  
 Unarco-Rohn Div. of Unarco Ind., Inc.

**Regulators, Voltage**

See Adv. Page

**Kay Industries, Inc. ....220**

Aiken Industries Inc.  
 Collins Radio Rockwell International  
 General Electric Co. Tubes/MW Devices  
 Kay Industries, Inc.  
 Microtran Co., Inc.  
 Motorola Semiconductor Products, Inc.  
 Temtron Electronics D 1-9

**Remote Antennas --See Antennas, Remote**

**Remote Broadcast Cue Systems**

**Thomson-CSF Laboratories, Inc.....202**  
**Vega.....198**

Broadcast Consultants Corp. D5, 6  
 Comrex Corp.  
 Image Devices Inc.  
 Rivers Associates, Inc.  
 Thomson-CSF Laboratories, Inc.  
 Track Audio, Inc. D 1-9  
 Vega Div. of Cetec Corp.

**Remote Control Monitors, VIT**

Broadcast Communications Devices, Inc. D9  
Marconi Instruments

**Remote Control Systems**

See Adv. Page

- CCA Electronics Corp. .. 99-106**
- Delta Electronics Inc. (Va.) .....183**
- Marti Electronics ..... 57**
- Micro Control Associates, Inc. ....257**
- Moseley Assoc. Inc. .... 69**
- Nurad, Inc. ....221**
- Time & Frequency Tech., Inc. .... 43**

American Microsignal Co.  
Audio Distributor Inc. D 1-9  
Bristol Div. of Acco  
Broadcast Communications Devices, Inc. D9  
Broadcast Consultants Corp. D5, 6  
Broadcast Specialties  
CCA Electronics Corp.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Comark Industries Inc.  
Comrex Corp.  
Datalogic-Rust Co.  
Delta Electronics Inc. (Va.)  
Dyma Engineering, Inc.  
Engineering Associates  
Fisher-Burke Broadcast Consultants  
Harris Corp. Broadcast Products Div.  
Image Magnification, Inc.  
Logitek Electronic Systems  
Marconi Communication Systems Ltd.  
Marconi Instruments  
Marti Electronics  
Mastertone Co., Inc.  
Maze Corp D6  
McBee Laboratories  
McMartin Industries, Inc.  
Micro Control Associates, Inc.  
Monroe Electronics, Inc.  
Moseley Assoc. Inc.  
North American Radio Corp.  
Nurad, Inc.  
Power-Optics Inc.  
Pulse Dynamics Mfg. Corp. (PDMC)  
Richmond Sound Design, Ltd.  
Robins Broadcast & Sound Equip. Corp.  
Ryder Magnetic Sales Corp.  
Sono-Mag Corp.  
Sparta --see Cetec Broadcast Group  
Tele-Cine Inc.  
Time & Frequency Tech., Inc.  
Val-Tronics, Inc. D1-9  
Vamco Engineering  
Veg. Div. of Cetec Corp.  
Wilkinson Electronics, Inc.

**Remote Pickup Receivers**

See Adv. Page

- Microwave Assoc. Inc. ....227**
- Moseley Assoc. Inc. .... 69**
- Wilkinson Electronics, Inc. .... 62**

Allied Broadcast Equip. D 1-9  
Broadcast Specialties  
Comrex Corp.  
Dyma Engineering, Inc.  
Farinon Electric  
Harris Corp. Broadcast Products Div.  
Marti Electronics  
McMartin Industries, Inc.  
Microwave Assoc. Inc.  
Moseley Assoc. Inc.  
Telemet a Geotel Co.  
TerraCom  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

**Remote Pickup Systems, Radio**

See Adv. Page

- Broadcast Component Dist. Communication Medias .....273**
- Broadcast Consultants Corp. .... 86**
- CCA Electronics Corp. .. 99-106**
- Marti Electronics ..... 57**
- Moseley Assoc. Inc. .... 69**

Audio Distributor Inc. D 1-9  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Equipment & Supply Co. D 1-9  
Broadcast Specialties  
CCA Electronics Corp.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Comrex Corp.  
Dyma Engineering, Inc.  
Farinon Electric  
Harris Corp. Broadcast Products Div.  
Marti Electronics  
Mastertone Co., Inc.  
Maze Corp D6  
McMartin Industries, Inc.  
Moseley Assoc. Inc.  
Pulse Dynamics Mfg. Corp. (PDMC)  
Sparta --see Cetec Broadcast Group  
TerraCom  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

**Remote Pickup Transmitters**

See Adv. Page

- Marti Electronics ..... 57**
- Microwave Assoc. Inc. ....227**
- Moseley Assoc. Inc. .... 69**
- Wilkinson Electronics, Inc. .... 62**

Allied Broadcast Equip. D 1-9  
Broadcast Specialties  
Comrex Corp.  
Dyma Engineering, Inc.  
Electronic Transport Systems  
Farinon Electric  
Harris Corp. Broadcast Products Div.  
Marti Electronics  
McMartin Industries, Inc.  
Microwave Assoc. Inc.  
Moseley Assoc. Inc.  
TerraCom  
Track Audio, Inc. D 1-9  
Wilkinson Electronics, Inc.

**Reverberation Systems**

See Adv. Page

- Broadcast Component Dist. Communication Medias .....269**
- MIC-MIX Audio Products, Inc. ....200**
- Orban/Parasound .....186**

AKG Acoustics  
Allied Broadcast Equip. D 1-9  
Audio Distributor Inc. D 1-9  
B & K Instruments Inc.  
Bell P/A Prod. Corp.  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Equipment Distributors Communication Medias dbx, Inc.  
Dyma Engineering, Inc.  
EMT Franz VGmbH  
Eventide Clock Works Inc.  
Gotham Audio Corp.  
Landy Associates Inc. D 1,2  
MIC-MIX Audio Products, Inc.  
Maze Corp D6  
Opamp Labs, Inc.  
Orban/Parasound  
Quad-Eight Electronics

Robins Broadcast & Sound Equip. Corp.

Shure Brothers Inc.  
Sound Genesis D8, 9  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9  
Westlake Audio

**Rewinders, Film**

Comquip, Inc.  
Image Devices Inc.  
Kalart Victor Corp.  
Magnasync/Moviola Corp.  
Neumade Products Corp.  
Research Technology, Inc.  
Sound Genesis D8, 9

**Rewinders, Tape**

Audico, Ltd.  
Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Equipment Distributors Communication Medias  
Neumade Products Corp.  
Pentagon Industries, Inc.  
Recortec Inc.  
Singer Products Co., Inc.  
Sound Genesis D8, 9  
Ultra Audio Pixtec

**Safety Devices, Ladder**

Air Space Devices Inc.  
Unarco-Rohn Div. of Unarco Ind., Inc.

**Scramblers, Speech**

Mountain West Alarm D8  
Singer Products Co., Inc.

**Screens, Projection Front**

Comquip, Inc.  
KVC Video Systems Inc. D 1,2  
Kliegl Bros. Lighting  
Raven Screen Corp.  
Telescript, Inc.

**Screens, Projection Rear**

Eastman Kodak Co.  
Image Devices Inc.  
KVC Video Systems Inc. D 1,2  
Kliegl Bros. Lighting  
Raven Screen Corp.

**Semiconductors, IC's**

See Adv. Page

- Temtron Electronics .....273**

A-Tel-A-Matic  
Calvert Electronics Inc. D 1-9  
Ceco Communications Inc.  
English Electric Valve North America Ltd.  
G.C. Electronics  
Harris Corp. Broadcast Products Div.  
JSH Electronics, Inc.  
C. M. Levit Electronics D 1-9  
P. R. Mallory & Co. Inc.  
Microwave Assoc. Inc.  
Motorola Semiconductor Products, Inc.  
Opamp Labs, Inc.  
RCA Distributor & Special Products Div.  
RCA Solid State Div.  
Temtron Electronics D 1-9  
Thor Electronics Corp.

**Semiconductors, Rectifier General**

See Adv. Page

- Temtron Electronics .....273**

Amperex Electronic Corp.  
A-Tel-A-Matic  
Calvert Electronics Inc. D 1-9  
Ceco Communications Inc.

Collins Radio Rockwell International Electronic Devices, Inc.  
English Electric Valve North America Ltd.  
General Electric Co. Tubes/MW Devices  
JSH Electronics, Inc.  
C. M. Levit Electronics D 1-9  
P. R. Mallory & Co. Inc.  
Microwave Assoc. Inc.  
Motorola Semiconductor Products, Inc.  
RCA Distributor & Special Products Div.  
Singer Products Co., Inc.  
Temtron Electronics D 1-9  
Thor Electronics Corp.  
United Radio Supply Inc. D9

**Semiconductors, Rectifier High Voltage Stack**

See Adv. Page

- Wilkinson Electronics, Inc. .... 62**

A-Tel-A-Matic  
Calvert Electronics Inc. D 1-9  
Ceco Communications Inc.  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Electronic Devices, Inc.  
English Electric Valve North America Ltd.  
JSH Electronics, Inc.  
C. M. Levit Electronics D 1-9  
P. R. Mallory & Co. Inc.  
Microwave Assoc. Inc.  
Motorola Semiconductor Products, Inc.  
RCA Distributor & Special Products Div.  
RCA Solid State Div.  
Singer Products Co., Inc.  
Thor Electronics Corp.  
Wilkinson Electronics, Inc.

**Semiconductors, Rectifier Power**

Amperex Electronic Corp.  
A-Tel-A-Matic  
Calvert Electronics Inc. D 1-9  
Ceco Communications Inc.  
Collins Radio Rockwell International Electronic Devices, Inc.  
English Electric Valve North America Ltd.  
General Electric Co. Tubes/MW Devices  
JSH Electronics, Inc.  
C. M. Levit Electronics D 1-9  
P. R. Mallory & Co. Inc.  
Microwave Assoc. Inc.  
Motorola Semiconductor Products, Inc.  
RCA Distributor & Special Products Div.  
RCA Solid State Div.  
Singer Products Co., Inc.  
Thor Electronics Corp.  
United Radio Supply Inc. D9  
Wilkinson Electronics, Inc.

**Semiconductors, Rectifier Silicon Controlled-SCR**

Amperex Electronic Corp.  
A-Tel-A-Matic  
Calvert Electronics Inc. D 1-9  
Ceco Communications Inc.  
Collins Radio Rockwell International  
English Electric Valve North America Ltd.  
G.C. Electronics  
General Electric Co. Tubes/MW Devices  
JSH Electronics, Inc.  
C. M. Levit Electronics D 1-9  
Microwave Assoc. Inc.  
Motorola Semiconductor Products, Inc.  
RCA Distributor & Special Products Div.  
RCA Solid State Div.  
Singer Products Co., Inc.  
Thor Electronics Corp.  
United Radio Supply Inc. D9  
Wilkinson Electronics, Inc.



## Semiconductors, Thyristor

Amperex Electronic Corp.  
A-Tel-A-Matic  
Calvert Electronics Inc. D 1-9  
Ceco Communications Inc.  
Dyma Engineering, Inc.  
English Electric Valve North America Ltd.  
G.C. Electronics  
General Electric Co. Tubes/MW Devices  
JSH Electronics, Inc.  
C. M. Levit Electronics D 1-9  
Motorola Semiconductor Products, Inc.  
RCA Distributor & Special Products Div.  
RCA Solid State Div.  
Singer Products Co., Inc.  
Thor Electronics Corp.  
United Radio Supply Inc. D9

## Semiconductors, Transistor AF

Amperex Electronic Corp.  
A-Tel-A-Matic  
Calvert Electronics Inc. D 1-9  
Ceco Communications Inc.  
G.C. Electronics  
JSH Electronics, Inc.  
C. M. Levit Electronics D 1-9  
P. R. Mallory & Co. Inc.  
Microwave Assoc. Inc.  
Motorola Semiconductor Products, Inc.  
RCA Distributor & Special Products Div.  
Singer Products Co., Inc.  
Temtron Electronics D 1-9  
Thor Electronics Corp.

## Semiconductors, Transistor FET

A-Tel-A-Matic  
Calvert Electronics Inc. D 1-9  
Ceco Communications Inc.  
G.C. Electronics  
Hitachi Denshi America, Ltd.  
JSH Electronics, Inc.  
C. M. Levit Electronics D 1-9  
P. R. Mallory & Co. Inc.  
Microwave Assoc. Inc.  
Motorola Semiconductor Products, Inc.  
RCA Distributor & Special Products Div.  
RCA Solid State Div.  
Singer Products Co., Inc.  
Temtron Electronics D 1-9  
Thor Electronics Corp.

## Semiconductors, Transistor General

See Adv. Page

### Temtron Electronics .....273

Amperex Electronic Corp.  
A-Tel-A-Matic  
Calvert Electronics Inc. D 1-9  
Ceco Communications Inc.  
G.C. Electronics  
General Electric Co. Tubes/MW Devices  
Harris Corp. Broadcast Products Div.  
JSH Electronics, Inc.  
C. M. Levit Electronics D 1-9  
Microwave Assoc. Inc.  
Motorola Semiconductor Products, Inc.  
RCA Distributor & Special Products Div.  
RCA Solid State Div.  
Singer Products Co., Inc.  
Temtron Electronics D 1-9  
Thor Electronics Corp.  
United Radio Supply Inc. D9

## Semiconductors, Transistor RF

Amperex Electronic Corp.  
A-Tel-A-Matic  
Calvert Electronics Inc. D 1-9  
Ceco Communications Inc.  
English Electric Valve North America Ltd.  
G.C. Electronics  
JSH Electronics, Inc.  
C. M. Levit Electronics D 1-9

Microwave Assoc. Inc.  
Motorola Semiconductor Products, Inc.  
RCA Distributor & Special Products Div.  
Singer Products Co., Inc.  
Thor Electronics Corp.

## Sensors, Tone

Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Equipment Distributors  
Communication Medias  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Consolidated Electronic Industries  
Frequency Devices Inc.  
IGM Div. of Northwestern Tech.  
Monroe Electronics, Inc.  
Moseley Assoc. Inc.  
Rivers Associates, Inc.  
Schäfer --see Cetec Broadcast Group

## Set-up Trucks

Editel Communications  
Harris Corp. Broadcast Products Div.  
Storeel Corp.  
Winsted Corp.

## Shifters, Phase Microwave

Comark Industries Inc.  
Dielectric Communications Div. Sola Basic, Inc.  
Hitachi Denshi America, Ltd.  
Maury Microwave Corp.  
Micro Communications, Inc.  
Microwave Assoc. Inc.  
Narda Microwave Corp.  
Pacific Recorders and Engrg. Corp.  
Singer Products Co., Inc.  
Systron-Donner

## Slow Scan TV Systems

Colorado Video Inc.  
Interand Corp. Telestrator Div.  
Javelin Electronics D9  
Media Concepts, Inc. D 1-9  
NEC America, Inc. Broadcasting Equip. Div.  
Teltron Inc.

## Sound Effect Systems

See Adv. Page

Audio Distributor Inc. ....247  
Cetec Audio .....217

Audio Distributor Inc. D 1-9

Cetec Audio  
Eventide Clock Works Inc.  
Gotham Audio Corp.  
IGM Div. of Northwestern Tech.  
MacKenzie Laboratories, Inc.  
The Orange County Electronics Corp. Ltd.  
Richmond Sound Design, Ltd.  
Track Audio, Inc. D 1-9

## Sound Systems, Automatic Level Control

See Adv. Page

Moseley Assoc. Inc. ....69

Broadcast Communications Devices, Inc. D9  
Broadcast Consultants Corp. D5, 6  
Media Concepts, Inc. D 1-9  
Moseley Assoc. Inc.  
The Orange County Electronics Corp. Ltd.  
Robins Broadcast & Sound Equip. Corp.  
Shure Brothers Inc.  
United Recording Electronics Industries

## Sound Systems, Outdoor

Allied Broadcast Equip. D 1-9  
Altec Sound Products

Atlas Sound  
Bell P/A Prod. Corp.  
Bogen Div. Lear Siegler, Inc.  
Broadcast Communications Devices, Inc. D9  
Eddor Div. of P.A.C.  
Electro-Voice Inc.  
G.C. Electronics  
Heath Co.  
KVC Video Systems Inc. D 1,2  
James B. Lansing Sound, Inc.  
Maze Corp D6  
McMartin Industries, Inc.  
Micro-Trak Corp.  
Microwave Assoc. Inc.  
Oregon Sound D 9  
Paso Sound Products Inc.  
Pulse Dynamics Mfg. Corp. (PDMC)  
Quad-Eight Electronics  
Richmond Sound Design, Ltd.  
Robins Broadcast & Sound Equip. Corp.  
Shure Brothers Inc.  
Sinai-Johnson  
Sound Genesis D8, 9  
Spectra Sonics  
United Radio Supply Inc. D9  
Whirlwind Music

## Sound Systems, Portable

Allied Broadcast Equip. D 1-9  
Altec Sound Products  
Automated Processes, Inc.  
Bell P/A Prod. Corp.  
Bogen Div. Lear Siegler, Inc.  
Broadcast Communications Devices, Inc. D9  
Comquip, Inc.  
Eddor Div. of P.A.C.  
Electro-Voice Inc.  
Heath Co.  
KVC Video Systems Inc. D 1,2  
James B. Lansing Sound, Inc.  
Maze Corp D6  
McMartin Industries, Inc.  
Media Concepts, Inc. D 1-9  
Micro-Trak Corp.  
Nagra Magnetic Recorders, Inc.  
Rupert Neve, Inc.  
Oregon Sound D 9  
Paso Sound Products Inc.  
Pulse Dynamics Mfg. Corp. (PDMC)  
Quad-Eight Electronics  
Richmond Sound Design, Ltd.  
Robins Broadcast & Sound Equip. Corp.  
Shure Brothers Inc.  
Sinai-Johnson  
Singer Products Co., Inc.  
Sound Genesis D8, 9  
Spectra Sonics  
Tape-Athon Corp.  
United Radio Supply Inc. D9  
Whirlwind Music

## Sound Systems, Studio

See Adv. Page

Accurate Sound Co. ....223  
Audio Distributor Inc. ....247  
Broadcast Component Dist. Communication Medias .....273  
Cetec Audio .....217

Accurate Sound Co.  
Altec Sound Products  
Ampro Broadcasting Inc.  
Audio Distributor Inc. D 1-9  
Bogen Div. Lear Siegler, Inc.  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Electronics, Inc.  
Cetec Audio  
Cetec Broadcast Group  
Crown International, Inc.  
Delta Electronics Inc. (N.C.)  
Dolby Laboratories, Inc.  
Dyma Engineering, Inc.  
Eddor Div. of P.A.C.  
Electro-Voice Inc.  
Fisher-Burke Broadcast Consultants  
Hartley Products Corp.

KVC Video Systems Inc. D 1,2  
James B. Lansing Sound, Inc.  
Magna-Tech Electronic Co., Inc.  
Maze Corp D6  
McMartin Industries, Inc.  
Media Concepts, Inc. D 1-9  
Micro-Trak Corp.  
Modular Audio Products Unit of Modular Devices, Inc.  
The Orange County Electronics Corp. Ltd.  
Paso Sound Products Inc.  
Pulse Dynamics Mfg. Corp. (PDMC)  
Quad-Eight Electronics  
Richmond Sound Design, Ltd.  
Robins Broadcast & Sound Equip. Corp.  
Scientific Systems, Inc.  
Shure Brothers Inc.  
Singer Products Co., Inc.  
Sound Genesis D8, 9  
Sparta --see Cetec Broadcast Group  
Spectra Sonics  
Television and Computer Corp.  
Track Audio, Inc. D 1-9  
Whirlwind Music

## Sound Systems, Theater

Allied Broadcast Equip. D 1-9  
Altec Sound Products  
Bell P/A Prod. Corp.  
Bogen Div. Lear Siegler, Inc.  
Broadcast Communications Devices, Inc. D9  
Comquip, Inc.  
Delta Electronics Inc. (N.C.)  
Dolby Laboratories, Inc.  
Electro Sound, Inc.  
Electro-Voice Inc.  
Hartley Products Corp.  
James B. Lansing Sound, Inc.  
Magna-Tech Electronic Co., Inc.  
Maze Corp D6  
Modular Audio Products Unit of Modular Devices, Inc.  
Rupert Neve, Inc.  
The Orange County Electronics Corp. Ltd.  
Oregon Sound D 9  
Paso Sound Products Inc.  
Quad-Eight Electronics  
Richmond Sound Design, Ltd.  
Robins Broadcast & Sound Equip. Corp.  
Shure Brothers Inc.  
Sinai-Johnson  
Sound Genesis D8, 9  
Spectra Sonics  
Ward-Beck Systems, Ltd.  
Whirlwind Music

## Speakers and Enclosures

See Adv. Page

Auratone Products .....274  
Broadcast Component Dist. Communication Medias .....271  
Collins Radio.....21  
James B. Lansing Sound, Inc. ....61  
M. Palmer & Associates.....274  
Ramko Research Inc. ....176  
Sound Dynamics, Inc. ....226

Altec Sound Products  
Atlas Sound  
Audio Designs & Mfg.  
Audio Distributor Inc. D 1-9  
Auratone Products  
Bogen Div. Lear Siegler, Inc.  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Equipment Distributors  
Communication Medias  
Broadcast Equipment & Supply Co. D 1-9  
Cetec Audio  
Cetec Broadcast Group  
Collins Radio Rockwell International

Crown International, Inc.  
 Eddor Div. of P.A.C.  
 Electro-Voice Inc.  
 G.C. Electronics  
 Gotham Audio Corp.  
 Harris Corp. Broadcast Products Div.  
 Hartley Products Corp.  
 Heath Co.  
 Jensen Sound Laboratories  
 James B. Lansing Sound, Inc.  
 Maze Corp D6  
 Micro-Trak Corp.  
 Charles Moore  
 The Orange County Electronics Corp.  
 Ltd.  
 M. Palmer & Associates  
 Paso Sound Products Inc.  
 Professional Audio Service  
 Pulse Dynamics Mfg. Corp. (PDMC)  
 Ramko Research Inc.  
 Sansui Electronics Corp.  
 Shure Brothers Inc.  
 Singer Products Co., Inc.  
 Sound Dynamics, Inc. D8, 9  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Spectra Sonics  
 Superscope, Inc.  
 Technics by Panasonic  
 United Recording Electronics  
 Industries  
 Val-Tronics, Inc. D1-9  
 Victor Duncan, Inc.  
 Westlake Audio  
 Whirlwind Music

#### STL Equipment

See Adv. Page  
**CCA Electronics Corp.** .. 99-106  
**Marti Electronics** ..... 57  
**Micro Control Associates, Inc.** ..... 257  
**Moseley Assoc. Inc.** ..... 69  
**Wilkinson Electronics, Inc.** ..... 62

Allied Broadcast Equip. D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Specialties  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 Coastcom  
 Collins Radio Rockwell International  
 Contel Mfg.  
 Dolby Laboratories, Inc.  
 Farinon Electric  
 GTE Lenkurt, Inc.  
 Harris Corp. Broadcast Products Div.  
 Marti Electronics  
 Mastertone Co., Inc.  
 Maze Corp D6  
 McMartin Industries, Inc.  
 Micro Communications, Inc.  
 Micro Control Associates, Inc.  
 Microwave Assoc. Inc.  
 Moseley Assoc. Inc.  
 Nurad, Inc.  
 QEI Corp.  
 RCA Broadcast Systems  
 RHG Elect Labs, Inc.  
 Singer Products Co., Inc.  
 Sparta --see Cetec Broadcast Group  
 Tele-Measurements, Inc. B-2  
 Tepeco Corp.  
 TerraCom  
 Time & Frequency Tech., Inc.  
 Val-Tronics, Inc. D1-9  
 Varian/Beverly Micro-Link Products  
 Wilkinson Electronics, Inc.

#### Stopwatches, Digital

Allied Broadcast Equip. D 1-9  
 Broadcast Consultants Corp. D5, 6  
 ESE  
 Heath Co.  
 Image Devices Inc.  
 Jules Racine & Co., Inc.  
 Sigma Electronics, Inc.  
 Track Audio, Inc. D 1-9

#### Studio Design and Construction Services

See Adv. Page  
**Accurate Sound Co.** ..... 223  
**Communications, Ltd.** ..... 270

A. F. Associates, Inc.  
 Accurate Sound Co.  
 Aderhold Construction Co.  
 American Data Div. Philips Broadcast Equip. Corp.  
 Ampro Broadcasting Inc.  
 Applied Video Electronics, Inc. D 1-9  
 Artist's Engineering Visual Communications Div.  
 Berkey-Colortran Inc. Communications, Ltd.  
 Dyma Engineering, Inc.  
 Imero Fiorentino Associates, Inc.  
 Fisher-Burke Broadcast Consultants  
 Hallikainen & Friends, Inc.  
 The Orange County Electronics Corp. Ltd.  
 Sound Genesis D8, 9  
 Track Audio, Inc. D 1-9  
 Ultra Audio Pixtec  
 Val-Tronics, Inc. D1-9  
 Westlake Audio

#### Studio Scenery

Imero Fiorentino Associates, Inc.  
 Janson Industries

#### Studio Systems, Audio

See Adv. Page  
**Ampro Broadcasting Inc.** ..... 70  
**Dynair Electronics, Inc.** ..... 175  
**Micro-Trak Corp.** ..... 260

Accurate Sound Co.  
 Ampro Broadcasting Inc.  
 Artist's Engineering Visual Communications Div.  
 Audio Designs & Mfg.  
 Automated Processes, Inc.  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Cetec Broadcast Group Communications, Ltd.  
 Custom Audio Electronics  
 Dyma Engineering, Inc.  
 Dynair Electronics, Inc.  
 Eventide Clock Works Inc.  
 Fisher-Burke Broadcast Consultants  
 Harris Corp. Broadcast Products Div.  
 LPB Inc.  
 Magna-Tech Electronic Co., Inc.  
 McCurdy Radio Ind. Inc.  
 McMartin Industries, Inc.  
 Media Concepts, Inc. D 1-9  
 Micro-Trak Corp.  
 Modular Audio Products Unit of Modular Devices, Inc.  
 Charles Moore  
 Opamp Labs, Inc.  
 The Orange County Electronics Corp. Ltd.  
 Quad-Eight Electronics  
 ROH Corporation  
 Richmond Sound Design, Ltd.  
 Robins Broadcast & Sound Equip. Corp.  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Spectra Sonics  
 TEAC Corp of America  
 Track Audio, Inc. D 1-9  
 Ultra Audio Pixtec  
 Ward-Beck Systems, Ltd.  
 Westlake Audio  
 Whirlwind Music

#### Subcarrier Multiplex Equipment

See Adv. Page  
**Moseley Assoc. Inc.** ..... 69  
 CCA Electronics Corp.

Coastcom  
 Collins Radio Rockwell International  
 Colorado Video Inc.  
 Farinon Electric  
 Fung Engineering Inc.  
 GTE Lenkurt, Inc.  
 Harris Corp. Broadcast Products Div.  
 McMartin Industries, Inc.  
 Micro Control Associates, Inc.  
 Moseley Assoc. Inc.  
 Orban/Broadcast  
 Tape-Athon Corp.  
 Tepeco Corp.  
 TerraCom

#### Switchers --See also Console Listings

See Adv. Page  
**American Data Div.** ..... 197  
**Audio Designs & Mfg.** ..... 27  
**Audio Distributor Inc.** ..... 247  
**Broadcast Consultants Corp.** ..... 83  
**C.R.V. Systems, Inc.** ..... 274  
**Central Dynamics Corp.** ..... 230  
**Cetec Audio Communications Technology, Inc.** ..... 194  
**Di-Tech Inc.** ..... 263  
**Dynair Electronics, Inc.** ..... 175  
**Dynasciences** ..... 14  
**Dytek Industries, Inc.** ..... 35  
**Glentronix Ltd.** ..... 222  
**Grass Valley Group, Inc.** ..... 3  
**Industrial Sciences** ..... 250  
**LPB Inc.** ..... 172  
**Lenco Inc.** ..... 19  
**McCurdy Radio Ind. Inc.** ..... IBC  
**Modular Audio Products** ..... 252  
**Rupert Neve, Inc.** ..... 169  
**Quantum Audio Labs, Inc.** ..... 276  
**ROH Corporation** ..... 259  
**Ramko Research Inc.** ..... 91  
**Robins Broadcast & Sound Equip. Corp.** ..... 38  
**Shintron Co. Inc.** ..... 93  
**Sound Dynamics, Inc.** ..... 226  
**Tangent Systems, Inc.** ..... 269  
**Vamco Engineering** ..... 198  
**Vital Industries Inc.** ..... BC  
**Ward-Beck Systems, Ltd.** ..... IFC

Alco Electronic Products, Inc.  
 American Data Div. Philips Broadcast Equip. Corp.  
 Ampro Broadcasting Inc.  
 Audio Designs & Mfg.  
 Audio Distributor Inc. D 1-9  
 Auditronics, Inc.  
 Automated Processes, Inc.  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Video Systems, Ltd.  
 C.R.V. Systems, Inc.  
 Central Dynamics Corp.  
 Cetec Audio  
 Cetec Broadcast Group Communications Technology, Inc.  
 Computer Image Video Controllers Dytek Industries, Inc.  
 Di-Tech Inc.  
 Dyma Engineering, Inc.  
 Dynair Electronics, Inc.  
 Dynasciences Div. Whitaker Corp.  
 Dytek Industries, Inc.  
 Fung Engineering Inc.  
 Glentronix Ltd. D 1-9  
 Grass Valley Group, Inc.  
 Holland Electronics  
 Ikegami Electronics (USA) Inc.  
 Industrial Sciences  
 International Nuclear Corp.  
 J&D Electronics Div

Javelin Electronics D9  
 Kay Elemetrics Corp.  
 LPB Inc.  
 Lenco Inc. Electronics Div.  
 Marconi Electronics Inc.  
 McCurdy Radio Ind. Inc.  
 Modular Audio Products Unit of Modular Devices, Inc.  
 Rupert Neve, Inc.  
 Quantum Audio Labs, Inc.  
 RCA Broadcast Systems  
 ROH Corporation  
 Ramko Research Inc.  
 Richmond Sound Design, Ltd.  
 Robins Broadcast & Sound Equip. Corp.  
 Ross Broadcast Products Ltd.  
 Shintron Co. Inc.  
 Sono-Mag Corp.  
 Sony Corp. of America VTR Div.  
 Sound Dynamics, Inc. D8, 9  
 Sparta --see Cetec Broadcast Group  
 Tangent Systems, Inc.  
 Telemet a Geotel Co.  
 3M Co. Mincom Div.  
 Vamco Engineering  
 Video Components, Inc.  
 Viscount Industries Ltd.  
 Vital Industries Inc.  
 Ward-Beck Systems, Ltd.  
 Weather Scan, Inc.  
 Yamaha International Corp.

#### Switchers, Routing

See Adv. Page  
**Central Dynamics Corp.** ..... 230  
**Communications Technology, Inc.** ..... 194  
**Di-Tech Inc.** ..... 263  
**Dynair Electronics, Inc.** ..... 175  
**Dynasciences** ..... 14  
**Dytek Industries, Inc.** ..... 35  
**Industrial Sciences** ..... 250  
**Vamco Engineering** ..... 198

American Data Div. Philips Broadcast Equip. Corp.  
 Audio Designs & Mfg.  
 Automated Processes, Inc.  
 Broadcast Communications Devices, Inc. D9  
 Central Dynamics Corp. Communications Technology, Inc.  
 Computer Image Video Controllers Dytek Industries, Inc.  
 dbx, Inc.  
 Di-Tech Inc.  
 Duca-Richardson Corp.  
 Dyma Engineering, Inc.  
 Dynair Electronics, Inc.  
 Dynasciences Div. Whitaker Corp.  
 Dytek Industries, Inc.  
 EDCO Products, Inc.  
 Holland Electronics  
 Industrial Sciences  
 International Communications & Control Corp.  
 J&D Electronics Div.  
 Landy Associates Inc. D 1,2  
 Modular Audio Products Unit of Modular Devices, Inc.  
 Peirce-Phelps, Inc. D 2, 5  
 ROH Corporation  
 Ramko Research Inc.  
 Robins Broadcast & Sound Equip. Corp.  
 Shintron Co. Inc.  
 Sigma Electronics, Inc.  
 TeleMation, Inc.  
 Telemet a Geotel Co.  
 Vamco Engineering  
 Viscount Industries Ltd.

#### Switches, Coaxial

Afford Mfg. Co.  
 A-Tel-A-Matic  
 Bird Electronic Corp.  
 Blonder-Tongue Labs.  
 C. S. P. Inc.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Comark Industries Inc.  
 Delta Electronics Inc. (Va.)



Dielectric Communications Div. Sola Basic, Inc.  
 Dyma Engineering, Inc.  
 Electronic Inst. & Spec.  
 Fung Engineering Inc.  
 ITT Jennings  
 Jampro --see Cetec Broadcast Group  
 Javelin Electronics D9  
 Kay Elemetrics Corp.  
 Magnecraft Electric Co.  
 Micro Communications, Inc.  
 Microwave Assoc. Inc.  
 Oak Industries, Inc.  
 RCA Community Television Systems  
 Richmond Hill Laboratories Ltd.  
 Rohde & Schwarz Sales Co.  
 Shively Laboratories, Inc.  
 Singer Products Co., Inc.  
 Systron-Donner  
 Tele-Measurements, Inc. B-2  
 Telonic Altair  
 Texscan Corp.  
 Trompeter Electronics  
 Vitek Electronics Inc.  
 Weinschel Engineering Co.  
 Wide Band Engineering Co., Inc.

**Switches, Crossbar**

See Adv. Page

**Communications**

**Technology, Inc. .... 194**  
**Dynair Electronics, Inc. .... 175**

American Data Div. Philips Broadcast Equip. Corp.  
 Communications Technology, Inc.  
 Delta Electronics Inc. (Va.)  
 Dynair Electronics, Inc.  
 ITT Jennings  
 International Nuclear Corp.  
 Richmond Hill Laboratories Ltd.  
 Tele-Measurements, Inc. B-2

**Switches, Power, Video Activated**

See Adv. Page

**Video Aids Corp. of Colorado**

Video Aids Corp. of Colorado

**Switching Systems**

See Adv. Page

**Cetec Audio ..... 217**  
**Collins Radio..... 21**  
**Dynair Electronics, Inc. .... 175**  
**Dytek Industries, Inc. .... 35**  
**Glentronix Ltd. .... 222**  
**Grass Valley Group, Inc. .... 3**  
**Industrial Sciences ..... 250**  
**Lenco Inc. .... 19**  
**Modular Audio Products ..... 252**  
**ROH Corporation ..... 259**  
**Vital Industries Inc. .... BC**

A. F. Associates, Inc.  
 American Data Div. Philips Broadcast Equip. Corp.  
 Ampro Broadcasting Inc.  
 Auditronics, Inc.  
 BSC Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Video Systems, Ltd.  
 Central Dynamics Corp.  
 Cetec Audio  
 Cetec Broadcast Group  
 Collins Radio Rockwell International Communications Technology, Inc.  
 Computer Image Video Controllers  
 Dytek Industries, Inc.  
 dbx, Inc.  
 Datalogic-Rust Co.  
 Datatek Corp.  
 Delta Electronics Inc. (Va.)  
 Di-Tech Inc.  
 Duca-Richardson Corp.  
 Dyma Engineering, Inc.

Dynair Electronics, Inc.  
 Dytek Industries, Inc.  
 GTE Lenkurt, Inc.  
 Glentronix Ltd. D 1-9  
 Grass Valley Group, Inc.  
 Holland Electronics  
 IGM Div. of Northwestern Tech.  
 Industrial Sciences  
 International Nuclear Corp.  
 Javelin Electronics D9  
 Landy Associates Inc. D 1,2  
 Leitch Video Ltd.  
 Lenco Inc. Electronics Div.  
 Marconi Electronics Inc.  
 Mastertone Co., Inc.  
 McCurdy Radio Ind. Inc.  
 Micro Communications, Inc.  
 Modular Audio Products Unit of Modular Devices, Inc.  
 Multronics, Inc.  
 Opamp Labs, Inc.  
 RCA Broadcast Systems  
 ROH Corporation  
 Richmond Hill Laboratories Ltd.  
 Richmond Sound Design, Ltd.  
 Robins Broadcast & Sound Equip. Corp.  
 Ross Broadcast Products Ltd.  
 Shintron Co. Inc.  
 Sigma Electronics, Inc.  
 Sono-Mag Corp.  
 Sony Corp. of America VTR Div.  
 Sparta --see Cetec Broadcast Group  
 Tangent Systems, Inc.  
 Tech Laboratories Inc.  
 Tektronix Inc.  
 TeleMation, Inc.  
 Tele-Measurements, Inc. B-2  
 Telemet a Geotel Co.  
 Trompeter Electronics  
 Vamco Engineering  
 Viscount Industries Ltd.  
 Vital Industries Inc.  
 Ward-Beck Systems, Ltd.

**Synchronizers, Audio/Video**

AEG-Telefunken Magnetic Tape Recorder Dept.  
 Allied Broadcast Equip. D 1-9  
 Ampex Corp.  
 Automated Processes, Inc.  
 The BTX Corp.  
 Broadcast Communications Devices, Inc. D9  
 Central Dynamics Corp.  
 EECO  
 Gould, Inc. Control & Systems Div.  
 KVC Video Systems Inc. D 1,2  
 Leitch Video Ltd.  
 MCI, Inc.  
 Magna-Tech Electronic Co., Inc.  
 Tele-Measurements, Inc. B-2  
 Westlake Audio

**Synchronizer, Digital Video**

See Adv. Page

**Micro Consultants ..... 187**  
**NEC America, Inc. .... 215**

Broadcast Video Systems, Ltd.  
 Consolidated Video Systems dbx, Inc.  
 Digital Video Systems  
 EECO  
 Gould, Inc. Control & Systems Div.  
 Landy Associates Inc. D 1,2  
 Leitch Video Ltd.  
 Magna-Tech Electronic Co., Inc.  
 Micro Consultants  
 Microtime, Inc.  
 NEC America, Inc. Broadcasting Equip. Div.  
 Peirce-Phelps, Inc. D 2, 5  
 RCA Broadcast Systems  
 Tele-Measurements, Inc. B-2  
 Vital Industries Inc.

**Synthesizers, FM Stereo**

Allied Broadcast Equip. D 1-9  
 Dyma Engineering, Inc.

**Systems Research and Development**

See Adv. Page

**Ampro Broadcasting Inc. .... 70**

A. F. Associates, Inc.  
 Ampro Broadcasting Inc.  
 Comark Industries Inc.  
 Dielectric Communications Div. Sola Basic, Inc.  
 Digital Video Systems  
 Dyma Engineering, Inc.  
 Imero Fiorentino Associates, Inc.  
 Fisher-Burke Broadcast Consultants  
 Hallikainen & Friends, Inc.  
 Harris Corp. PRD Electronics Div.  
 International Electro-Magnetics  
 Lenco Inc. Electronics Div.  
 Marconi Communication Systems Ltd.  
 Merrill Cable Equipment Corp.  
 Pacific Recorders and Engrg. Corp.  
 Richmond Hill Laboratories Ltd.  
 Telemet a Geotel Co.  
 Tepeco Corp.

**Tape, Magnetic Recording Audio**

See Adv. Page

**Audio Distributor Inc. .... 247**  
**Broadcast Component Dist. Communication Medias ..... 273**  
**CCA Electronics Corp. .. 99-106**  
**Dimension 3 Recording Co. .... 277**  
**Recording Supply Co. .... 250**

Accurate Sound Co.  
 Agfa-Gevaert Inc.  
 Ampex Corp.  
 Audio Distributor Inc. D 1-9  
 Audio Magnetics Corp.  
 BSC Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 CCA Electronics Corp.  
 Capitol Magnetic Products  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Colorado Magnetics  
 Comquip, Inc.  
 dbx, Inc.  
 Dimension 3 Recording Co.  
 Duotone Co. Inc.  
 Dyma Engineering, Inc.  
 Fisher-Burke Broadcast Consultants  
 Fuji Photo Film USA, Inc. Magnetic Products Dept.  
 Image Devices Inc.  
 Irish Magnetic Recording Tape  
 Joa Cartridge Service D2  
 Landy Associates Inc. D 1,2  
 P. R. Mallory & Co. Inc.  
 Martin Audio/Video D2  
 Mastertone Co., Inc.  
 Maxell Corp. of America  
 Media Concepts, Inc. D 1-9  
 Memorex Corp. Professional Products Group  
 Nagra Magnetic Recorders, Inc.  
 Pentagon Industries, Inc.  
 Professional Audio Service  
 Recording Supply Co.  
 Roscor Corp. D3, 4  
 Ryder Magnetic Sales Corp.  
 Singer Products Co., Inc.  
 Sono-Mag Corp.  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Studio Tape Exchange D2  
 Superscope, Inc.  
 Tapex Corp.  
 Tele-Measurements, Inc. B-2  
 3M Co. Magnetic Audio/Video Prod. Div.  
 Track Audio, Inc. D 1-9

United Radio Supply Inc. D9  
 VIF International  
 Val-Tronics, Inc. D1-9  
 Victor Duncan, Inc.  
 Westlake Audio  
 Wilkinson Electronics, Inc.

**Tape, Magnetic Recording Audio Cartridge**

See Adv. Page

**Dimension 3 Recording Co. .... 277**  
**Telex Communications, Inc. .... 8**

Ampex Corp.  
 Ampro Broadcasting Inc.  
 Aristocart Div. Western Broadcasting Co., Ltd.  
 Audio Distributor Inc. D 1-9  
 Audio Magnetics Corp.  
 BSC Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Cartridge Service D 1-9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 Capitol Magnetic Products  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Contel Mfg.  
 dbx, Inc.  
 Dimension 3 Recording Co.  
 Dyma Engineering, Inc.  
 Fidelipac  
 Fisher-Burke Broadcast Consultants  
 Fuji Photo Film USA, Inc. Magnetic Products Dept.  
 Irish Magnetic Recording Tape  
 Joa Cartridge Service D2  
 LPB Inc.  
 Landy Associates Inc. D 1,2  
 P. R. Mallory & Co. Inc.  
 Mastertone Co., Inc.  
 Maxell Corp. of America  
 Media Concepts, Inc. D 1-9  
 Memorex Corp. Professional Products Group  
 Professional Audio Service  
 Singer Products Co., Inc.  
 Sono-Mag Corp.  
 Sound Dynamics, Inc. D8, 9  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Superscope, Inc.  
 Tapecaster TCM, Inc.  
 Tapex Corp.  
 Tele-Measurements, Inc. B-2  
 Telex Communications, Inc.  
 3M Co. Magnetic Audio/Video Prod. Div.  
 United Radio Supply Inc. D9  
 Val-Tronics, Inc. D1-9  
 Wilkinson Electronics, Inc.

**Tape, Magnetic Recording Computer**

Asaca Corp. of America  
 Fisher-Burke Broadcast Consultants  
 Fuji Photo Film USA, Inc. Magnetic Products Dept.  
 KVC Video Systems Inc. D 1,2  
 Memorex Corp. Professional Products Group  
 Sono-Mag Corp.

**Tape, Magnetic Recording Test**

Agfa-Gevaert Inc.  
 Ampex Corp.  
 Ampro Broadcasting Inc.  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Dyma Engineering, Inc.

Fidelipac  
Fisher-Burke Broadcast Consultants  
G.C. Electronics  
Gotham Audio Corp.  
Mastertone Co., Inc.  
Nagra Magnetic Recorders, Inc.  
Nortronic Co., Inc.  
Professional Audio Service  
Sono-Mag Corp.  
Sound Genesis D8, 9  
TEAC Corp of America  
Taber Mfg. & Engr. Co.  
Tapex Corp.  
Telectro Systems Corp.  
Track Audio, Inc. D 1-9  
VIF International  
Val-Tronics, Inc. D1-9  
Victor Duncan, Inc.

### Tape, Magnetic Recording Video

See Adv. Page  
**C.R.V. Systems, Inc.** .....274  
**Dimension 3 Recording Co.** .....277  
**3M Co.** .....24

Ampex Corp.  
Audio Magnetics Corp.  
BSC Inc.  
C.R.V. Systems, Inc.  
Comprehensive Video Supply Corp. D 1-9  
Comquip, Inc.  
Dimension 3 Recording Co.  
E. I. du Pont de Nemours & Co., Inc. Magnetic Products Div.  
Fisher-Burke Broadcast Consultants  
Fuji Photo Film USA, Inc. Magnetic Products Dept.  
Hitachi Denshi America, Ltd.  
Image Devices Inc.  
Irish Magnetic Recording Tape  
Javelin Electronics D9  
KVC Video Systems Inc. D 1,2  
Karex, Inc.  
Landy Associates Inc. D 1,2  
Martin Audio/Video D2  
Maxell Corp. of America  
Media Concepts, Inc. D 1-9  
Memorex Corp. Professional Products Group  
Panasonic Video Systems Div.  
Peirce-Phelps, Inc. D 2, 5  
Professional Audio Service  
Roscor Corp. D3, 4  
Sony Corp. of America VTR Div.  
Studio Tape Exchange D2  
TDK Electronics Corp.  
TEAC Corp of America  
Tele-Measurements, Inc. B-2  
3M Co. Magnetic Audio/Video Prod. Div.  
The Video Tape Co.  
Videodetics Corp.  
Weather Scan, Inc.

### Tape, Recording Logging

Ampex Corp.  
Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Equipment Distributors Communication Medias  
Dyma Engineering, Inc.  
Fisher-Burke Broadcast Consultants  
Moseley Assoc. Inc.  
Recording Supply Co.  
Singer Products Co., Inc.  
Sono-Mag Corp.  
Sound Genesis D8, 9  
SoundScriber Magnetic Recording Co., Inc.  
Stancil-Hoffman Corp.  
Telectro Systems Corp.  
Tele-Measurements, Inc. B-2  
3M Co. Magnetic Audio/Video Prod. Div.  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9

### Tape, Time Announced

See Adv. Page  
**Broadcast Component Dist. Communication Medias** .....273

Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Equipment Distributors Communication Medias  
Cetec Broadcast Group  
Harris Corp. Broadcast Products Div.  
IGM Div. of Northwestern Tech.  
Schafer --see Cetec Broadcast Group  
Tape-Athon Corp.  
Tapex Corp.  
Tele-Measurements, Inc. B-2

### Tape Addressors, Video

See Adv. Page  
**Recortec Inc.** .....267

### Tape Cartridge Loaders

See Adv. Page  
**Broadcast Component Dist. Communication Medias** .....273

Audico, Ltd.  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors Communication Medias  
Broadcast Equipment & Supply Co. D 1-9  
Dyma Engineering, Inc.  
Electro Sound, Inc.  
Maze Corp D6  
Professional Audio Service  
RCA Broadcast Systems  
Ramko Research Inc.  
Re-Play Video Cartridge Service  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9

### Tape Cassette Loaders

Audico, Ltd.  
Lauderdale Electronic Labs  
Ramko Research Inc.  
Recortec Inc.  
Track Audio, Inc. D 1-9

### Tape Cassettes, Audio

See Adv. Page  
**Recording Supply Co.** .....250  
**Telex Communications, Inc.** .....8

Ampex Corp.  
Audio Magnetics Corp.  
Broadcast Communications Devices, Inc. D9  
Broadcast Consultants Corp. D5, 6  
Capitol Magnetic Products  
Duotone Co. Inc.  
Dyma Engineering, Inc.  
Fisher-Burke Broadcast Consultants  
Fuji Photo Film USA, Inc. Magnetic Products Dept.  
Image Devices Inc.  
Irish Magnetic Recording Tape  
Joa Cartridge Service D2  
Karex, Inc.  
Martin Audio/Video D2  
Mastertone Co., Inc.  
Maxell Corp. of America  
Media Concepts, Inc. D 1-9  
Memorex Corp. Professional Products Group  
Pentagon Industries, Inc.  
Professional Audio Service  
Recording Supply Co.  
Sound Genesis D8, 9  
Studio Tape Exchange D2

Telex Communications, Inc.  
3M Co. Magnetic Audio/Video Prod. Div.  
Track Audio, Inc. D 1-9  
United Radio Supply Inc. D9  
Weather Scan, Inc.

### Tape Cassettes, Video

See Adv. Page  
**3M Co.** .....24  
3M Co. Magnetic Audio/Video Prod. Div.

### Tape Cleaners

See Adv. Page  
**Nova Corp.** .....268

Audio Magnetics Corp.  
Broadcast Communications Devices, Inc. D9  
Fisher-Burke Broadcast Consultants  
G.C. Electronics  
Martin Audio/Video D2  
Nortronic Co., Inc.  
Nova Corp.  
Recortec Inc.  
Research Technology, Inc.  
TEAC Corp of America  
Television Equipment Associates  
3M Co. Magnetic Audio/Video Prod. Div.  
Track Audio, Inc. D 1-9  
Ultra Audio Pixtec  
Weather Scan, Inc.

### Tape Conditioners, Video

See Adv. Page  
**Recortec Inc.** .....264

Microtran Co., Inc.  
Nova Corp.  
Recortec Inc.  
Research Technology, Inc.  
Television Equipment Associates  
Ultra Audio Pixtec

### Tape Deck and Turntable Speed Controls

Dyma Engineering, Inc.  
Eventide Clock Works Inc.  
QRK Electronic Products  
Rek-O-Kut Inc.  
Scully Recording Instruments Div. of Dictaphone Corp.  
VIF International

### Tape Decks, Magnetic --See also Cartridge Machine listings

See Adv. Page  
**Broadcast Component Dist. Communication Medias** .....271  
**International Tapetronics Corp.** .....261  
**Telex Communications, Inc.** .....8

AEG-Telefunken Magnetic Tape Recorder Dept.  
Accurate Sound Co.  
Ampro Broadcasting Inc.  
Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors Communication Medias  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Gould Inc. Instrument Systems Div.  
Harris Corp. Broadcast Products Div.  
Heath Co.  
IGM Div. of Northwestern Tech.

International Electro-Magnetics  
International Tapetronics Corp.  
LPB Inc.  
Mastertone Co., Inc.  
Media Concepts, Inc. D 1-9  
Nagra Magnetic Recorders, Inc.  
Otari Corp.  
Sansui Electronics Corp.  
Schafer --see Cetec Broadcast Group  
Scully Recording Instruments Div. of Dictaphone Corp.  
Singer Products Co., Inc.  
Sono-Mag Corp.  
Sound Genesis D8, 9  
Sparta --see Cetec Broadcast Group  
Studer Revox America  
Superscope, Inc.  
TEAC Corp of America  
Tape-Athon Corp.  
Tapecaster TCM, Inc.  
Tapex Corp.  
Telectro Systems Corp.  
Telex Communications, Inc.  
Triple I Inc. The Economy Co.  
VIF International  
Video Research Corp.  
Wilkinson Electronics, Inc.

### Tape Duplicators

See Adv. Page  
**Accurate Sound Co.** .....223

Accurate Sound Co.  
Ampex Corp.  
Audico, Ltd.  
Audio Distributor Inc. D 1-9  
Broadcast Automation Assoc. D 1,2,5,6  
CaVox Stereo Productions  
Cetec Audio  
Electro Sound, Inc.  
Fisher-Burke Broadcast Consultants  
Garner Industries  
Gotham Audio Corp.  
KVC Video Systems Inc. D 1,2  
Martin Audio/Video D2  
Mastertone Co., Inc.  
Media Concepts, Inc. D 1-9  
Microtime, Inc.  
Otari Corp.  
Pentagon Industries, Inc.  
Recortec Inc.  
Sound Genesis D8, 9  
Telectro Systems Corp.  
Telex Communications, Inc.  
Track Audio, Inc. D 1-9  
Video Research Corp.

### Tape Evaluators, Video

See Adv. Page  
**Recortec Inc.** .....262,263

Comquip, Inc.  
Kaltronics Corp.  
Merlin Engineering Works, Inc.  
Permag Corp.  
Recortec Inc.  
Television Equipment Associates

### Tape Meters

See Adv. Page  
**Broadcast Component Dist. Communication Medias** .....273

Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Equipment Distributors Communication Medias  
Gotham Audio Corp.  
Martin Audio/Video D2  
Nagra Magnetic Recorders, Inc.  
Tapex Corp.  
Tentel

### Tape Motion Controls, Audio

Accurate Sound Co.  
Dyma Engineering, Inc.  
Tape-Athon Corp.  
Triple I Inc. The Economy Co.



## Tape Racks, Cartridge

See Adv. Page

**McCurdy Radio Ind. Inc.** ..... IBC  
**Professional Audio Service** ..... 274  
**Sound Dynamics, Inc.** ..... 226

Audio Distributor Inc. D 1-9  
Audio Magnetics Corp.  
Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Cartridge Service D 1-9  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors Communication Medias  
Broadcast Equipment & Supply Co. D 1-9  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Fidelipac  
Joa Cartridge Service D2  
LPB Inc.  
Mastertone Co., Inc.  
McCurdy Radio Ind. Inc.  
Micro-Trak Corp.  
Charles Moore  
Neumade Products Corp.  
Professional Audio Service  
RCA Broadcast Systems  
Research Technology, Inc.  
Sinai-Johnson  
Sound Dynamics, Inc. D8, 9  
Sparta -- see Cetec Broadcast Group  
Storeel Corp.  
Tapex Corp.  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9  
Winsted Corp.

## Tape Recording Accessories

See Adv. Page

**Broadcast Component Dist. Communication Medias** ..... 269  
**Broadcast Consultants Corp.** ..... 83  
**Nova Corp.** ..... 268  
**Ramko Research Inc.** ..... 91  
**Recording Supply Co.** ..... 250  
**Sound Dynamics, Inc.** ..... 226  
**Taber Mfg. & Engr. Co.** ..... 174  
**Telex Communications, Inc.** ..... 8  
**VIF International** ..... 246  
**Vamco Engineering** ..... 198

AEG-Telefunken Magnetic Tape Recorder Dept.  
Ampex Corp.  
Ampro Broadcasting Inc.  
Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors Communication Medias  
Capitol Magnetic Products  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Comqip, Inc.  
dbx, Inc.  
Dyma Engineering, Inc.  
ELPA Marketing Industries, Inc.  
Electro Sound, Inc.  
Electro-Voice Inc.  
Fidelipac  
G.C. Electronics  
LPB Inc.  
Landy Associates Inc. D 1,2  
Lipsner-Smith Corp.  
Martin Audio/Video D2

Mastertone Co., Inc.  
Media Concepts, Inc. D 1-9  
Micro-Trak Corp.  
Microtran Co., Inc.  
Nagra Magnetic Recorders, Inc.  
Nortronics Co., Inc.  
Nova Corp.  
Professional Audio Service  
RCA Broadcast Systems  
Ramko Research Inc.  
Recording Supply Co.  
Recortec Inc.  
Robins Broadcast & Sound Equip. Corp.  
Scully Recording Instruments Div. of Dictaphone Corp.  
Sound Dynamics, Inc. D8, 9  
Sound Genesis D8, 9  
Sparta -- see Cetec Broadcast Group  
Studer Revox America  
TEAC Corp of America  
Taber Mfg. & Engr. Co.  
Tapex Corp.  
Telectro Systems Corp.  
Telex Communications, Inc.  
Tentel  
3M Co. Magnetic Audio/Video Prod. Div.  
Track Audio, Inc. D 1-9  
VIF International  
Vamco Engineering  
Videomax Div. Orrox Corp.  
Westlake Audio

## Tape Splice Finders

See Adv. Page

**Beaucart Div.** ..... 28  
**Broadcast Component Dist. Communication Medias** ..... 269

Ampro Broadcasting Inc.  
Beaucart Div. UMC Electronics Co.  
Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors Communication Medias  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
Harris Corp. Broadcast Products Div.  
IGM Div. of Northwestern Tech.  
International Tapetronics Corp.  
Recortec Inc.  
Research Technology, Inc.  
Sparta -- see Cetec Broadcast Group  
Tapecaster TCM, Inc.  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9

## Tape Splicers

See Adv. Page

**Broadcast Component Dist. Communication Medias** ..... 269  
**Broadcast Consultants Corp.** ..... 83  
**CCA Electronics Corp. .. 99-106**

Audio Distributor Inc. D 1-9  
Broadcast Communications Devices, Inc. D9  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.  
Broadcast Equipment & Supply Co. D 1-9  
CCA Electronics Corp.  
Collins Radio Rockwell International  
Comprehensive Video Supply Corp. D 1-9  
Duotone Co. Inc.  
ELPA Marketing Industries, Inc.  
Electro Sound, Inc.  
Fidelipac  
G.C. Electronics

Image Devices Inc.  
Joa Cartridge Service D2  
Mastertone Co., Inc.  
Nagy Research Products  
Nortronics Co., Inc.  
Panasonic Video Systems Div.  
Professional Audio Service  
Research Technology, Inc.  
Robins Broadcast & Sound Equip. Corp.  
Sound Genesis D8, 9  
Studer Revox America  
TEAC Corp of America  
Track Audio, Inc. D 1-9  
Victor Duncan, Inc.

## Tape Spot Assemblers, Video

Recortec Inc.

## Tape Transport Reconditioning Services

Accurate Sound Co.  
Merlin Engineering Works, Inc.

## Tape Transports

See Adv. Page

**Accurate Sound Co.** ..... 223  
**Audio Distributor Inc.** ..... 247  
**Broadcast Component Dist. Communication Medias** ..... 271  
**International Tapetronics Corp.** ..... 261  
**Telex Communications, Inc.** ..... 8

AEG-Telefunken Magnetic Tape Recorder Dept.  
Accurate Sound Co.  
Ampro Broadcasting Inc.  
Audio Distributor Inc. D 1-9  
Broadcast Automation Assoc. D 1,2,5,6  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors Communication Medias  
Cetec Broadcast Group  
Comqip, Inc.  
Cook Electric Co.  
Electro Sound, Inc.  
Gould Inc. Instrument Systems Div.  
IGM Div. of Northwestern Tech.  
International Electro-Magnetics  
International Tapetronics Corp.  
Lauderdale Electronic Labs  
Mastertone Co., Inc.  
McCurdy Radio Ind. Inc.  
Media Concepts, Inc. D 1-9  
Merlin Engineering Works, Inc.  
Nagra Magnetic Recorders, Inc.  
Pentagon Industries, Inc.  
Schafer -- see Cetec Broadcast Group  
Sono-Mag Corp.  
Sound Genesis D8, 9  
Sparta -- see Cetec Broadcast Group  
Studer Revox America  
Tape-Athon Corp.  
Telectro Systems Corp.  
Telex Communications, Inc.  
Triple I Inc. The Economy Co.  
VIF International  
Video Research Corp.  
Westlake Audio

## Telephone Answering Equipment

See Adv. Page

**Broadcast Component Dist. Communication Medias** ..... 273

Ampro Broadcasting Inc.  
A-Tel-A-Matic  
Boston Sound & Power Systems  
Broadcast Component Dist. Communication Medias D 1-9  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors Communication Medias

Electronic Transport Systems  
IGM Div. of Northwestern Tech.  
Lauderdale Electronic Labs  
Media Concepts, Inc. D 1-9  
Monroe Electronics, Inc.

## Telephone Tone Receivers

See Adv. Page

**Di-Tech Inc.** ..... 263

Ampro Broadcasting Inc.  
Bristol Div. of Acco  
Di-Tech Inc.  
Frequency Devices Inc.  
Monroe Electronics, Inc.  
TM Systems, Inc.  
Vega Div. of Cetec Corp.

## Telephone Tone Transmitters

See Adv. Page

**Di-Tech Inc.** ..... 263

Bristol Div. of Acco  
Di-Tech Inc.  
Frequency Devices Inc.  
Ikegami Electronics (USA) Inc.  
Monroe Electronics, Inc.  
TM Systems, Inc.  
Vega Div. of Cetec Corp.

## Teletype Noise Reducer Cabinets

Dyma Engineering, Inc.  
PSI Paperwork Systems, Inc.

## Termination Units

See Adv. Page

**CCA Electronics Corp. .. 99-106**  
**Dielectric Communications Div. Sola Basic, Inc.** ..... 165  
**Industrial Sciences** ..... 250

Bird Electronic Corp.  
CCA Electronics Corp.  
Dielectric Communications Div. Sola Basic, Inc.  
Electro Impulse, Inc.  
Holland Electronics  
Industrial Sciences  
Micro Communications, Inc.  
Pacific Recorders and Engrg. Corp.  
Systron-Donner

## Test Chart Pattern Illuminators

dbx, Inc.  
Glentronix Ltd. D 1-9  
Landy Associates Inc. D 1,2  
Specialized Industries, Inc.  
Telecommunications Industries Ltd.

## Test Charts, Camera

See Adv. Page

**D and S Corley Ltd.** ..... 202  
**Tele-Measurements, Inc.** ..... 224

ATV Research  
dbx, Inc.  
D and S Corley Ltd.  
Dyma Engineering, Inc.  
Glentronix Ltd. D 1-9  
Harris Corp. Broadcast Products Div.  
Image Devices Inc.  
Landy Associates Inc. D 1,2  
Marconi Communication Systems Ltd.  
RCA Broadcast Systems  
Telecommunications Industries Ltd.  
Tele-Measurements, Inc. B-2  
Ultra Audio Pixtec

## Test Film, Video

See Adv. Page

**D and S Corley Ltd.** ..... 202  
D and S Corley Ltd.

**Test Inserter/Readers, VIT**

See Adv. Page

**Time Tech Corp. .... 275**

Time Tech Corp.

**Test Probe/Meters, I.C. and Semiconductor Heat**

Micro-Technical Industries

**Test Records**

B & K Instruments Inc.  
Broadcast Consultants Corp. D5, 6  
Dyma Engineering, Inc.  
G.C. Electronics  
Gotham Audio Corp.  
Mastertone Co., Inc.  
Shure Brothers Inc.

**Test Sets, Multifunction**

See Adv. Page

**Telemet ..... 79**

Amber Electro Design, Ltd.  
Dielectric Communications Div. Sola Basic, Inc.  
Kay Elemetrics Corp.  
Lampkin Lab. Inc.  
Leitch Video Ltd.  
Lenco Inc. Electronics Div.  
Pacific Recorders and Engrg. Corp.  
Potomac Instruments, Inc.  
Richmond Hill Laboratories Ltd.  
Sadelco, Inc.  
Singer Products Co., Inc.  
Systron-Donner  
TM Systems, Inc.  
Telemet a Geotel Co.  
Thomson-CSF Laboratories, Inc.  
Val-Tronics, Inc. D1-9

**Test Sets, Vertical Interval**

Broadcast Communications Devices, Inc. D9  
Lenco Inc. Electronics Div.  
Marconi Instruments  
Rohde & Schwarz Sales Co.  
Telemet a Geotel Co.  
Television Equipment Associates

**Test Slides, Video**

See Adv. Page

**D and S Corley Ltd. .... 202**  
**Tele-Measurements, Inc. .... 224**

Comprehensive Video Supply Corp. D 1-9  
dbx, Inc.  
D and S Corley Ltd.  
Laird Telemedia Inc.  
Landy Associates Inc. D 1,2  
Marconi Electronics Inc.  
Specialized Industries, Inc.  
Telecommunications Industries Ltd.  
Tele-Measurements, Inc. B-2

**Test Tapes, Audio**

See Adv. Page

**Broadcast Component Dist. Communication Medias ..... 269**  
**Sound Dynamics, Inc. .... 226**

Accurate Sound Co.  
Ampex Corp.  
Ampro Broadcasting Inc.  
Audio Distributor Inc. D 1-9  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Electronics, Inc.  
Broadcast Equipment Distributors  
Communication Medias

Cetec Broadcast Group  
Colorado Magnetics  
Dyma Engineering, Inc.  
Fidelipac  
Gotham Audio Corp.  
Martin Audio/Video D2  
Mastertone Co., Inc.  
Nagra Magnetic Recorders, Inc.  
Nortronics Co., Inc.  
Pentagon Industries, Inc.  
Professional Audio Service  
Sound Dynamics, Inc. D8, 9  
Sound Genesis D8, 9  
Sparta --see Cetec Broadcast Group  
TEAC Corp of America  
Taber Mfg. & Engr. Co.  
Tapex Corp.  
Track Audio, Inc. D 1-9  
VIF International  
Val-Tronics, Inc. D1-9  
Westlake Audio

**Testers, Demodulator/Detector**

See Adv. Page

**Telemet ..... 79**

Telemet a Geotel Co.

**Testers, Integrated Circuit**

Heath Co.  
Motorola Semiconductor Products, Inc.  
Tektronix Inc.

**Testers, Semiconductor**

B & K Precision Dynascan Corp.  
Datatron, Inc.  
Delta Electronics Inc. (N.C.)  
Harris Corp. PRD Electronics Div.  
Heath Co.  
Hickok Elect. Instrument  
Lauderdale Electronic Labs  
Leader Instruments Corp.  
Lectrotech Inc.  
Micro-Technical Industries  
Motorola Semiconductor Products, Inc.  
Rohde & Schwarz Sales Co.  
SPI-ITT Metrix Instruments Div.  
Sencore Inc.  
Sinai-Johnson  
Tektronix Inc.  
United Radio Supply Inc. D9

**Testers, Tape Recorder**

Amber Electro Design, Ltd.  
Broadcast Aids, Inc.  
Fidelipac  
Lauderdale Electronic Labs  
Marconi Instruments  
Professional Audio Service  
Tentel

**Testers, Vacuum Tube**

B & K Precision Dynascan Corp.  
Heath Co.  
Hickok Elect. Instrument  
Lectrotech Inc.  
SPI-ITT Metrix Instruments Div.  
Sencore Inc.  
Sinai-Johnson  
Singer Products Co., Inc.  
United Radio Supply Inc. D9

**Textbooks, Communications**

See Adv. Page

**Howard W. Sams & Co., Inc. .... 258**

Comprehensive Video Supply Corp. D 1-9  
Image Devices Inc.  
Opamp Labs, Inc.  
Howard W. Sams & Co., Inc.  
Ultra Audio Pixtec  
United Radio Supply Inc. D9

**Time Announcers**

Automation Electronics, Inc.  
Beta Technology, Inc.

Broadcast Consultants Corp. D5, 6  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Consolidated Electronic Industries  
Hallikainen & Friends, Inc.  
IGM Div. of Northwestern Tech.  
Mastertone Co., Inc.  
Schafer --see Cetec Broadcast Group  
Sono-Mag Corp.  
Stancil-Hoffman Corp.  
Tape-Athon Corp.

**Time Base Correctors, Helical Scan and Quad**

See Adv. Page

**C.R.V. Systems, Inc. .... 274**  
**Consolidated Video Systems ..... 199**  
**Edutron, Inc. .... 213**  
**Micro Consultants ..... 187**  
**Microtime, Inc. .... 55**  
**NEC America, Inc. .... 215**

Ampex Corp.  
Broadcast Communications Devices, Inc. D9  
C.R.V. Systems, Inc.  
Consolidated Video Systems dbx, Inc.  
Digital Video Systems  
Dyma Engineering, Inc.  
Edutron, Inc.  
General Television Ntwk. D 3  
Landy Associates Inc. D 1,2  
Martin Audio/Video D2  
Media Concepts, Inc. D 1-9  
Merlin Engineering Works, Inc.  
Micro Consultants  
Microtime, Inc.  
NEC America, Inc. Broadcasting Equip. Div.  
Peirce-Phelps, Inc. D 2, 5  
RCA Broadcast Systems  
Roscor Corp. D3, 4  
Sony Corp. of America VTR Div.  
Systa-Matics, Inc.

**Timers, Program**

See Adv. Page

**Broadcast Component Dist. Communication Medias ..... 273**  
**Broadcast Consultants Corp. .... 83**  
**ESE ..... 63, 65**  
**Glentronix Ltd. .... 254**

Audio Distributor Inc. D 1-9  
Beta Technology, Inc.  
Broadcast Aids, Inc.  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Conrac Corp. Cramer Div.  
Digital Concepts Corp.  
Dyma Engineering, Inc.  
ESE  
Glentronix Ltd. D 1-9  
Gotham Audio Corp.  
IGM Div. of Northwestern Tech.  
Pacific Recorders and Engrg. Corp.  
Sound Genesis D8, 9  
Standard Electric Time  
Tapecaster TCM, Inc.  
Track Audio, Inc. D 1-9  
Val-Tronics, Inc. D1-9  
Vamco Engineering  
Video Devices Co.

**Timers, Videotape**

See Adv. Page

**Artist's Engineering ..... 275**  
**Recortec Inc. .... 265**  
**Vamco Engineering ..... 198**

Artist's Engineering Visual Communications Div.  
Broadcast Aids, Inc.  
Convergence Corp.  
Digital Concepts Corp.

Dyma Engineering, Inc.  
Dynasciences Div. Whitaker Corp.  
Martin Audio/Video D2  
Merlin Engineering Works, Inc.  
Recortec Inc.  
Vamco Engineering

**Titling Systems**

See Adv. Page

**Knox Ltd. .... 256**  
**TeleMation, Inc. .... 97**  
**3M Co. .... 33**

BJA Systems, Inc.  
Beston Electronics Inc.  
Broadcast Communications Devices, Inc. D9  
Chyron Telesystems  
Interand Corp. Telestrator Div.  
International Communications & Control Corp.  
Knox Ltd.  
Laird Telemedia Inc.  
Reynolds/Leteron Co.  
System Concepts Inc.  
TeleMation, Inc.  
Telescript, Inc.  
Thomson-CSF Laboratories, Inc.  
3M Co. Mincom Div.  
Video Data Systems

**Tool Kits (Hand Tools)**

See Adv. Page

**Jensen Tools & Alloys ..... 277**

A-Tel-A-Matic  
Comprehensive Video Supply Corp. D 1-9  
G.C. Electronics  
Heath Co.  
Image Devices Inc.  
Jensen Tools & Alloys  
Martin Audio/Video D2  
Mountain West Alarm D8  
P. K. Neuses Inc.  
Sono-Mag Corp.  
United Radio Supply Inc. D9  
Upton Tools Inc.

**Tower Beacon Light Flashers**

See Adv. Page

**CCA Electronics Corp. ... 99-106**  
**Elcom Engineering Co. .... 275**  
**Hughy & Phillips Inc. .... 200**  
**SSAC Inc. .... 275**

CCA Electronics Corp.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Crouse Hinds Co.  
Dyma Engineering, Inc.  
Elcom Engineering Co.  
Flash Technology Corp. of America  
Harris Corp. Broadcast Products Div.  
Hughy & Phillips Inc.  
Jampro --see Cetec Broadcast Group  
Lauderdale Electronic Labs  
Magnum Towers, Inc.  
Mastertone Co., Inc.  
SSAC Inc.  
Tiner Communications Service, Inc.  
Unarco-Rohn Div. of Unarco Ind., Inc.

**Tower Guys --See Antenna and Tower Guys**

Philadelphia Resins Corp.

**Tower Installation and Services - -See Antenna and Tower Installation and Services**

**Tower Light Failure Alarms**

See Adv. Page

**Hughy & Phillips Inc. .... 200**  
**Moseley Assoc. Inc. .... 69**

Harris Corp. Broadcast Products Div.



Hughey & Phillips Inc.  
Magnum Towers, Inc.  
Moseley Assoc. Inc.

### Tower Light Indicator Panels

See Adv. Page

**Hughey & Phillips Inc. ....200**

Collins Radio Rockwell International  
Crouse Hinds Co.  
Fisher-Burke Broadcast Consultants  
GTE Sylvania Inc. Lighting Products  
Group

Hughey & Phillips Inc.  
Magnum Towers, Inc.  
Mastertone Co., Inc.

### Tower Lighting Isolation Transformers

See Adv. Page

**CCA Electronics Corp. .. 99-106**  
**Hughey & Phillips Inc. ....200**

CCA Electronics Corp.  
C. S. P. Inc.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Decca Austin Insulators  
Fisher-Burke Broadcast Consultants  
Harris Corp. Broadcast Products Div.  
Hughey & Phillips Inc.  
Jampro --see Cetec Broadcast Group  
Magnum Towers, Inc.  
Mastertone Co., Inc.  
North American Radio Corp.

### Tower Lights, High Intensity Obstruction --See also Lights, Tower Obstruction, Red

See Adv. Page

**Flash Technology Corp.  
of America .....216**

Cetec Broadcast Group  
Crouse Hinds Co.  
Dyma Engineering, Inc.  
Flash Technology Corp. of America  
GTE Sylvania Inc. Lighting Products  
Group  
Harris Corp. Broadcast Products Div.  
Hughey & Phillips Inc.  
Jampro --see Cetec Broadcast Group  
Magnum Towers, Inc.

### Towers

See Adv. Page

**CCA Electronics Corp. .. 99-106**  
**Collins Radio..... 21**  
**Sound Dynamics, Inc. ....226**  
**Stainless, Inc. .... 34**

Allied Tower Co., Inc.  
Broadcast Consultants Corp. D5, 6  
CCA Electronics Corp.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dyma Engineering, Inc.  
E-Z Way Products, Inc.  
Fort Worth Tower Co., Inc.  
G.C. Electronics  
Harris Corp. Broadcast Products Div.  
Jampro --see Cetec Broadcast Group  
Kline Iron & Steel Co.  
Magnum Towers, Inc.  
Mastertone Co., Inc.  
Maze Corp D6  
Sound Dynamics, Inc. D8, 9  
Stainless, Inc.  
Swager Tower Corp.  
Tiner Communications Service, Inc.  
Unarco-Rohn Div. of Unarco Ind., Inc.  
Up-Right Scaffolds  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

### Towers, Antenna Receiving

See Adv. Page

**Stainless, Inc. .... 34**

Allied Tower Co., Inc.  
E-Z Way Products, Inc.  
Magnum Towers, Inc.  
Singer Products Co., Inc.  
Stainless, Inc.  
Swager Tower Corp.  
Tiner Communications Service, Inc.  
Unarco-Rohn Div. of Unarco Ind., Inc.  
Up-Right Scaffolds

### Towers, Antenna Transmitting AM

See Adv. Page

**Stainless, Inc. .... 34**

Allied Tower Co., Inc.  
Broadcast Consultants Corp. D5, 6  
Broadcast Specialties  
CCA Electronics Corp.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dielectric Communications Div. Sola  
Basic, Inc.  
Dyma Engineering, Inc.  
E-Z Way Products, Inc.  
Fort Worth Tower Co., Inc.  
Harris Corp. Broadcast Products Div.  
Jampro --see Cetec Broadcast Group  
Kline Iron & Steel Co.  
Magnum Towers, Inc.  
Mastertone Co., Inc.  
Pacific Recorders and Engrg. Corp.  
RCA Broadcast Systems  
Singer Products Co., Inc.  
Stainless, Inc.  
Swager Tower Corp.  
Tiner Communications Service, Inc.  
Unarco-Rohn Div. of Unarco Ind., Inc.  
Up-Right Scaffolds  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

### Towers, Antenna Transmitting FM

See Adv. Page

**Stainless, Inc. .... 34**

Allied Tower Co., Inc.  
Broadcast Consultants Corp. D5, 6  
Broadcast Specialties  
CCA Electronics Corp.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Dielectric Communications Div. Sola  
Basic, Inc.  
Dyma Engineering, Inc.  
E-Z Way Products, Inc.  
Fort Worth Tower Co., Inc.  
Harris Corp. Broadcast Products Div.  
Jampro --see Cetec Broadcast Group  
Kline Iron & Steel Co.  
Magnum Towers, Inc.  
Mastertone Co., Inc.  
Pacific Recorders and Engrg. Corp.  
RCA Broadcast Systems  
Singer Products Co., Inc.  
Stainless, Inc.  
Swager Tower Corp.  
Tiner Communications Service, Inc.  
Unarco-Rohn Div. of Unarco Ind., Inc.  
Up-Right Scaffolds  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

### Towers, Antenna Transmitting TV

See Adv. Page

**Stainless, Inc. .... 34**

Allied Tower Co., Inc.  
CCA Electronics Corp.  
Cetec Broadcast Group  
Dielectric Communications Div. Sola  
Basic, Inc.  
Dyma Engineering, Inc.  
E-Z Way Products, Inc.  
Fort Worth Tower Co., Inc.

Harris Corp. Broadcast Products Div.  
Jampro --see Cetec Broadcast Group  
Kline Iron & Steel Co.  
Magnum Towers, Inc.  
Pacific Recorders and Engrg. Corp.  
RCA Broadcast Systems  
Singer Products Co., Inc.  
Stainless, Inc.  
Swager Tower Corp.  
Tiner Communications Service, Inc.  
Unarco-Rohn Div. of Unarco Ind., Inc.  
Up-Right Scaffolds  
Val-Tronics, Inc. D1-9

### Transformers, Audio

Altec Sound Products  
A-Tel-A-Matic  
Automated Processes, Inc.  
Broadcast Communications Devices,  
Inc. D9  
Dyma Engineering, Inc.  
Electro-Voice Inc.  
Gotham Audio Corp.  
Lauderdale Electronic Labs  
Martin Audio/Video D2  
Microtran Co., Inc.  
Modular Audio Products Unit of  
Modular Devices, Inc.  
Charles Moore  
Opamp Labs, Inc.  
The Orange County Electronics Corp.  
Ltd.  
Quad-Eight Electronics  
Shure Brothers Inc.  
Studer Revox America  
Westlake Audio  
Whirlwind Music

### Transformers, Line Level

See Adv. Page

**Robins Broadcast &  
Sound Equip. Corp. .... 38**

Broadcast Communications Devices,  
Inc. D9  
Dyma Engineering, Inc.  
Lauderdale Electronic Labs  
Martin Audio/Video D2  
Microtran Co., Inc.  
Charles Moore  
Opamp Labs, Inc.  
Robins Broadcast & Sound Equip.  
Corp.

### Transformers, RF Sampling

See Adv. Page

**Delta Electronics Inc.  
(Va.) .....183**

A-Tel-A-Matic  
Delta Electronics Inc. (Va.)  
Dyma Engineering, Inc.  
Harris Corp. Broadcast Products Div.  
Multronics, Inc.  
North Hills Electronics, Inc.  
Val-Tronics, Inc. D1-9

### Translator Repair Parts

See Adv. Page

**Television Technology  
Corp. ....265**

Acrodyne Industries Inc.  
Television Technology Corp.  
Tepeco Corp.

### Translator Systems, High Power

See Adv. Page

**Acrodyne Industries  
Inc. ....188**  
**CCA Electronics Corp. .. 99-106**  
**Television Technology  
Corp. ....265**

Acrodyne Industries Inc.  
CCA Electronics Corp.  
Dielectric Communications Div. Sola  
Basic, Inc.

Dyma Engineering, Inc.  
EMCEE Broadcast Products  
D. N. Latus & Co., Inc.  
Pacific Recorders and Engrg. Corp.  
Rolane Sales Corp.  
Television Technology Corp.  
Tepeco Corp.

### Translator Systems, Low Power

See Adv. Page

**Acrodyne Industries  
Inc. ....188**  
**CCA Electronics Corp. .. 99-106**  
**Television Technology  
Corp. ....265**

Acrodyne Industries Inc.  
CCA Electronics Corp.  
Contel Mfg.  
Dyma Engineering, Inc.  
EMCEE Broadcast Products  
Harris Corp. Broadcast Products Div.  
Ikegami Electronics (USA) Inc.  
D. N. Latus & Co., Inc.  
Marconi Electronics Inc.  
Rodelco Corp.  
Rohde & Schwarz Sales Co.  
Rolane Sales Corp.  
Scientific-Atlanta, Inc.  
Singer Products Co., Inc.  
Television Technology Corp.  
Tepeco Corp.

### Transmission Lines

See Adv. Page

**Andrew Corp.....205**  
**CCA Electronics Corp. .. 99-106**  
**Cablewave Systems  
Inc. ....173**

Andrew Corp.  
Belden Corp.  
Broadcast Automation Assoc. D  
1,2,5,6  
Broadcast Specialties  
CCA Electronics Corp.  
Cablewave Systems Inc.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Comark Industries Inc.  
Continental Electronics Mfg. Co.  
Dielectric Communications Div. Sola  
Basic, Inc.  
Dyma Engineering, Inc.  
The Finney Co.  
Harris Corp. Broadcast Products Div.  
Jampro --see Cetec Broadcast Group  
Mastertone Co., Inc.  
Maury Microwave Corp.  
Maze Corp D6  
Micro Communications, Inc.  
Pacific Recorders and Engrg. Corp.  
Phelps Dodge Communications Co.  
RCA Broadcast Systems  
Saxton Products Inc.  
Shively Laboratories, Inc.  
Singer Products Co., Inc.  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

### Transmission Sets

Amber Electro Design, Ltd.  
Cablewave Systems Inc.  
GTE Lenkurt, Inc.  
Val-Tronics, Inc. D1-9

### Transmission Systems, TV Optical Carrier

American Laser Systems, Inc.

### Transmitter Kits

ATV Research  
CSI Electronics, Inc.  
Harris Corp. Broadcast Products Div.  
Heath Co.  
McMartin Industries, Inc.





Marconi Communication Systems Ltd.  
Marconi Electronics Inc.  
North American Radio Corp.  
RCA Broadcast Systems  
Singer Products Co., Inc.

**Transmitters, AM to order**

See Adv. Page

**CCA Electronics Corp. .. 99-106**  
**Collins Radio..... 21**

CCA Electronics Corp.  
CSI Electronics, Inc.  
C. S. P. Inc.  
Collins Radio Rockwell International  
Continental Electronics Mfg. Co.  
Harris Corp. Broadcast Products Div.  
Marconi Communication Systems Ltd.  
Maze Corp D6  
North American Radio Corp.  
Singer Products Co., Inc.  
Sintronic Corp.  
Wilkinson Electronics, Inc.

**Transmitters, FM 10 Watt**

See Adv. Page

**Broadcast Component**  
**Dist. Communication**  
**Medias.....273**  
**CCA Electronics Corp. .. 99-106**  
**McMartin Industries,**  
**Inc.....174**  
**Wilkinson Electronics,**  
**Inc..... 62**

AEL, Inc.  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Consultants Corp. D5, 6  
Broadcast Equipment & Supply Co. D  
1-9  
Broadcast Specialties  
CCA Electronics Corp.  
CSI Electronics, Inc.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
GTE Lenkurt, Inc.  
Harris Corp. Broadcast Products Div.  
LPB Inc.  
Marconi Communication Systems Ltd.  
Mastertone Co., Inc.  
McMartin Industries, Inc.  
QEI Corp.  
RCA Broadcast Systems  
Rohde & Schwarz Sales Co.  
Singer Products Co., Inc.  
Sintronic Corp.  
Sparta --see Cetec Broadcast Group  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

**Transmitters, FM 40 Watt**

See Adv. Page

**CCA Electronics Corp. .. 99-106**  
CCA Electronics Corp.

**Transmitters, FM 50 Watt**

See Adv. Page

**McMartin Industries,**  
**Inc.....174**

AEL, Inc.  
Broadcast Equipment & Supply Co. D  
1-9  
CCA Electronics Corp.  
CSI Electronics, Inc.  
Harris Corp. Broadcast Products Div.  
Marconi Communication Systems Ltd.  
Mastertone Co., Inc.  
McMartin Industries, Inc.  
Rohde & Schwarz Sales Co.  
Singer Products Co., Inc.  
Sintronic Corp.  
Wilkinson Electronics, Inc.

**Transmitters, FM 100 Watt**

See Adv. Page

**CCA Electronics Corp. .. 99-106**  
**McMartin Industries,**  
**Inc.....174**  
**Wilkinson Electronics,**  
**Inc..... 62**

AEL, Inc.  
Broadcast Equipment & Supply Co. D  
1-9  
Broadcast Specialties  
CCA Electronics Corp.  
CSI Electronics, Inc.  
Harris Corp. Broadcast Products Div.  
Marconi Communication Systems Ltd.  
Mastertone Co., Inc.  
McMartin Industries, Inc.  
Scientific Radio Systems, Inc.  
Singer Products Co., Inc.  
Sintronic Corp.  
Wilkinson Electronics, Inc.

**Transmitters, FM 250 Watt**

See Adv. Page

**CCA Electronics Corp. .. 99-106**  
**McMartin Industries,**  
**Inc.....174**  
**Wilkinson Electronics,**  
**Inc..... 62**

AEL, Inc.  
Broadcast Equipment & Supply Co. D  
1-9  
Broadcast Specialties  
CCA Electronics Corp.  
CSI Electronics, Inc.  
Cetec Broadcast Group  
Harris Corp. Broadcast Products Div.  
Marconi Communication Systems Ltd.  
Marti Electronics  
Mastertone Co., Inc.  
McMartin Industries, Inc.  
North American Radio Corp.  
Singer Products Co., Inc.  
Sintronic Corp.  
Sparta --see Cetec Broadcast Group  
Wilkinson Electronics, Inc.

**Transmitters, FM 500 Watt**

See Adv. Page

**McMartin Industries,**  
**Inc.....174**  
**Wilkinson Electronics,**  
**Inc..... 62**

Broadcast Equipment & Supply Co. D  
1-9  
Broadcast Specialties  
CCA Electronics Corp.  
CSI Electronics, Inc.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Harris Corp. Broadcast Products Div.  
Marconi Communication Systems Ltd.  
Mastertone Co., Inc.  
McMartin Industries, Inc.  
RCA Broadcast Systems  
Singer Products Co., Inc.  
Sparta --see Cetec Broadcast Group  
Wilkinson Electronics, Inc.

**Transmitters, FM 1 kw**

See Adv. Page

**CCA Electronics Corp. .. 99-106**  
**Collins Radio..... 21**  
**McMartin Industries,**  
**Inc.....174**  
**Sound Dynamics, Inc. ....226**  
**Wilkinson Electronics,**  
**Inc..... 62**

AEL, Inc.  
Broadcast Consultants Corp. D5, 6  
Broadcast Equipment & Supply Co. D  
1-9  
Broadcast Specialties  
CCA Electronics Corp.  
CSI Electronics, Inc.

Cetec Broadcast Group  
Collins Radio Rockwell International  
Fung Engineering Inc.  
Harris Corp. Broadcast Products Div.  
Marconi Communication Systems Ltd.  
Marconi Electronics Inc.  
Mastertone Co., Inc.  
McMartin Industries, Inc.  
North American Radio Corp.  
RCA Broadcast Systems  
Scientific Radio Systems, Inc.  
Singer Products Co., Inc.  
Sintronic Corp.  
Sound Dynamics, Inc. D8, 9  
Sparta --see Cetec Broadcast Group  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

**Transmitters, FM 1.5 kw**

See Adv. Page

**Wilkinson Electronics,**  
**Inc..... 62**

Wilkinson Electronics, Inc.

**Transmitters, FM 2 kw**

See Adv. Page

**Wilkinson Electronics,**  
**Inc..... 62**

Wilkinson Electronics, Inc.

**Transmitters, FM 2.5 kw**

See Adv. Page

**Broadcast Component**  
**Dist. Communication**  
**Medias.....271**  
**McMartin Industries,**  
**Inc.....174**

AEL, Inc.  
Broadcast Component Dist.  
Communication Medias D 1-9  
Broadcast Equipment & Supply Co. D  
1-9  
Broadcast Specialties  
CCA Electronics Corp.  
CSI Electronics, Inc.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Harris Corp. Broadcast Products Div.  
Marconi Communication Systems Ltd.  
Mastertone Co., Inc.  
McMartin Industries, Inc.  
North American Radio Corp.  
Singer Products Co., Inc.  
Sparta --see Cetec Broadcast Group  
Wilkinson Electronics, Inc.

**Transmitters, FM 3 kw**

See Adv. Page

**CCA Electronics Corp. .. 99-106**  
**McMartin Industries,**  
**Inc.....174**

AEL, Inc.  
Allied Broadcast Equip. D 1-9  
Broadcast Equipment & Supply Co. D  
1-9  
Broadcast Specialties  
CCA Electronics Corp.  
CSI Electronics, Inc.  
Cetec Broadcast Group  
Fisher-Burke Broadcast Consultants  
Harris Corp. Broadcast Products Div.  
Marconi Communication Systems Ltd.  
Mastertone Co., Inc.  
McMartin Industries, Inc.  
RCA Broadcast Systems  
Singer Products Co., Inc.  
Sintronic Corp.  
Sparta --see Cetec Broadcast Group  
Val-Tronics, Inc. D1-9

**Transmitters, FM 3.5 kw**

See Adv. Page

**McMartin Industries,**  
**Inc.....174**

Allied Broadcast Equip. D 1-9  
Broadcast Specialties  
CSI Electronics, Inc.  
McMartin Industries, Inc.  
Sintronic Corp.

**Transmitters, FM 4 kw**

See Adv. Page

**CCA Electronics Corp. .. 99-106**  
**Wilkinson Electronics,**  
**Inc..... 62**

CCA Electronics Corp.  
Wilkinson Electronics, Inc.

**Transmitters, FM 5 kw**

See Adv. Page

**CCA Electronics Corp. .. 99-106**  
**Collins Radio..... 21**  
**McMartin Industries,**  
**Inc.....174**  
**Wilkinson Electronics,**  
**Inc..... 62**

AEL, Inc.  
Allied Broadcast Equip. D 1-9  
Broadcast Equipment & Supply Co. D  
1-9  
Broadcast Specialties  
CCA Electronics Corp.  
CSI Electronics, Inc.  
Cetec Broadcast Group  
Collins Radio Rockwell International  
Harris Corp. Broadcast Products Div.  
Marconi Communication Systems Ltd.  
Marconi Electronics Inc.  
Mastertone Co., Inc.  
McMartin Industries, Inc.  
RCA Broadcast Systems  
Singer Products Co., Inc.  
Sintronic Corp.  
Sparta --see Cetec Broadcast Group  
Val-Tronics, Inc. D1-9  
Wilkinson Electronics, Inc.

**Transmitters, FM 7.5 kw**

See Adv. Page

**McMartin Industries,**  
**Inc.....174**  
**Wilkinson Electronics,**  
**Inc..... 62**

AEL, Inc.  
Allied Broadcast Equip. D 1-9  
Broadcast Equipment & Supply Co. D  
1-9  
Broadcast Specialties  
CCA Electronics Corp.  
CSI Electronics, Inc.  
Collins Radio Rockwell International  
Harris Corp. Broadcast Products Div.  
Marconi Communication Systems Ltd.  
Mastertone Co., Inc.  
McMartin Industries, Inc.  
Singer Products Co., Inc.  
Wilkinson Electronics, Inc.

**Transmitters, FM 8 kw**

See Adv. Page

**CCA Electronics Corp. .. 99-106**  
CCA Electronics Corp.

**Transmitters, FM 10 kw**

See Adv. Page

**Broadcast Component**  
**Dist. Communication**  
**Medias.....271**  
**Collins Radio..... 21**

**McMartin Industries, Inc.** ..... 174  
**Sintron Corp.** ..... 256  
**Wilkinson Electronics, Inc.** ..... 62

AEL, Inc.  
 Allied Broadcast Equip. D 1-9  
 Broadcast Component Dist.  
 Communication Medias D 1-9  
 Broadcast Equipment & Supply Co. D 1-9  
 CCA Electronics Corp.  
 CSI Electronics, Inc.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Harris Corp. Broadcast Products Div.  
 Marconi Communication Systems Ltd.  
 Marconi Electronics Inc.  
 Mastertone Co., Inc.  
 McMartin Industries, Inc.  
 RCA Broadcast Systems  
 Singer Products Co., Inc.  
 Sintron Corp.  
 Sparta --see Cetec Broadcast Group  
 Val-Tronics, Inc. D1-9  
 Wilkinson Electronics, Inc.

**Transmitters, FM 12 kw**  
 See Adv. Page  
**CCA Electronics Corp. .. 99-106**  
**McMartin Industries, Inc.** ..... 174  
**Sintron Corp.** ..... 256

AEL, Inc.  
 Allied Broadcast Equip. D 1-9  
 Broadcast Equipment & Supply Co. D 1-9  
 Broadcast Specialties  
 CCA Electronics Corp.  
 CSI Electronics, Inc.  
 Collins Radio Rockwell International  
 Harris Corp. Broadcast Products Div.  
 McMartin Industries, Inc.  
 Singer Products Co., Inc.  
 Sintron Corp.

**Transmitters, FM 15 kw**  
 See Adv. Page

**Broadcast Component Dist. Communication Medias** ..... 271  
**McMartin Industries, Inc.** ..... 174  
**Sintron Corp.** ..... 256

Allied Broadcast Equip. D 1-9  
 Broadcast Component Dist.  
 Communication Medias D 1-9  
 Broadcast Equipment & Supply Co. D 1-9  
 CCA Electronics Corp.  
 CSI Electronics, Inc.  
 Collins Radio Rockwell International  
 Harris Corp. Broadcast Products Div.  
 McMartin Industries, Inc.  
 Singer Products Co., Inc.  
 Sintron Corp.

**Transmitters, FM 20 kw**  
 See Adv. Page  
**CCA Electronics Corp. .. 99-106**  
**McMartin Industries, Inc.** ..... 174  
**Sintron Corp.** ..... 256  
**Wilkinson Electronics, Inc.** ..... 62

Allied Broadcast Equip. D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Equipment & Supply Co. D 1-9  
 Broadcast Specialties  
 CCA Electronics Corp.  
 CSI Electronics, Inc.  
 Collins Radio Rockwell International  
 Harris Corp. Broadcast Products Div.  
 Mastertone Co., Inc.  
 McMartin Industries, Inc.

North American Radio Corp.  
 RCA Broadcast Systems  
 Singer Products Co., Inc.  
 Sintron Corp.  
 Val-Tronics, Inc. D1-9  
 Wilkinson Electronics, Inc.

**Transmitters, FM 22.5 kw**  
 See Adv. Page

**McMartin Industries, Inc.** ..... 174  
**Sintron Corp.** ..... 256

Allied Broadcast Equip. D 1-9  
 CSI Electronics, Inc.  
 Collins Radio Rockwell International  
 McMartin Industries, Inc.  
 Sintron Corp.

**Transmitters, FM 25 kw**  
 See Adv. Page

**Broadcast Component Dist. Communication Medias** ..... 271  
**Collins Radio** ..... 21  
**McMartin Industries, Inc.** ..... 174  
**Sintron Corp.** ..... 256  
**Wilkinson Electronics, Inc.** ..... 62

AEL, Inc.  
 Allied Broadcast Equip. D 1-9  
 Broadcast Component Dist.  
 Communication Medias D 1-9  
 Broadcast Equipment & Supply Co. D 1-9  
 Broadcast Specialties  
 CCA Electronics Corp.  
 CSI Electronics, Inc.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Harris Corp. Broadcast Products Div.  
 McMartin Industries, Inc.  
 Singer Products Co., Inc.  
 Sintron Corp.  
 Sparta --see Cetec Broadcast Group  
 Val-Tronics, Inc. D1-9  
 Wilkinson Electronics, Inc.

**Transmitters, FM 27.5 kw**  
 See Adv. Page  
**CCA Electronics Corp. .. 99-106**

CCA Electronics Corp.

**Transmitters, FM 35 kw**  
 See Adv. Page  
**CCA Electronics Corp. .. 99-106**  
**McMartin Industries, Inc.** ..... 174  
**Sintron Corp.** ..... 256

Allied Broadcast Equip. D 1-9  
 CCA Electronics Corp.  
 CSI Electronics, Inc.  
 McMartin Industries, Inc.  
 Sintron Corp.

**Transmitters, FM 40 kw**  
 See Adv. Page

**Broadcast Component Dist. Communication Medias** ..... 271  
**McMartin Industries, Inc.** ..... 174  
**Sintron Corp.** ..... 256

AEL, Inc.  
 Allied Broadcast Equip. D 1-9  
 Broadcast Component Dist.  
 Communication Medias D 1-9  
 CCA Electronics Corp.  
 CSI Electronics, Inc.  
 Collins Radio Rockwell International  
 Harris Corp. Broadcast Products Div.

Mastertone Co., Inc.  
 McMartin Industries, Inc.  
 North American Radio Corp.  
 RCA Broadcast Systems  
 Singer Products Co., Inc.  
 Sintron Corp.  
 Wilkinson Electronics, Inc.

**Transmitters, FM 50 kw**  
 See Adv. Page

**Broadcast Component Dist. Communication Medias** ..... 271  
**Collins Radio** ..... 21  
**McMartin Industries, Inc.** ..... 174  
**Sintron Corp.** ..... 256  
**Wilkinson Electronics, Inc.** ..... 62

AEL, Inc.  
 Allied Broadcast Equip. D 1-9  
 Broadcast Component Dist.  
 Communication Medias D 1-9  
 CCA Electronics Corp.  
 CSI Electronics, Inc.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Harris Corp. Broadcast Products Div.  
 McMartin Industries, Inc.  
 North American Radio Corp.  
 Singer Products Co., Inc.  
 Sintron Corp.  
 Sparta --see Cetec Broadcast Group  
 Wilkinson Electronics, Inc.

**Transmitters, FM 55 kw**  
 See Adv. Page  
**CCA Electronics Corp. .. 99-106**

CCA Electronics Corp.

**Transmitters, FM 70 kw**  
 See Adv. Page  
**CCA Electronics Corp. .. 99-106**

CCA Electronics Corp.

**Transmitters, FM 100 kw**  
 See Adv. Page  
**CCA Electronics Corp. .. 99-106**

CCA Electronics Corp.  
 CSI Electronics, Inc.  
 Harris Corp. Broadcast Products Div.  
 North American Radio Corp.  
 Singer Products Co., Inc.

**Transmitters, FM to order**  
 See Adv. Page  
**CCA Electronics Corp. .. 99-106**  
**Collins Radio** ..... 21

CCA Electronics Corp.  
 CSI Electronics, Inc.  
 Collins Radio Rockwell International  
 Fisher-Burke Broadcast Consultants  
 Harris Corp. Broadcast Products Div.  
 Marconi Communication Systems Ltd.  
 Maze Corp D6  
 North American Radio Corp.  
 Rohde & Schwarz Sales Co.  
 Singer Products Co., Inc.  
 Sintron Corp.  
 Wilkinson Electronics, Inc.

**Transmitters, TV Microwave**  
 See Adv. Page

**International Microwave Corp.** ..... 266  
**Microwave Assoc. Inc.** ..... 227  
**Sound Dynamics, Inc.** ..... 226

Acrodyne Industries Inc.  
 EMCEE Broadcast Products

Farinon Electric  
 GTE Lenkurt, Inc.  
 Hughes Microwave Communication Products  
 International Microwave Corp.  
 Microwave Assoc. Inc.  
 RCA Broadcast Systems  
 Sound Dynamics, Inc. D8, 9  
 Tepco Corp.  
 TerraCom  
 Varian/Beverly Micro-Link Products

**Transmitters, TV 1 Watt**  
 See Adv. Page  
**Howe-Yin Research Co. Inc.** ..... 259

Acrodyne Industries Inc.  
 EMCEE Broadcast Products  
 Fung Engineering Inc.  
 GTE Lenkurt, Inc.  
 Harris Corp. Broadcast Products Div.  
 Howe-Yin Research Co. Inc.  
 Marconi Communication Systems Ltd.  
 Rohde & Schwarz Sales Co.  
 Television Technology Corp.  
 Townsend Associates, Inc.  
 Varian/Beverly Micro-Link Products

**Transmitters, TV 10 Watt**  
 See Adv. Page  
**Howe-Yin Research Co. Inc.** ..... 259

Acrodyne Industries Inc.  
 EMCEE Broadcast Products  
 GTE Lenkurt, Inc.  
 Harris Corp. Broadcast Products Div.  
 Howe-Yin Research Co. Inc.  
 Marconi Communication Systems Ltd.  
 Rodelco Corp.  
 Rolane Sales Corp.  
 Television Technology Corp.  
 Townsend Associates, Inc.  
 Varian/Beverly Micro-Link Products

**Transmitters, TV 20 Watt**

Acrodyne Industries Inc.  
 EMCEE Broadcast Products  
 Harris Corp. Broadcast Products Div.  
 Marconi Communication Systems Ltd.  
 Rodelco Corp.  
 Rolane Sales Corp.  
 Television Technology Corp.

**Transmitters, TV 60 Watt**

Acrodyne Industries Inc.  
 EMCEE Broadcast Products  
 Harris Corp. Broadcast Products Div.  
 Marconi Communication Systems Ltd.  
 Rodelco Corp.  
 Rolane Sales Corp.

**Transmitters, TV 100 Watt**  
 See Adv. Page  
**CCA Electronics Corp. .. 99-106**  
**Howe-Yin Research Co. Inc.** ..... 259

Acrodyne Industries Inc.  
 CCA Electronics Corp.  
 EMCEE Broadcast Products  
 Harris Corp. Broadcast Products Div.  
 Howe-Yin Research Co. Inc.  
 Marconi Communication Systems Ltd.  
 Rodelco Corp.  
 Rolane Sales Corp.  
 Television Technology Corp.

**Transmitters, TV 500 Watt**

Acrodyne Industries Inc.  
 CCA Electronics Corp.  
 EMCEE Broadcast Products  
 Harris Corp. Broadcast Products Div.  
 Marconi Communication Systems Ltd.  
 Marconi Electronics Inc.



**Transmitters, TV 1 kw**

See Adv. Page

**Acrodyne Industries**

Inc. .... 188  
**CCA Electronics Corp. ... 99-106**  
**Howe-Yin Research Co.**  
 Inc. .... 259

Acrodyne Industries Inc.  
 CCA Electronics Corp.  
 EMCEE Broadcast Products  
 Harris Corp. Broadcast Products Div.  
 Howe-Yin Research Co. Inc.  
 Marconi Communication Systems Ltd.  
 Marconi Electronics Inc.  
 Philips Broadcast Equip Corp.  
 Townsend Associates, Inc.

**Transmitters, TV 2 kw**

Acrodyne Industries Inc.  
 CCA Electronics Corp.  
 EMCEE Broadcast Products  
 Harris Corp. Broadcast Products Div.  
 Marconi Communication Systems Ltd.

**Transmitters, TV 3 kw**

See Adv. Page

**Howe-Yin Research Co.**  
 Inc. .... 259

Howe-Yin Research Co. Inc.

**Transmitters, TV 5 kw**

Acrodyne Industries Inc.  
 CCA Electronics Corp.  
 Harris Corp. Broadcast Products Div.  
 Marconi Communication Systems Ltd.  
 Marconi Electronics Inc.  
 Philips Broadcast Equip Corp.  
 Townsend Associates, Inc.

**Transmitters, TV 6 kw**

See Adv. Page

**CCA Electronics Corp. ... 99-106**

Acrodyne Industries Inc.  
 CCA Electronics Corp.  
 Harris Corp. Broadcast Products Div.  
 Marconi Communication Systems Ltd.  
 Philips Broadcast Equip Corp.

**Transmitters, TV 10 kw**

Acrodyne Industries Inc.  
 CCA Electronics Corp.  
 Harris Corp. Broadcast Products Div.  
 Howe-Yin Research Co. Inc.  
 Marconi Communication Systems Ltd.  
 Marconi Electronics Inc.  
 Philips Broadcast Equip Corp.

**Transmitters, TV 11 kw**

Acrodyne Industries Inc.  
 Harris Corp. Broadcast Products Div.  
 Marconi Communication Systems Ltd.  
 Philips Broadcast Equip Corp.

**Transmitters, TV 12 kw**

See Adv. Page

**CCA Electronics Corp. ... 99-106**

Acrodyne Industries Inc.  
 CCA Electronics Corp.  
 Harris Corp. Broadcast Products Div.  
 Marconi Communication Systems Ltd.  
 Philips Broadcast Equip Corp.  
 Townsend Associates, Inc.

**Transmitters, TV 12.5 kw**

See Adv. Page

**CCA Electronics Corp. ... 99-106**

CCA Electronics Corp.

**Transmitters, TV 15 kw**

See Adv. Page

**CCA Electronics Corp. ... 99-106**

CCA Electronics Corp.  
 Harris Corp. Broadcast Products Div.  
 Marconi Communication Systems Ltd.  
 Marconi Electronics Inc.  
 RCA Broadcast Systems

**Transmitters, TV 17.5 kw**

See Adv. Page

**CCA Electronics Corp. ... 99-106**

**Transmitters, TV 24 kw**

See Adv. Page

**CCA Electronics Corp. ... 99-106**

CCA Electronics Corp.

**Transmitters, TV 25 kw**

See Adv. Page

**CCA Electronics Corp. ... 99-106**

CCA Electronics Corp.  
 Harris Corp. Broadcast Products Div.  
 Marconi Communication Systems Ltd.  
 Marconi Electronics Inc.  
 Philips Broadcast Equip Corp.  
 RCA Broadcast Systems  
 Townsend Associates, Inc.

**Transmitters, TV 30 kw**

See Adv. Page

**CCA Electronics Corp. ... 99-106**

CCA Electronics Corp.  
 Harris Corp. Broadcast Products Div.  
 Marconi Communication Systems Ltd.  
 Marconi Electronics Inc.  
 Philips Broadcast Equip Corp.  
 RCA Broadcast Systems  
 Townsend Associates, Inc.

**Transmitters, TV 35 kw**

See Adv. Page

**CCA Electronics Corp. ... 99-106**

CCA Electronics Corp.  
 Harris Corp. Broadcast Products Div.  
 Marconi Communication Systems Ltd.  
 Marconi Electronics Inc.  
 Philips Broadcast Equip Corp.  
 RCA Broadcast Systems

**Transmitters, TV 50 kw**

See Adv. Page

**CCA Electronics Corp. ... 99-106**

CCA Electronics Corp.  
 Harris Corp. Broadcast Products Div.  
 Marconi Communication Systems Ltd.  
 Marconi Electronics Inc.  
 Philips Broadcast Equip Corp.  
 RCA Broadcast Systems

**Transmitters, TV 55 kw**

See Adv. Page

**CCA Electronics Corp. ... 99-106**

CCA Electronics Corp.  
 Harris Corp. Broadcast Products Div.  
 Marconi Communication Systems Ltd.  
 Marconi Electronics Inc.  
 Philips Broadcast Equip Corp.  
 RCA Broadcast Systems  
 Townsend Associates, Inc.

**Transmitters, TV 100 kw**

See Adv. Page

**CCA Electronics Corp. ... 99-106**

CCA Electronics Corp.  
 Harris Corp. Broadcast Products Div.  
 Marconi Communication Systems Ltd.  
 Marconi Electronics Inc.  
 RCA Broadcast Systems  
 Townsend Associates, Inc.

**Transmitters, TV to order**

Acrodyne Industries Inc.  
 CCA Electronics Corp.  
 Harris Corp. Broadcast Products Div.  
 Howe-Yin Research Co. Inc.  
 Marconi Communication Systems Ltd.  
 RCA Broadcast Systems  
 Television Technology Corp.  
 Townsend Associates, Inc.

**Tuners, AM**

See Adv. Page

**McKay Dymek Co. .... 254**  
**Ramko Research Inc. .... 176**

McKay Dymek Co.  
 Ramko Research Inc.

**Tuners, FM**

See Adv. Page

**Ramko Research Inc. .... 176**

Accurate Sound Co.  
 Collins Radio Rockwell International  
 Crown International, Inc.  
 Heath Co.  
 Lauderdale Electronic Labs  
 Martin Audio/Video D2  
 Precision Elect. Inc.  
 Ramko Research Inc.  
 TEAC Corp of America

**Tuners, TV Audio**

See Adv. Page

**Rhoades National Corp. .... 277**

Rhoades National Corp.

**Turnkey Equipment Installation Services**

AEL, Inc.  
 A. F. Associates, Inc.  
 Ampro Broadcasting Inc.  
 Applied Video Electronics, Inc. D 1-9  
 Atlantic Research Corp.  
 Beta Technology, Inc.  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Specialties  
 CCA Electronics Corp.  
 EMCEE Broadcast Products  
 Farinon Electric  
 Fisher-Burke Broadcast Consultants  
 GTE Lenkurt, Inc.  
 Harris Corp. Broadcast Products Div.  
 Hughes Microwave Communication Products  
 Magna-Tech Electronic Co., Inc.  
 Marconi Communication Systems Ltd.  
 Maze Corp D6  
 Merrill Cable Equipment Corp.  
 Microtime, Inc.  
 Microwave Assoc. Inc.  
 Pacific Recorders and Engrg. Corp.  
 RCA Broadcast Systems  
 RCA Community Television Systems  
 Rivers Associates, Inc.  
 Roscor Corp. D3, 4  
 Spectra Sonics  
 Tele-Measurements, Inc. B-2  
 Track Audio, Inc. D 1-9  
 Ultra Audio Pixtec  
 Westlake Audio  
 The Widget Works, Inc.

**Turntable Speed Control --See Tape Deck and Turntable Speed Control****Turntables, Phonograph**

See Adv. Page

**Broadcast Component Dist. Communication Medias ..... 273**

**Broadcast Consultants**

Corp. .... 83, 84  
**CCA Electronics Corp. ... 99-106**  
**Collins Radio..... 21**  
**McCurdy Radio Ind.**  
 Inc. .... IBC  
**Micro-Trak Corp. .... 260**  
**Ramko Research Inc. .... 97, 176**  
**Russco Electronics Mfg. Inc. .... 18**  
**Sound Dynamics, Inc. .... 226**

Ampro Broadcasting Inc.  
 Audio Distributor Inc. D 1-9  
 Broadcast Automation Assoc. D 1,2,5,6  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Component Dist. Communication Medias D 1-9  
 Broadcast Consultants Corp. D5, 6  
 Broadcast Electronics, Inc.  
 Broadcast Equipment Distributors Communication Medias  
 Broadcast Equipment & Supply Co. D 1-9  
 Broadcast Specialties  
 CCA Electronics Corp.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Dyma Engineering, Inc.  
 ELPA Marketing Industries, Inc.  
 EMT Franz VGmbH  
 Gotham Audio Corp.  
 Harris Corp. Broadcast Products Div.  
 Heath Co.  
 International Electro-Magnetics  
 LPB Inc.  
 Martin Audio/Video D2  
 Mastertone Co., Inc.  
 McCurdy Radio Ind. Inc.  
 Media Concepts, Inc. D 1-9  
 Micro-Trak Corp.  
 ORK Electronic Products  
 RCA Broadcast Systems  
 Ramko Research Inc.  
 Russco Electronics Mfg. Inc.  
 Sansui Electronics Corp.  
 Singer Products Co., Inc.  
 Sintronic Corp.  
 Sound Dynamics, Inc. D8, 9  
 Sound Genesis D8, 9  
 Sparta --see Cetec Broadcast Group  
 Stanton Magnetics Inc.  
 TEAC Corp of America  
 Technics by Panasonic  
 Track Audio, Inc. D 1-9  
 Val-Tronics, Inc. D1-9  
 Wilkinson Electronics, Inc.

**TV Systems, Closed Circuit**

A. F. Associates, Inc.  
 ATV Research  
 American Data Div. Philips Broadcast Equip. Corp.  
 A-Tel-A-Matic  
 Atlantic Research Corp.  
 Berkey-Colortran Inc.  
 Boston Insulated Wire & Cable Co.  
 Broadcast Communications Devices, Inc. D9  
 Broadcast Video Systems, Ltd.  
 Catej Div. United Scientific Corp.  
 Ceco Communications Inc.  
 Central Dynamics Corp.  
 Colorado Video Inc.  
 Communications Technology, Inc.  
 Comquip, Inc.  
 Dage-MTI, Inc.  
 Davis & Sanford Co. Inc.  
 Delta Electronics Inc. (N.C.)  
 Denson Electronic Corp. D 1-9  
 Dynair Electronics, Inc.  
 Fernseh Group Robert Bosch Corp.  
 GBC Closed Circuit TV Corp.  
 General Electric Co. ISO Div.  
 General Electric Co. Tubes/MW Devices  
 General Television Ntwk. D 3  
 Hitachi Denshi America, Ltd.  
 Ikegami Electronics (USA) Inc.  
 International Nuclear Corp.  
 Javelin Electronics D9  
 Laird Telemedia Inc.  
 Leitch Video Ltd.

Lenzar Optics Corp.  
 Marco Video Systems, Inc. D 2,5  
 Marconi Electronics Inc.  
 Media Concepts, Inc. D 1-9  
 Merrill Cable Equipment Corp.  
 Panasonic Video Systems Div.  
 Peirce-Phelps, Inc. D 2, 5  
 Philips Broadcast Equip Corp.  
 Power-Optics Inc.  
 RCA Broadcast Systems  
 RCA Electro Optics and Devices  
 Tele-Cine Inc.  
 Tele-Measurements, Inc. B-2  
 Teltron Inc.  
 Temtron Electronics D 1-9  
 Varian/Beverly Micro-Link Products  
 Videometrics Corp.  
 Westinghouse Ind. & Gov't Tube Div.  
 Winegard Television Systems  
 The Zei-Mark Corp.

**Vacuum Tube (Rectifier)  
 Replacements, Solid State**

Broadcast Consultants Corp. D5, 6  
 Dyma Engineering, Inc.  
 Wilkinson Electronics, Inc.

**Vacuum Tubes, Camera Image-  
 Orthicon**

See Adv. Page

**Image Concepts, Inc. ....270**  
**Temtron Electronics .....273**

Calvert Electronics Inc. D 1-9  
 Ceco Communications Inc.  
 Comquip, Inc.  
 English Electric Valve North America  
 Ltd.  
 Fernseh Group Robert Bosch Corp.  
 General Electric Co. ISO Div.  
 General Electric Co. Tubes/MW  
 Devices  
 Image Concepts, Inc.  
 JSH Electronics, Inc.  
 C. M. Levit Electronics D 1-9  
 RCA Distributor & Special Products  
 Div.  
 RCA Electro Optics and Devices  
 Teltron Inc.  
 Temtron Electronics D 1-9  
 Thor Electronics Corp.  
 United Radio Supply Inc. D9

**Vacuum Tubes, Camera Isocon**

See Adv. Page

**Image Concepts, Inc. ....270**

Calvert Electronics Inc. D 1-9  
 Ceco Communications Inc.  
 English Electric Valve North America  
 Ltd.  
 Image Concepts, Inc.  
 JSH Electronics, Inc.  
 C. M. Levit Electronics D 1-9  
 RCA Distributor & Special Products  
 Div.  
 RCA Electro Optics and Devices  
 Teltron Inc.  
 Thor Electronics Corp.

**Vacuum Tubes, Camera  
 Leddicon**

See Adv. Page

**Temtron Electronics .....273**

Calvert Electronics Inc. D 1-9  
 English Electric Valve North America  
 Ltd.  
 RCA Distributor & Special Products  
 Div.  
 Temtron Electronics D 1-9

**Vacuum Tubes, Camera  
 Newvicon**

See Adv. Page

**Temtron Electronics .....273**

Temtron Electronics D 1-9

**Vacuum Tubes, Camera  
 Plumbicon**

See Adv. Page

**Amperex Electronic  
 Corp. ....203**  
**Image Concepts, Inc. ....270**

Amperex Electronic Corp.  
 Calvert Electronics Inc. D 1-9  
 Ceco Communications Inc.  
 GBC Closed Circuit TV Corp.  
 Harrls Corp. Broadcast Products Div.  
 Hitachi Denshi America, Ltd.  
 Image Concepts, Inc.  
 JSH Electronics, Inc.  
 C. M. Levit Electronics D 1-9  
 RCA Distributor & Special Products  
 Div.  
 Teltron Inc.  
 Temtron Electronics D 1-9  
 Thor Electronics Corp.  
 United Radio Supply Inc. D9

**Vacuum Tubes, Camera Saticon**

See Adv. Page

**Temtron Electronics .....273**

**Vacuum Tubes, Camera Silicon  
 Array**

See Adv. Page

**Temtron Electronics .....273**

Amperex Electronic Corp.  
 Calvert Electronics Inc. D 1-9  
 Ceco Communications Inc.  
 English Electric Valve North America  
 Ltd.  
 GBC Closed Circuit TV Corp.  
 General Electric Co. ISO Div.  
 JSH Electronics, Inc.  
 C. M. Levit Electronics D 1-9  
 RCA Distributor & Special Products  
 Div.  
 RCA Electro Optics and Devices  
 Teltron Inc.  
 Temtron Electronics D 1-9  
 Thomson-CSF Electron Tubes  
 Thor Electronics Corp.  
 Westinghouse Ind. & Gov't Tube Div.

**Vacuum Tubes, Camera Telicon**

Calvert Electronics Inc. D 1-9  
 Ceco Communications Inc.  
 JSH Electronics, Inc.  
 C. M. Levit Electronics D 1-9  
 Teltron Inc.  
 Thor Electronics Corp.

**Vacuum Tubes, Camera Vidicon**

See Adv. Page

**Image Concepts, Inc. ....270**  
**Temtron Electronics .....273**

ATV Research  
 Amperex Electronic Corp.  
 A-Tel-A-Matic  
 Calvert Electronics Inc. D 1-9  
 Ceco Communications Inc.  
 English Electric Valve North America  
 Ltd.  
 General Electric Co. ISO Div.  
 General Electric Co. Tubes/MW  
 Devices  
 Harris Corp. Broadcast Products Div.  
 Hitachi Denshi America, Ltd.  
 Image Concepts, Inc.  
 JSH Electronics, Inc.  
 C. M. Levit Electronics D 1-9  
 RCA Distributor & Special Products  
 Div.  
 RCA Electro Optics and Devices  
 Teltron Inc.  
 Temtron Electronics D 1-9  
 Thor Electronics Corp.  
 United Radio Supply Inc. D9  
 Westinghouse Ind. & Gov't Tube Div.

**Vacuum Tubes, Camera Vikon**

Calvert Electronics Inc. D 1-9  
 Ceco Communications Inc.  
 JSH Electronics, Inc.  
 C. M. Levit Electronics D 1-9  
 Teltron Inc.  
 Thor Electronics Corp.

**Vacuum Tubes, Camera Vistacon**

Calvert Electronics Inc. D 1-9  
 RCA Distributor & Special Products  
 Div.  
 RCA Electro Optics and Devices

**Vacuum Tubes, Cathode Ray  
 Oscilloscope**

See Adv. Page

**Temtron Electronics .....273**

Amperex Electronic Corp.  
 Calvert Electronics Inc. D 1-9  
 Ceco Communications Inc.  
 English Electric Valve North America  
 Ltd.  
 JSH Electronics, Inc.  
 C. M. Levit Electronics D 1-9  
 RCA Distributor & Special Products  
 Div.  
 Temtron Electronics D 1-9  
 Thomson-CSF Electron Tubes  
 Thor Electronics Corp.

**Vacuum Tubes, Cathode Ray TV  
 Color**

See Adv. Page

**Temtron Electronics .....273**

Calvert Electronics Inc. D 1-9  
 Ceco Communications Inc.  
 General Electric Co. Tubes/MW  
 Devices  
 JSH Electronics, Inc.  
 C. M. Levit Electronics D 1-9  
 RCA Distributor & Special Products  
 Div.  
 Temtron Electronics D 1-9  
 Thomson-CSF Electron Tubes  
 Thor Electronics Corp.  
 United Radio Supply Inc. D9

**Vacuum Tubes, Cathode Ray TV  
 Monochrome**

Amperex Electronic Corp.  
 Calvert Electronics Inc. D 1-9  
 Ceco Communications Inc.  
 General Electric Co. Tubes/MW  
 Devices  
 JSH Electronics, Inc.  
 C. M. Levit Electronics D 1-9  
 RCA Distributor & Special Products  
 Div.  
 RCA Electro Optics and Devices  
 Temtron Electronics D 1-9  
 Thor Electronics Corp.  
 United Radio Supply Inc. D9

**Vacuum Tubes, Rectifier**

Broadcast Consultants Corp. D5, 6  
 Calvert Electronics Inc. D 1-9  
 Ceco Communications Inc.  
 EIMAC Div. of Varian  
 English Electric Valve North America  
 Ltd.  
 General Electric Co. Tubes/MW  
 Devices  
 JSH Electronics, Inc.  
 C. M. Levit Electronics D 1-9  
 RCA Distributor & Special Products  
 Div.  
 Temtron Electronics D 1-9  
 Thomson-CSF Electron Tubes  
 Thor Electronics Corp.  
 United Radio Supply Inc. D9  
 Westinghouse Ind. & Gov't Tube Div.

**Vacuum Tubes, Translator**

See Adv. Page

**Television Technology  
 Corp. ....265**  
**Temtron Electronics .....273**

Calvert Electronics Inc. D 1-9  
 Ceco Communications Inc.  
 EIMAC Div. of Varian  
 JSH Electronics, Inc.  
 C. M. Levit Electronics D 1-9  
 RCA Distributor & Special Products  
 Div.  
 RCA Power Tube Marketing  
 Television Technology Corp.  
 Temtron Electronics D 1-9  
 Thomson-CSF Electron Tubes  
 Thor Electronics Corp.

**Vacuum Tubes, Transmitting**

See Adv. Page

**CCA Electronics Corp. .. 99-106**  
**Calvert Electronics Inc. ....250**  
**Econco Broadcast  
 Service Inc. ....229**  
**Temtron Electronics .....273**

Broadcast Consultants Corp. D5, 6  
 Broadcast Specialties  
 CCA Electronics Corp.  
 Calvert Electronics Inc. D 1-9  
 Ceco Communications Inc.  
 Cetec Broadcast Group  
 Collins Radio Rockwell International  
 Comet Sales  
 Communications, Ltd.  
 Dyma Engineering, Inc.  
 EIMAC Div. of Varian  
 Econco Broadcast Service Inc.  
 English Electric Valve North America  
 Ltd.  
 General Electric Co. Tubes/MW  
 Devices  
 Harris Corp. Broadcast Products Div.  
 JSH Electronics, Inc.  
 C. M. Levit Electronics D 1-9  
 RCA Distributor & Special Products  
 Div.  
 Singer Products Co., Inc.  
 Sparta -- see Cetec Broadcast Group  
 Temtron Electronics D 1-9  
 Thomson-CSF Electron Tubes  
 Thor Electronics Corp.  
 Val-Tronics, Inc. D1-9  
 Westinghouse Ind. & Gov't Tube Div.

**Vacuum Tubes, Transmitting  
 Rebuilt**

See Adv. Page

**Econco Broadcast  
 Service Inc. ....229**  
**Vacuum Tube  
 Industries .....254**

Ceco Communications Inc.  
 Econco Broadcast Service Inc.  
 Freeland Products Co.  
 C. M. Levit Electronics D 1-9  
 Temtron Electronics D 1-9  
 Thor Electronics Corp.  
 Vacuum Tube Industries

**Vector Displays, Color**

Beston Electronics Inc.  
 Broadcast Video Systems, Ltd.  
 Harris Corp. Broadcast Products Div.  
 Lectrotech Inc.  
 Tektronix Inc.  
 Ultra Audio Pixtec  
 Video Aids Corp. of Colorado

**Viewfinders, Closed Circuit  
 Camera**

Ceco Communications Inc.  
 Javelin Electronics D9  
 Martin Audio/Video D2  
 Weather Scan, Inc.



### Voltmeters, AC

Aiken Industries Inc.  
A-Tel-A-Matic  
B & K Instruments Inc.  
B & K Precision Dynascan Corp.  
Boonton Electronics  
Bristol Div. of Acco  
Dana Laboratories, Inc.  
Dranetz Engineering Labs., Inc.  
Dyma Engineering, Inc.  
John Fluke Mfg. Co., Inc.  
General Electric Co. Tubes/MW  
Devices  
Gralex Industries  
Harris Corp. Broadcast Products Div.  
Heath Co.  
Hickok Elect. Instrument  
ITT Jennings  
International Instrument Div.  
Lauderdale Electronic Labs  
Leader Instruments Corp.  
Lectrotech Inc.  
Philips Test & Measuring Instruments,  
Inc.  
Rohde & Schwarz Sales Co.  
Rycom Instruments  
SPI-ITT Metrix Instruments Div.  
Sencore Inc.  
Systron-Donner  
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### Voltmeters, DC

Aiken Industries Inc.  
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B & K Precision Dynascan Corp.  
Bristol Div. of Acco  
Dana Laboratories, Inc.  
Dyma Engineering, Inc.  
John Fluke Mfg. Co., Inc.  
General Electric Co. Tubes/MW  
Devices  
Gralex Industries  
Harris Corp. Broadcast Products Div.  
Heath Co.

Hickok Elect. Instrument  
ITT Jennings  
International Instrument Div.  
Lauderdale Electronic Labs  
Leader Instruments Corp.  
Lectrotech Inc.  
Philips Test & Measuring Instruments,  
Inc.  
Rohde & Schwarz Sales Co.  
Rycom Instruments  
SPI-ITT Metrix Instruments Div.  
Sencore Inc.  
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### Voltmeters, FET

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Heath Co.  
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Inc.  
Rohde & Schwarz Sales Co.  
SPI-ITT Metrix Instruments Div.  
Sencore Inc.  
Sinai-Johnson  
United Systems Corp.

### Voltmeters, Vacuum Tube

B & K Precision Dynascan Corp.  
Boonton Electronics  
Dyma Engineering, Inc.  
Gralex Industries  
Heath Co.  
ITT Jennings  
Rohde & Schwarz Sales Co.  
SPI-ITT Metrix Instruments Div.  
Sinai-Johnson

**Volt-ohm Meters --See meters,  
Volt Ohm**

### Wattmeters

Allied Broadcast Equip. D 1-9  
Bird Electronic Corp.  
Boonton Electronics  
Coaxial Dynamics  
Collins Radio Rockwell International  
Dielectric Communications Div. Sola  
Basic, Inc.  
Dyma Engineering, Inc.  
Electro Impulse, Inc.  
Harris Corp. Broadcast Products Div.  
Heath Co.  
Hickok Elect. Instrument  
Lampkin Lab. Inc.  
Leader Instruments Corp.  
Micro Communications, Inc.  
Philips Test & Measuring Instruments,  
Inc.  
Rohde & Schwarz Sales Co.  
SPI-ITT Metrix Instruments Div.  
Singer Products Co., Inc.  
Val-Tronics, Inc. D1-9

### Waveguides

**See Adv. Page  
Nurad, Inc. ....221**

Andrew Corp.  
CCA Electronics Corp.  
Cablewave Systems Inc.  
Comark Industries Inc.  
Dielectric Communications Div. Sola  
Basic, Inc.  
Dyma Engineering, Inc.  
Harris Corp. Broadcast Products Div.  
Hitachi Denshi America, Ltd.  
Maury Microwave Corp.  
Micro Communications, Inc.  
Microwave Assoc. Inc.  
Nurad, Inc.  
RCA Broadcast Systems  
RF Systems, Inc.  
Singer Products Co., Inc.  
Systron-Donner

### Weather Instruments

**See Adv. Page  
ESE ..... 63, 65  
Scientific Radio  
Systems, Inc. ....208  
Texas Electronics .....267**

Broadcast Consultants Corp. D5, 6  
Collins Radio Rockwell International  
ESE  
Heath Co.  
Mastertone Co., Inc.  
Maze Corp D6  
Merill Cable Equipment Corp.  
Scientific Radio Systems, Inc.  
Taylor Instrument  
Texas Electronics  
Track Audio, Inc. D 1-9  
Weather Scan, Inc.

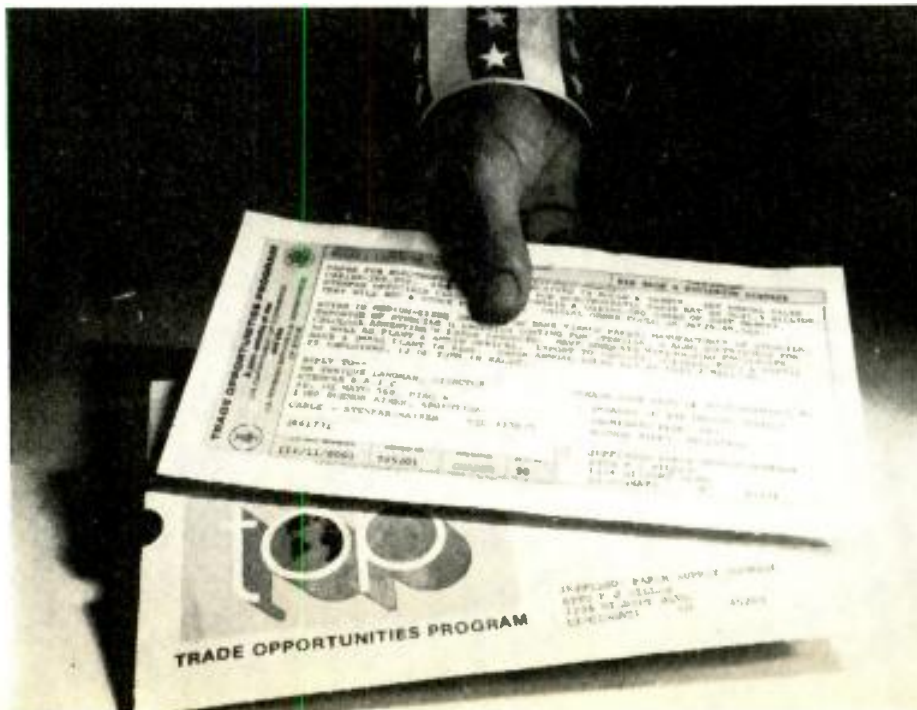
**Weather Radar --See Radar,  
Weather**

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Audio Accessories Inc.  
Belden Corp.  
Beta Technology, Inc.  
Boston Insulated Wire & Cable Co.  
C. S. P. Inc.  
Cablewave Systems Inc.  
Communications, Ltd.  
Dyma Engineering, Inc.  
Martin Audio/Video D2  
Peirce-Phelps, Inc. D 2, 5  
Prestolite Wire Div.  
RCA Broadcast Systems  
Rex Rheostat & Co., Inc.  
SGL Waber Electric  
Sono-Mag Corp.  
Sound Genesis D8, 9  
Telatronics  
Tele-Measurements, Inc. B-2  
Times Wire and Cable  
Union Connector Co., Inc.

Company Mailing Addresses Begin on Page 231.

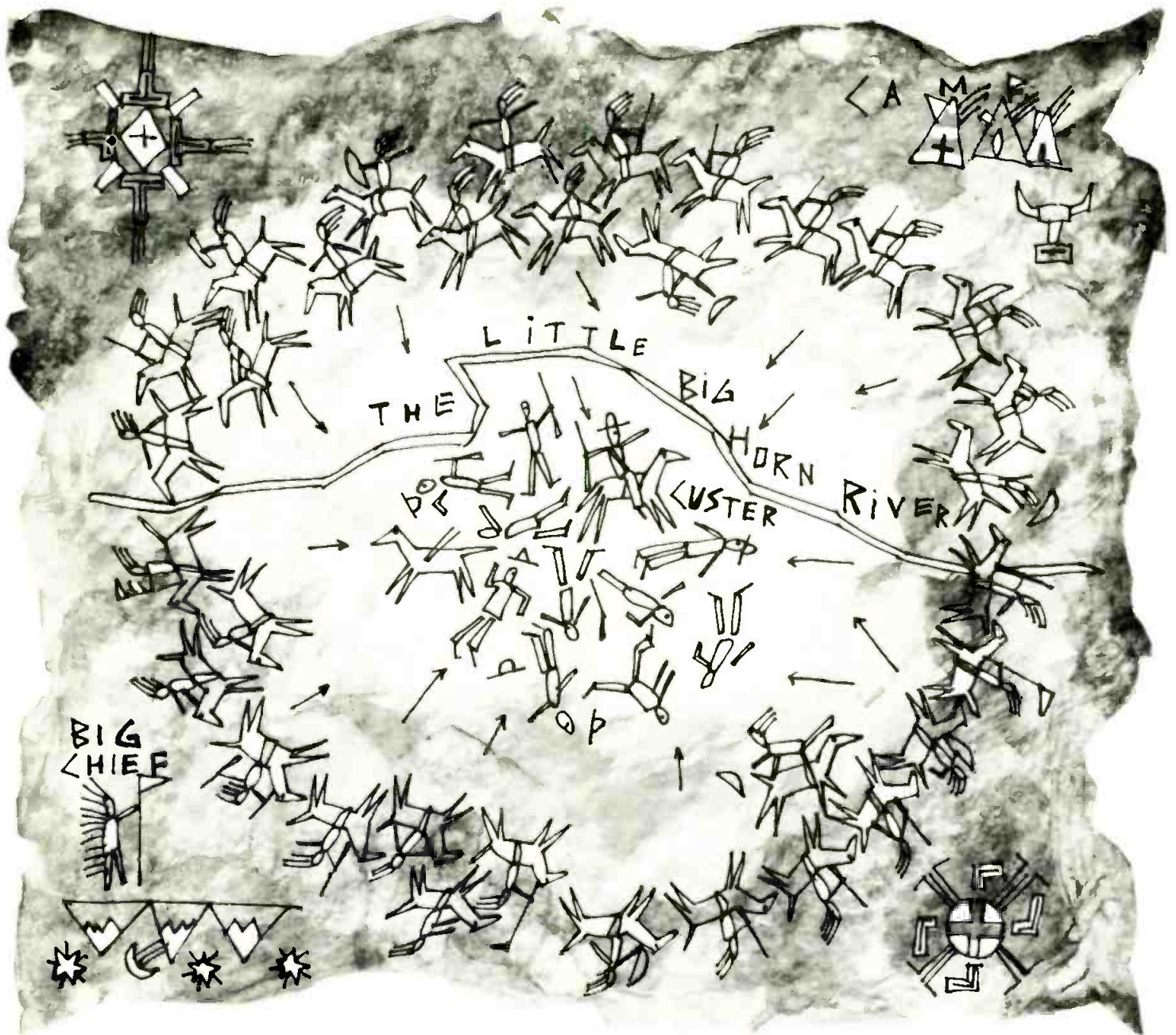
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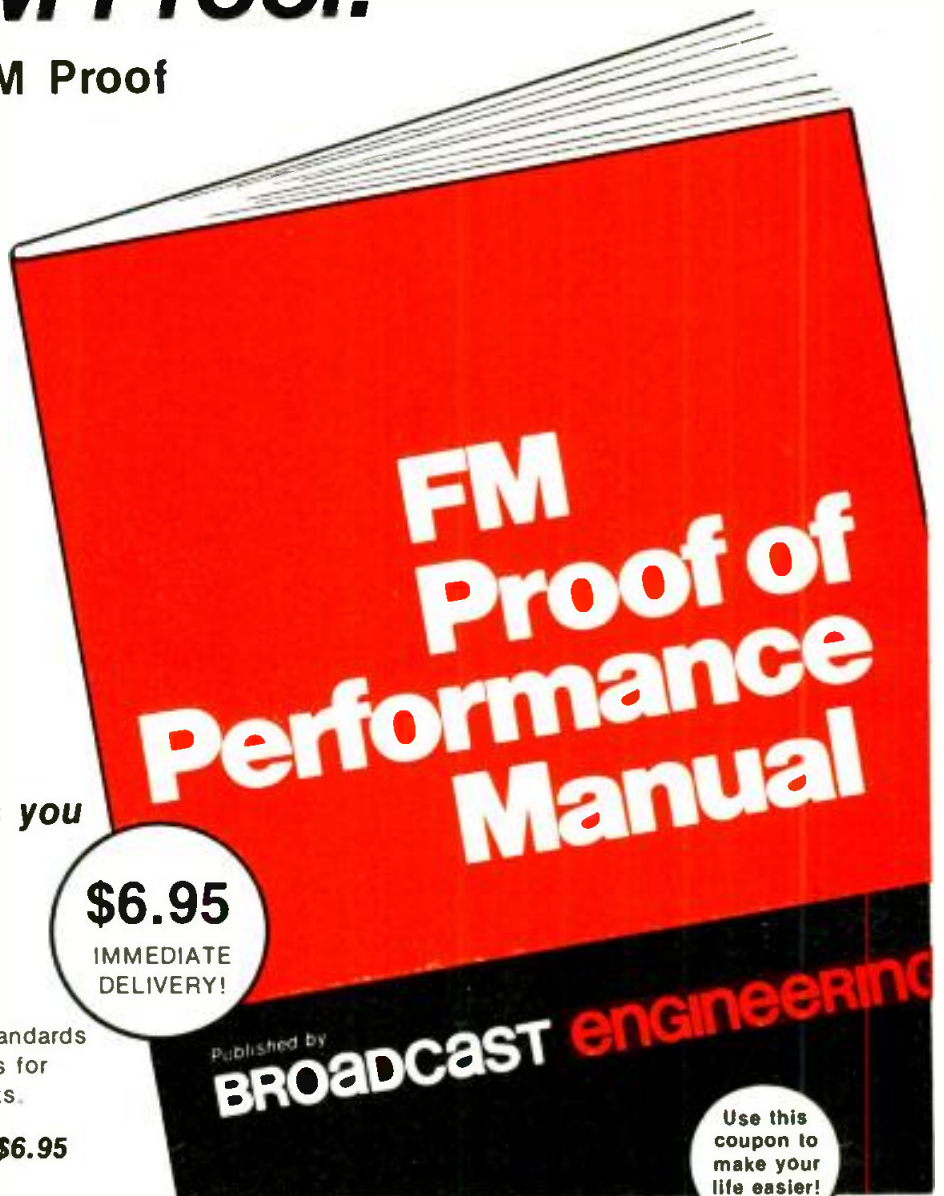
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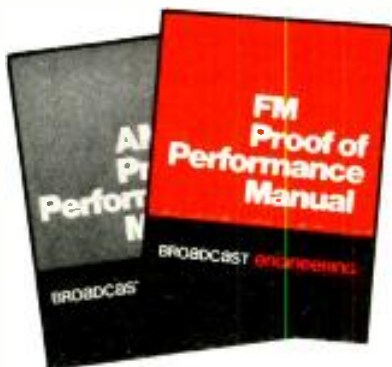
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DM 3/77

# Up to your pattern in alligators



By Bob Jones & Dennis Ciapura

Don't laugh. It's true. There is one station now in the United States that does have its own alligator farm and believe us this is no laughing matter!

Like many old time stations, WFUN has found it economical to move its transmitter site further away from the metro area. This is because of both the appreciated value of its land and the need to improve its suburban coverage.

So, when you're faced with a decision to move out, and your city of license is Miami, Florida, there is only one place to go—into the Everglades. WFUN has successfully engineered the first radio station ever constructed in the Everglades Swamp.

## **Physical Problems**

The greatest problem is access. There are only two roads now criss-

crossing the Everglades. The famous Tamiami Trail and the newer Alligator Alley. Take your pick. The WFUN site we selected is located 21 miles west of Miami along the Tamiami Trail. As an engineer what's the first problem you encounter? The stubborn environmentalists! With 10,000 acres of no good swamp, they want to protect the 10 acres we need. So who really cares? Needless to say the FCC Rules on Environmental Impact are a "piece of cake" compared to the environmentalists of Dade County Florida.

The next problem you encounter is muck. That's right, muck. Like in swamp muck. Before you can install towers, guy anchors, etc., you need to be able to drive to such sites. This requires roads which require removal of the muck. Or as we learned, you need to "demuck."

Step one is to dig out the muck, fill it with rock, and keep on filling

until you can get to the place where the towers and anchors are to be erected. Of course the muck will flow, and there is no guarantee on how long you will be able to reach your towers.

The second physical problem is living creatures—like snakes, alligators, scorpions, etc. While I realize other stations have faced similar problems before, I doubt anybody has seen so many so often in one place. It really is hard to work when you keep looking over your shoulder to watch out for what is sneaking up behind you. We, of course, ignore the little creatures like mosquitoes, deer flies, wasps, etc.

## **Installation**

Unlike many new stations, WFUN had to bury all its cables. Not really, but we didn't want some environmentalist to accuse us of tripping an alligator or a swamp deer.



Doghouses must be elevated to guard against seasonal flooding. There is a wet season and a dry season in the Everglades. Plus of course one must protect against hurricanes. Whether we have elevated our doghouses and tower piers sufficiently, we will never know until the next hurricane comes. But by careful calculation from long time residents of the swamp, we feel confident we have.

Again with adverse weather in mind, we placed our studio-transmitter building up near the Tamiami Trail. This provides for maximum accessibility in bad weather as well as minimizes the length of driveway we have to maintain.

It goes without saying that standby power is a necessity when constructing in the Everglades Swamp. As with the doghouses and tower piers, the studio transmitter building has been elevated to be above the "high water" mark.

One of the special problems we had was the construction of the doghouses. In the case of WFUN they have to be tight. Varmint tight they mean. After all nobody wants to run a motel for rattlesnakes or mud-daubers. This means that all excessive holes must be plugged. Stripping must be placed around any warped doorways, etc. Whether chemicals will be required in the future to assist in the control of snakes, bugs, wasps, etc., we just do not know yet, but we presume they will.

### Field Intensity Survey

Normally when one sets out to prove a directional pattern he takes readings on foot or by auto. In our case neither of these methods were generally available. As noted we constructed 21 miles out in the Everglades Swamp, and there are only two roads. Even if the water level were not so deep it would be madness to attempt to walk any close-in points. We did find access to a few points we could drive to, in the direction of Miami, Florida.

At one time we considered calling this story by a very bicentennial name: One If By Land, Two If By Sea, and Three If By Air. For this is just what we did. Where we could, we took readings by land on accessible roads, levees or trails. When this failed we took measurements by water. As can be seen this is by air boat. In fact to the best of our knowledge this is the first directional proof ever, where an air boat was used. And when that failed we resorted to the trusty helicopter. Enough has been said about helicopters and helicopter technique, but at this point we believe it may be of general interest to discuss a bit about the use of air boats.

### Special Field Techniques

There are really two problems when one sets out to conduct field measurement by air boat. These are knowing the distance and the bearing you are from the towers.

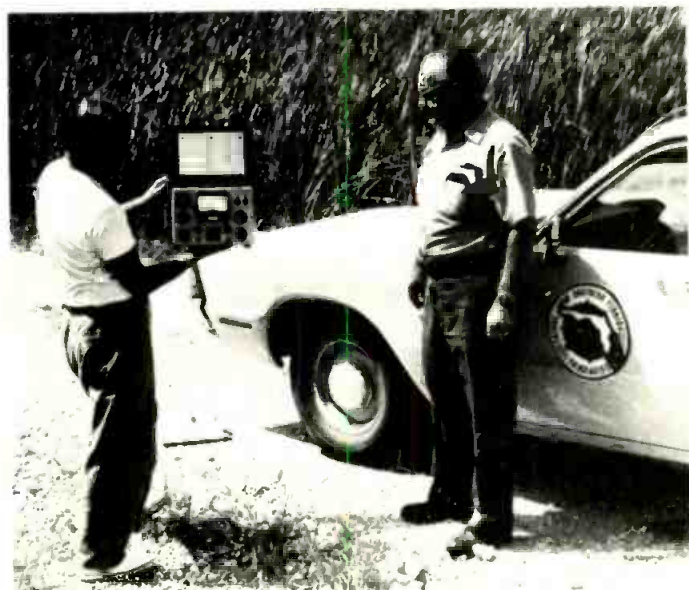
This really means you have to stay within visual sight of the towers. Or in flat swamp land about four to five miles. There is no substitute for an Indian guide who knows every blade of grass and can tell you exactly where you are. In our case we used both an experienced guide as well as aerial photos. Ours were on a scale of 600 feet to the inch. We began at the furthest point we desired to take readings and rode the boat into the tower site. The tower will serve as a natural visual compass to keep you on course. By use of a watch, or clock, readings can be obtained at uniform intervals.

Care must be taken that the metal in the air boat does not affect the accuracy of the field intensity meter. This is no different than the precautions one needs to take when making readings in a boat, or helicopter, etc. If the air boat does, and ours did, affect your meter you must correctly determine a calibration factor to be applied to the readings obtained. This is generally in the magnitude of 15-20 percent.

### Audio And Transmitting

Now that WFUN had been provided with the best possible R.F. field that a new directional antenna system could provide, it was up to the station's engineering staff to devise the best possible signal to drive the array. A new Harris MW-5, pulse duration modulation transmitter was installed, while the

*continued on page 164*



"Sam, the Park Service man," observes test out on levee that runs through the Everglades National Park.



Bob Jones, BE facilities editor, is shown perched in helicopter bubble ready for another run over the Everglades.



Ed Jurish stands alone against a backdrop of Everglades wilderness. At this stage, underground cables have just gone in.



Bell two-man helicopter, with Bob Jones and field-intensity measuring gear aboard, takes to the air at newly completed antenna farm.

## Up to your pattern

*continued from page 163*

original R.C.A. transmitter was retained as an auxiliary. The MW-5 was selected because the design appeared to be capable of delivery clean positive peak performance and low I.M. distortion, due partly to the absence of high level audio transformers. The R.C.A. was a good choice as a backup transmitter despite its relative age because of its good reliability record and excellent audio performance.

The station's programming is an automated tape format consisting of easy listening music and a very limited number of commercials. While we naturally wanted to obtain the best possible average modulation level for optimum coverage, we also felt that it was imperative that good audio fidelity and dynamic range be maintained, so that listening fatigue due to compression could be minimized.

This balance between average level and fidelity is difficult to arrive at and is different for every radio market, depending upon market size, competition and class of station as well as coverage restrictions due to the directional array. Although the classic approach is to increase audio processing until the signal starts to sound bad and cut back a little, we decided to take a somewhat different approach with WFUN. The processing gear was selected and set up for maximum loudness level first and then the processing parameters were rolled

back until a noticeable drop in apparent loudness level was detected. As we had suspected, a little processing in the right places produced nearly the same apparent loudness level as gross processing but with a much more pleasing air sound.

### The Audio Chain

The output of the console is fed into a C.B.S. Audimax which has been modified so that the expansion characteristic is limited to about 5 dB. This allows the unit to correct level errors at the board without seriously affecting the dynamic range of the music. The Audimax output is then fed to a Durrugh DAP-1 three band audio processor which is set up to compensate for the loss of highs that most AM receivers inflict on their detected audio. The 3 to 5 kHz region is very important to perceived loudness and unfortunately, most AM sets are already down a few dB at 5 kHz. Very low frequencies which most radios won't cleanly reproduce are limited at this point to avoid wasting modulation capability and generating unnecessary distortion at the receiving end, for although it is possible to transmit excellent low distortion, wideband AM audio, most receivers would reproduce this audio diet with a combination of bass indigestion and treble suffocation. Rolling the lowest octave and brighten-

ing the highs yields a much cleaner sound in the field.

### The Last Step

Finally, the audio is passed on to a C.B.S. AM Volumax for asymmetrical peak limiting. Only a few dB of peak limiting was used at WFUN to avoid a compressed sound with the easy listening, soft M.O.R. format. The final result is a very good average level with a very musical open sound and surprisingly good subjective fidelity.

Since the new system has been on the air, WFUN has received reception reports from England, Ireland, Norway and Canada. The fellow in Norway sent a tape along with his reception report, which gave us excellent opportunity to see just how effectively our system was working in keeping the audio above the QRM. Although WFUN does not expect to do very well in radio ratings in northeastern Europe, night interference from Cuba can sometimes be as strong in southern Florida as the interference on the Norwegian tape from across the sea!

All in all, the WFUN project can be described as an interesting blend of modern broadcast technology and the primitive beauty and challenge of one of America's last remaining wildernesses...and from it all comes music, which we hope, as one poet has suggested, "soothes the savage beast" or was it breast?



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# WTAR-TV/AM combines operation for better news coverage

By Dave Busch

"Combined radio and television news coverage can add up to better and more comprehensive news service for the listening and viewing public," reports James E. Mays, news director of WTAR-TV-AM in Norfolk, Virginia.

"Smaller, separate news staffs for each would duplicate efforts in many cases. The result of a combined staff is that we have more

people on the street reporting what is happening," Mays says.

A tightly-run, efficient news operation is especially essential in the Hampton Roads area WTAR serves. Slow news days are a rarity. Mays' biggest problem is deciding what local stories of strictly regional interest to mix in with a host of nationally important stories developing in the area at the same time.

The radio and television news staff covers a market ranked 50th nationwide, which has more dramatic happenings for any area its size in the country, according to Mays. The bay area consists of seven cities ranging in population from Suffolk's 80,000 to Norfolk's 350,000. It is the seat of the world's largest shipbuilding industry, headquarters for the NATO naval force, and the site of 12 major military bases.

"A lot of our local news affects people all around the world," Mays says. "We pretty much dismiss fender-benders and concentrate on hard news for our radio and television newscasts."

The news director depends heavily on six, two-person news crews, each consisting of a reporter and cameraperson. The reporter audiotapes each interview with newsmakers for radio with a small cassette recorder while the photographer exposes television footage. For fast-breaking stories, the reporter scripts the report at the scene and phones it into the station.

The telephoned report is taped by the radio news editor along with actuality segments fed from the reporter's recorder into the remote telephone. The WTAR radio news editor then puts the pieces together for the next newscast.

"If there is time, of course, we have the reporter come back to the station and record his or her report," Mays says, "but the reporter may have to remain on the scene for further developments."

## On the hour, every hour

WTAR's radio newscasts are scheduled for every hour on the half hour. The CBS affiliate carries the network news on the hour. For each newscast, stories are rewritten, with additional taped comments spliced in and lengthened or shortened, depending on the development of the story. This revamping can take place up to 19 times a day with the work done by both the reporter and radio editor.

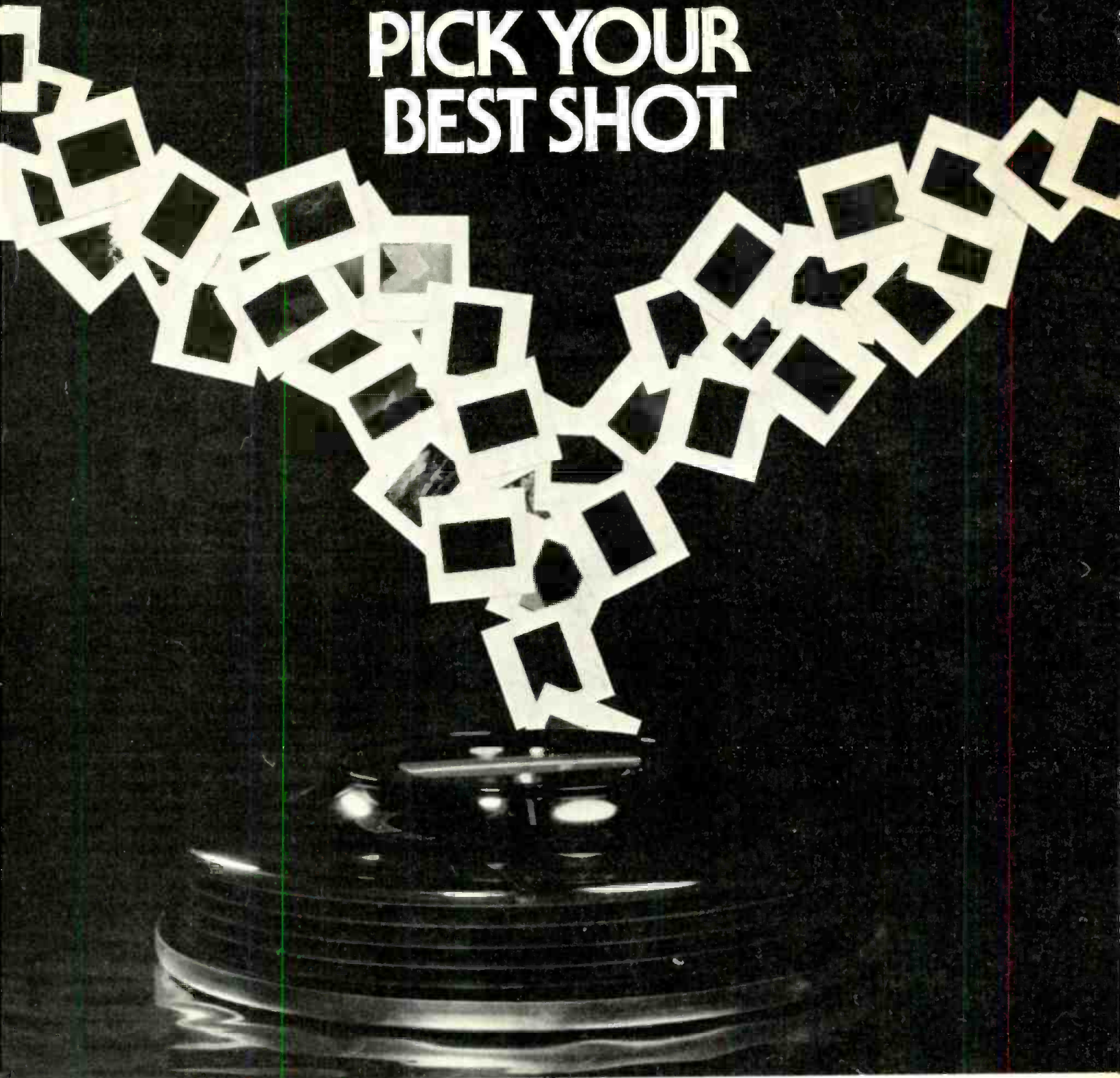
*continued on page 168*



Video news film is used at recommended exposure indexes for most assignments, though they have been "pushed" one, two and three steps when necessary. (Photo courtesy of Eastman Kodak)



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## WTAR news coverage

continued from page 166

Mays adheres to a strict "first in, first out" rule. That is, a new story is carried first either on television or radio depending on which medium has the next scheduled newscast.

WTAR has two daily televised news programs, one at 6 p.m. and another at 11 p.m. Preparation of stories for these shows is only slightly less hectic than radio.

"The reporter is able to take the audiotape he or she prepared for radio and write the television report including cues from that," Mays explains. "This eliminates having to wait for film to be processed. Reporting for both television and radio dovetails very nicely in this respect and in several others."

Mays says that there are obvious differences in radio and television news reporting. For radio, the reporter must emphasize setting more and concentrate on descriptive aspects that are captured on film.

But, he points out the key comments from newsmakers provide the "nut" of the story for both television reports and taped radio interviews.

---

*"The reporter audiotapes each interview with newsmakers for radio with a small cassette recorder while the photographer exposes television footage."*

---

"The important thing," he continues, "is hiring people who have worked in one medium or the other. It is relatively easy to teach experienced reporters the requirements of the other medium but difficult to train a neophyte in both from scratch."

### The importance of visuals

Mays joined WTAR 10 years ago from the newspaper business. He was both a reporter and a photographer, and so he places a great emphasis on content of words—for radio as well as television—and visuals for the TV screen. Because of the large number of nationally important stories that originate in Hampton Roads, he says that it is essential that new stories be compact but comprehensive. "Good visuals," he says, "are one way of presenting complex stories in an easily understood way.

"For example, we must often explain the city budgets for the seven municipalities we serve," Mays says. "We could display charts showing the figures, but instead, we shoot film of a sewer project and superimpose the costs of that project. This ties the two together."

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*"The reporter is able to take the audiotape he or she prepared for radio and write the television report including cues from that."*

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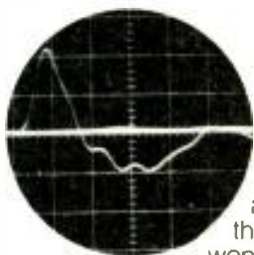
Recently, three cities held city council meetings at the same time. Because six to 10 local stories were going to be used on the half-hour evening news programs, Mays didn't want three of them to focus on city council meetings.

"But these were important discussions," Mays adds. "So, we interviewed the council presidents

continued on page 170

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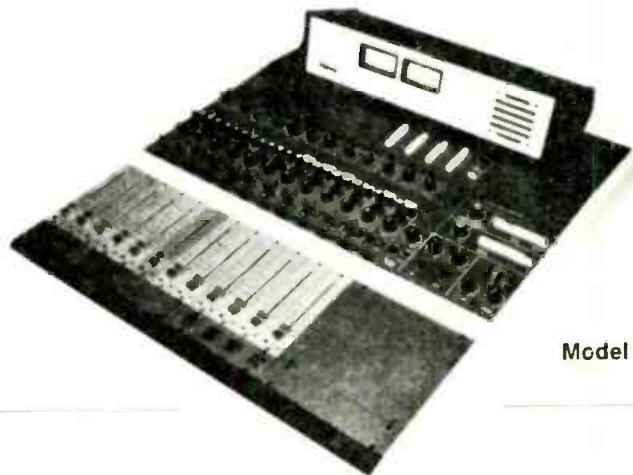


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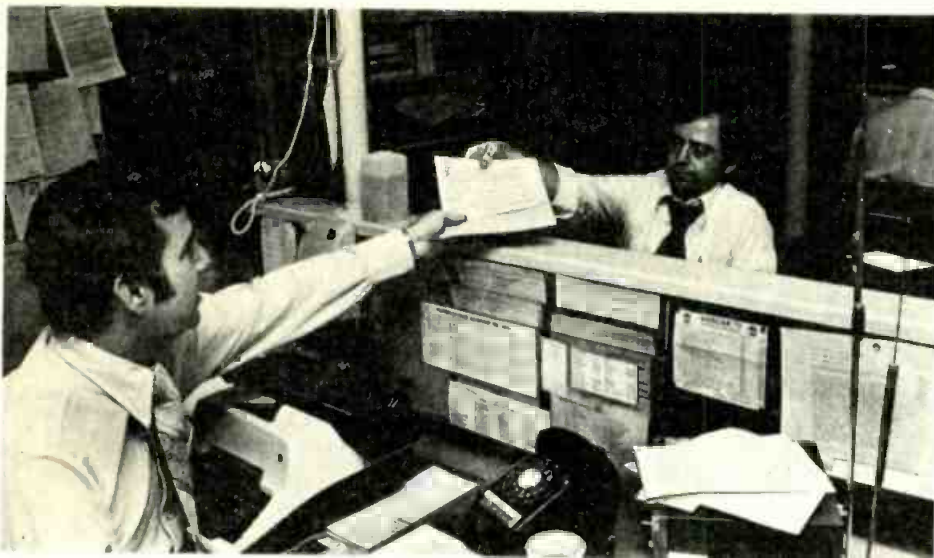
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Close cooperation is evident between radio and television news operations at WTAR. Here, the television news producer hands a story list to the radio anchorman. (Photo courtesy of Eastman Kodak)

## WTAR news coverage

*continued from page 168*

and various dissident members of council and summed up the actions of all three meetings in three separate stories. Good editing techniques kept the visuals interesting."

Mays believes the ability to add visual highlights and sidebars to

breaking stories is often an important difference between radio and television coverage. The added dimension of sight comes at no penalty in maneuverability and flexibility for the reporter. The small CP 16 cameras used by WTAR are

lightweight and can be taken anywhere the reporter goes with his recorder.

"Film cameras are the most durable image recording equipment now available," Mays says. "ENG equipment still has a considerable amount of catching up to do. We can send a film crew 600 miles and not have to worry about the equipment working. In addition, because of the portability of the camera we work with smaller crews. This is important to a station our size."

The sturdiness of film cameras was pointed out in the spring of 1977 when a tanker split in two off the coast of Virginia. WTAR-TV commissioned a helicopter, flew a news crew to the deck of one half of the stricken ship, and brought back film coverage amidst rocking waves and billowing spume. By filming at 64 frames per second, the crew produced rock-steady, hand-held footage. The film got back to the station at quarter to five, and led off the six o'clock TV news.

WTAR crews use Eastman Ektachrome video news film 7239 (daylight) and 7240 (tungsten) which allows them to do much of their work by available light. Each pho-

*continued on page 172*



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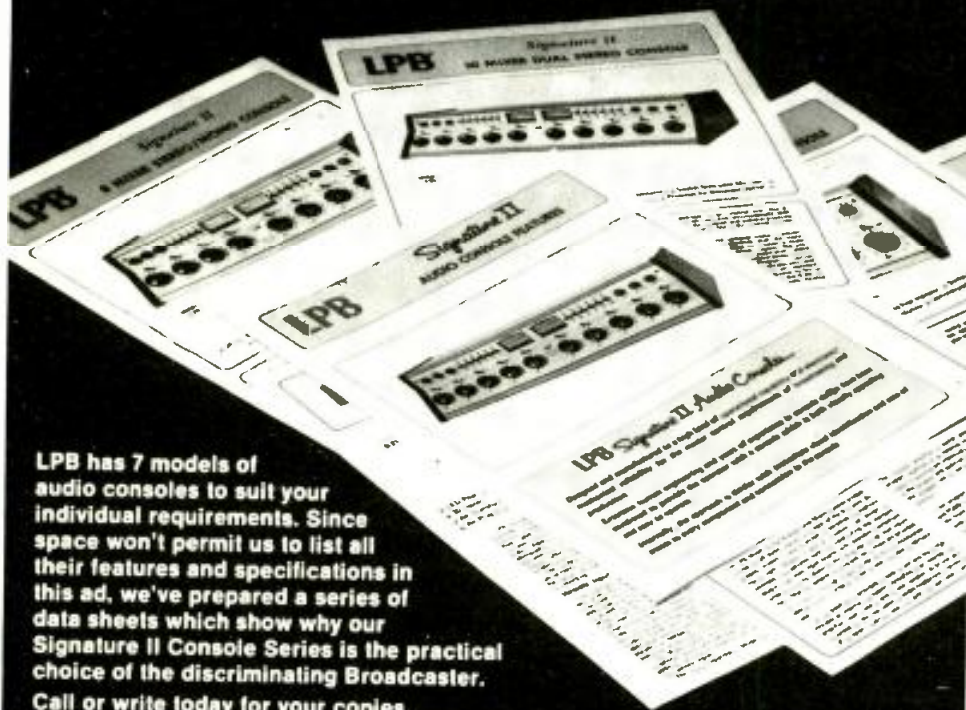
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**WTAR news coverage**

*continued from page 170*

tographer carries four lights and a battery unit for extreme low-light conditions. Film processing using Process VNF-1 takes around 30 minutes.

**Looking ahead**

Mays is pleased with the fast processing and says it helps negate part of ENG's current main advantage: getting to look at visuals immediately. He has been hesitant to make a strong commitment to electronic journalism until technology improves. WTAR has several Akai 1/4-inch units, which were bought for one purpose: experience.

"We wanted to gain expertise so that we will be ready when, hopefully, digital technology is available four or five years down the line. Until then, only competitive pressures could force us to make a bigger investment in analog gear," he says.

The electronic cameras and recorders are currently used several times a week under controlled situations such as press conferences. Six news photographers use CP 16 cameras.

WTAR produces eight public affairs documentaries a year—many an hour long—and a weekly half-hour program, *Newsmakers*. The latter is unusual in two aspects: It is presented in prime time and though it originally started out as a studio production, a major segment is now produced on film.

"*Newsmakers* leads into our 11 p.m. news on Sundays," Mays says. "This is a new time slot for the program, but it had captured about 29% of the viewing audience in its old position."

*Newsmakers* was a talk show until the idea was hatched of using a film background on the topic of the day as an introduction. "It is a very effective way of presenting facts that can't be covered in the studio," Mays says. The film usually consumes 15 to 22 minutes of the half-hour with the studio portion serving more or less as a wrap-up.

**Get out of the studio**

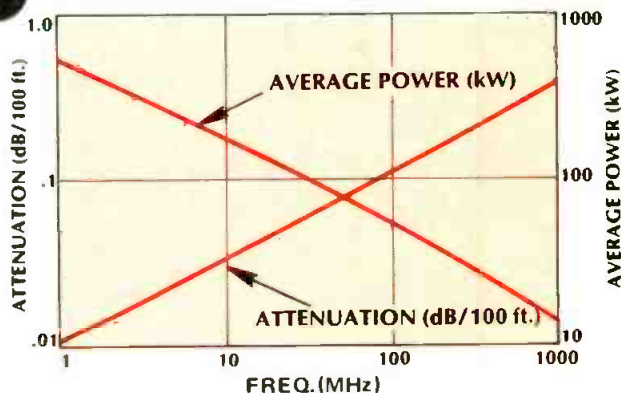
"We are getting out in the community, looking at urban renewal, solar energy, health care, and other topics that the man on the street cares about," Mays points out. For example, WTAR visited a man who had complained about the noise from low-flying jet planes. The

*continued on page 174*



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## WTAR news coverage

*continued from page 172*

station showed, on the air, just how bad the problem was.

Another time, a nearby beach was shown as it is today and as it was many years ago. Then through studio discussion, a picture was developed on how the same area could look with community involvement.

"That was a lot more effective than having an urban renewal spokesperson sit in a chair and tell us all the wonderful things that could be happening. We showed, rather than told," Mays says.



Photographers edit their own film to insure that the person who knows the most about that particular footage does the final assembling. (Photo courtesy of Eastman Kodak)

The background function of *Newsmakers* is so important that the show's producer is finding increasing use for WTAR's morgue of black-and-white film and stills. "He mines these," he says, "like a treasure trove of past information." Mays feels the program epitomizes efficient use of personnel. A producer-reporter and photographer shoot film on Wednesdays. The story is scripted and edited Thursdays, and on Friday evenings the studio portion is taped and interwoven with the film footage.

"It may seem like a hectic schedule, but actually, our news photographers enjoy the assignment. It gives them more time to experiment with angles and editing than they usually have," Mays says.

### The documentary

Each photographer also works about once a year on a docu-

*continued on page 176*



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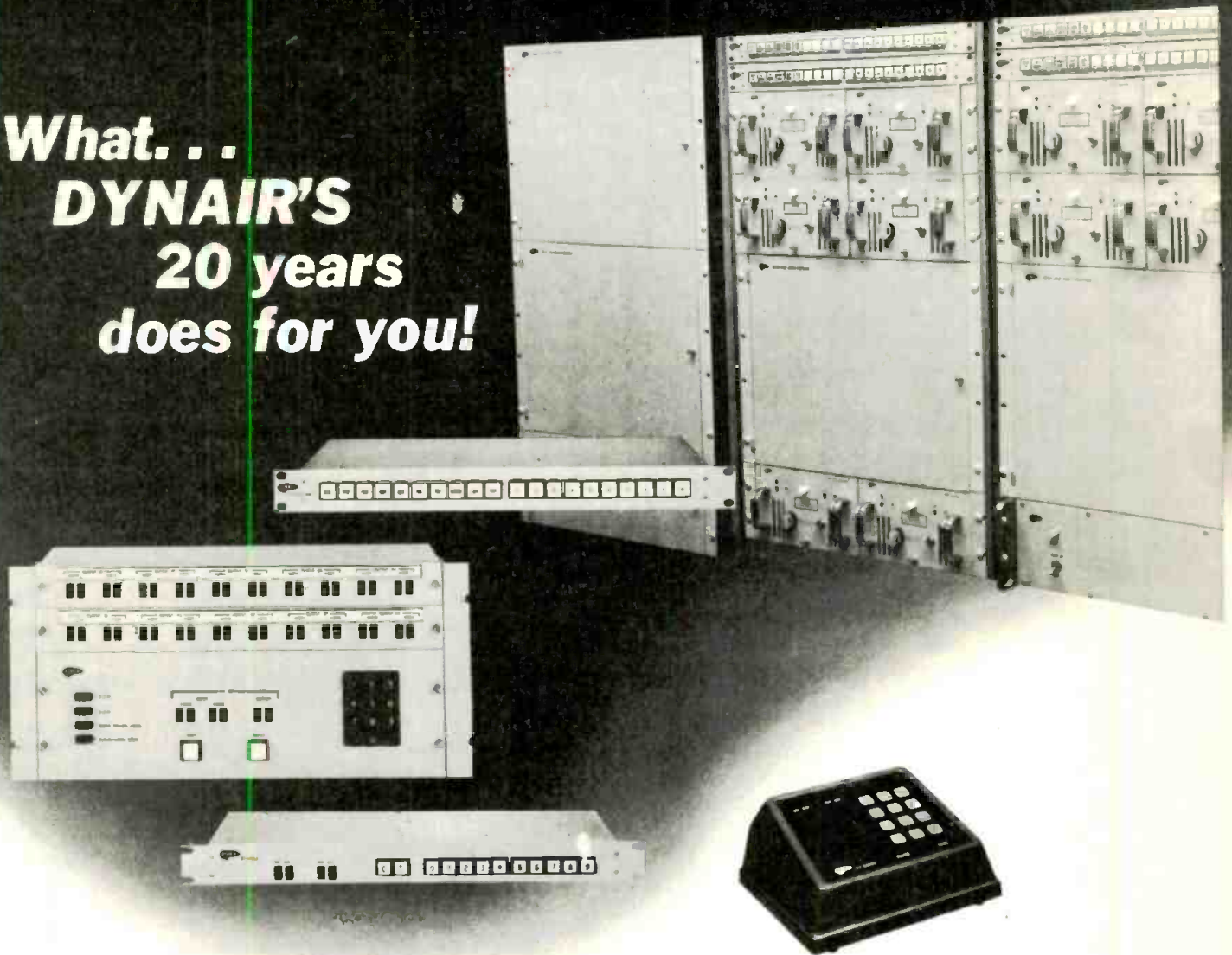
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## WTAR news coverage

*continued from page 174*

mentary. WTAR has a successful series running under the title *Winds of Change*.

"Our working theme is that change is not necessarily bad, but things will change just the same. These are the things that are changing in your area, and here is how they will affect you, our viewers," Mays says.

Frequently, *Winds of Change's* investigative efforts uncover a whole chain of impending incidents.

"When we looked at medical malpractice, we found that it was just one symptom in a whole series of changes in the health care field—one that was going to affect how we all deal with our doctors," Mays says. "We titled it 'Malpractice-Symptom One,' and looked at some of the other symptoms of change—such as the use of nurse-practitioners instead of doctors for basic health care, changes in family practice and so on."

*"Good visuals are one way of presenting complex stories in an easily understood way," reports Mays.*

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In another in the series, WTAR found that offshore oil well drilling was coming to Virginia. Mays dispatched a crew to the Gulf Coast where offshore drilling has been under way for some time. The resulting documentary gave local viewers an idea of what happens to an area—good and bad—when offshore drilling begins.

### The challenge for quality

All these film stories were produced with maximum image quality in mind. One thing Mays insists on is that each photographer edit his or her own film.

"After all, he or she is the one who knows the most about what is on that reel," Mays says. "The photographer won't get lazy if he or she has to edit the material brought back."

"It is difficult boiling down some of these complex issues into a one-minute news story," Mays says. "With so many municipalities, we find ourselves flooded with city-government stories competing with the military news events that spring up both here and in Washington. But it certainly is a challenge to all of us." [ ]



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BOHANA



KITCHEN

Central Dynamics Corp. announces the appointments of **Buddy Naeyaert** as vice president of marketing, **Howard Shephard**, vice president of product planning, and **Vince Lyons**, western regional manager...**Arnold Taylor** moves from senior product manager to national sales manager for Ampex Corporation's audio-visual systems division...

**A. H. Bott** joins Broadcast Electronics, Inc. as vice president, engineering...**Herman D. Post**, president of Robins Broadcast & Sound Equipment Corporation, announces the appointment of **Steven N. Friedman** as vice president of the professional products division... As religious broadcasting sales specialist for CCA Electronics Corp., **Bill Kitchen** will maintain close liaison with religious broadcasters both in engineering and sales capacities...

**Patricia A. Rooney** has been promoted to sales coordinator for the cable communications division of Scientific-Atlanta, Inc...The new director of communication product sales for Time and Frequency Technology is **Robert W. Cochran**, it has been announced by **Joe Wu**, president...**Richard Pass**, president of Pass Associates, will be directing sales in Eastern Pennsylvania, Delaware and Southern New Jersey for Robins Broadcast & Sound Equipment Corporation...**Neville H. "Doc" Bennett** moves from director of program management to acting engineering administrator for TeleMation, Inc...

**John Woods** has been named vice president, engineering, for Catel, a division of United Scientific Corporation...**Donald Dworkin**, formerly with Manhattan Cable TV, joins Warner Cable Corp. as manager of cable TV engineering...**John K. Major** is the new general manager of WONO(FM), Syracuse, New



York...**Jerry Bridges** moves from chief financial officer to executive vice president at Taft Broadcasting Corp...Radford Associates announces the appointment of **Ralph L. Hucaby**, former vice president and director of engineering of television station WTVF in Nashville, as an associate of the firm...



ROONEY



LAYN



KEANE

**Fred Layn**, appointed to the newly created position of eastern regional manager for Studer Revox America, Inc., will handle both sales and service on the Studer line of professional studio recording equipment...**James M. Keane** has been promoted to vice president, engineering, for Systems Resources Corporation...The board of governors of the International Telecommunications Satellite Organization (INTELSAT) has elected **José Martínez-Villarejo** of Spain chairman and **Marcel Perras** of Canada vice chairman...

**John J. Sie** becomes vice president, marketing and affiliates, for SHOWTIME, Viacom's pay-cable subsidiary...Brigadier General **Harold R. Johnson**, USAF (Ret.) has joined American Satellite Corporation as vice president for marketing...The appointment of **David Orienti** as CCA Electronic Corp.'s area manager for Michigan, Indiana and Ohio has been announced by **Arthur Silver**, vice president-sales...



SIE



BURKHART



WOODWORTH

**Paul P. Hoppe, Jr.**, is the new vice president of engineering for Switchcraft, Inc....New buyer for Radio Shack, **Garrett B. Burkhardt**, will be responsible for the primary purchasing of electronic parts and components, alarm systems, wire and cable. North American Media Company has elected **Jack O. Koonce** as president...**David DiManna** has joined the staff of TPC Communications in Pittsburgh as a staff director...**Tom E. Paro** becomes executive vice president of the Association of Maximum Service Telecasters...

**John T. Shafer** moves from Foto-Kem Industries to Deluxe Laboratories, where he assumes duties in the marketing department...**Maurice P. Talbot, Jr.** has been named legal assistant to FCC Commissioner Margita E. White...As manager of sales for Studer Revox America, Inc., **James Woodworth** will be

*continued on page 180*

# More Value to RCA Quad Users!

## Quad Refurbishing

VMI's craftsmanship guarantees you the highest quality refurbished quad head at the lowest price available. VMI's specific technology and experience surpass any other refurbisher.

## Special Conversions\*

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- II. Full high band, economy covers—\$2,195.00.
- III. High Band operation, low band machine/base interface—\$1,495.00.

Every head sent to VMI receives all factory updates the first time in. To have the best performing RCA quad heads on your machines, send them to us where you will get extra value plus the lowest price.

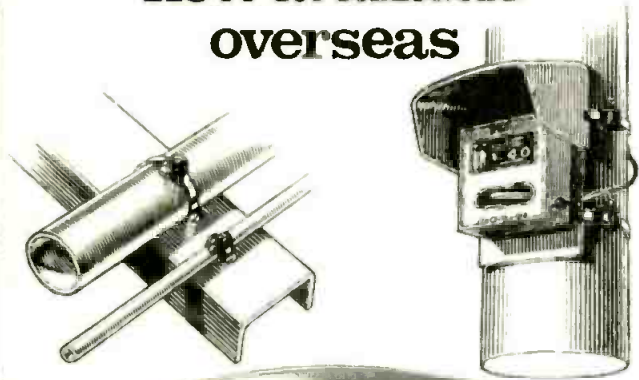
\* Above conversions require low band, air bearing trade-in. For ball bearing trade-in add \$200.00.



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THE ADJUSTABLE  
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BAND.\***



The Suda Super-tight stainless steel clamping device is No. 1 in Japan with many communications, power supply, CATV and other industrial companies.

All you need is a screw driver or pliers to clamp an item to a pole, pipe or tower. Suda rust-resistant band comes in 10 or 20mm widths. One coil is 50 meters long so you can avoid waste by cutting desired lengths at the job site.

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So quick, so easy to use. Suda offers you superb quality at competitive prices.

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**people  
in the news**

.....  
continued from page 179

responsible for domestic sales of Studer's Revox line of tape recorders, tuners, amplifiers and other consumer audio products...**N. H. Bennett**, new customer service manager at TeleMation, Inc., was formerly service operations manager for Beehive International...

**Linda Feldman**, a sound engineer who has been involved in equipment testing and consumer education at TEAC Corp. of America, has been named manager of the company's training department...KVC, Inc. has established an international division headed by **Sidney C. (Chuck) Sterchele**, former president of Global Television Associates...New director of technical services at KVC, Inc. is **Joseph F. "Chip" Chiappalone**...

The promotion of **Bud Yankowski** to manager of engineering has been announced by Edward M. Mullin, president of Ampro Broadcasting...The board of directors of Penril Corp. has elected **Paul Keane** vice president, **Joseph Gregory** corporate secretary, and **Gloria Ehrlich** assistant corporate secretary...**Justin Camerlengo** moves from manager of public relations to public relations director at Panasonic...

**Ray Mattinson**, chief engineer and account executive at KAPX Radio, San Clemente, Calif., passed away August 2 following a stroke. Mattinson had spent several decades in the field of broadcast engineering prior to coming to KAPX. He was with KOGO Radio in San Diego and KERO TV in Bakersfield, and was chief engineer at KAPX since September 1975. His friendly manner and courageous spirit following the recent discovery of extensive internal cancer will be sorely missed by his friends both at KAPX and in the San Clemente community. He is survived by his wife Lillian of San Juan Capistrano, and four children.

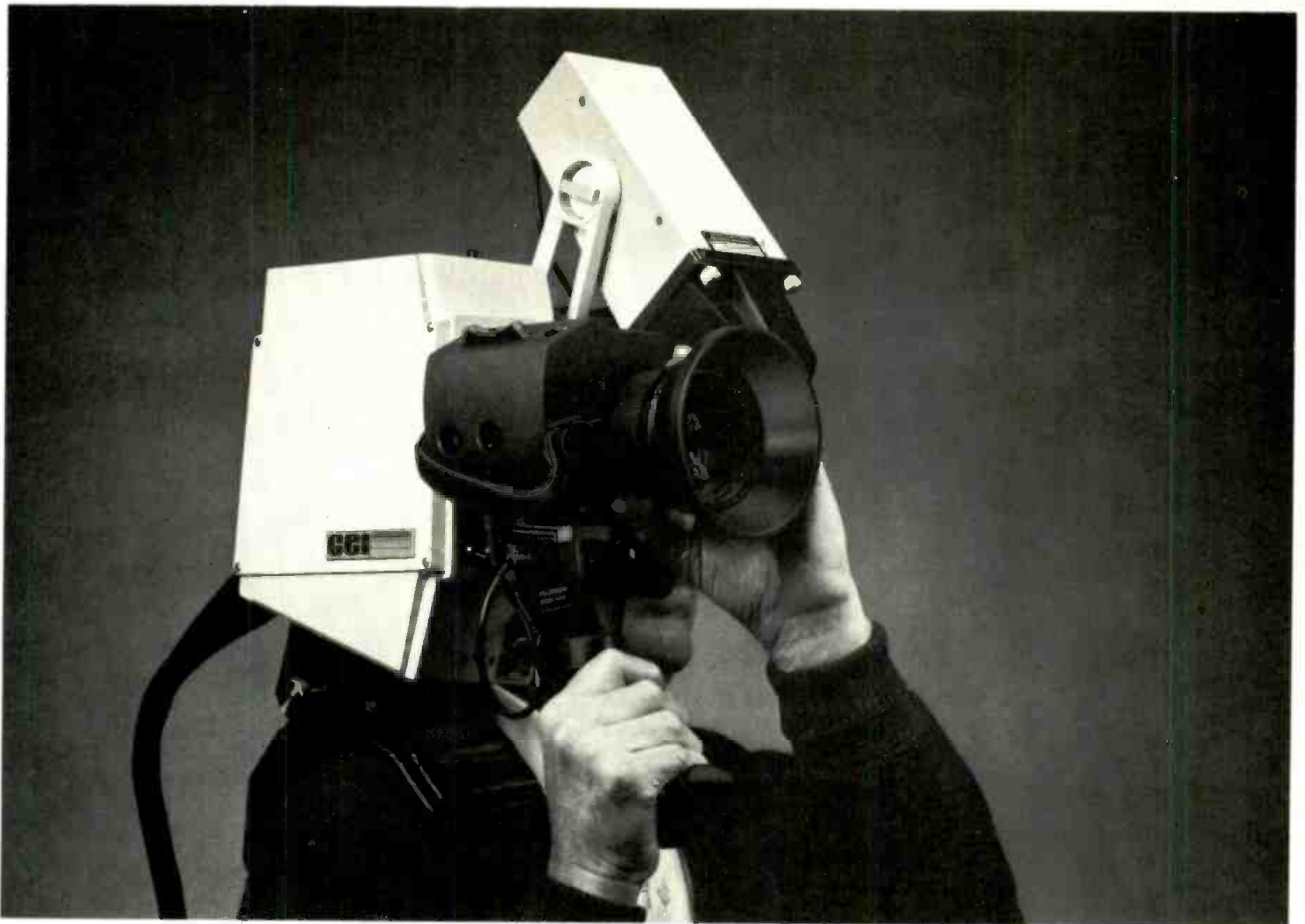
**Len Hensel**, vice president and general manager, WSM, Nashville, has been elected chairman of the radio board of directors of the National Association of Broadcasters, as **Kathryn F. Borman**, president, Springfield (Mass.) Television Broadcasting Co., becomes chairwoman of NAB's television board of directors...New chairman of the 45-member board of directors of the NAB is **Donald A. Thurston**, president of Berkshire Broadcasting Co., North Adams, Mass.

**Richard Estell**, general manager of Michigan State University's public radio stations, WKAR AM and FM, has been elected president of the Public Broadcaster's Organization of Michigan (PBOM)...**Raymond Telesky**, recently appointed director of quality control and reliability engineering for computer products at the Computer Products Group, will be responsible for maintaining high standards of quality control...**Leo Mahan** is the new assistant manager, product planning and national manager for product training, for the video products division of Sony Corporation of America...

**Lynn Ronan** becomes assistant manager of video administration at Sony...

continued on page 182





## The new CEI-310. Is it really that good?

A lot of people who saw our new broadcast quality field production camera at NAB could hardly believe it. They asked us a lot of incredulous questions.

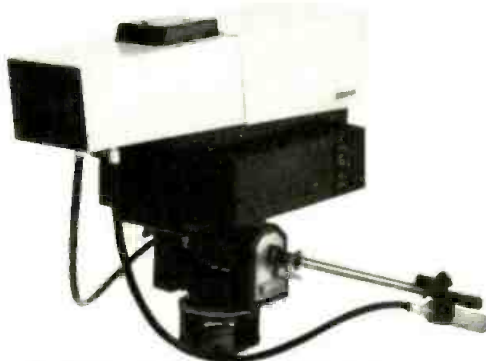
Is it really that small? That portable? Is it really making those incredibly good pictures we're seeing on the monitors? Even at those outrageously low light levels? Is the resolution actually as good as it looks?

Does it really require only one lightweight cable out to the electronics unit—for video and broadcast quality audio? Up to 400 feet? And up to 2500 feet with a systems integration unit?

Is it really that automatic? Does it really have full signal pro-

cessing? Does it really accept different tube types—2/3 inch Saticons or Plumbicons?

Can it really operate from battery belt? Battery pack? Any 12-volt DC source? Or normal AC power?



*Is this studio camera really the same as the portable one above?*

Is it really totally modular? Can it truly be reconfigured in minutes to a full-fledged studio camera—self-contained or system—with a big 8-inch viewfinder?

The answer to all these questions, of course, is yes. Now ask yourself this question. Shall I play it safe with a big name like Philips or RCA or Fernseh? Or shall I show a little initiative and take a look at this new CEI camera everybody's talking about?

Just give us the chance to show you. Call your local CEI representative now. Or get in touch with us directly at 880 Maude Avenue, Mountain View, California 94043, (415) 969-1910.

**TAKE A NEW LOOK**

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## FEATURES

- Solid State Modulator Driver
- Solid State Exciter
- Only One Tube Type - (4) 4-1000A
- Variable Vacuum Capacitor Tuning
- Motorized Variable Capacitor Loading
- Low Distortion, High Level Modulation
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- Automatic Recycle
- Simplified PA Tuning - Only two controls
- Double Duty Plate & Modulation Transformers
- Pretuned at Customer's Frequency
- Power Cutback (optional)
- Designed for Remote Control
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- Completely Metered
- Uses Standard Parts with Original Maker Numbers



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## people in the news

.....  
continued from page 180

**Preston Weber** moves from product marketing manager for data acquisition system products to national sales manager at the data tech division of Penril Corp....**Michael Marcovsky** has been named general manager of Columbus, Ohio programming for the QUBE division of Warner Cable Corporation...As sales manager, photo tubes, **David Farrar** will be responsible for the marketing function of English Electric Valve Company's photo tubes worldwide...



MARCOVSKY

RAY

HORNER

**Don Rhodes**, national sales manager for TeleMation, Inc., has announced the appointment of **James Kubit** as field sales engineer for the western region...**Paul C. Gordon** is the new president of Federal Electric Corporation...**John Semenuk**, who has been with GTE Sylvania since 1957, was recently appointed materials manager for the parts division...

Two weeks after rejoining National Semiconductor Corp. as technical director, **Pierre Lamond** was elected a vice president...**Carroll B. Ray, Jr.** will handle corporate development for Radio Shack...**Harvey Schein**, who has been president and chief executive officer at Sony Corp. of America for the past five years, has been promoted to chairman of the board. He will continue as the company's chief executive officer...

**Setsutaro Kobayashi**, chairman of the board, Fuji Photo Film Co., Ltd., Japan and president of Fuji Photo Film USA, Inc., died August 12, 1977 (Tokyo time). He was 77 years of age. Kobayashi joined the company in 1934 and served in a variety of sales and executive positions. In 1937, he was named a director of the board of Fuji and in 1943, became executive managing director. He was promoted to executive vice president in 1958 and president in 1960.

Warner Cable Corp., a subsidiary of Warner Communications Inc., has announced the appointment of four executives in its QUBE division, set up to introduce the company's new two-way communication service to the Columbus, Ohio area: vice president of marketing, **J. Ronald Castell**, joins Warner Cable from WBNS radio and TV in Columbus, where he was in charge of marketing; vice president of operations is **James L. Fischer**, who will direct overall technical operations; **Dr. Vivian Horner**, vice president of educational and children's programming, was formerly the director of research for *The Electric Company*, a production of Children's Television Workshop; and **Harlan P. Kleiman**, vice president of premium programming, pioneered the first specials in the cable TV industry. □



# DELTA ELECTRONICS

NEW

**OIB-3 OPERATING IMPEDANCE BRIDGE** – The new OIB-3 features direct reading of 'R' to 1000 Ohms and 'X' to 900 Ohms. The OIB-3 also contains an integral rf amplifier.

NEW

**AMC-1 AMPLITUDE MODULATION CONTROLLER** – Provides automatic control of the modulation levels of an AM broadcast transmitter.

NEW

**APC-1. AUTOMATIC POWER CONTROLLER** – Provides automatic control of the antenna current of an AM broadcast transmitter.

NEW

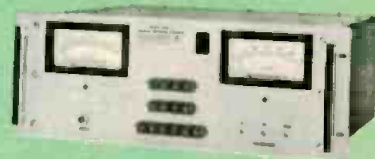
**TCA-N-EX AND TCA-N-EXR SERIES RF AMMETERS** – Equipped with output provisions for direct attachment of remote reading meters. Complies fully with new FCC regulations for remote metering.



## Antenna Monitoring

**AAM-1 ANALOG ANTENNA MONITOR** – FCC type approved. Provides accurate true ratio and phase readings. Easy to interface with existing control systems. AAMH-1 provides hardwired remote control of AAM-1.

**DAM-1 DIGITAL ANTENNA MONITOR** – FCC type approved. Provides digital readout of amplitude, ratio and phase. Also available: DAMA-1 Base Current Adapter for remote digital readout of antenna base currents; DAMX-1 to extend capacity of DAM-1 up to 12 towers.



## Transmitter/Antenna Remote Control

**TMCS-1 TRANSMITTER/ANTENNA REMOTE CONTROL SYSTEM** – Provides digital readout and control of the DAM-1 and transmitter over a single voice channel. Other systems available: DAMR-1/DAML-1 for digital readout and control of the DAM-1 only; DAMH-1 for use where the remote control point is close enough to the monitor to permit hardwired inter-connection.



## Measurement/Test Instruments

**OIB-1 OPERATING IMPEDANCE BRIDGE** – For antenna system measurements under transmitter power. May also be used as a conventional bridge.



**RG-1B RECEIVER/GENERATOR** – Two-watt signal generator with a tracking detector. Built-in rechargeable battery power supply for full portability in making low power impedance measurements. For use with OIB-1 or other RF bridges.



**CPB-1 COMMON POINT IMPEDANCE BRIDGE** – Monitors common point impedance continuously. Designed for permanent installation.



## Other Products

**TCT-( ) TOROIDAL CURRENT TRANSFORMER** – Provides accurate, stable R.F. samples for phase and amplitude measurements. Available in three sensitivities. Also available: TCTR-1 Compensated Rectifier Circuit to provide DC voltage for remote current measurement when used with TCT-( ).

**MJ-50 METER JACK** – A make-before-break in line jack assembly that permits "hot" insertion of OIB-1 Bridge or Ammeters.

DELTA ELECTRONICS



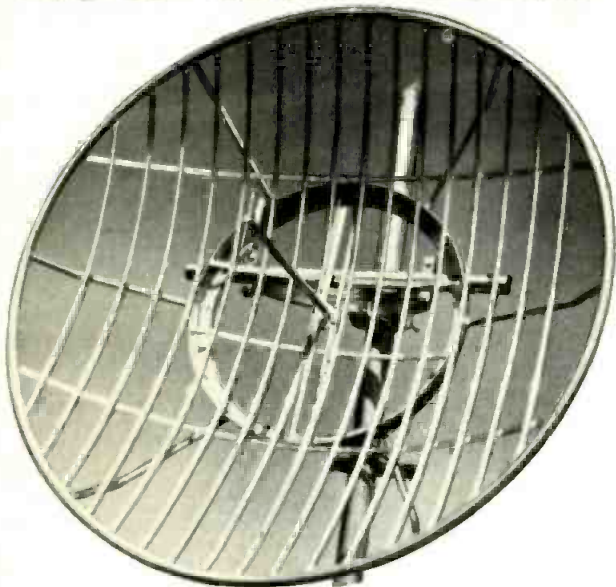
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## Mark Low Profile Grid Design

Cuts tower construction cost with no sacrifice in electrical performance. 3-point mounting greatly reduces path alignment and installation time.

Ringbacks further improve already extremely low wind loading characteristics of Mark Grid Antennas compared to solid dish type parabolics. Frequency range 350-2700 MHz. Others available on special application. Nest 4 to a crate. Write:

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AUDIO PROCESSOR Model 740

DUAL-BAND LIMITER Model 306

31-BAND 1/2 OCT. Equalizer Model 231

10-Band Graphic Equalizer Model 213

**iem** has been making special professional tapeheads since 1959. Thousands of configurations are available for audio, video, medical, and scientific uses. Full refurbishing.

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# industry news

continued from page 20

## Spurious emissions proposal faces opposition from NAB

Compliance with the FCC's proposal to limit spurious emissions from high-power broadcast transmitters to -90 dB would impose unjustified hardships upon licensees, according to the NAB. The NAB urged that the present tolerance be maintained.

Spurious emissions are those outside authorized channels and the FCC has proposed the new tolerance for submission to the 1979 World Administrative Radio Conference.

The NAB said there is no evidence that nations meeting the present international standard are causing widespread interference across their borders.

The NAB stated that the suggested suppression levels may be beyond practicality because the measurement could be made under ideal conditions such as during the manufacturing process, but would be difficult if not impossible under actual field conditions.

The majority of high-power broadcast transmitters have a normal life span of approximately 20 to 25 years, according to the NAB. Those now in operation unable to meet the new emission requirements by the mandatory compliance date in 1982 would have to be replaced or substantially modified even though their electronic life span was not finished.

## First-class FCC licensing course being offered

Designed to prepare students for a career in the communications industry, "Radiotelephone Electronics: 1st Class Licensing Preparation," will be offered September 26 through spring 1978 at the New School for Social Research in New York City.

The 300-hour course covers several diverse areas of electronics and radio-frequency theory, developing basic skills at each level, culminating in the 1st- and 2nd-class exams. The student receives 10 undergraduate credits at the completion of the course.

Some of the topics covered in the program are: the structure of matter, conduction; DC-circuit analysis; batteries; induction; generators; motors; transformers; AC-circuit analysis; resonant circuits; vacuum-tube, gas-tube, solid-state rectification; filter networks; AF and RF amplifiers, multipliers, oscillators; AM and FM modulation, transmission and reception; antenna theory; transmission-line theory; microwave; FCC regulations; television transmission; directional-antenna theory; and op-amp circuits.

The final sessions of the course will feature visits to actual studios for transmitter and student orientation. Resources are available for individual instructional assistance.

Due to the extensive technical material a student must grasp, the course requires a two-semester commitment and intensive study.

continued on page 186



# It's BASIC



**BASIC**  
**(A)**  
**BASIC**  
**(B)**

We asked broadcasters all over the country what they wanted most in an audio control system. They told us and we built it. We call it BASIC.

Everybody wants a system that talks English... not computerese. BASIC will find the next station ID if you ask it to "find the next station ID." Just like that. You can insert your programming commands in broadcast language phrases.

Everybody wants a system that will perform all important functions (not everyone agreed on what was important and what wasn't). Nevertheless, BASIC performs all of the functions all IGM systems ever have... and more.

**...the only  
audio control  
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that talks  
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Everybody said "those big systems cost too much. Produce one that we all can afford." So we did. We call it BASIC... and it's the finest thing IGM ever did.

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at  
NRBA  
BOOTH 119-120**

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Sony KV5100 5" color receiver/monitor

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## industry news

continued from page 184

### FCC modifies equal time recommendations to Congress

The FCC has voted against recommending that Congress consider an exemption to Section 315 of the political equal-time laws which would apply only to candidates demonstrating substantial support among the electorate. The exemption would apply if they polled 2% of the vote in the last general election or received support by petition from 1% of the electorate.

This modifies the FCC's May 4 recommendations to Congress: exempting Presidential and Vice Presidential candidates from the equal-time opportunities of Section 315; that a "major candidates test" be applied to other partisan races; and review of Section 399 and Section 312(a) (7) with respect to noncommercial broadcast stations.

The recommendations to exempt Presidential and Vice Presidential candidates and to review the public broadcasting sections were upheld.

Under current law, every use of a broadcast station by a candidate triggers an obligation to provide equal time unless the candidate is presented on an exempt newscast, news interview, documentary or in on-the-spot coverage of a bona fide news event.

continued on page 188

## The New Reverb Price/Performance Leader:

Introducing the new *dual channel* Orban/Parasound Spring Reverb. The new 111B retains all of the electrical features of its popular single-channel predecessor and augments them with a new bass control and "quasi-parametric" midrange control. The new midrange equalizer permits stepless adjustment of its  $\pm 12$  dB equalization range, as well as continuously variable center-frequency and *bandwidth*. This equalization flexibility is unparalleled in the low-cost reverb field and effectively complements the simple equalizers usually found on low-cost mixers and consoles.

Included in the new package is our unique "floating threshold limiter" which minimizes "spring twang" and provides absolute protection from overload. And our highly-respected electronics provides a bright, super-clean sound with the best signal-to-noise in the spring reverb field. Most remarkably, the two-channel 111B costs exactly as much as our single

channel model. The only thing you give up is the flexibility of our dual-chassis construction — now the spring is mounted with the electronics.

At \$695 for two channels, the 111B provides the quality alternative to the cheaper, consumer-quality reverbs on the market. With industrial-quality construction, line-level balanced outputs, compact size, and smooth, four-spring (per channel) sound, the 111B is the ideal choice for the user with space and/or budget limitations. And as always, you can count on Orban/Parasound's reliability and prompt service. For more information on the new 111B, see your local Orban/Parasound distributor, or contact

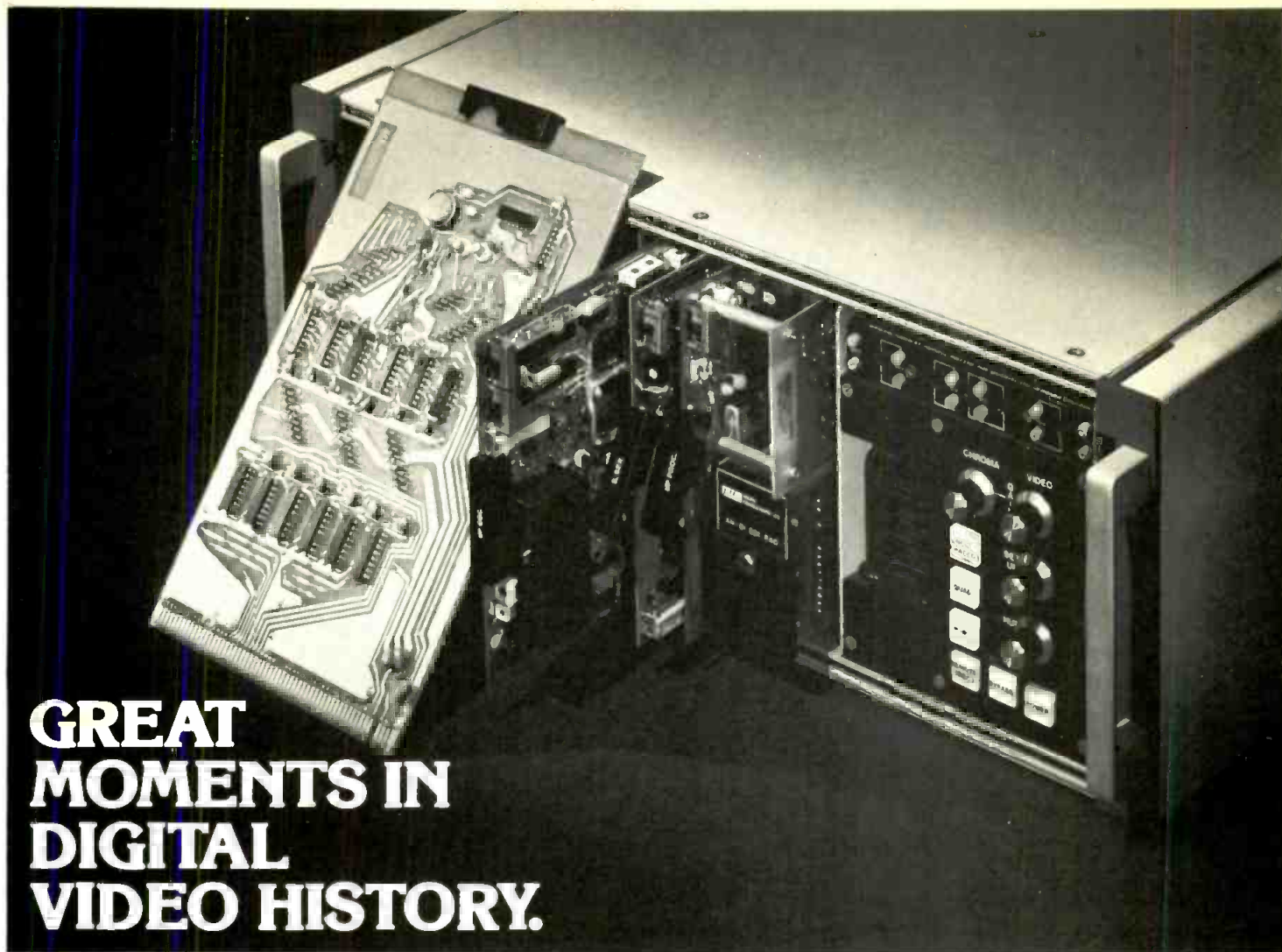
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## GREAT MOMENTS IN DIGITAL VIDEO HISTORY.

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The same people who brought you the world's most advanced digital framestore synchronizer now bring you the world's most advanced digital time base corrector—the new DTC 300. The DTC is advanced not only in its performance specifications, but also in its modularity.

Now, for the first time in digital video history, you can buy a top-of-the line time base corrector at an attractive price, and broaden its capabilities as your needs broaden. True modularity means that upgrading is simply plugging in new boards. That's all there is to it.

The basic unit handles a variety of VTR's—helical, segmented field, etc. With plug-in options, you can also handle heterodyne and non-capstan servo units. In short, any VTR.

Additional plug-in options are drop-out compensator, look-ahead velocity compensator, sync generator output driver, and jittered subcarrier output to convert heterodyne VTR's to direct color VTR's. They take minutes to install.

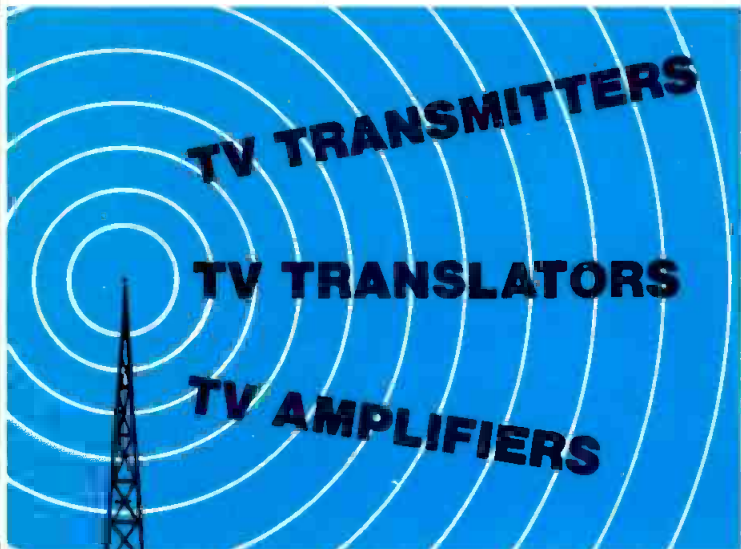
With products like the DTC 300, Micro Consultants is creating great moments in digital video history. Shouldn't you be creating your own? Make a start. Call your local Micro Consultants representative. Or write us at P.O. Box 10057, Palo Alto, California 94303.



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## industry news

continued from page 186

Section 312(a) (7) permits the FCC to revoke any station license or construction permit for willful or repeated failure to allow reasonable access to or to permit purchase of reasonable amounts of broadcast time by a legally qualified candidate for federal office. Section 399 prohibits a noncommercial educational broadcast station from engaging in editorializing, supporting or opposing any candidate for political office.

### PMPEA aids recovery of lost or stolen equipment

Notification of lost or stolen equipment can be sent to the Professional Motion Picture Equipment Association. The PMPEA circulates the information to the repair and used equipment departments of its 50 members, including manufacturers and dealers of professional motion picture equipment throughout the U.S. and Canada.

Should any loss of this nature occur, forward a list of the equipment, with serial numbers and other pertinent data to: Lee A. Duncan, PMPEA Secretary-Treasurer, c/o Victor Duncan, Inc., 2659 Fondren Drive, Dallas, TX 75206.

continued on page 190

# Meet the MILLION DOLLAR Success Story: the SMC DP-2 Digital Programmer

We've sold over one million dollars of DP-2 automation so far in 1977. And that's a success story we want you to investigate. Because the DP-2 is the finest microprocessor automation system available today — out-performing the human functions of action and decision-making. To discover how the DP-2 can work for your station, call:

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# New Orleans Moves Up To OPTIMOD-FM!

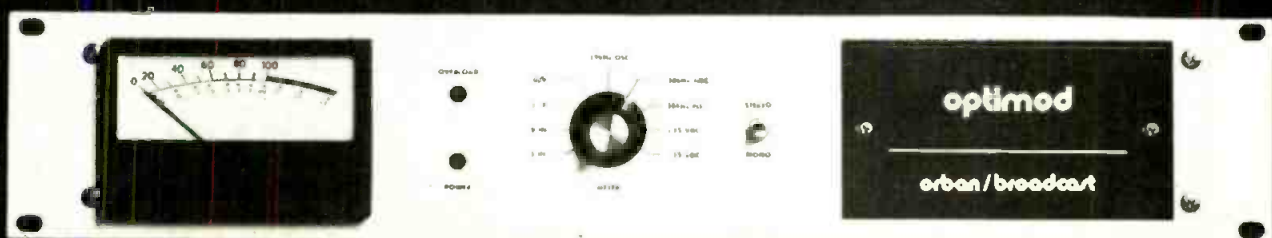


In New Orleans the FM dial is dominated by the cleaner, brighter, louder sound of OPTIMOD-FM. Eight out of nine FM's licensed to New Orleans have purchased OPTIMOD-FM. Like hundreds of other broadcasters, they recognize OPTIMOD-FM as the easy-to-install, cost effective breakthrough to better FM audio.

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## urban / broadcast

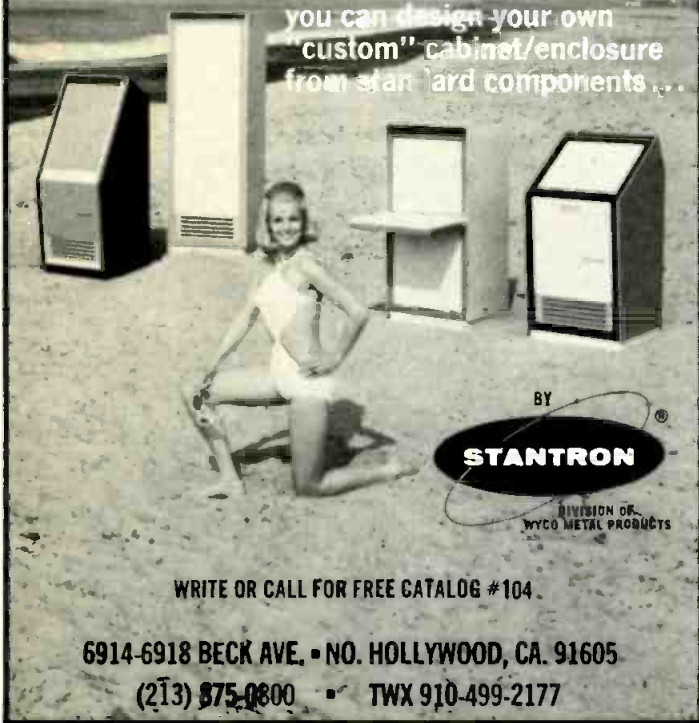
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## industry news

continued from page 188

### Changes proposed in radio operator licensing

Persons holding a restricted radiotelephone operator permit may be authorized to operate AM and FM stations if the FCC passes a proposed rules amendment. No examination is required to obtain the permit as opposed to the currently required limited radiotelephone operator permit.

Other changes being considered are:

- A dual-license structure: one series for the routine operation, and one for the technical operation and maintenance of the various classes of radio stations and for the retitling of licenses;
- A new class of operator license for the operation of television broadcast transmitters;
- A strengthening of the current rules regarding operator responsibility by adding requirements that the licensed operator or technician responsible for the maintenance of a transmitter will: (1) ascertain that the station is authorized by the Commission, (2) make no modifications to the transmitter that would void FCC type-acceptance or type-approval, and (3) be responsible for making the required entries in the station records;
- A new requirement that the technician responsible for maintenance, upon completion of his duties, enter a signed statement in the station record that the

continued on page 192

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# Maximum Signal Performance In Harris' FM Transmitters with the MS-15 Exciter... for the Sound of the Century!

There's no doubt about it, your listeners will hear the difference with the new Harris 'K' line of FM transmitters featuring the MS-15 solid-state exciter, employing Digitally Synthesized Modulation (DSM)\* and overshoot compensation. These advanced design techniques offer higher stereo separation, and increased loudness with no degradation of audio quality.

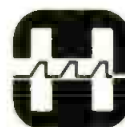
DSM affords the ultimate in stereo and SCA performance,

with 40 dB or better separation, 30 Hz through 15 kHz. Modulation of the 19 kHz pilot and crosstalk into the subchannel are eliminated with this technique.

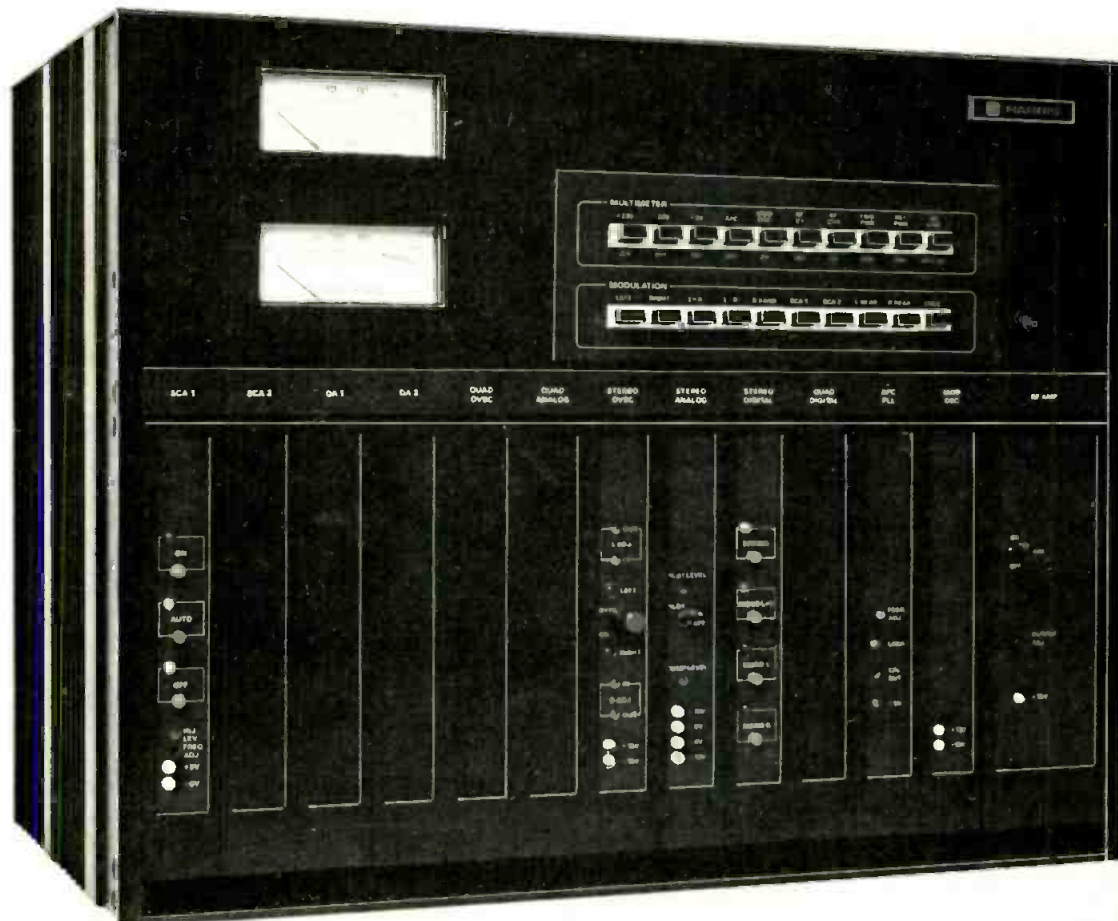
The new Dynamic Transient Response filter (DTR) allows no greater than 2% overshoot. Thus, a 2 to 6 dB increase in loudness can be achieved while maintaining excellent transient response, high stereo separation, low crosstalk and low intermodulation distortion.

For the clearest, loudest sound around, write for information on the new Harris FM transmitters with the MS-15 exciter to: Harris Corporation, Broadcast Products Division, Quincy, Illinois 62301.

\* Patent applied for



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## industry news

continued from page 190

station is operating in compliance with FCC rules and authorization; if the station is in noncompliance, the technician would be required to give the particulars and additionally to notify the licensee in writing:

- A simplified examination for the limited radio-telephone operator permit by combining two examination elements into one.

### New FCC office opens

A new FCC field office in Pittsburgh is charged with investigating violations of federal laws and regulations concerning radio communication. It will be staffed with three persons to meet the needs of the growing number of users of radio communications within approximately 200 miles of Pittsburgh.

Since the technical staff will be performing tasks away from the office most of the time, answers to questions frequently asked about radio operator examination schedules, citizens radio license issuance, television interference, etc., will be provided by a recorded telephone message. (412)823-3553. Call (412) 823-3380 for other communications.

Wolfe P. Huber will be engineer in charge. The mailing address is Federal Communications Commission, William Penn Highway, Monroeville, PA 15146.

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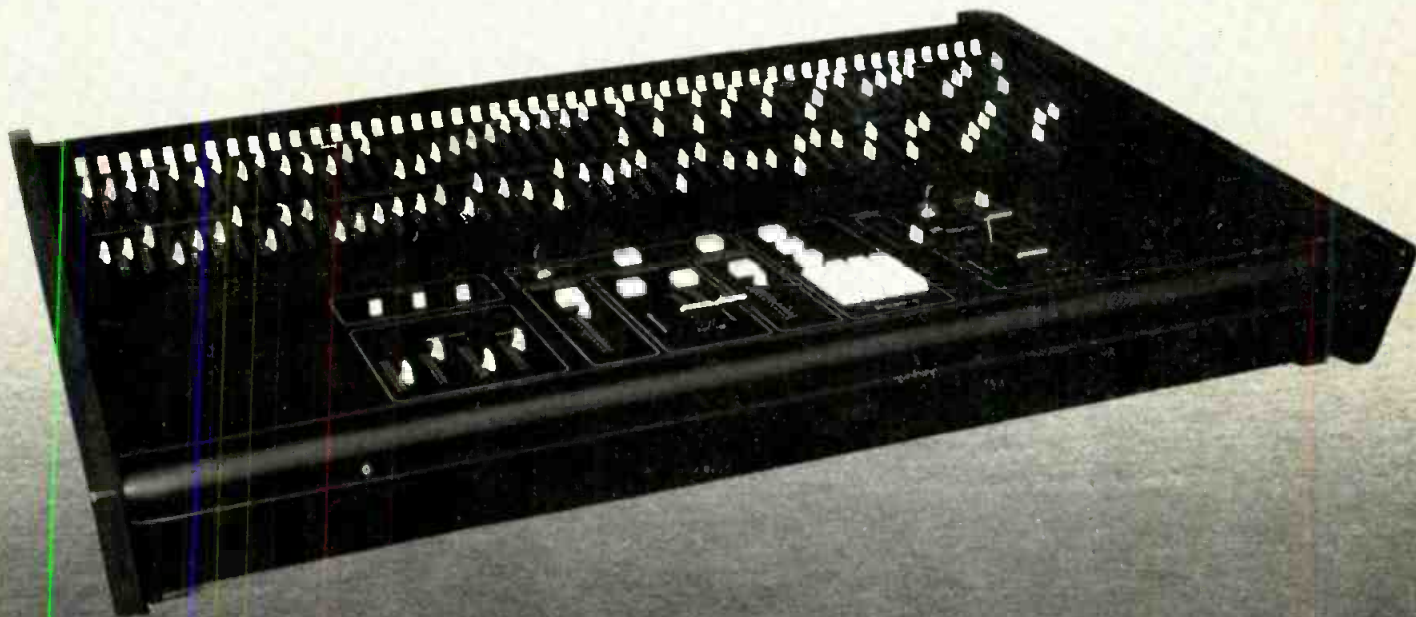
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sor controlled. Micro-Q offers timed crossfades, cue insert, preview and submastering. For your newscasts, commercials or more sophisticated production, be creative with your lighting — memorize it the Micro-Q way. Ask for your new Micro-Q brochure.

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**news  
briefs**

**TeleMation reports first half profit**

Recovering from a first half loss in 1976 of \$536,000, TeleMation, Inc., has reported a first half profit in 1977 of \$257,000, or 25 cents per share, on revenues of \$4,709,000. For the quarter ending June 30, 1977 TeleMation reported a net profit of \$213,000, or 21 cents per share, compared to loss for the same three-month period in 1976 of \$134,000, or 30 cents per share. W. Paul Warnock, president, attributed the return to profitability to the improved performance of the hardware portion of the company's business.

**Dynatech creates new division**

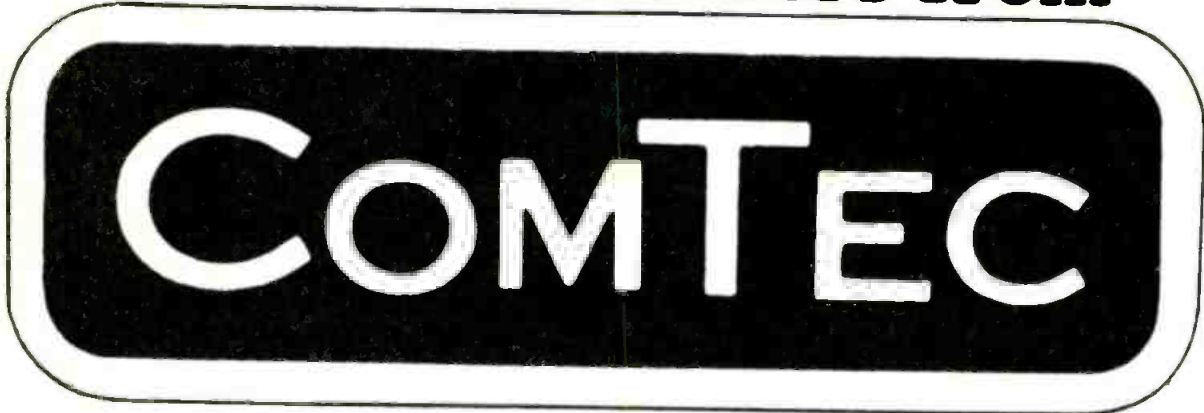
Dynatech Corporation has separated the data division from the laboratory products division. In order to provide a name more closely identified with its primary area of business, the new division has been named Dynatech Data Systems.

**Maintenance training seminar slated**

Cinema Products Corp. will hold its two-day "CP Maintenance Training Seminar" October 14-15, just prior to the opening of the SMPTE 119th Conference & Equipment Exhibit. The seminar will feature sessions conducted by representatives from several equipment manufacturers who will report on current practices

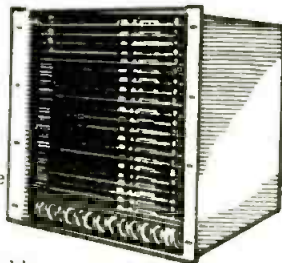
*continued on page 196*

**Two top-of-the-line  
broadcast switchers from**



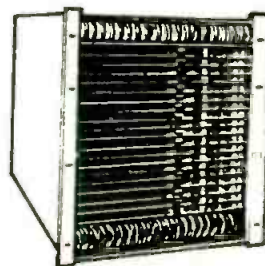
From the company with 8 complete lines of routing switchers.

**20X**



5 level (video, 2 audio, 2 aux.) matrix  
Or 3 level (video, audio, aux.) matrix  
20 x 10 or 20 x 20 Mainframes  
Each channel separately programmable  
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Complete control flexibility  
Breakaway audio (optional)  
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**40X**



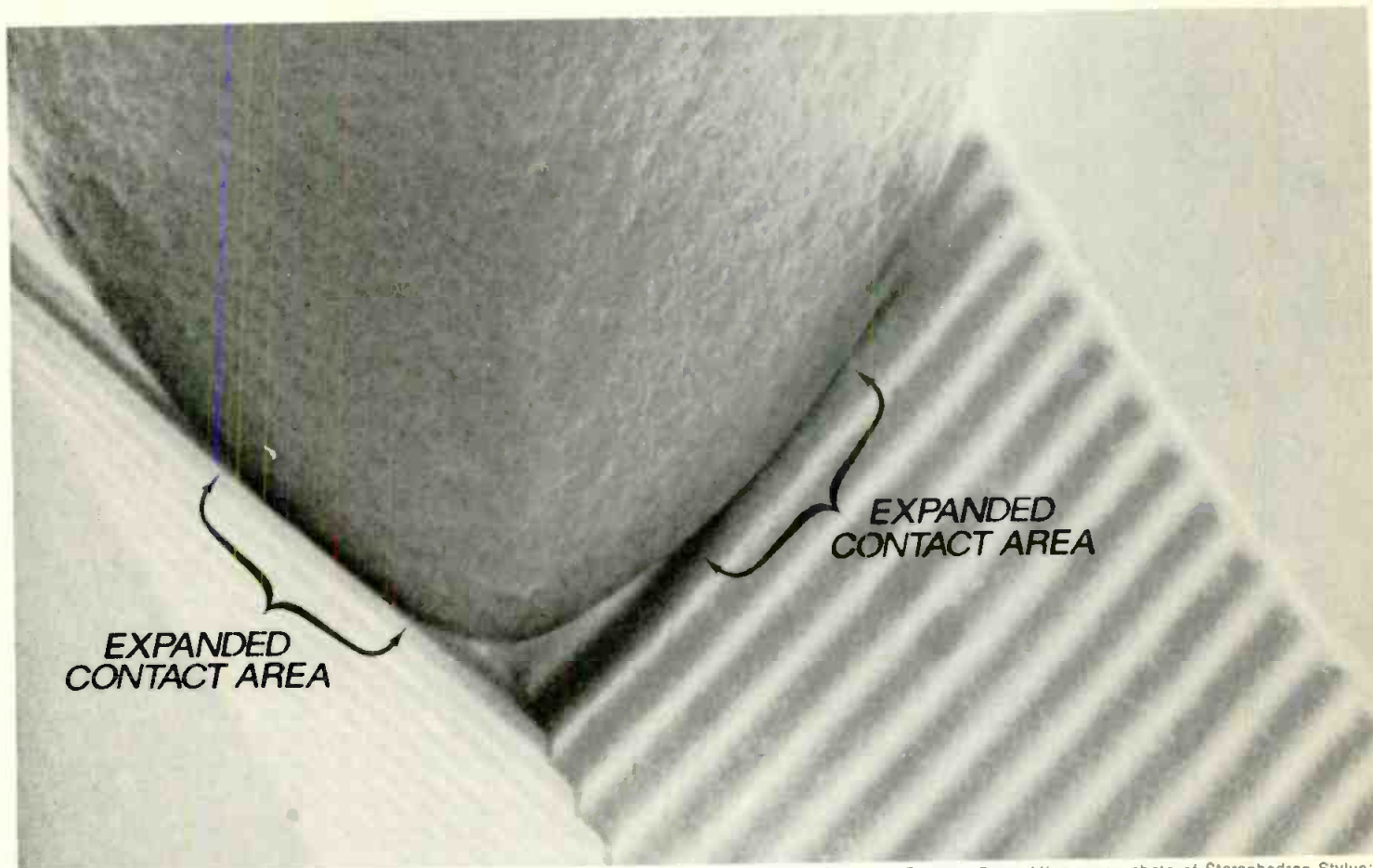
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Emergency and back-up supplies available  
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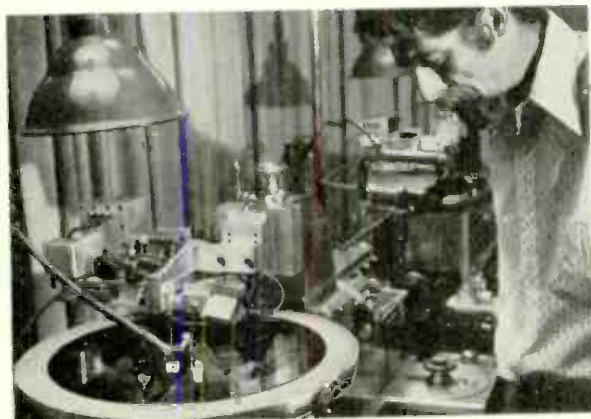
# Better stereo records are the result of better playback pick-ups



© Stanton Magnetics, Inc., 1977

Scanning Electron Beam Microscope photo of Stereohedron Stylus; 2000 times magnification. Brackets point out wider contact area.

## Enter the New Professional Calibration Standard, Stanton's 881S



Mike Reese of the famous Mastering Lab in Los Angeles says: "While maintaining the Calibration Standard, the 881S sets new levels for tracking and high frequency response. It's an audible improvement. We use the 881S exclusively for calibration and evaluation in our operation."

The recording engineer can only produce a product as good as his ability to analyze it. Such analysis is best accomplished through the use of a playback pick-up. Hence, better records are the result of better playback pick-up. Naturally, a calibrated pick-up is essential.

There is an additional dimension to Stanton's new Professional Calibration Standard cartridges. They are designed for maximum record protection. This requires a brand new tip shape, the Stereohedron®, which was developed for not only better sound characteristics but also the gentlest possible treatment of the record groove. This cartridge possesses a revolutionary new magnet made of an exotic rare earth compound which, because of its enormous power, is far smaller than ordinary magnets.

Stanton guarantees each 881S to meet the specifications within exacting limits. The most meaningful warranty possible, individual calibration test results, come packed with each unit.

Whether your usage involves recording, broadcasting or home entertainment, your choice should be the choice of the professionals... the STANTON 881S.



For further information write to Stanton Magnetics, Terminal Drive, Plainview, New York 11803

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## The Optek 7400C Automatic Bulk Tape Degausser

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- ★ Fully automatic
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- ★ Adapters for ACR25/TCR100 and 3/4" cassettes

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## news briefs

continued from page 194

and the latest developments in their field. These include: John Norris, Eastman Kodak Co., who will present Kodak's new, fast film stock, VNF 7250; Bern Levy, Angenieux Corporation of America, who will demonstrate the proper use and care of both zoom and fixed focal length lenses; and Nat Tiffen, Tiffen Optical Corp., who will discuss special filter applications. Also scheduled is a special session on Cinema Products' STEADICAM™, a film/video camera stabilizing system.

### IFPA 18th annual conference scheduled

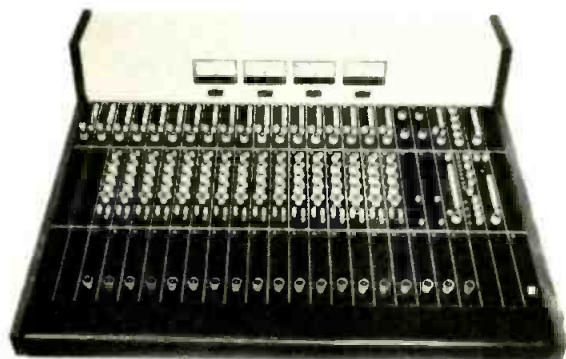
IFPA, Film and Video Communicators will hold its annual meeting, Trade Show and Cindy Awards Festival October 5-8 at Chicago's new Holiday Inn in the Chicago City Centre. Filmmakers, video and filmstrip producers, writers, camerapeople, managers, industrial representatives, representatives from government, education, and a wide range of allied A-V professionals and students are expected to attend.

### INTELCOM '77 to include 250 exhibitors

More than 250 communications companies from all over the world will exhibit their products and services at INTELCOM '77, the first International Telecommunications Exposition to be held in the U.S. In

continued on page 198

**OKAY,  
YOU ASKED  
FOR IT  
AND GRANDSON  
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"It" is more. That's what broadcasters have been asking for in production consoles. Flexibility. Capability. And totally unique Grandson has it all.

There is nothing else like it anywhere!

Equalization at each input position. Don't laugh. If you don't think it's needed, that's because you haven't tried it. EQ is only the most useful, creative tool in audio. And Grandson's EQ is something special. One major network has bought a bunch. That's special.

Monitoring and foldback flexibility to let you and the talent have separate monitor mixes! And changes of monitor mode at the push of a single button. Here's the key to fast, creative production.

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Grandson is "it." A totally unique approach. Want more details? Write or phone today.

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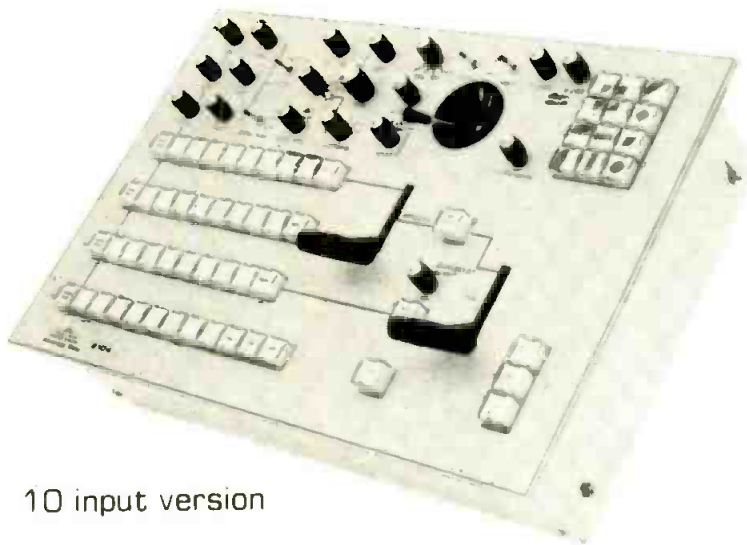
3750 Old Getwell Road, Memphis, TN 38118, 901-362-1350

The closer you look, the better we look.

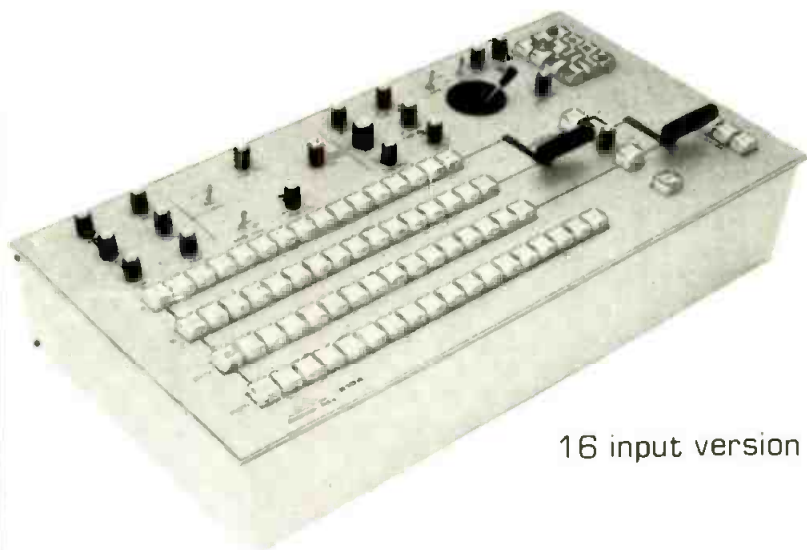
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- Joystick pattern positioner
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Uncompromising quality and reliability make the ADC Model 2104 a production tool that is ideal for use in even the most exacting applications.

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**news  
 briefs**

*continued from page 196*

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addition, the exposition has scheduled 70 technical sessions covering all aspects of telecommunications, financial seminars, and 19 intensive short courses on computer networks, satellites, digital trends, management of communication systems, marketing and finance. Bjorn Lundvall, chairman of the board of directors, L. M. Ericsson, Sweden, will be a keynote speaker at INTEL.COM '77, being held at the Georgia World Congress Center in Atlanta October 9-15. Lundvall will speak on Telecommunications and Economic Development in the Developing Countries.

**NAB task force on minority ownership proposed**

The executive committee of the National Association of Broadcasters has directed that a task force be established to attempt to foster an increase in minority broadcast ownership. The NAB staff was asked to prepare an organizational plan for the establishment of such a task force for presentation at the next executive committee meeting.

**Broadcasters clinic scheduled for October 19-20**

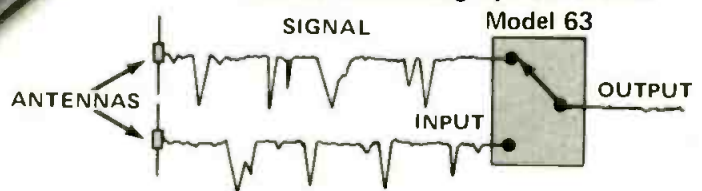
The 23rd Annual Broadcasters Clinic sponsored by the University of Wisconsin-Extension will be held in Madison October 19 and 20. Among the speakers at *continued on page 200*

**The Ultimate in Wireless Microphone Systems**

Vega's new Model 63 Diversity Receiving System virtually eliminates problem noise and signal dropouts that are occasionally encountered when a wireless microphone system is used on a set, in studios, and in theatres. Moreover, because excellent soundtracks can be obtained from fully concealed wireless mics, much of the tedious dialogue looping on taped programs is no longer necessary. When used with any of Vega's fine wireless transmitters, the audio is like a hardwired connection. Of course, Vega's Diversity Receiving System will improve the performance of any brand VHF wireless mic. It's no surprise that the Model 63 Diversity Receiving System is being used by all major network studios. Try one, and see what it can do for you.



**How the Diversity Receiving System works**



*The Model 63 Diversity automatically switches electronically to the strongest signal, i.e. eliminating signal dropouts.*



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SET UP

PH SYNC

## a broadcast quality, digital TBC

It's the CVS 516, first digital TBC made and priced to give users of non-segmented, heterodyne VTRs all the proven advantages of modern digital video processing.

The CVS 516 is ideal for ENG, teleproduction, studio VTR backup and much more because it comes with features that, before, you'd find only in TBCs costing up to twice as much.

For example, correction of chroma/luminance delay problems, a 3dB chroma noise reduction, velocity compensation and color dropout compensation are standard.

So is "Gyrocomp," an exclusive, use-proven CVS memory design that easily handles severe gyroscopic distortions—without breakup.

There's also a broadcast stable, gen-lock sync generator, automatic VTR advanced sync and a built-in completely adjustable processing amplifier.

If all that's not enough, add our optional, moderately priced Image Enhancer/Noise Reducer. This plug-in card

substantially reduces luminance and chroma noise and significantly improves subjective resolution. And, to tame even the wildest instability, you can add our optional 16 line window.

Simple operation is another plus for the CVS 516. Front panel controls give you total mastery of your video signal. Each control also has a preset unity position to give you a consistent starting point for all your tapes.

All this, and more, is contained in a package that weighs only 25 pounds, is only 3½ inches high and uses only 175 watts—major advantages with today's increasing emphasis on ENG and field production.

So, to give your heterodyne productions the quality they deserve, get the one digital TBC made and priced to do the job—the CVS 516. For full details and/or a demonstration, contact your authorized CVS Distributor or CVS. And ask for our new booklet about the basics of digital time base correction. It's free.

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## news briefs

continued from page 198

the "Broadcasters Clinic '77" will be Matti Siukola, director of antenna design for RCA, and Howard Shepard, director of advance planning for Central Dynamics. Other companies represented will include Ampex and Harris Corporation.

### NAB meetings scheduled

The NAB will conduct three meetings this fall to give the public an opportunity to ask questions about the Radio and Television Codes and broadcast policies. The meetings are scheduled for Cambridge, Mass. (October 18), San Diego (November 11) and Dallas (November 15). Participants will include NAB executives, members of the NAB code boards, representatives from the networks, local radio and television stations, and television writers and producers.

### Multi-Image workshop

The Association for Multi-Image (AMI) will sponsor a production workshop at Rhode Island College in Providence, September 29 through October 2. The event is being staged by Hans-Erik Wennberg and will feature multi-image presentations by various practitioners who will explain and discuss related production problems as the presentations proceed. □

# Broadcast/Recording Equipment from MICMIX



## TIME WARP

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Wide ranging variable time translation of audio signals for uniqueness in commercials and special programming.

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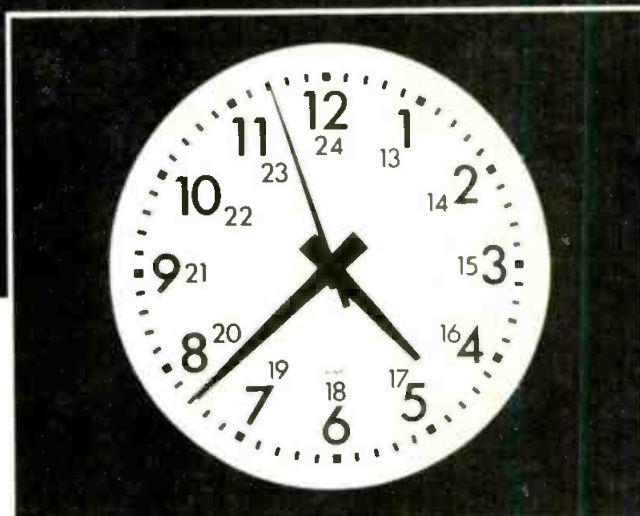
In the beginning,  
Time was a reflection  
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Today Time is earth-bound,  
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With the coming of the twentieth century man has discovered space travel and broadcasting. Both demand micro-second accuracy to a degree never imagined before.

Leitch provides it with the Leitch Precision Impulse Clock. Controlled by impulses accurate to within one nine billionth of a second, Leitch clocks can be fully synchronized to the exact second. Compatibility with other impulse drive systems allows them to be added to existing drivers or to be installed separately as a totally new system.

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## VIDEO TEST FILM...

### NEW TEST FILM AND SLIDES FOR PRECISION TELECINE ALIGNMENT

- MT Multitest—A pattern of neutral grays and colors available in 16 mm film loop or slide.
- TA2—Five-step crossed gray scale slide, 2.5 power law.
- CB2 Color Bar slide—six colors plus white, colors designed to fall on vetroscope radials.

*MT, TA2 and CB2 have a mid gray (50 IRE) surround to the active area and have the same spectral characteristics as the majority of programming material.*

- DM—Depth of Modulation slide.
- TC—General Purpose Test Chart incorporating registration, centering, focus and safe title patterns.
- FT Flare Test slide—instantly shows the existence of optical flare.

*The above patterns are available in 3 1/4" x 4" and 35 mm slide sizes.*

*All DSC test materials are computer calibrated to an accuracy of  $\pm 1$  IRE unit. May be purchased or leased.*

*DSC also has a complete line of 8" x 10" test slides for studio camera alignment.*

Since 1965, DSC has been supplying precision test materials to the television community. For additional information, please telephone or write:



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## One (or two) for the road.

Thomson-CSF Laboratories keeps breaking conventional sound barriers (cords and booms) with RF microphone systems that offer reliable transmission with excellent range and true high fidelity.

First, the RM-102 single channel portable system provides one full diversity channel for field and remote broadcast use. Or, if multiple channels are needed, where no AC power is available, the RM-104 solves the problem. Two full diversity channels can capture action dialog on the set or in the field, making it fully usable for filming or taping. 950 MHz diversity reception achieves drop-out free performance, and both systems come with transmitters and antennae so they're complete and completely portable.

**Now Portability Plus.** Thomson-CSF takes portability a step

further with its new ENG 101 single channel miniature, portable diversity microphone system, specifically designed for use with today's miniature ENG cameras.



Model ENG 101 transmitter and receiver.



**THOMSON-CSF LABORATORIES, INC.**

37 Brownhouse Rd., Stamford, CT 06902  
(203) 327-7700/TWX (710) 474-3346



RM-102 transmitter and receiver.

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## from blue bananas to sag tails

### Old record books never tell the truth

While working the midnight shift in Armed Forces Radio at Lajes Field, Azores, Portugal, I had what I thought was a great idea to get our listeners involved. I would ask questions on a particular sport. I am not a sports fan, but in our news room I found a book on baseball statistics.

Baseball season was over; the book looked brand new and I was ready to go. I announced that questions on baseball would be asked and that persons with the correct answers would have their names aired along with the acknowledgment of answering correctly.

I aired a question. While a record was playing I received many calls. None were correct. I gave the book's answer, asked another question, played another record. Again, no correct answer. I kept this up for about 20 minutes. My idea worked—I involved quite a few listeners, all of whom were becoming irritated at my answers.

I would have defended that book to no end. So you can imagine my empty feeling and rapid pulse when, after one particular phone call, I read the cover of my reference book. It was one year old! Anthony Mollica, Santa Monica, Calif.

### Roaring to the rescue

At one of the transmitter sites in the bay area, the chief engineers of the stations at the site would all come in on the same evening for transmitter maintenance. One of the stations had a remote control for an AM transmitter at another site which was a classic home-brew unit twice nominated for kluge of the year. There were no drawings and plenty of clip leads.

One of the chief engineers was a joker. One night he secretly wired a sparkler under the remote control and touched it off with a match to cries of, "Bob, Bob!" Victim Bob entered the room and set the world's record for widest opened mouth with a lit cigarette still dangling from lower lip before roaring to the rescue. Roy H. Trumbull, Loney College, Oooklond. □



**Regardless  
of who made your  
2/3-inch Plumbicon\* TV camera,  
or where it was made—  
Amperex has the exact replacement  
for the tube  
that came with the camera.**



We know this tube as only its originator *can* know it. You can take our word for it...*there is only one Plumbicon*. And no matter where your Plumbicon camera comes from, whether it's a full-sized studio camera or one of the new hand-held portables... Amperex has the replacements for your equipment that will give you equal or better performance compared to any tube that came with the camera.

There *is* this difference. Amperex replacement tubes are immediately available, off-the-shelf,

for delivery within 24 hours through local distributors and Amperex factory sales representatives. And Amperex tube distributors (your own local businessmen), are carefully selected for their ability to support Plumbicon TV camera systems with on-the-spot customer support and on-the-spot customer service.

For more information on Plumbicon TV camera tubes, write or phone: Amperex Electronic Corporation, Slatersville Division, Slatersville, Rhode Island 02876. Telephone: 401-762-3800.

**Amperex®**

TOMORROW'S THINKING IN TODAY'S PRODUCTS

A NORTH AMERICAN PHILIPS COMPANY

\*Trademark of N.V. Philips of the Netherlands

For More Details Circle (148) on Reply Card

# QUALITY TALKS FOR KEYH

Houston, Texas



Continental's new 5/10 kW AM transmitter is setting records for acceptance. It has performance and efficiency, with the cleanest sound around. Listen to Continental: quality talks.

Write for brochure: Continental Electronics  
Mfg. Co. Box 270879 Dallas, Texas 75227  
(214) 381-7167

**Continental**  
**Electronics**

For More Details Circle (149) on Reply Card

## technical data

**Allen Avionics, Inc.**—Catalog 11V for 1977-78 features video and pulse delay lines, L-C filters and video equalizers. The illustrated catalog describes and gives specifications for this line of video units designed to achieve precise short delays.

Featured in the catalog are pulse and video delay lines, models VP0635, VP1270 and VP0010, which have flat amplitude response to 5.5 MHz, small increments of delay variation, low signal distortion and tight delay tolerance.

Also included in the catalog are models VE300 and AV-535, TV line equalizers; Spiradel<sup>®</sup>, a fixed delay line; delay equalized NTSC lowpass filters; NTSC reject filters; and an NTSC bandpass filter.

For More Details Circle (300) on Reply Card

**Cetec Sparta**—New full-color literature describing the latest broadcast (radio and TV) audio consoles is available from Cetec Broadcast Group.

Labeled **Cetec Sparta Audio Equipment/1**, the 12-page booklet is devoted to the Centurian Series and 3000-Series consoles. **Audio Equipment/2**, also a 12-page booklet, is expected soon. It will describe other console lines, studio and remote broadcast furniture, speakers and related studio equipment.

For More Details Circle (301) on Reply Card

**Frequency Devices, Inc.**—A 36-page catalog has been offered featuring electrical specifications complete with tabulated amplitude, phase data and mechanical dimension drawings of 10-product families.

These help the designer select the correct filter for any specific application in question. The catalog simplifies selection by dividing the filter types into four categories: highpass, lowpass, bandpass and band reject.

A one-page selection guide introduced  
*continued on page 206*

# VAN LADDER INTRODUCES THE MODEL 2913 BC BROADCASTING UNIT



Are you plagued with costly interruptions, time consuming searches for clear transmission paths and set-up, and lost shots?

Modern broadcasting demands the finest most reliable equipment available. Signal interruptions and equipment malfunctions are costly in viewer and sponsor satisfaction.

With the VanLadder Broadcast Unit you can extend the reliability of your mobile Electronics News Gathering to your station system. Raising your microwave dish 30 feet allows transmission over trees, buildings, passing traffic and other line-of-sight objects. Increase the range of on-the-spot transmissions to as many as 30 miles.

The VanLadder Model 2913 BC Unit mounts on all styles and sizes of Electronic News Gathering vans with virtually no interior obstructions.

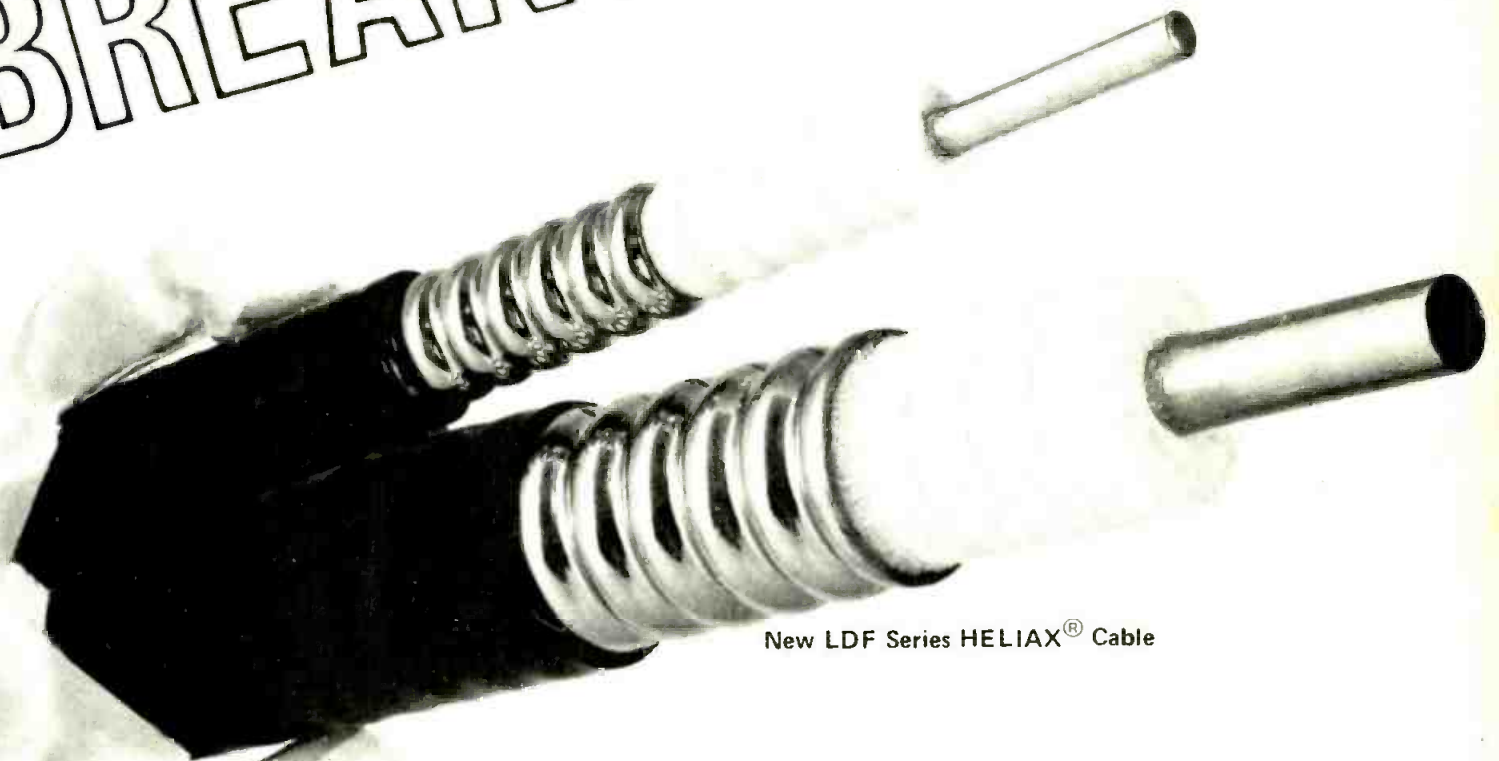


**VanLadder, Inc.**  
Box 709  
Spencer, Iowa 51301  
800-831-5051

VAN  LADDER WILL MAKE THE DIFFERENCE



# LOW LOSS CABLE BREAKTHROUGH



New LDF Series HELIAX<sup>®</sup> Cable



## ANDREW

Lower loss, improved moisture barrier, plus all the traditional advantages of HELIAX foam-dielectric cable. New low density foam dielectric reduces attenuation, almost to that of air-dielectric cables. Annular corrugations, in conjunction with connector "O" ring seals, provide a positive longitudinal moisture block.

Connectors have been improved too. New features include self-flaring assembly, superior electrical contact, high resistance to pull-off and twist-off, moisture seals, and low VSWR through cable cut-off frequency.

Two sizes, 1/2" and 7/8" are available now for immediate shipment. For further information contact your Andrew Sales Engineer or ask for Bulletin 1160.

### ANDREW CORPORATION

10500 W. 153rd St., Orland Park, IL, U.S.A. 60462  
Telephone: (312) 349-3300

### ANDREW ANTENNA COMPANY LTD.

606 Beech St., Whitby, Ontario, Canada L1N 5S2  
Telephone: (416) 668-3348

### ANDREW ANTENNAS

Lochgelly, Fife, Great Britain KY5 9HG  
Telephone: (0592) 780561

### ANDREW ANTENNAS

171 Henty St., Reservoir, Victoria, Australia 3073  
Telephone: (03) 460-1544

### ANDREW ANTENAS LTDA.

Av. Victor Andrew, 585, Caixa Postal 600, 18100 Sorocaba-  
SP-Brasil Telephone: (0152) 28900

### ANTENNES ANDREW S.A.R.L.

B.P. 44, 28400 Nogent-le-Rotrou, France  
Téléphone: (37) 52 19 06

### ANTENAS Y PERITAJES

Av. Reforma 445 P.B.-K., México 5, D.F. México  
Teléfono: (905) 525-5443

For More Details Circle (151) on Reply Card

# ASSURE PEAK SIGNAL OUTPUT

with trimmable Vacuum Capacitors from ITT Jennings.

The unique construction of these capacitors combines a tunable and a fixed capacitor in the same ceramic envelope with a VACUUM dielectric. This combination offers higher current ratings, smaller size, greater thermal stability, and better reliability than conventional designs. They are ideal for high frequency unattended transmitter operation, or anywhere stable peak signal output is important.



- Current ratings: 200 A. Rms. @ 9 KVAC to 85 A. Rms. @ 50 KVAC.
- Capacitance values available from 20 to 1357 pFd.
- Size: All models are just 4.5" tall by 5.3" in diameter and come with built-in mounting rings for ease of installation.
- Operating Temperature: -55°C. to +125°C.

If you are concerned with antenna phasing or matching, or working with grid bias or tank filter networks, you will want to know more about the Trimmable Vacuum Capacitors from ITT Jennings. For more information contact: ITT Jennings, 970 McLaughlin, San Jose, CA 95122. (408) 292-4025.

**JENNINGS ITT**

For More Details Circle (152) on Reply Card

## Tech Data

continued from page 204

duces each category and presents the following information for each model listed: range of center or cutoff frequencies; number of poles (2, 4, 6 or 8); transfer characteristics (Butterworth, Bessel or Tchebyscheff); tuning characteristics (fixed frequency or resistor, voltage or uP tunable) and case dimension drawing number.

A family of power supplies compatible with the product line is also fully specified.

For More Details Circle (302) on Reply Card

**Marconi Instruments Ltd.**—One of the many applications possible with the 110-MHz TF2370 Spectrum Analyzer is impedance measurement and matching. This is described in a new Applications Note, No. 18 in the Measuretest Series.

The TF2370 is accepted as an instrument for spectral analysis. Its signal handling and secondary features simplify its operation and enhance its usefulness.

The booklet shows that there are occasions when these secondary features can provide powerful measurement techniques which dominate its primary use as an analyzer of spectra.

For More Details Circle (303) on Reply Card

**Sencore, Inc.**—Five product-line brochures, describing all 25 Sencore instruments grouped in five product lines have been released. The six-page color "mini-catalogs" feature digital multimeters, communications and CB instruments, oscilloscope and power supplies, transistor and tube testers, and TV and radio service equipment.

Each brochure details applications and uses for each instrument, plus complete specifications for easy reference. Featured in the brochures are Sencore's latest instruments, including the FC45 230-MHz frequency counter and the TF46 Portable Super Cricket Transistor and FET Analyzer, featuring battery-operated automatic "good-bad" testing and complete parameter analyzing.

For More Details Circle (304) on Reply Card

**Vector Electronic Company**—A new 16-page short-form catalog lists 354 packaging products along with complete part nomenclature, an order form and price list.

continued on page 208

# IMI-3000

## FEATURES

- Eliminates inconsistencies of multiple monitor viewing.
- Rear-screen projection either with mirrors or direct (with optional sweep reversal switches).
- No hook or loss of sync from 1/2", 3/4", 1" or 2" videotape inputs.
- Remote control operation.
- Solid-state electronics.
- Priced less than a replacement light valve.
- Low cost CRT replacement.
- No projector operator required.
- Stable no-drift operation.
- Remote control includes RCA XL100 receiver monitor.
- Built-in tilt adjustments to 10°.
- Picture sizes 8, 10, 12, 14, 16, 18, 20 foot wide.
- Uses optics tubes and power of the magna image III.

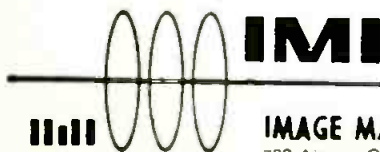


PROJECTOR HEAD  
WIDE ANGLE VIEWING ON STANDARD SCREENS

**\$9,800 Is The Price!  
For A \$50,000 Picture  
BIG-BRIGHT-COLOR  
PICTURES**



RECEIVER MONITOR  
REMOTE CONTROL



**IMAGE MAGNIFICATION INC.**

739 Airway Circle, New Smyrna Beach, Fla. 32069  
(904) 427-5294

For More Details Circle (153) on Reply Card



# OTARI MX-5050 the original (and still the best) compact professional recorder

Just over two years ago, Otari introduced a unique new product—the first truly professional recorder in a compact package—the MX-5050. Since then, the performance and reliability of this innovative new machine have been tested and proven in over a thousand critical professional applications—by broadcasters, recording studios, A/V departments, musicians, and semipro recordists worldwide. Universal acceptance and repeat orders by these satisfied customers tell this remarkable recorder's success story better than we can.



*Bias can be re-optimized in seconds.*

As you compare the MX-5050 with other recorders, keep this in mind. The MX-5050 is not a hi-fi machine with a few professional features added later as an afterthought. It was designed from the ground up based on Otari's 10 year experience as Japan's leading manufacturer of professional recorders and high speed duplicators. It is a full professional machine with the performance, features, and field proven reliability that you expect to find only in the larger professional recorders.

Here are some of the key reasons why the MX-5050 is the best compact recorder available today.

**Production Features:** Creative production is simplified with: Front panel edit to spill tape. Lift-up head cover to mark splices and clean heads. Built-in splicing block on head cover. Adjustable cue to defeat head lifters. Selective reproduce to add new tracks in perfect time synchronization. Two speed operation, 15 and 7½ or 7½ and 3¾ ips (field changeable in dc servo versions).

**Performance Features:** Headroom is 19 dBm, a full 15 dBm over the switch selectable fixed output of +4 dBm. This standard reference level output can be rear panel switched to -10 dBm to drive a PA system or power amplifier. S/N ratio is NAB weighted 69 dB full track, 68 dB half track, and 65 dB quarter track. Crosstalk is greater than 60 dB half track. Outputs are 600 ohm balanced (standard on half track) or unbalanced. Line input and output connectors are XLR.



**Operating Features:** Bias is front-panel continuously adjustable (not limited to fixed positions). With built-in test oscillator (not available on other compact professional recorders) bias can be optimized in seconds when changing tape. Record EQ and standard reference level are also front adjustable. Straight-line tape path simplifies threading. Capstan is located on back side of tape for improved tape life. An extra reproduce head is standard on all versions to allow playback of tapes in different formats. For pitch control and freedom from power line variations, an optional dc capstan servo is available with ±10% correction range.



*Easy threading; capstan on back side.*

**Versatility:** Available in full-track (with half-track reproduce capability standard), two-track, and quarter-track versions. Walnut case (standard), rugged portable road case, rack mounting adaptor, or floor console. Universal power supply standard. Low impedance input and output transformers and remote control also optional accessories.

See your nearest Otari dealer for the full story or contact Otari. And, if it's multichannel you need, ask about the standard-setting four and eight channel versions of the MX-5050.

## OTARI

Otari Corporation  
981 Industrial Road  
San Carlos, Calif. 94070  
(415) 593-1648 TWX: 910-376-4890

Otari Electric Co., Ltd.  
4-29-18 Minami Ogikubo  
Suginami-ku, Tokyo 167, Japan  
(03) 333-9631 Telex: J26604



## Edit Code Reader And Video Display \$1500

BTX 4300 reads time code at play speed down to -15 dBm and generates 7 by 9 dot matrix characters for a full "in video" display.

Use with economical helical editing systems or as an on-line display when recording or playing back video material. May be driven from 1/10 to 80 times play speed by the BTX 4400 Edit Code Decoder.

The BTX 4300, like BTX comparators, readers, decoders, remote digital displays and code generators, is a sensible building block which easily interfaces with, and improves the performance of any editing system at minimum cost. For complete information circle reader service card or contact: The BTX Corporation, 438 Boston Post Road Weston, Massachusetts 02193 • (617) 891-1239



For More Details Circle (189) on Reply Card

## Tech Data

continued from page 206

An expanded section on plugboards includes many new microprocessor boards as well as dozens of time-proven cards for DIP and discrete components. Also listed are enclosures and card cages. Particular emphasis is placed on the Vector-Pak enclosure cases with internal structure for efficient mounting of cards and modules.

Other sections include kits, tools, connectors, sockets, terminals and patchboards. Accessories and associated equipment are cross-indexed for convenient reference.

For More Details Circle (305) on Reply Card

**Verelco Ltd.**—Details covering the audio and power connector range are contained in a new 12-page brochure published by Elco.

The brochure provides details of six main connector ranges which include intermediate, medium and RF bypass power connectors, and audio connectors. All are suitable for applications ranging from headsets to military-specification communications equipment where resistance to moisture, salt, temperature cycling, vibration and quick connecting actions are necessary.

All Elco connectors listed in the brochure are available in the United Kingdom through Varelco Ltd.

For More Details Circle (306) on Reply Card

**Jamison Door Company**—The Owner's Guide to Safety Management and Maintenance Scheduling deals with company's line of cold storage, sound reduction and other specialized doors.

In the forward of the two-color, 12-page guide, Jamison cites the added costs in lost production time, higher energy bills, inefficient performance, and other, sometimes hidden, expenses that can result if doors are not properly and safely used and carefully maintained.

Instructions on ordering recommended safety and maintenance information and equipment, as well as on establishing and keeping a maintenance log are included in the text.

For More Details Circle (307) on Reply Card

**TeleMation, Inc.**—New literature has been released on the TVS/TAS-1000 Video-Audio Distribution Switching Systems.

The eight-page brochure outlines  
continued on page 210

## NOAA Warning Alarm Receiver

162.40 MHz—162.475 MHz—162.55 MHz

*The sole government-operated radio system for communicating attack or disaster warnings directly to the general public!*

Use the "institutional grade" receiver most used by NOAA, and designed and built by the same manufacturer as the NOAA WEATHER RADIO transmitters. Under NOAA contract 6-35384 and previous contracts, SRS provides the transmitters, antennas, and receivers for over 300 weather radio stations in the U.S. SRS has also supplied the receivers under separate orders to the Defense Civil Preparedness Agency, radio broadcast stations, Army Corps of Engineers, municipalities, NASA, power companies, etc.

- 162.40, 162.475, 162.55 MHz
- Warning Alarms
  - Single Tone
  - Up To Five Dual Tones (Sequential Or Simultaneous)
  - Relay Contacts For External Alarm
- AC With Internal Rechargeable Battery
- Optional Vox/Monitor Alarm
- Optional Field Strength Meter

SR-401  
RECEIVER



**Scientific Radio Systems Inc.**

367 ORCHARD ST. ■ ROCHESTER, N.Y. 14606

■ PHONE (716) 458-3733 ■ TELEX 978-368 ■ CABLE SIRAD ■ FTS 716-263-5700

AN EQUAL OPPORTUNITY EMPLOYER

For More Details Circle (130) on Reply Card



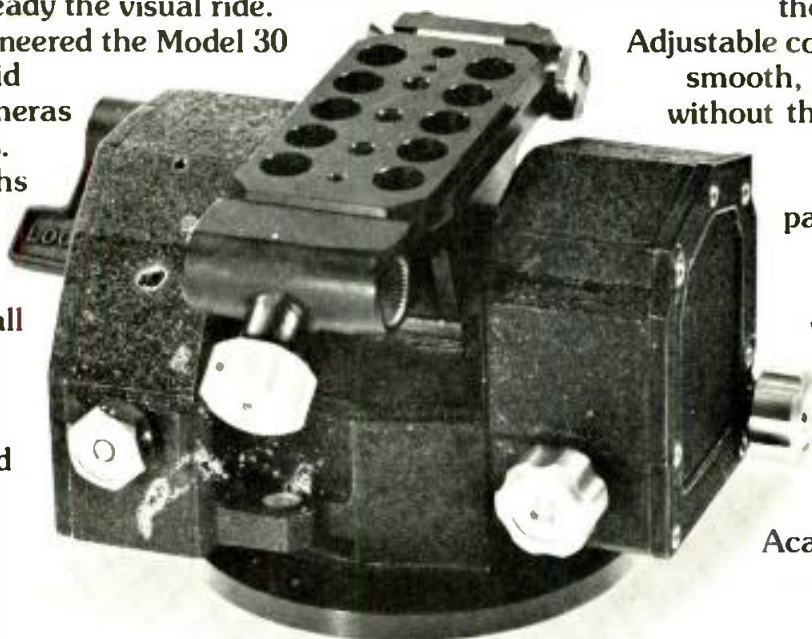
# FLUID FOR THOUGHT.

**Your new portable camera needs a fluid head more than your heavy camera.**

That's right! Just as a light sports car needs good shocks to hold it on the ground and smooth the ride, your light camera needs a good fluid head to steady the visual ride.

O'Connor has engineered the Model 30 to be the ultimate fluid head for portable cameras weighing up to 30 lbs.

It's small and weighs only 5 lbs., yet it has the smooth, steady action and features which are unique to all O'Connor heads. It pans 360° and tilts ±60°. The pan drag, pan lock, tilt drag and tilt lock all operate independently for greater flexibility and control.



The Model 30 has a totally unique counterbalance which is adjustable in the field. One simple tool will adjust the spring to match the weight of the camera.

Adjustable counterbalance provides smooth, consistent, fluid action without the distracting influence of camera weight.

So, the next time your panning gets rough, turn your thoughts to fluid.

O'Connor fluid... when you demand the very best.



1976 Scientific/Technical Academy Award recipient.



## O'Connor

FLUID CAMERA HEADS

100 Kalmus Drive, Costa Mesa, CA 92626

Please send more information.

Company \_\_\_\_\_

Name \_\_\_\_\_ Title \_\_\_\_\_

Address \_\_\_\_\_

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

My camera weighs \_\_\_\_\_ lbs.



## Tech Data

continued from page 208

the features of the TVS/TAS-1000 including solid-state crosspoints with vertical switching, single-coax "party-line" control, plug-in conversion to phone line or computer control, automatic restoration after power failure with refresh memory option, dual video outputs, standard multiple-sourced components, and automatic system testing of all circuit parameters through all possible signal paths.

In addition, design considerations,

input circuitry, crosspoint circuitry, output amplifiers, crosstalk considerations, control systems, vertical interval switching, matrix configurations, control configurations and status monitoring are briefly described with appropriate pictures and graphics. Specifications are also included.

For More Details Circle (308) on Reply Card

**Hybricon Corp.**—A 12-page catalog has been published on a new series of wire-wrap boards and accessories. The problem of mounting integrated circuits with discrete

components on a wire-wrap board has been solved, without the use of component carriers.

A new dimension in flexibility is presented involving the efficient mounting of all sizes of ICs and associated discrete components with an I/O arrangement for buss-oriented systems, which is a special interest for microprocessor-based designs. It shows how a user can save up to 40% when boards are not fully loaded with integrated circuits and components.

For More Details Circle (309) on Reply Card

# THE SYSTEMS APPROACH

*...at last, AGC/Processing and Peak Control in the proper packages.*



**MULTIMAX**—the AGC/Processor with exceptional input headroom, low noise, and low distortion. Multimax is the 3 band processor which employs unique energy based, open-loop compressors as the active gain control elements. A special gated release circuit insures smooth gain control and band tracking performance. Separate cross-over frequencies are designed for AM and FM bandwidths.

**MULTILIMITER**—the limiter that features an input "gain riding" compressor, a variable compression ratio fast limiter and a ultra fast peak control limiter which provides modulation protection without relying on clippers.

**The Multimax, Multilimiter "package" concept puts your processor and limiter where they belong...in separate boxes. Multimax and Multilimiter are available for AM or FM application.**

*Call, write or telex today...*



PACIFIC RECORDERS AND ENGINEERING CORPORATION  
11100 ROSELLE ST., SAN DIEGO, CALIFORNIA 92121  
TELEPHONE (714) 453-3255 TELEX 695008

For More Details Circle (155) on Reply Card

**Telecommunications Technology, Inc.**—A new, illustrated four-page brochure describes the model 1120 and 1122 transmission test sets, third-generation digital instruments specifically designed for telecommunications. Both models provide full capacity for measuring transmission level, frequency, noise and notch noise.

The models are functionally identical, but the 1120 is portable (detachable rack-mount hardware available) and the 1122 requires a mounting space on a 12-inch or 23-inch equipment rack. Each test set includes its own microprocessor with on-board memory for controlling all measurements and transmit functions as well as a complete self-diagnostic routine which indicates whether all functions are working properly.

The brochure includes specifications, an illustrated demonstration of a typical self-test sequence, and descriptive information on the various features such as dual displays, 2-line dial/transfer/hold, full auto-ranging on all measurements, portable battery operation (1120 only) and low distortion oscillator.

For More Details Circle (310) on Reply Card

**Semiconductor Circuits, Inc.**—A new 40-page application and selection guide provides a glossary of power supply terminology and presents test procedures. Practices are recommended for the user of both line-operated and DC/DC converter power supplies. Special requirements for safely powering UPs are defined. Ground loop avoidance and DC/DC converter "spike" noise problems also receive coverage.

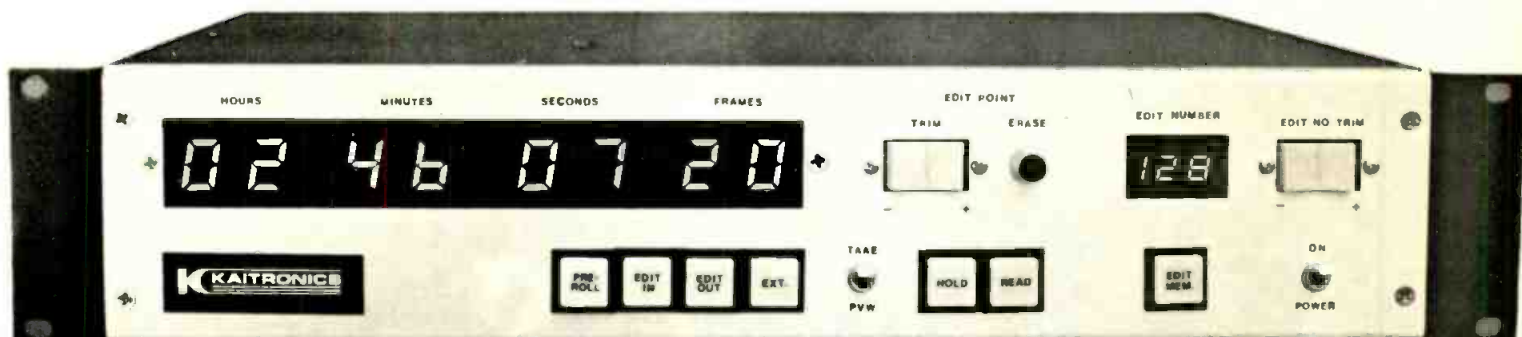
Complete electrical and mechanical specifications are included for 11 families of line-operated supplies and 10 families of DC/DC converters. Several new families and many new models are described.

continued on page 212



# Our Edit Memory Control can .....

Memorize 128 Edit Points,  
Control VTR's for Multiple Edits,  
..... and is priced under \$4,300



Model EMC-100

The EMC-100 can memorize all the edit functions and execute the commands to make them happen for you.

As you watch the monitor, you punch the buttons to register the edit points into the memory, instead of jogging them down on a scratch pad.

The basic model stores up to 128 edit points (512 or more, optional). Four pushbuttons are provided to select control functions for each edit point (additional control functions optional).

In the Edit Memory mode, the edit points can be recalled, previewed, shifted or erased, as often as you like, before the final edit is made.

The EMC-100 will operate with both Quad and Helical VTR's. It controls the machine and its editor, via the remote control connections, to perform sequence of edit functions by strobing out commands, converted from the stored edit points, in the form of contact closures or logic level pulses.

The EMC-100 can be programmed for exact prerolls for any type of machine. A.B rolls and double system rolls for different types of machines can be performed with ease.

The EMC-100 is equally versatile for either off-line or on-line applications.

For daily ENG and Field Productions, whether to use edit code or not can be decided later at the studio. While previewing the 'raw footage', you can lay down the edit code and mark all your edit points, simultaneously, on the first pass, with the edit code generator feeding both the VTR and the EMC-100.

Together with an edit code generator, the EMC-100 gives you a new dimension of editing flexibility.

## Other Kaitronics SMPTE Edit Code Products:



SMPTE Edit Code Generator  
SMPTE Edit Code Reader  
Numeric Character Generator  
Widespread PreAmps & Accessories

For more information, send for brochures or call:

Paul Tarrodaychik, VP, Marketing  
(408) 739-4262

## KAITRONICS

870 MAHLER ROAD, BURLINGAME, CA

Tel: (415) 697-9102

For More Details Circle (156) on Reply Card

## Tech Data

continued from page 210

One hundred forty models of line-operated supplies and DC/DC converters that are available from stock are described in two tables called In-Stock Selection guides.

Available sockets are described by both dimension drawings and a listing of the power supplies with which they will mate. Options are defined and then tabulated relative to product families.

For More Details Circle (311) on Reply Card

**Newark Electronics**—Over 100,000 electronic devices are listed in catalog number 103.

The catalog features the products of 166 leading electronic component manufacturers, including: Allen-Bradley, Alpha, Amphenol, Belden, Bourns, Bud, Centralab, TRW/Cinch, Cornell-Dubilier, Cutler-Hammer, General Electric, International Rectifier, Mallory, Motorola, Ohmite, Potter & Brumfield, RCA, SPC Technology, Sprague, Switchcraft, Texas Instruments and dozens of others. Several lines not previously stocked have been added.

Descriptions, electrical and physical specifications and illustrations are provided for semiconductors, resistors, capacitors, potentiometers, controls, switches, relays, fuses, circuit breakers, transformers, connectors, sockets, wire, cable, lamps, lights and other related electronics products.

Detailed product indexing and a separate index of manufacturers are designed to assist in product selection.

For More Details Circle (312) on Reply Card

**Telex Communications, Inc.**—Detailed in a new illustrated brochure is the full line of audio tape components. The brochure includes complete product specifications, descriptions and ordering information.

The catalog features heavy-duty open reel tape transports and tape cartridge transports. Endless loop NAB-type magnetic tape cartridges are also shown. The company's latest solid-state record/play, play-back and power amplifiers for single and multi-channel systems are described in detail.

For More Details Circle (313) on Reply Card

**Acrodyne Industries, Inc.**—A new data and specification sheet on weatherproof enclosure system describes availability for solid-state translator applications up to 10 watts VHF and UHF and other equipment requiring a 19-inch width by a 17-inch maximum panel height.

The data sheet includes information on the new enclosure's features, a chart of available options, complete specifications and photographs illustrating both a close-up and an example of convenient mounting to a tower or pole.

A schematic is also included illustrating position of ventilating fans, prewired AC junction box, front door locking provisions and suggested mounting arrangements.

For More Details Circle (314) on Reply Card

**Van Nostrand Reinhold**—Covering product/service management, Product/Service Strategy provides a framework for making decisions about products and services. The 305-page book by Richard T. Hise shows how product/service decisions fit into the general marketing area. Discussion of material is approached on the premise that there are certain fundamental concepts common to all products and services. These concepts are drawn

continued on page 214



# BOGNER® TV BROADCAST ANTENNAS

**the  
HIGH POWER  
line.**

**HORIZONTAL & CIRCULAR POLARIZATION—  
OMNIDIRECTIONAL & DIRECTIONAL—  
HIGH GAIN RUGGED SLOT AND DIPOLE  
ARRAYS.**

Available in 9 standard horizontal patterns—choice of vertical patterns... with power gains to over 100, and conservative power ratings to 156 Kw, to 78 Kw, to 10 Kw or to 3 Kw.

Hundreds of Bogner Antennas have been providing continuous trouble-free performance in urban and remote areas since 1965.

For your CATALOG and price list, including all required electrical, mechanical and structural data—Call or Write Mike Bogner.

**BOGNER  
BROADCAST  
EQUIPMENT CORP.**  
401 Railroad Avenue, Westbury, N.Y. 11590  
(516) 997-7800

For More Details Circle (157) on Reply Card



# How can we offer digital TBC quality and flexibility - at a price this low?



## Simply by designing a better time base corrector.

For example, the single most complex and expensive part of a digital TBC is the analog-to-digital converter. The TBC-110A eliminates the A to D converter through the use of a charge-storage analog memory. By sampling and storing the video signal at 14.318180 MHz, the TBC-110A provides the same sampling speed and video bandwidth as the competition's highest priced model — without the expensive A to D converter.

## A true time base corrector that does it all.

The TBC-110A will remove all high frequency jitter, water-fall, skew, and geometry error (S banding) from any type of non-segmented helical scan recorder. H lock VTRs can be corrected to house sync and FCC specifications by locking the TBC-110A to EXT sync. Other types of VTRs, such as line lock models, can be locked to the center of the floating window in the INT sync mode.

## Fades, wipes, and inserts possible with non H-lock VTR's.

The internal digital sync generator provides a full complement of pulse outputs that are locked to either the internal oven-controlled crystal, or a VCD that is tracking the video input. The tracking mode (floating window) can be used to lock cameras to the sync outputs of the TBC so that fades, wipes, and inserts can be accomplished with non H-lock VTRs.

## Complete video processing.

The TBC-110A provides complete video processing, including such features as separate luminance and chrominance processing in all modes, so that negative black spikes below sync are removed without clipping negative chroma. Chroma Gain and Chroma Phase are also adjustable in all modes (het and direct).

## Exceptional skew error correction.

The TBC-110A is capable of removing step errors within one line after they occur, thus providing total and almost instantaneous skew error correction.

## Truly superior heterodyne processing.

Heterodyne chrominance jitter is minimized because the TBC-110A first demodulates chroma — then removes time base error in parallel luminance and chrominance memories. The result is superior heterodyne processing — minimal color error.

If your studio operates one or more helical scan recorders, a time base corrector is a virtual necessity. The TBC-110A has the credentials to satisfy the most demanding studio requirements, while maintaining a price that is comfortable even for small distribution systems.

The TBC-110A is now available at \$4,990.00. Slide rails are an optional extra.

# EduTron™

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Gainesville, Florida 32601  
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For More Details Circle (158) on Reply Card



## Increased Performance for your Mincom



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La Palma Avenue,  
ANAHEIM  
California 92807  
Tel. 714-528-9505

Listec Television  
Equipment  
Corporation,  
35 Carr Dr  
PLAINVIEW,  
N.Y. 11803  
Tel. 516-694-8963

Television  
Engineering  
Corporation,  
519 Rudder Rd.,  
FENTON, Missouri 63026  
Tel. 314-343-5605

For More Details Circle (160) on Reply Card

## Tech Data

continued from page 212

from the areas of behavioral science, organization theory, economics and quantitative methods.

Emphasis is placed on those current trends affecting product decisions. New product development, life-cycle management and product elimination are treated. Special attention is given to the product elimination decision.

Topics discussed include: introduction to product/service management, marketing consumer and industrial products and services, organizing the product/service function, developing objectives for products and services, developing successful new products and services and life-cycle management for managing products and services.

For More Details Circle (315) on Reply Card

**Acrodyne Industries, Inc.**—A new data and specifications sheet has been released on the model TT-445 6-kilowatt VHF television transmitter utilizing low-level IF modulation. Carrier modulation, envelope delay and VSB shaping are performed in the low-level solid-state stages to guarantee the best video performance available for FCC and CCIR systems.

The data describes the modulator in depth, as well as detailing solid-state circuitry, required tubes and cavities, logic display, and an exclusive fault memory system.

Complete visual, aural service and mechanical specifications are included for both FCC and CCIR (system "B") operations.

For More Details Circle (316) on Reply Card

**Electronic Industries Association**—The 1977 *Electronic Market Data Book* presents statistics, facts and commentary on the growth and development of the U.S. electronics industry.

The book is a compilation of material that can assist in identifying possible growth areas and following market trends. The information covers: consumer electronics, communications and industrial products, government products, electronic components, world trade and related information such as employment and R&D trends.

For More Details Circle (317) on Reply Card

**3M Company**—A four-page brochure containing information on two

continued on page 216

BROADCAST ENGINEERING



# NEC

## The Broadcast Equipment Company you'll be hearing a lot more about.

You'll hear about us, because we're making it a practice to listen to you. As the world's second largest maker of broadcast equipment, we're not in a position to dictate; and we won't — even when we're number one.

We have a line of equipment in the U.S., that's well worth your investigation: VTR's, TBC's, frame synchronizers, etc. And we're ready to expand it. When you're ready.

Just let us hear from you.

# NEC

**NEC America, Inc.**

Broadcast Equipment Division  
130 Martin Lane  
Elk Grove Village, Illinois 60007  
(312) 640-3792

For More Details Circle (80) on Reply Card

## Tech Data

continued from page 214

television-related products, model 5110 color insert keyer and model 5120 video outliner, is available from the company's Mincom Division.

The color insert keyer adds color and dimension to graphics produced by a character generator or camera. The video outliner, by offering a choice of five outline possibilities, furnishes new options for the display of alphanumeric

characters and other TV graphics.

Also included in the two-color booklet are flow charts showing proper installations of the units in relation to video input and program output. In addition, detailed specifications are given for both pieces of hardware.

For More Details Circle (318) on Reply Card

**National Association of Educational Broadcasters**—Public broadcasting will be structurally and fundamentally altered within the next 18 months and the two papers

that are the basis for this change are in the current *Public Telecommunications Review*.

The persuasive internal Task Force paper that was submitted to Carnegie Corporation calling for a commission on the future of public broadcasting appears in its entirety along with the options paper written by the House Subcommittee on Communication's chief counsel, Harry Shooshan, for this fall's hearings on the "review" of the Broadcasting Act of 1934.

Shooshan has prepared an examination of the obstacles faced by public broadcasting and describes options to consider for their resolution. Public broadcasting is beset with political and financial problems which have barred the system from developing to its full potential. In September, it is these problems that Congress will review.

For More Details Circle (319) on Reply Card

**AMP Incorporated**—A new 14-page booklet from the Capatron Division is designed to help anyone who buys or builds power supplies. The *Power Supply Specifying Guide* emphasizes high-voltage units. There are sections devoted to the make or buy decision, determining whether a custom or a standard package is needed. The guide also explains how to specify high-voltage power supplies, using oil as a high-voltage insulator and packaging high-voltage circuits.

For More Details Circle (320) on Reply Card

**Labgear Ltd**—A slim pocket-size product planner which gives details of the company's television distribution, test and teletext equipment is now available.

Preamplifiers and power units, distribution equipment, repeater amplifiers, room aeriels, test equipment and associated accessories are included, as well as "Colourtext," a teletext adapter. The planner also includes a dBmV conversion to voltage level chart.

For More Details Circle (321) on Reply Card

**National Semiconductor Corporation**—A comprehensive data book is being offered on field-effect transistors and analog switches.

The 277-page handbook provides many features helpful in choosing FET products. There are alphanumeric parts lists and cross reference guides. The parts lists serve as an index to an FET selector guide, which includes n-channel, p-chan-

continued from page 218

## YOU'RE BEGINNING TO SEE THE LIGHT! A HIGH INTENSITY LIGHTING SYSTEM offering

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No High Voltage Conduit Runs  
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Now, over 125 reliable ElectroFlash Systems are in operation. The FTB-205 systems mark and protect America's NEWEST BROADCAST TOWERS. Many more towers with ElectroFlash protection are operating in CANADA.

These numbers do not include the ElectroFlash Systems on Microwave communications towers or the "HOT" tower systems, one on a 1/2 mega-watt radio navigation radiator and others on combination AM radiator-FM towers in the United States and Canada.

**TIME TO REPAINT YOUR TOWER? TWO** of the ElectroFlash Systems soon to be "turned on" will replace surface paint and night lighting on older towers!

Why the FTB-205 ElectroFlash Beacon System from FTCA? Simple! When you add considerations such as:

- Superior Design
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- Long Life
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to other exclusive features, the results are benefits obtainable only with the FTB-205 ElectroFlash System.

**MARK and PROTECT YOUR TOWER with CONFIDENCE!**

**SPECIFY the FTB-205 ElectroFlash System!**

For system locations and station calls or for additional information on the marking of your tower.

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For More Details Circle (163) on Reply Card



# Tune-up, Preset and Change Scenes. In Real Time.

The Series 20A offers great flexibility in theatre sound mixing, television production, and concert sound reproduction.

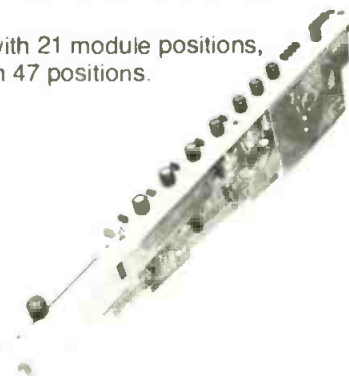
The Series 20A is totally modular. That means you can have custom convenience at off-the-shelf prices. Because modularity lets you purchase only the modules you need. As your needs expand, you simply plug in more modules. And you can customize the arrangement for a particular show. Just plug the modules into any position on the chassis. No tools required.

The Series 20A simplifies your real time operation by allowing you to predetermine program content and distribution. Designed with human engineering in mind, the following features are provided.

- 4 chassis/enclosure sizes: 2½' with 21 module positions, 4' with 31, 5' with 39, and 6' with 47 positions.

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**audio**

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- Up to 37 input channels, each switch selectable for mic and line level signals. Optional switching modules for selection of up to 48 additional remote inputs.
- Presettable (mute) circuit for each of four independent pre-sets. Any input can be assigned to any combination of the four muting circuits. Allows instantaneous changeover from one "scene" to another.
- Two complete foldback buses having level and switching controls at each input, with sub master controls.
- 3-Knob equalization on every input channel—with boost or cut.
- Unique datacable and roadmap configuration to interconnect Cetec's all solid-state printed circuits. Straightforward design provides simple plug-in module positioning.

For further information, contact Cetec Audio

A division of Cetec Corporation.

13035 Saticoy Street

No. Hollywood, CA 91605

Phone: (213) 875-1900 TWX: 9104992669

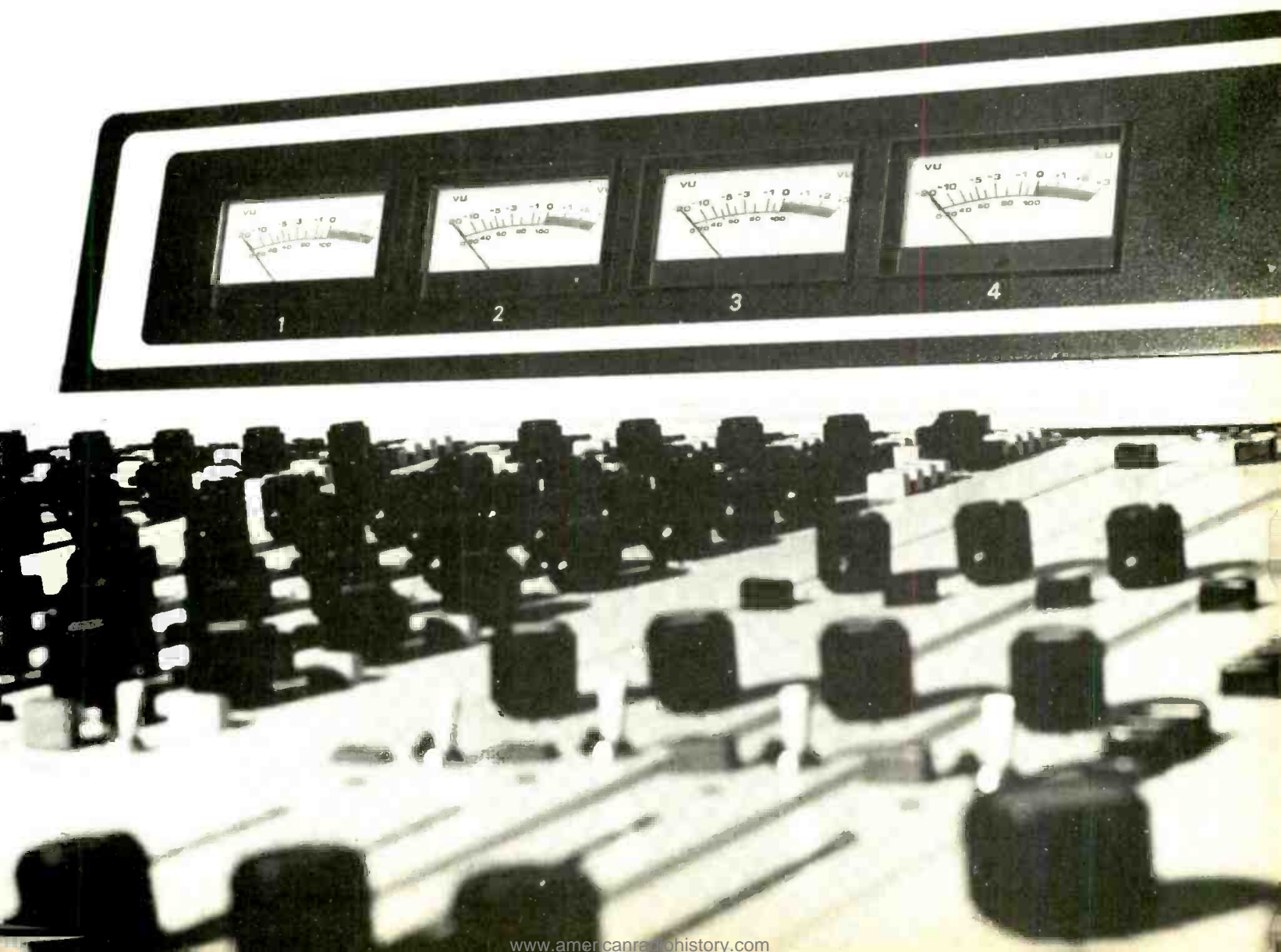
A division of Cetec Systems LTD.

U.K. Sapphire House, 16 Uxbridge Rd., Ealing,

London W52BP

Phone: 01-579-9145 Telex: 837329

For More Details Circle (164) on Reply Card



## Tech Data

continued from page 216

nel, and n-channel dual FETs organized into application areas. There are detailed characteristics on all processes, including all parts manufactured from a particular process by package type.

The book also features selection guides, applications information and data sheets for the line of analog switches and other monolithic FET structures.

An applications section includes

articles on such topics as *The Low Noise JFET*, *A Linear Multiple-Gain-Controlled Amplifier*, and *Monolithic Dual FETs vs. 2-Chip Dual FETs*.

For More Details Circle (322) on Reply Card

**Clifford B. Hannay & Son, Inc.—** Specialized use of reels for electric cable is described in a series of brochures.

Each brochure shows typical applications of power rewind, spring rewind and manual rewind reels in handling cable for power transmission, signal transmission and for

grounding.

A cutaway photo shows features of a typical reel. The brochures cover applications for industrial electric service, utilities, electrical contractors and broadcast engineering.

For More Details Circle (323) on Reply Card

**Signal Transformer Co., Inc.—** Transformers is a new catalog packed with detailed design information on all kinds of power transformers. The bulletin, a combination short-form catalog and quick application guide, presents major functional specifications and mechanical data on the company's transformers, along with schematics.

In addition to filter chokes and power-isolation transformers, the catalog includes SPLIT/TRAN® and FLATHEAD® printed-circuit board transformers.

The SPLIT/TRAN transformer features a split-bobbin construction that provides high isolation (2500V RMS Hipot) and eliminates the need for electrostatic shielding. The new FLATHEAD transformer offers an 0.850-inch high silhouette for easy mounting on tightly stacked pc boards.

For More Details Circle (324) on Reply Card

**RCA—Closed Circuit TV Accessories**, a 40-page catalog, offers a quick selection guide to over 700 CCTV accessories. Referred to as CCV-113A, this guide is arranged by major product categories for easy access and gives a brief description of each product, its model number, the optional user price and the data sheet number on which more detailed information will be found.

For More Details Circle (325) on Reply Card

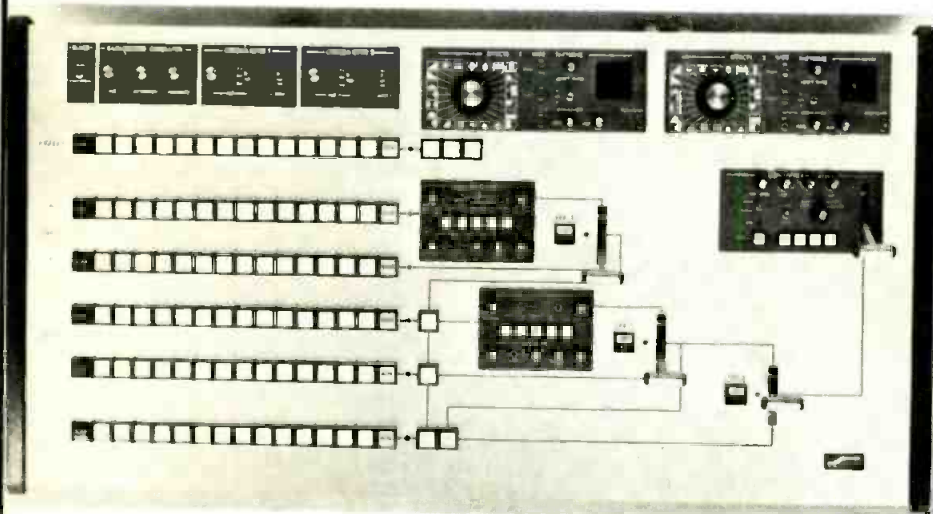
**Federal Communications Commission—**A new edition of the Radio Control Service rules has been made available from the Government Printing Office.

The Radio Control Service involves radio signaling and radio control of remote objects or devices such as model airplanes, model boats and all other types of models; garage door openers; burglar alarm systems and cameras.

The new, separate edition includes all of the rules a Radio Control Service licensee is required to follow. The FCC reminded such licensees that they were required to keep up with changes in subpart C of part 95 of the rules. Changes are published in the Federal Register shortly after their adoption. □

For More Details Circle (326) on Reply Card

# ANNOUNCING THE ROSS RVS 16-6C

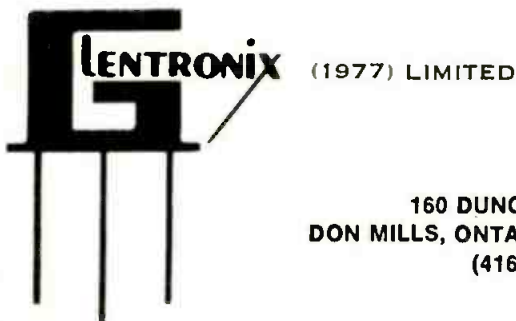


The Ross RVS 16-6C pictured above features:

1. An additional matte generator (colorizer) which allows the titles to be colored independently of the main background generator in the switcher.
2. Switchable black or white borders.
3. Switchable OFF, BORDER, SHADOW and OUTLINE modes.
4. Master fade to black on downstream keyer.

PLUS all of the other unique features which have made ROSS the fastest-selling switchers in Canada!

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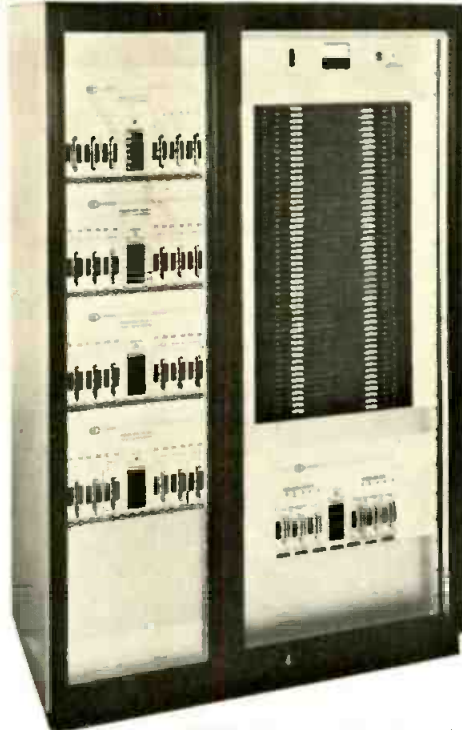
**Electronics Diversified Inc.**

ESPECIALISTAS EN CONTROLES DE ILUMINACION

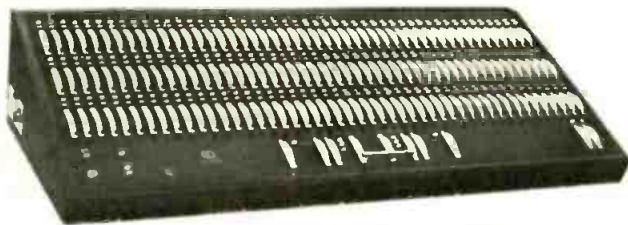
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We invite your inquiries and will consult with you on any problems with which you may be faced. We have everything in lighting equipment. Brochures on request.

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## DIMMER BANK DBM5

Modular system: The plug-in units can be removed from the rack for maintenance without the use of any tools. The module can be removed under power without any damage to the units.

- *Modular Plug-In for easy service*
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- *Various Output Panels available*
- *Input wiring error indicator*
- *Convenience Outlet*
- *Less than 3% drift*
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## DESK CONTROL CONSOLE

- "A" and "B" Subscenes
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- Grand Master
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- Uncompensated Control Cable (1 ft. to 5000 ft. with no calibration)



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For More Details Circle (166) on Reply Card

[www.americanradiohistory.com](http://www.americanradiohistory.com)

# new products

## Low-frequency function generator

A new low-frequency function generator has been developed by Phillips Test & Measuring Instruments, Inc. The PM5129 generator has an output from 1 Hz to 1 MHz. The low-distortion sine, square and triangle waveforms can be varied in amplitude, frequency, DC level and

duty cycle.

Output frequency is set by a linear scale over eight ranges and can be stable or swept by an internal ramp signal or modulated internally by a 2 Hz to 20 kHz tone.

Two features of the PM5129 are the single shot and burst modes. Single shot outputs may be initiated

by pushbutton control, a variable "peak-level" control or by external TTL signals. In burst mode the number of cycles in each burst can be varied by the period control over a 10 to 1 ratio.

The PM5129 has a maximum output of 30V into 50 ohms and can be step attenuated down to 68 dB. A variable of 0.2 dB amplitude control shows approximate output levels.

For More Details Circle (327) on Reply Card

## TV time code character generator

Gould, Inc., Control and Systems Division, has expanded its Data-metrics digital timing equipment for SMPTE editing to include the model SP-722, a single unit which will generate and read SMPTE time code and display the decoded time on an editing monitor.

The new feature of digitally displaying hours/minutes/seconds/frames is accomplished by "mixing" with the video signal. Time characters are adjustable to any position on the monitor, have switchable size and style, and can be adjusted for optimum intensity.

For More Details Circle (328) on Reply Card

## Tape transport consoles

Rus Lang Corporation has introduced two new tape transport consoles, the RL 600 and RL 700.

The RL 600 is designed to accept the new style of tape decks 19" x (up to) 21" which have their electronics integrated with the transport. The RL 700 will accommodate tape transports 19" x (up to) 24½", such as the Ampex 300 Series. The RL 500, introduced last year, handles 19" x 15¼" decks.

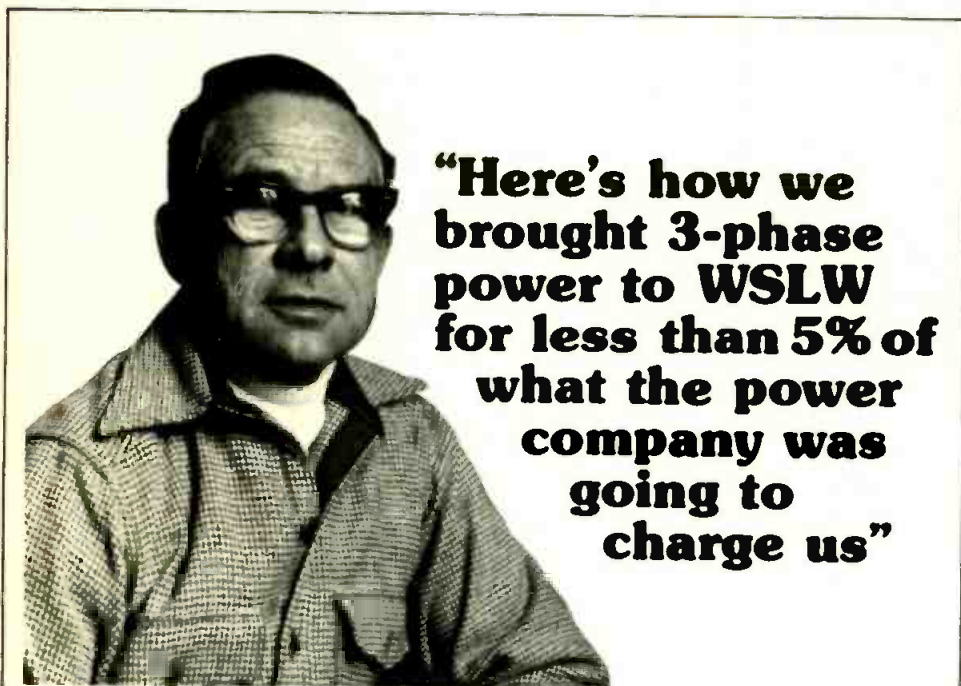
All three models feature front panel access in both horizontal and vertical positions, plus a rear shelf for power supplies.

For More Details Circle (329) on Reply Card

## News lighting system

Cinema Products Corporation has made available a new, lightweight CP/NewsLite 12V/100W lighting system. It is ideal for use with the new, faster film stocks (Eastman VNF 7250 and Fujicolor RT400, both rated at 400 ASA) in most television

continued on page 222



**"Here's how we brought 3-phase power to WSLW for less than 5% of what the power company was going to charge us"**

Claude F. Jones, Vice President and General Manager Radio Station WSLW, White Sulfer Springs, W. Va.

When WSLW decided on moving their transmitter to higher ground to increase their service area and potential listenership, they were faced with the problem of 3-phase power availability. WSLW's Vice President and General Manager, Claude F. Jones first called the Utility Company for an estimate. Then he called Kay Industries. Mr. Jones found the difference hard to believe. Kay's Phasemaster® Rotary Converter brought 3-phase power to WSLW for less than 5% of what it would have cost to bring in utility-supplied 3-phase power. And with the Phasemaster®, not only were transient spikes eliminated but, WSLW also got excellent voltage regulation.

The Phasemaster® 3-Phase Rotary Converter is making it possible for AM and FM stations all over the country to *economically* convert single phase to 3-phase power. A full line of these rotary converters, from ¼ to 200 HP, is available from Kay Industries, Inc. For more information concerning the Phasemaster's® various broadcast applications, write to Kay Industries.



**Phasemaster® Rotary Converter**  
the equivalent of utility-supplied 3-phase power at an affordable price.



**KAY INDUSTRIES, INC.**  
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South Bend, Indiana 46617  
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**QUADS**



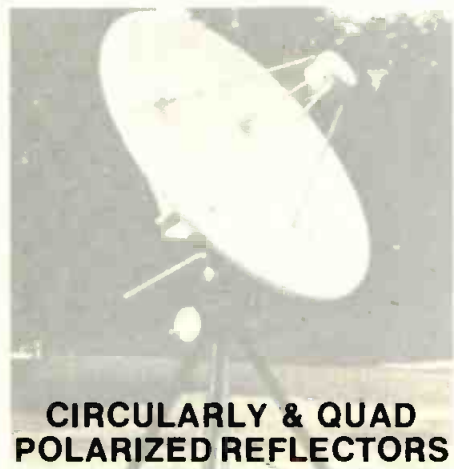
**SUPERQUADS**

**ANTENNAS FOR  
ALL BANDS**

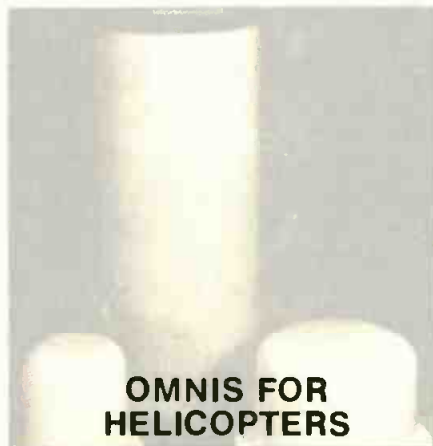
**2.0 GHz**  
**2.5 GHz**  
**7.0 GHz**  
**13.0 GHz**  
**2.0 + 7.0 GHz**  
**7.0 + 13.0 GHz**



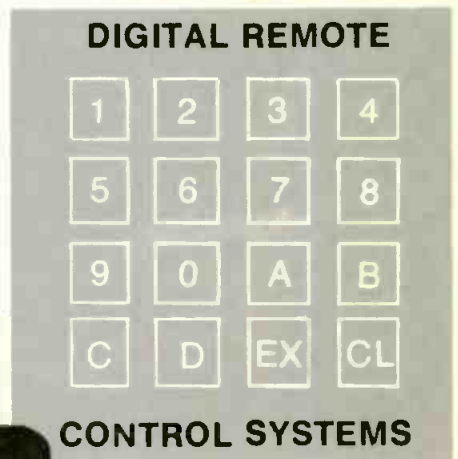
**HIGH GAIN HORNS**



**CIRCULARLY & QUAD  
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HELICOPTERS**



**DIGITAL REMOTE**

1	2	3	4
5	6	7	8
9	0	A	B
C	D	EX	CL

**CONTROL SYSTEMS**

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For More Details Circle (169) on Reply Card

## New Products

*continued from page 220*

newsgathering, documentary, and similar applications.

The ultra-lightweight lighting system consists of a focusing CP/News-lite, a 100W/12V 3400°K "Quartz" lamp, and a CP 12V battery (with built-in charger).

Designed to be top-mounted on CP-16, CP-16R and other 16mm cameras, the focusing CP/Newslite also features a convenient integral handle and a detachable yoke.

The CP 12V battery recharges overnight and includes a black leather case and shoulder strap.

### Intercom interface adapter

Clear-Com will soon introduce Adapt-A-Com.

The Adapt-A-Com allows a Clear-Com user to interface their system with any known two-wire, three-wire or four-wire communication link. This includes carbon, Telco-loop telephone type or professional television closed-circuit systems.

Controls include a mode select switch, transmit and receive gains, and set-up functions. Connections include cannon type, connector for

use with test headset and Clear-Com interconnection plus binding posts for interface to external communication systems.

For More Details Circle (330) on Reply Card

### Microphones

A. B. Pearl of Sweden, manufacturer of high-quality microphones, has appointed Cara International, Limited as its import agent for the western section of the U.S.

Cara Pacific Sales Company will handle the Pearl line in the Pacific Coast states. All inquiries should be directed to Cara International Limited, 4145 Via Marina, #120, Marina del Rey, California 90291.

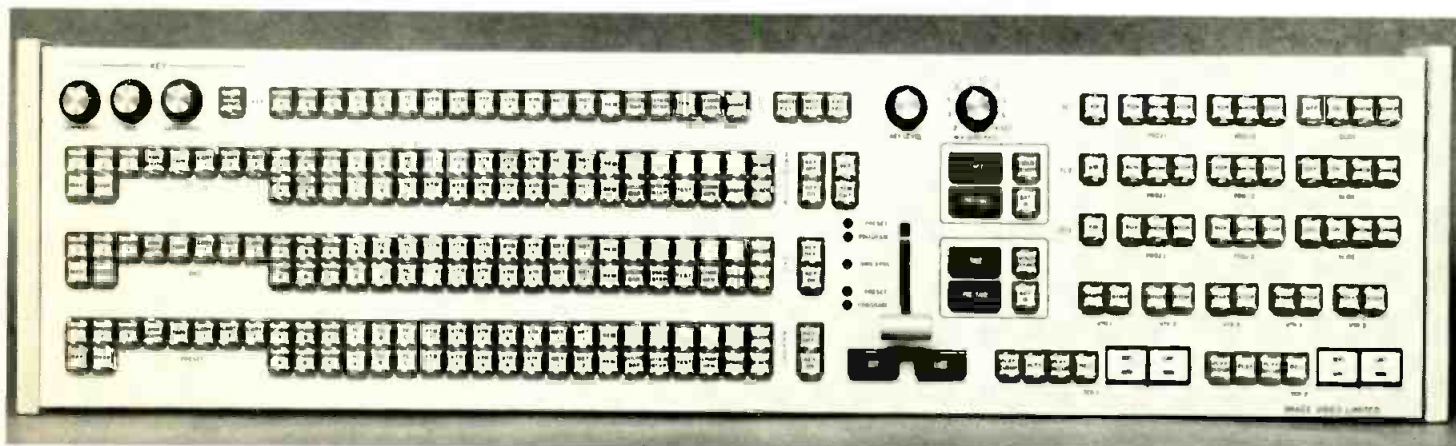
Pearl microphones have been available for several years under the PML trademark. Encompassing a wide range of microphones for all sound recording, broadcast, television, public address and home recording applications, the line includes a wireless mic system, an interference tube (shot-gun) system, and a complete range of accessories and power supplies for SYMSI 12- and 48-volt systems.

Suggested user net prices for the line of dynamic mics range from

*continued on page 224*

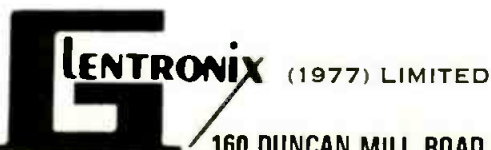
# CKY-TV WINNIPEG chooses IMAGE VIDEO

Audio-Video Master Control Switcher designed for future computer operation



CKY-TV had a custom requirement which included a master control facility to control the main transmitter at Winnipeg and a satellite transmitter, machine controls for VTRs, 16mm and slide projectors. They also wanted to provide for the future installation of computer control. This was to be supplied with a console which matched up with an existing console at the station.

The complete equipment package was supplied by IMAGE VIDEO.



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## Audio Problems . . .

### Contact

# Accurate Sound

...Whatever your problems: new equipment, rebuilt equipment, reconditioning or updating. Accurate Sound's "Total Systems" capability can solve your problem. Our experts will design a system for your complete audio/video complex, including building construction and acoustics. This service also includes consultation to determine the exact equipment required for your particular application. In addition, we offer technical assistance in the construction and installation of your system. Accurate Sound assembles and pretests ALL equipment prior to shipment to your facility. Lease finance is available.



### Accurate Sound / MCI 2600

This recorder/reproduce system provides complete recording using Inovonics, three speed electronics, AG-440, Ampex 351, MCI JH5 or other electronics. The transport features our new tape motion control box that eliminates the tape handling deficiencies typical of most older tape transports. We offer a one year parts warranty with 90 days labor. Priced without console:

\$2,675.00 mono  
\$3,265.00 2-channel  
\$4,645.00 4-channel

For a walnut formica console, add \$330.00 to the above prices.

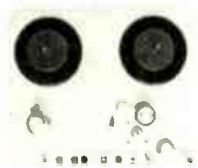
### 2400 Duplicator

Brings you real time duplication quality 16-times faster. It produces copies at 7½ ips; 30HZ to 18KHZ with less than 45 degrees phase error. Features: automatic recueing of master for preset number of cycles. Reload slaves while master rewinds. Precision-mounted ferrite heads. Head assemblies contain equalization level calibrations. State-of-the-art tape motion control includes constant tension holdback, motion sensing, dynamic and mechanical braking. Two channel systems from \$7,500.00.



### 2600 Transport

Functions are fully remotable, including record and tape lift. Standard version includes constant tension holdback, delayed stop, three speed, constant tension takeup, capstan slow start and a two inch tape capability. The 2600 is available with Ampex, Accurate Sound, Inovonics, MCI or Scully electronics. Standard version \$1,495.00.

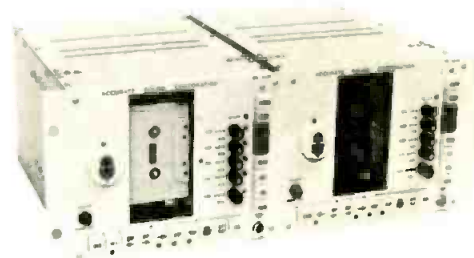


### Accurate Sound Model 445

Professional, high quality, two channel reproduce only electronics equally suited to new installations as well as updating existing systems. Features include: built in power supply providing transport power via a rear panel connector, dual EQ settings and remote EQ access for properly wired transports. Plus, the 445 makes use of plug-in, 44-style cards. Priced with meters at \$695.00 and without meters for \$595.00.

### Cassette Recorder

Designed primarily as an on-line logging recorder for broadcast use. It is a four channel recorder / reproducer with many transport functions: skip-forward, skip-backward, automatic play with either



continuous run or BOT/EOT sense, optional bi-directional play, optional capstan engage for search and cue, digital readout tape position indicator, any speed available between .5 and 20 ips with variable speed option...all with remote controllable functions. The system is packaged in a two module bay with provision for module to module dub function. The package size is 7" high x 19" wide x 12" deep. Price \$4,800.00.

### Tentelometer

The Tentelometer Tape Tension Gage can diagnose mechanical sources of WOW and flutter, in addition to helping set-up and maintain a quality audio recording. Priced from \$179.00 complete.



accurate sound corporation

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Phone (415) 365-2843

**Send for our illustrated catalog with new and used equipment listings.**

## TELE-PAT PRECISION TEST SLIDES PUT YOU RIGHT IN THE PICTURE

Whether you're a top network station or an independent videotape producer, the picture your viewers see must be clear, sharp and color-true. There's only one way to make sure—and that's to check and align your TV cameras regularly with Tele-Pat precision test pattern slides.

Tele-Measurements provides 17 different test patterns in two sizes. The 100 series slides are 2" x 2" in size, for film multiplexers and spot scanners. The 300 series are 8" x 10" for use with Tele-Pat test pattern illuminators. Series 200 and 400 are special color patterns, and series 500 are customer specified slides, available on special order.

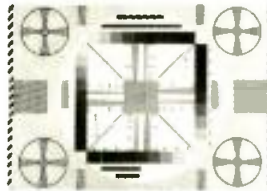
All test slides are mounted in optical glass and are electronically accurate to  $\pm 1\%$  of vertical and horizontal tolerances. Test patterns include:

**TM-101 & TM-301 Resolution Slide (Retna).** Standard reference for measuring resolution, testing for streaking, interlace, shading, scanning linearity, and aspect ratio. Horizontal and vertical wedges with 200 to 800 line resolution.

**TM-102 & TM-302 Resolution/Extended Gray Scale.** Same as TM-101 and TM-301, with the addition of four logarithmic gray scales for transfer characteristic testing.

**TM-202 & TM-402 Color Fleshtone Slide.** For overall color performance and set-up purpose.

**TM-501 Station I.D. Color Slides.** Supplied with your station call letters, channel, and location. Professional identification for local monochrome and color programming.



TM 102



TM 501

For a complete list of Tele-Pat test pattern slides and illuminators, call or write



**TELE-MEASUREMENTS INC.**

145 Main Avenue, Clifton, New Jersey 07014  
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For More Details Circle (172) on Reply Card

## Change Sound to Silence with a **TABERASER**



This rugged, heavy duty bulk tape eraser wipes sound from all magnetic tapes, cartridges, cassettes and magnetic film stock; handling up to 2".

It erases with minimum residual noise because the field automatically diminishes at the end of each 30-second cycle. A thermal control and blower keeps the unit below 71° C.

Available for 60Hz or 50Hz operation.

For the distributor in your area—Call or write:

**TABER** Manufacturing & Engineering Company  
2081 Edison Ave. • San Leandro, Ca. 94577 • (415) 635-3831

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## New Products

continued from page 222

under \$40 to \$170. The condenser prices range from \$85 to \$1,125. The condenser mics feature a rectangular diaphragm and employ FET preamplifiers. The models DC-63 and ST-8 are provided with variable pickup patterns.

For More Details Circle (331) on Reply Card

### Power amplifier

BGW Systems' new professional power amplifier, model 250C, delivers 100 watts/channel into 8 ohms with less than .03% IM distortion, and 150 watts/channel into 4 ohms at 1 kHz.

The 250C features: modularized amplifier output stages; front panel clipping indicators; relay-operated delay and speaker protection; front panel gain controls; front panel mounted magnetic circuit breaker; separate chassis and signal grounding rear panel connections for elimination of ground loops; rear panel convertible bridged mono operation slide switch; and plug-in matching input transformer provision with mechanical guard.

For More Details Circle (332) on Reply Card

### Remotely operated television transmitters

Howe-Yin Research has announced the addition of a series of remotely operated, unattended service VHF television transmitters to its line of television broadcast equipment. Presently available in 100 watt and 1 kilowatt ratings, 3 kilowatt and 10 kilowatt models are scheduled as future additions.

These transmitters feature low-level IF modulation and quarter-wave re-entrant type cavities designed and manufactured by the company. Extensive use of CMOS logic circuitry provides complete manual and remote control, protective interlocking and monitoring of all vital functions, fault memory and display, and maximum "on air" reliability through automatic bypassing of any or all PA stages in the event of a continuous overload.

For More Details Circle (333) on Reply Card

### Circularly polarized antenna

A circularly polarized TV broadcast antenna employing patented end-fire elements is being offered by CCA Electronics Corporation.

The new antenna, specifically

continued on page 226



# 29 STATIONS

Have Chosen

## Autotron systems

A few have Autotron I, the complete automatic traffic and billing system, that provides several terminals, for several of your stations, doing several tasks all at the same time...

...others have selected Autotron IV, which does traffic and billing, but also does payables, general ledger and payroll, and is operated by one employee in a normal work week for the busiest AM/FM...

...still others have chosen Autotron VI, the only total automation system made, adding program automation control and memory (not just interface, CONTROL) to traffic, billing, payables, general ledger and payroll; and, throws Automatic Transmitter Logging in at no extra charge, while even automatically rescheduling discrepancies...

...finally a group or two has chosen one central computer with remote terminals at their other stations.



And now, we're proud to introduce the ultimate program automation system—(CUEAC)—Autotronics Division of Automation Electronics, Inc. exclusively presents Cueurac and Cueuraster real-to-reel and cartridge players and recorders, all automation ready. Cueurac features 500 "on-line"

cartridges and is available as a stand-alone system or as a part of the Autotron business systems. Think of the walk-away possibilities. Until now programming formats have been limited to available automation equipment; now, at last a total system that can bring new dimensions to formatting. Economical when automation alone, but when combined with the Autotron system—it's absolutely great! The Autotron Systems and Cueurac are on display...ask about them and then see them in action...you'll wonder how you got along without them so long.

One turn-key purchase or lease/buy, no fees, no percentage of billing, no add-on expenses, no line charges—  
—completely in-house.

Call Allen Collier or Fwisty Goid at Autotron-Dallas... 214-233-7829  
or Larry Zaiser at Autotron-Lafayette... 317-423-2572  
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Autotron, Cueurac, Cueuraster and Autotronics Division are trademarks and services of Automation Electronics, Inc.

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- tape heads
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- turntables
- phono preamplifiers
- amplifiers
- loggers
- headsets
- equalizers
- tape tension gages
- wireless mic systems
- transmitters
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- microwave equipment
- towers
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- tape cartridges/racks/machines

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Contact:**



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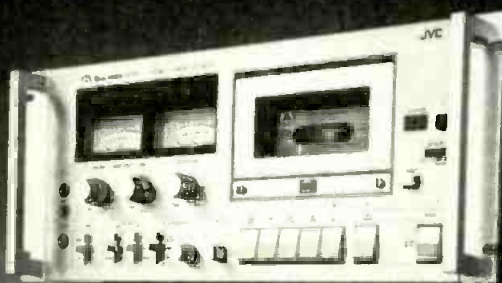
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**GREAT FOR NEWSROOM PRODUCTION AREAS  
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**A Cassette  
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That's Ideal  
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STABLE MECHANISM AND TRANSPORT THE JVC KD-95 USES TWO MOTORS. AN FG SERVO TYPE FOR CAPSTAN DRIVE AND A DC TYPE FOR REEL DRIVE. IT HAS THREE ELECTROMAGNETIC PLUNGERS FOR PAUSE, BRAKE AND PLAY. ALL OPERATIONS ARE UNDERTAKEN ELECTRONICALLY WITH TOUCH OF THE BUTTONS. DIRECT CHANGE OF MODES CAN BE ACHIEVED WITHOUT FEAR OF TAPE DAMAGE THANKS TO THE JVC-DEVELOPED TTL IC. IT PROVIDES ABOUT ONE SECOND OF DELAY BEFORE SELECTED MODE OPERATION BEGINS. HEAD AZIMUTH, HEIGHT AND TILT CAN BE ADJUSTED FOR ACCURATE ALIGNMENT. THE JUMBO FLYWHEEL IS 80MM IN DIAMETER AND IS COUPLED TO THE 2-MOTOR ID MECHANISM TO CONTRIBUTE TO A REDUCED WOW AND FLUTTER OF 0.05% WRMS. DIMENSIONS ARE 420 mmW x 211mmH x 320mmD (16-1/4 in.W x 8-5/16 in.H x 12-5/8 in.D)

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1977 BUYERS GUIDE



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www.americanradiohistory.com

## New Products

continued from page 224

designed to eliminate ghosting problems in TV signal propagation, is now permitted based on amended FCC rules. The rule changes allow television broadcasters to convert from horizontal to circular or elliptical polarization for their broadcast systems.

The antenna utilizes the slot array for the horizontal component and is the only currently manufactured antenna which allows future addition of circular polarization without incurring the cost at the time of initial purchase.

For More Details Circle (334) on Reply Card

### Color television camera

The FP-1212 color television camera from Hitachi Denshi America, Ltd. features a built-in IQ-type encoder which makes it possible to utilize the FP-1212 for broadcasting purposes by attaching an optional, large magnification lens. Accurate fidelity in color reproduction is assured through the use of an RGB three-tube Plumbicon™ camera.

NTSC or PAL color composite signals can be obtained from the built-in encoder, without employing an accessory unit (broadcasting IQ encoder for NTSC color system). Independent RGB (red, green, blue) output terminals are provided to use with an external encoder. (RGB signals are available simultaneously with encoder signal.)

Additional features include: aperture correction circuit; built-in color bar generator; automatic iris control circuits; remote-controlled registration circuits; remote-controlled color temperature compensation circuits; removable viewfinder; and tally lamp and intercommunication circuit.

For More Details Circle (335) on Reply Card

### Solar electric generators

Solar Power Corporation has announced the availability of model P-1002 Solar Electric Generators and Arrays for remote powering of radio repeater stations, microwave links, signaling devices, cathodic protection, water pumps, telemetry equipment and other remote power applications.

Using 57mm silicon solar cells wired together in series and mounted in a UV-stable case made of polycarbonate, P-1002 Arrays withstand impact, wind, tempera-

continued on page 228

BROADCAST ENGINEERING





## Introducing two new ways to get the lighter side of the news.

Microwave Associates' MA-2CP and MA-2EP.

They're by far the lightest, easiest to carry, simplest to use and maintain portable microwave radios to move onto the market.

Because they're so light, the 2 watt MA-2CP and 8 watt MA-2EP open up a new era of flexibility in news gathering at 2GHz. You can go almost anywhere the news is.

Both models have a unique frequency offset capability that gives you a total of 21 microwave channels. Three times the frequency agility of older models.

If you want, we also offer the 2CP and 2EP in 1-channel and 7-channel versions.

In addition, the MA-2EP provides sophisticated diagnostics, switch-selectable tuning and the opportunity of mounting the



RF head up to 30 feet away.

Both the MA-2CP and MA-2EP are engineered with people in mind. And each system is compatible with all our Portable Line accessories.

So if you need two great little portables for ENG remotes, write or call for the complete details.

The MA-2CP. And the MA-2EP.

They're guaranteed to give your news gathering a nice, light touch. Microwave Associates, Communications Equipment Group, Burlington, MA 01803. 617-272-3100.



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## New Products

continued from page 226



# The Super System

**THE TW INTERCOM SYSTEM:** A refined, high-quality, and ultra-reliable intercom system for the demanding professional. Employing only two wires for operation, up to fifty units may be connected on line without loading or serious performance degradation. Features include: mic level limiter, flashing signal light, adjustable side tone, and powerful two watt headphone amp.

Portable system standard with two channels; rack mount standard with three channels. The RTS "TW" Intercom System is compatible with

all carbon or dynamic mic headsets. It is completely field serviceable and handsomely packaged to provide super service under the toughest conditions. In addition, the system is uniquely flexible, allowing custom requirements such as multiple channels, discrete channel talk & listen switching, iso switching, and special interfacing.

For more information please call or write: RTS SYSTEMS, 4167 FAIR AVENUE, NORTH HOLLYWOOD, CA 91602 (213) 980-0511

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ture and severe weather conditions.

The electrical output for a single P-1002 module is 1.4 watts of peak power with .60 amps and 2.3 volts also produced at peak power. A low-voltage drop-blocking diode is used to prevent storage battery discharge at night. Ten feet of neoprene-jacketed two-conductor output cable is also provided.

For More Details Circle (336) on Reply Card

### Image enhancer

The PAL/SECAM version of the "Crisp-Matic" image enhancer and noise reducer was displayed at the recent Montreux Symposium and Technical Exhibition. The PAL/SECAM "Crisp-Matic" is manufactured and sold by Yves Faroudja, Inc.

The three units on display at the company's booth were delivered to VCI in Paris (a duplication facility), the IBA in England, and a representative in Munich after the exhibition. European distribution is being arranged through video product representatives who saw the product on display and expressed an interest.

For More Details Circle (337) on Reply Card

# A Rare Sight



## YOU MAY NOT SEE IT FOR ANOTHER 10 MONTHS

When an installation such as this microwave station in Greenland is accessible for only a few months a year you need a dependable, remote power source. Inside the protective shelter TELAN thermoelectric generators are the sole source of power. For more information about TELAN please call or write to us today.

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For More Details Circle (179) on Reply Card

### Camera lens system

Rank Precision Industries is offering a new Varotal Multi-Role Lens (MRL), which for the first time gives television camera users a common set of optical zoom lens modules for both TV broadcast standard cameras and for portable cameras.

Considered a major breakthrough in lens system design, this Rank Optics-Taylor Hobson MRL permits the user to select lens modules to make up a system tailored to his individual needs and budget. To extend lens usage, Rank has put together an extremely compact objective with a wide specification to full professional standards. Three interchangeable lens fronts give wide-angle, narrow-angle and standard possibilities—a total focal length range of 56 to 1. Rank offers the MRL for most broadcast TV cameras.

The MRL's location arrangement and release set-up gives instantaneous lens interchange which needs no re-registration or camera adjustment.

The portable MRL was designed basically for use with tripod-

continued on page 246



# High Precision Rebuilding— Your Assurance of Quality

## Putting it all together at Econco

### SERVICE

Econco's prompt 30-day repair service, coupled with fast reliable UPS handling, makes getting tubes repaired a quicker method than ordering a new tube from a distributor. 7-Day repair rush orders and 1-day delivery available in emergencies. Add to this Econco's improved capability in making glass seals, mesh filaments and improved grid making capability.

### RECYCLE USED TUBES

As we become more and more conservation conscious of energy and virgin materials, we encourage stations to consider selling their used tubes to us. Save your packaging and when you get a few or a lot, send them to us for cash. We'll make them better than new.

### TUBE TESTING

All rebuilt tubes are fully tested and must meet new tube specifications or we do not ship them. Tubes which do not meet specs. are repaired again or scrapped if not repairable.

### THE PRICE IS RIGHT

Econco's prices average approximately 50% of new tube prices. These savings are even greater when you include sales tax on new tubes.



Glass Lathe



Filament Mounting



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### HIGH POWER TUBE REPAIR . . .

With the trend to use higher power tubes and increased needs for this service, Econco now provides high power tube repair. Econco can now repair most internal defects on 5671's and 5681's. We have also been able to add the 4CX35, 000C, 6697A and 5682's to our price list.

Begin recycling  
today - send us  
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Tube Testing



## ECONCO BROADCAST SERVICE, INC.

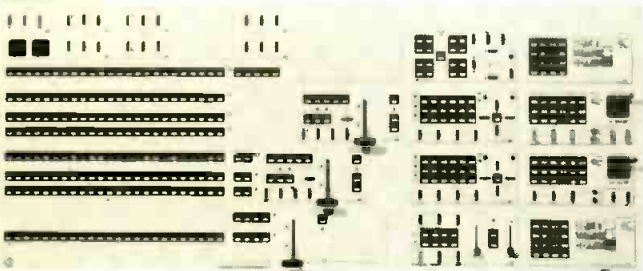
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Woodland, California 95695  
Telephone (916) 662-4495 or (916) 662-6031

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# Central Dynamics. International pacesetter in television broadcast equipment.

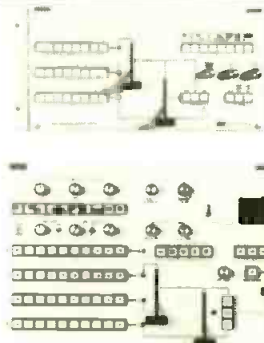
## Video switchers.



### New, Super Powerful CD 480 The Smart Switcher

Revolutionary modular switchers with unprecedented production power. They outperform the largest conventional switchers, yet are extremely simple to operate. Their power and ease of operation are due to CDL's new Sequential Effects (SFX) Amplifier, which can cut, mix or wipe between two Background Sources and two separate Key Sources either individually or in any combination. Models with one or two SFX Amplifiers provide all the standard and optional features you need, including Rotary & Random wipes, RGB Shadow keys, Hard and Soft Color Border wipes, Color Border keys, Quad with Color Borders, Encoded Chroma keying, Key Mask generator, and 16, 24 or 32 inputs. A variety of modular accessories will continue to keep your switcher smarter than the rest as new technology develops.

The CD-480 is now being shipped.

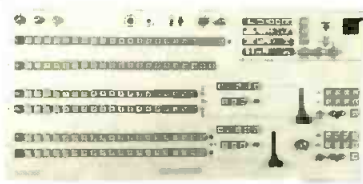


### VS-10

An inexpensive broadcast quality 8-input switcher that features flexibility and ease of operation. Self-contained electronics for rapid installation in ENG and other small mobiles.

### VS-14

Sophisticated enough for large studio production, yet compact and inexpensive enough for small mobiles. Soft wipes and keys—even a Downstream keyer—are standard. Self-contained and remote versions available.



### VSP-1260S

#### An amazing value

Now the smallest station can afford a conventional 20-input mix/effects switcher of the highest quality and reliability. All features, including an Encoded Chroma keyer and Bordered keys, are standard (not optional, as is often the case). And the price is astonishingly affordable.

## Automation.



### System 100

Computer controlled automation system for Technical Operations that communicates directly with a Business Computer System. Stores and retrieves the schedule with entry error checking, makes automatic time corrections, performs complicated audio/video switching sequences (including dissolves, fades, wipes and keys), assigns machines, verifies material and prints the "As-Aired" log.

### Master Control Switchers

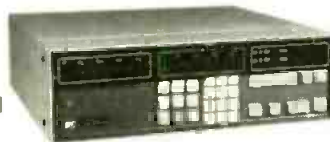
Ranging from CDL's new CD 480 MC to a 2 Bus MCS-829 or a 3 Bus MCS-770. All 3 can be interfaced to System 100 Technical Automation System.

## Tape editing systems.



### PEC-120 Video Tape Editor

A computer editing System with easily operated control panel and CRT display for rapid and precise control of VTR's & Switcher CDL's unique Self Learning Cueing Software Program is a new feature.



### EDS-200 Video Tape Editor

A two machine Time Code microprocessor Editor that interfaces to Quad or Helical VTR's.

### Also a complete line of production and TV terminal equipment, including:

- SMPTE Time Code Generators and Readers
- Video and Pulse Distribution Amplifiers
- Chroma Keyers: RGB and Encoded
- Processing Amplifiers
- Audio/Video Routing Switchers
- Pulse Assignment Systems
- Machine Control Systems

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TWX—610 422 3906

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# MASTER INDEX

## Manufacturers and Suppliers

### A

**AEG-Telefunken, Magnetic Tape Recorder Dept.,** P. O. Box 2154, D-7750 Konstanz, West Germany

**AEL, Inc.,** Box 552, Lansdale, Pa. 19446

**A. F. Associates, Inc.,** 100 Stonehurst Court, Northvale, N. J. 07647

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Instrument Dynamics, Inc. 20 Tower Lane, Avon Park South Avon Conn. 06001 (203) 678-1088 Ken Wakoen

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**Agfa-Gevaert Inc.,** 275 N. Street, Teterboro, N.J. 07608

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**Ailtech,** 19535 E. Walnut Dr., City of Industry, Calif. 91748

**Air Space Devices Inc.,** Box 197, Paramount, Calif. 90723

**Aitken Communications Inc.,** 214 Harrison St., Taft, Cal. 93268

**Akai America, Ltd.,** Box 6010, Compton, Calif. 90224

**Alco Electronic Products, Inc.,** 1551 Osgood St., North Andover, Mass. 01845

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Dalis Electronic Supply 917 N. 7th St. Phoenix Ariz. 85006 (602) 258-8151 Ken Schmehl

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33435

**C. S. P. Inc.,** 203 Airport Rd., Doyle-  
town, Pa. 18901

**Cablewave Systems Inc.,** 60 Dodge  
Ave., North Haven, Conn. 06473

Ken Robinson, Bill Meola (203) 628-5706

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ton Tex 75006 (214) 242-6122 Marv  
Villians  
Cablewave Systems, Inc 790 Lucerne Dr  
Sunnyvale Calif 94086 (408) 735-8500  
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**Califone International, Inc.,** 5922  
Bowcroft St., Los Angeles, Calif.  
90016

**Calvert Electronics Inc., D 1-9,** 220  
East 23rd St., New York, N. Y.  
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**The Camera Mart, Inc.,** 456 W. 55th  
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Canon U.S.A., Inc 140 Industrial Ave Elm-  
hurst Ill 60126 (312) 833-3070 M  
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**Capitol Magnetic Products,** 1750  
North Vine St., Hollywood, Calif.  
90028

**Catel Div., United Scientific Corp.,**  
1400 D Stierlin Rd., Mt. View, Calif  
94043

**CaVux Stereo Productions,** 502 S. Isis,  
Inglewood, Calif. 90301

**Ceco Communications Inc.,** 2115  
Avenue X, Brooklyn, N.Y. 11235

**Central Dynamics Corp.,** 331 W.  
Northwest Hwy., Palatine, Ill. 60067

Dave Spindle, National Sales Mgr (312)  
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91403 (213) 789-0574 Vince Lyons. Re-  
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**Cetec Audio, Box 3941,** North Holly-  
wood, Calif. 91605

Don King (213) 875-1900

**Cetec Broadcast Group,** 75 Castilian  
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Box 31 Marion Va. 24354 (703) 783-  
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(813) 934-9696 Dwight Herbert. District  
Mgr.  
Box 728 Blowing Rock N.C. 28605 (704)  
264-6297 Burt Rumlby. District Mgr  
950 Rue de la Banque #104 St. Louis Mo.  
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97034 (503) 635-4729 Dave McDonald.  
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**Chrono-Log Corp.,** 2 W. Park Rd.,  
Havertown, Pa. 19083

**Chronotron Systems, Inc.,** 230  
Mineola Blvd., Mineola, N.Y. 11501

**Chyron Telesystems,** 223 Newtown  
Rd., Plainview, N.Y. 11803

**Cine 60, Inc.,** 630 9th Ave., New York,  
N.Y. 10036

**Cinema Products Corp.,** 2037 Gran-  
ville Ave., Los Angeles, Calif.  
90025

**David Clark Co., Inc.,** 360 Franklin St.,  
Worcester, Mass. 01604

**Clear-Com,** 759 Harrison St., San  
Francisco, Calif. 94107

**Coastcom,** 2346 Stanwell Drive, Con-  
cord, Calif. 94520

**Coaxial Dynamics,** 13110 Enterprise,  
Cleveland, Ohio 44135

**Cohu, Inc., Electronics Div.,** Box 623,  
San Diego, Cal. 92112

**Collins Radio, Rockwell International,**  
Mail Station 406-240, Dallas, Tex.  
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Jorge Bicocchi, Int'l Sales Coordi-  
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(602) 783-6380 Morris Courtright

Rockwell Int'l. Collins Broadcast Products  
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(503) 254-2818 T. T. Cauthers

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452-6044 R. F. Cassidy

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Bennett R. Collins (317) 849-2705

**Colorado Magnetics, 4620 Milkweed**  
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80917

**Colorado Video Inc., Box 928, Boulder,**  
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**Comark Industries Inc., Box 196,**  
Westfield, Mass. 01085

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8931 Roy Phillips

Perspective Measurements 2141 W.  
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Gene Sudduth Co. Box 15263 Charlotte  
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Nucom Associates Box 243 Edmonds  
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Catawba, N.C. 28609

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St., Santa Ana, Calif. 92706

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**Communications Technology, Inc.,**  
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**Computer Image Video Controllers,**  
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Ave. Suite 4, Denver, Colo. 80223

**Computer Labs, 505 Edwardia Dr.,**  
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**Comquip, Inc., 366 S. Maple Ave., Glen**  
Rock, N.J. 07452

**Comrex Corp., 60 Union Ave., Sud-**  
bury, Mass. 01776

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**Conrac Div., Conrac Corp., 600 North**  
Rimsdale Ave., Covina, Calif. 91722

**Consolidated Electronic Industries,**  
9721 Singleton Dr., Bethesda, Md.  
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**Consolidated Video Systems, 1255 E.**  
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(416) 251-3355 Peter McDonnell

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**Continental Electronics Mfg. Co., Box**  
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Morton Grove, Ill. 60053

**Cooke Engineering Co., See Dynatech**  
**Data Systems, 900 Slaters Lane,**  
Alexandria, Va. 22314

**Corning Glass Works, 3900 Electroni-**  
cs Dr., Raleigh, N. C. 27604

**Cosmic Lens Div., Asahi Precision**  
**Co., Ltd., 424 Higashi Oizumi, Neru-**  
ma-Ku, Tokyo, Japan 177

**Crouse Hinds Co., Box 131, Syracuse,**  
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**Custom Audio Electronics, 2828**  
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**D and S Corley Ltd., 80 Galaxy Blvd.,**  
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**Dage-MTI, Inc., 208 Wabash St., Mi-**  
chigan City, Ind. 46360

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Mass. 02149

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Union, N. J. 07083

**Datatron, Inc., Box 11427, Santa Ana,**  
Cal. 92707

**Davis Mfg., Div. of J I Case, Box 9228,**  
Wichita, Kans. 67277

**Davis & Sanford Co. Inc., 24 Pleasant**  
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**Decca Austin Insulators, 71 Selby**  
Road, Brampton Ont., Canada L6W  
1K5

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**Delta Electronics Inc. (N.C.), 145**  
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27101

**Delta Electronics Inc. (Va.), Box 1508,**  
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Joseph Novik (703) 321-9845

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**Denson Electronic Corp., D 1-9, Box**  
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**Dielectric Communications Div. Sola**  
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Saddle Brook, N.J. 07662

**Digital Video Systems, 519 McNicoll**  
Ave., Willowdale, Ont., Canada M2H  
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**Digi-Tech, Box 2114, Salem, Ore.**  
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**Ditch Witch, P.O. Box 66, Perry, Okla.**  
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**Di-Tech Inc., 315 Wyandanch Ave., N.**  
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**Duca-Richardson Corp., 11465 W.**  
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view Road, Costa Mesa, Calif.  
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**Duotone Co. Inc., Box 1168, South**  
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19422 J. B. Waltrich. Video Product  
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**ELPA Marketing Industries, Inc., New  
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**EMCEE Broadcast Products, P.O. Box  
116, White Haven, Pa. 18661**

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**Eastman Kodak Co., 343 State St.,  
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Calif. 95945**

**Elcom Engineering Co., Box 10432,  
Santa Ana, Calif. 92711**

Jim Lawrence (714) 544-5760

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**Electro Impulse, Inc., Box 870, Red  
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Ken Parr Assoc. 9314 W. 122nd St. Palos  
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Electro-Visual Corp. of Americas 3617 W.  
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Calif. 92704 (714) 545-6991

**Electronic Devices, Inc., 21 Gray Oaks  
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**Electronic Inst. & Spec., 42 Pleasant  
St., Stoneham, Mass. 02180**

**Electronic Transport Systems, Box  
861, Westfield, Mass. 01085**

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bane Calif. 94005 (415) 469-5220 Dan  
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7100 Jim Johnson

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**General Electric Co., Tubes/MW Devices**, 316 E. Ninth St., Owensboro, Ky. 42301

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International Communications, & Con-  
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 Caldwell Audio/Video Equipment 1080 Bellamy Rd. N. Scarborough, Ont. M1H 1H2 Canada (416) 438-6230 W. Jones  
 Harris Corp. Gates Radio Div. 212 Brunswick Ave. Pointe Claire, Que. Canada (514) 695-3751 Vic Hosquet  
 MSC Electronics Ltd. 254 Wildcat Rd. Downsview, Ont. Canada (416) 661-4180 David LaFrenais  
 McCurdy Radio Industries Ltd. 108 Carnforth Rd. Toronto, Ont. M4A 2L4 Canada (416) 751-6262 George McCurdy  
 Nortec West, Ltd. 325 W. 5th Ave. Vancouver, B.C. Canada (416) 872-8525 R. Whitehouse  
 Oakwood Audio Labs. Ltd. 652 King Edward St. Winnipeg, Man. R3H 0P2 Canada (204) 786-6711 Ron Paley  
 Orange County Associates Chateau Seven Group Ltd. 1125 Empress St. Winnipeg, Man. Canada (204) 772-6350 Michael Gillespie  
 Pineway Electronics 1875 Leslie St., Unit 3 Don Mills, Ont. M3B 2M5 Canada (416) 449-1343 Mel Crosby  
 Lee Engineering Ltd. Napier House, Bridge St. Walton-On-Thames, Surrey England 43124/5/6 Tom Lee  
 R. F. Enterprises Ltd. 1-22-2 Yoyogi, Shibuya-Ku Tokyo Japan 370-3417 Yasuo Nakanishi  
 Tropolco, S.A. Apartado 8465 Panama 7 Republic of Panama 23-1285 Roy Bettis  
 Itamé, S.A. C/Ing. Alfonso Pena Boeuf 15 Poligono Industrial Fin de Semana Madrid 22 Spain 215-59-37 Jose L. de la Rosa  
 Applied Electronic Industries Ca. Av. Casanova-Calle Recreo, Edif. Rupi, P.4. Otc. 43 Sabana Grande, Caracas Venezuela 72-88-37 Fitzroy Nesbit  
 General Electric de Venezuela S.A. Apartado No. 1.666 Caracas. 101 Venezuela 71-98-11 R. E. Farrell  
 Otacua Apartado de Correos 3994 Caracas Venezuela 781-1022

**Microtran Co., Inc., Box 236, Valley Stream, N.Y. 11582**

**Microwave Assoc. Inc., South Ave., NW Industrial Prk., Burlington, Mass. 01803**

H. P. Scott (617) 272-3100

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 Midwest 10920 Ambassador Dr., Suite 119 Kansas City Mo. 64153 (816) 891-8538 Merv Knold  
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**Millard Metal Service Center, Inc., Box 'O', Braintree, Mass. 02184**

**Miller-Stephenson Chemical Co., Inc., George Washington Hwy., Danbury, Conn. 06810**

**Minneapolis Magnetics, Inc., 8125 Pleasant Ave. S., Minneapolis, Minn. 55420**

**Modular Audio Products, Unit of Modular Devices, Inc., 50 Orville Dr., Bohemia, N. Y. 11716**

Rick Belmont (516) 567-9620

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 Sylvan Ginsbury Ltd. Export 1500 Queen Anne Rd. Teaneck N.J. 07666 (201) 837-1100 Robert Kolts (Export)  
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 BSC, Inc. 2932 River Rd. River Grove Ill. 60171 (312) 452-5551 Paul Bergetz  
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 Broadcast Supply West 2711 Locust Ave. W. Tacoma Wash. 98466 (206) 565-2301 Irv Law  
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**Monroe Electronics, Inc., 100 House Ave., Lyndonville, N.Y. 14098**

**Charles Moore, Box 2023, Rocky Mount, N.C. 27801**

**Moseley Assoc. Inc., 111 Castilian Drive, Goleta, Cal. 93017**

John E. Leonard, Jr. VP/Mktg (805) 968-9621

**Motorola Semiconductor Products, Inc., 5005 E. McDowell Rd., Phoenix, Ariz. 85008**

**Mountain West Alarm, DB, Box 10780, Phoenix, Ariz. 85064**

**Multronics, Inc., 9005 Red Branch Rd., Columbia, Md. 21045**

**N**

**NEC America, Inc., Broadcasting Equip. Div., 130 Martin Lane, Elk Grove Village, Ill. 60007**

Hugh F. Gillogly (312) 640-3792

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 AV Media 3344 W. Broad St. Columbus Ohio 43200 (614) 228-2477 John McMullin  
 Technical Video Systems, Inc. 245 Olson St. Winston-Salem N.C. 27103 (919) 768-9536 James E. Holladay  
 Lebow Labs Audio-Video, Inc. 424 Cambridge St. Alston Mass. 02134 (617) 782-0600 Will Morin, Pres.  
 Broadcast Communications Devices 5526 E. La Palma Ave. Anaheim Calif. 92807 (408) 984-6614 John Baumann

**Nagra Magnetic Recorders, Inc., 19 W. 44th St., Room 715, New York, N.Y. 10036**

**Nagy Research Products, Box 289, McLean, Va. 22101**

**Narda Microwave Corp., 75 Commercial St., Plainview, N.Y. 11803**

**National Electrolab Ltd., 1536 Columbia St., North Vancouver, BC, Canada V7J 1A4**

Terry C. Gould (604) 985-0511

**Neumade Products Corp., 720 White Plains Rd., Scarsdale, N.Y. 10583**

**P. K. Neuses Inc., 1401 Rohlfing Rd., Rolling Meadow, Ill. 60008**

**Rupert Neve, Inc., Berkshire Industrial Park, Bethel, Conn. 06801**

Tony Langley (203) 744-6230

**REGIONAL SALES CONTACTS:**

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 Rupert Neve of Canada, Ltd. 2717 Rena Rd. Milton, Ont. 4T 3K1 Canada (416) 677-6611  
 North American Radio Corp., 3814 Marquis Dr., Suite 111, Garland, Tex. 75042  
 North Hills Electronics, Inc., Alexander Pl., Glen Cove, N.Y. 11542

**North Wind Power Co., Box 315, Warren, Vt. 05674**

**Norton Associates Inc., 10 Ditomas Court, Copaque, N.Y. 11726**

**Nortronics Co., Inc., 8101 Tenth Ave. N., Minneapolis, Minn. 55427**

Mike Nystrom (612) 545-0401

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 D M F & Associates 8 Perimeter Pl. N.W. Suite 850 Atlanta Ga. 30339 (404) 435-2616  
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 Carmine Vignola Associates 1001C Southwest Blvd. Box 569 Jefferson City Mo. 65101 (314) 893-3205  
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 Norris & Co. 2860 S. Circle Dr., Suite 308 Colorado Springs Colo. 80906 (303) 576-3324  
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 Gemini Electronics Marketing 1144 N. 175th St. Seattle Wash. 98133 (206) 542-1116  
 Len Finkler, Ltd. 25 Toro Rd. Downsview, Ont. M3J 2A6 Canada (416) 630-9103  
 Moulthrop Sales, Inc. 7080 Commerce Dr. Pleasanton Calif. 94566 (415) 846-0550  
 L. P. Hench Co. 9900 S.W. 168th St. Miami Fla. 33157 (305) 251-4343  
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 Snider & Associates 1020 Auahi St. Bldg. 3 Honolulu Hawaii 96814 (808) 941-2400  
 James H. Podolny Co. 251 S. Court St. Box 565 Medina Ohio 44256 (216) 725-8814  
 Vector Sales 4901 W. 77th St., Suite 131 Edina Minn. 55435 (612) 835-5820

**Nova Corp., Box 2121, Canoga Park, Calif. 91306**

Kim Forrest (213) 888-5122

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 TMC System Sales, Inc. Tabako Kakan. 2-10 Shinogawacho Shinjuku-Ku Tokyo Japan K. Aya

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 H. M. Holtzberg Associates Box 322 Totawa N.J. 07511 (201) 256-0455 Herbert M. Holtzberg  
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 Radford Associates 1331 Otter Creek Rd. Nashville Tenn. 37215 (615) 373-0231 Ralph L. Hucaby

**Oak Industries, Inc., Crystal Lake, Ill. 60014**

**O'Connor Eng. Labs, Inc., 100 Kaimus Drive, Costa Mesa, Calif. 92626**

Cary C. Clayton (714) 979-3993

**Oktel Corp., 1731 Dell Ave., Campbell, Calif. 95008**

Bernard Okey (408) 374-1811



Oldham Tower Systems, 48 Bayou Dr., Indianola, Miss. 38751  
The Olesen Co., 1535 Ivar Ave., Hollywood, Calif. 90028  
Onan, 1400 73rd Avenue NE, Minneapolis, Minn. 55432  
Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, Calif. 90038  
B. Losmandy (213) 934-3566

Optek, 5526 E. La Palma Ave., Anaheim, Calif. 92807  
John Baumann (714) 528-2321

Optima Enclosures, 2166 Mountain Industrial Blvd., Tucker, Ga. 30084  
The Orange County Electronics Corp. Ltd., 1125 Empress St., Winnipeg, Man., Canada R3E 3H1

Orban/Broadcast, 680 Beach St., Suite 365, San Francisco, Calif. 94109  
Jesse Maxenichs (800) 227-4068. Calif. (415) 441-0666

Orban/Parasound, 680 Beach St., San Francisco, Calif. 94109  
Sid Goldstein (415) 673-4544

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Cara Pacific 4145 Vai Marina, Apt. 120 Marina Del Rey Calif. 90291 (310) 821-7898 Bill Cara  
Eidserco 12 Estel Place Green Brook N.J. 08812 (201) 968-0344 Jim Loder  
H.P. Marketing 917 W. Heatherbrae Phoenix Ariz. 85013 (602) 279-4883 Alan Kari Pace  
H.P. Marketing 2530 W. Church Ave. Littleton Colo. 80120 (303) 794-8367 Dan Peterson  
Theodore Pappas & Assoc., Inc. 5218 W. Diversey Ave. Chicago Ill. 60639 (312) 685-2338 Ted Pappas  
J. B. Parent Co. 5188 Wedgewood Rd. Medina Ohio 44256 (216) 725-8871 Jim Parent

Technical Systems Reps. 2065 Peachtree Ind. Ct. #215 Chamblee Ga. 30341 (404) 457-0426 Norm Schneider  
V.F. Sales, Inc. 181 Worcester Rd. Natick Mass. 01760 (617) 237-6544 George Markunas  
H.P. Marketing 9628 S. Raintree Pl Sandy Utah 84070 (801) 942-5684 Jon Hooper  
AudioLab Hellas B. Enianos St. Athens (104) Greece Cristos Lilis  
Audio Products Int'l. Via G. Spontini. 3 20131 Milano Italy Roberto Beppato  
Audio Products Int'l. Via S. Bernadette. 76 Roma 00167 Italy Piero Marziali  
Cadac Holland C.V. Amstel St. 97 Hilversum Holland Dick Swanaveld  
Delta Equipment Rue de Calevoit 112 B-1180 Bruxelles Belgium L. F. Velu  
Electronica Fernández 208 Eleanor Roosevelt St. Box 415 Hato Rey Puerto Rico 00918 (809) 767-3500 Jose Arturo Fernandez  
Electronica Gramcko Av. Sanz-Edificio Escar-Local B Caracas Venezuela Manuel Caraballo

Elmus GmbH Herderstrasse 16 D1 Berlin 12 West Germany Heinrich Keinert  
Industrial Tape Applications 1-7 Harewood Ave. Marleybone Rd. London W1N England Martin Parmiter  
Larex Electronica Ltda. Ave. Princesa Isabela. 7 Sala 915/916 Rio de Janeiro Brazil Claus Eppenstein  
M. Llewellyn-Jones Apartado. 8-178 Madrid 8 Spain M. Llewellyn-Jones  
Scenic Sounds Equip. 97-99 Dean St. London W1V 5RA England David Hawkins  
Schaeffer, Riesser & Cie 14 Bis. Rue Marbeuf Paris 8e France Jean Planchard  
A. D. Smith Cinema (Phils) Inc. Box 1342 Makati, Rizal Philippines Tony Smith  
Sudamcorp S.A.C.I. Florida 165 Buenos Aires 1333 Argentina Thomas Graham  
Tal & Ton AB Kungsgatan 5 411 19 Göteborg Sweden Jan Setterberg  
Syntec Pty. Ltd. 5-7 Smith St. Chatswood N.S.W. 2069 Australia E. C. Sloss

Oregon Magnetics, Box 13374, Portland, Ore. 97213

Jim Carlock (503) 233-8295

Oregon Sound, D 9, 665 Wilson St., Eugene, Ore. 97402

Otari Corp., 981 Industrial Rd., San Carlos, Calif. 94070

Lew Barrett (415) 593-1648

## P

PSI Paperwork Systems, Inc., Box 38, Bellingham, Wash. 98225

Pacific Recorders and Engr. Corp., 11100 Roselle St., San Diego, Calif. 92121

Jack Williams (714) 453-3255

M. Palmer & Associates, 525 S.W. First St., Lake Oswego, Ore. 97034

Martin Palmer (503) 635-3238

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M. Palmer & Associates Box 10941 Eugene Ore. 97401

W. A. Palmer Films, Inc., 611 Howard St., San Francisco, Cal. 94105

Panasonic Video Systems Div., Box 1501, Secaucus, N.J. 07094

Alvin Barshop (201) 348-7683

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Panasonic Video Systems Div. Southeast Area #2 Meca Way Duluth Ga. 30136 (404) 448-5683 Leroy Wright. Regional Mgr.  
Panasonic Video Systems Div. Midwest Area 1098 Greenleaf Ave. Elk Grove Village Ill. 60007 (312) 539-0710 Gary Olson. Regional Mgr.  
Panasonic Video Systems Div. Southwest Area 1825 Walnut Hill Lane Irving Tex. 75062 (214) 256-1388 Terry Conner. Regional Mgr.

Paso Sound Products Inc., 251 Park Ave. S., New York, N.Y. 10010

Peirce-Pheips, Inc., D 2, 5, 2000 N. 59th St., Philadelphia, Pa. 19131

Pentagon Industries, Inc., 4751 N. Olcott Ave., Chicago, Ill. 60656

Permag Corp., 88-06 Van Wyck Expwy., Jamaica, N. Y. 11418

Perrott Engineering, 1020 N. Fillmore St., Arlington, Va. 22201

Phelps Dodge Communications Co., Rt. 79, Marlboro, N.J. 07746

Saul Escoff. Mgr., Special Products (201) 462-1880

Philadelphia Resins Corp., 20 Commerce Dr., Montgomeryville, Pa. 18936

Richard E. Dearborn (215) 855-8450

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Jon B. Jolly, Inc. 5416 California Ave. S.W. Seattle Wash. 98136  
The Heckerman Corp. 814 W. Hyde Park Blvd. Inglewood Calif. 90302 (213) 678-2264 Fred Heckerman  
Breit Tower Service Dinner Key Marina Miami Fla. 33132 (305) 858-3143 Charles E. Breit  
Tool-Tronics Box 1611 Zephyrhills Fla. 33599 (813) 782-7177 John Clanton  
Taurus Industries 188 South Blvd. Baton Rouge La. 70808 (504) 383-9955 Dale Pearson  
McLaughlin Industries 5824 Chestwood St. Houston Tex. 77017 (713) 641-1266 Pat McLaughlin

M.S.E. Engineering Systems Ltd. 265 Canartic Dr. Downsview, Ont. M3J 2N7 Canada (416) 661-5646 Al Egerton

Philips Broadcast Equip Corp., 91 McKee Dr., Mahwah, N. J. 07430

William E. Amos. V.P. Mktg (201) 529-3800

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Philips Broadcast Equip. Corp. Mid Atlantic Region 91 McKee Dr. Mahwah N.J. 07430 (201) 529-3800 Michael Hartt  
Philips Broadcast Equip. Corp. National Sales Div. 3300 Northeast Expy., Suite 1G Atlanta Ga. 30341 (404) 458-0171 Gino Nappo. Nat'l. Sales Mgr.  
Philips Broadcast Equip. Corp. Southeast Region 3300 Northeast Expy., Suite 1G Atlanta Ga. 30341 (404) 458-0171 Jeffrey Clarine  
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Philips T & M, Inc. 1393 Main St. Waltham Mass. 02154 (617) 889-4492 Rick Sharp  
Philips T & M, Inc. Box 54 Mechanicsville Pa. 18934 (215) 677-5770 John Bell  
Philips T & M, Inc. 6 Leswyn Rd. Toronto, Ont. M6A 1K2 Canada (416) 789-7188 Jack Weldon  
Highsmith & Co. 3733 Monroe Rd. Charlotte N.C. 28205 (704) 333-7743 Carlo Della Mea  
Torkelson Associates 540 W. Frontage Rd. Northfield Ill. 60093 (312) 446-9085 Frank Clayton

Photo Research, Div. of Kollmorgen Corp., 3000 N. Hollywood Way, Burbank, Cal. 91505

Plastoid Corp., 633 3rd Ave., New York, N. Y. 10017

Pleasantville Labs, Box 15068, Baltimore, Md. 21208

G. Romero or A. Levin (202) 223-3749

Potomac Instruments, Inc., 932 Philadelphia Ave., Silver Spring, Md. 20910

David G. Harry (301) 589-2662

Power-Optics Inc., Box 266, Fairview Village, Pa. 19409

Precision Elect. Inc., 9101 King St., Franklin Park, Ill. 60131

Prestolite Wire Div., 3529 24th St., Port Huron, Mich. 48060

Prodelin Inc., Box 131, Hightstown, N.J. 08520

Professional Audio Service, Box 1953, Fort Worth, Texas 76101

Jeanie Sims (817) 536-6254

Project Support Systems, 750 N. Mary Ave., Sunnyvale, Calif. 94086

Pulse Dynamics Mfg. Corp., (PDMC), Box 355, Colchester, Ill. 62326

Pulse Techniques Inc., 1411 Palisade Ave., Teaneck, N.J. 07666

E. R. Shenk (201) 837-2575

## Q

QEI Corp., Rt. 73, Kresson, N. J. 08053

QRK Electronic Products, 1568 N. Sierra Vista, Fresno, Calif. 93703

Quad-Eight Electronics, 11929 Vose St., North Hollywood, Calif. 91605

Quantum Audio Labs, Inc., 1905 Riverside Dr., Glendale, Calif. 91201

John Pritchett. Pres. (213) 841-0970

Quick-Set Inc., 3650 Woodhead Drive, Northbrook, Ill. 60062

Mark Stolman (312) 498-0700

## R

RCA Broadcast Systems, Front and Cooper Streets, Camden, N.J. 08102

RCA Community Television Systems, 7355 Fulton Ave., North Hollywood, Calif. 91605

RCA Distributor & Special Products Div., Cherry Hill Offices, Camden, N.J. 08101

RCA Electro Optics and Devices, New Holland Ave., Lancaster, Pa. 17604

RCA Power Tube Marketing, Lancaster, Pa. 17604

RCA Solid State Div., Rt. 202, Somerville, N.J. 08876

RF Systems, Inc., 155 King St., Cohasset, Mass. 02025

RHG Elect Labs, Inc., 161 E. Industry Court, Deer Park, N.Y. 11729

ROH Corporation, 107 Technology Park, Norcross, Ga. 30092

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Didier/Denver Box 1599 Evergreen Colo. 80439 (303) 674-6000 Herb Didier  
H. M. Dyer Electronics 31185 Ten Mile Rd. Farmington Hills Mich. 48024 (313) 478-2157 Mike Dyer, Dick Pinter  
Emmons Associates 10700 Lyndale Ave. South Minneapolis Minn. 55420 (612) 881-1118 Keith Emmons  
H. M. Holzberg Associates Box 322 Totowa N.J. 07511 (201) 256-0455 Herb Holzberg  
Landy Associates 1890 E. Marlon Pike Rt. 70 Cherry Hill N.J. 08003 (609) 424-4660 Jim Landy, Dick Fine  
NBE, Inc. RR #2 Westport N.Y. 12993 (518) 962-4567 John Ring  
NU-CDM Associates 1916 N.E. Ballinger Way, Suite B Seattle Wash. 98155 (206) 364-9911 John Nutting  
Radford Associates 3203 Lanier Dr. Atlanta Ga. 30319 (404) 237-6097 Lou Radford



Singer Products Co., Inc. One World Trade Center, Suite 2365 New York N.Y. 10048 (212) 432-1400 Richard Stanco  
The Gene Sudduth Co. 845 39th St. S.E. Paris Tex. 75460 (214) 785-5764 Gene Sudduth  
Television Engineering Corp. 519 Rudder Rd. Fenton Mo. 63026 (314) 343-5605 Jack Vines

**RTS Systems**, 4167 Fair Ave., North Hollywood, Calif. 91602

Doug Leighton (213) 980-0511

**Jules Racine & Co., Inc.**, 85 Executive Blvd., Elmstord, N.Y. 10523

**Radio Time Service**, Box 6613, Tucson, Ariz. 85733

**Ram Audio Systems, Inc.**, 17 Jansen St., Danbury, Conn. 06810

**Ramko Research Inc.**, 11355 'A' Folsom Blvd., Rancho Cordova, Calif. 95670

Jack M. Ducart (916) 635-3600

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Broadcast Equipment & Supply Rt. 1, Weaver Pike Bluff City Tenn. 37618 (615) 968-7342 Cliff Droke

Broadcast Supply West 2711 Locust Ave. Tacoma Wash. 98466 (206) 565-2301 Irv Law

Collins Radio 1225 N. Alma Richardson Tex. 75080 (214) 690-5310

Communications Systems, Inc. 1001 Perry Ave. Drawer 'C' Cape Girardeau Mo. 63701 (314) 334-6097 Dean Spidel  
Custom Products 107 E. Calhoun Magnolia Ark. 71753 (501) 234-3778 Paul Jameson

Georgia Broadcasting, Inc. 1001 Abercorn Expy. Savannah Ga. 31406 (912) 925-0022 Ed Bigby

Broadcast Consultants Corp. 21 N. Wirt Leesburg Va. 22075 (703) 777-8660 David Green

Lauderdale Electronic Labs 16 S.W. 13th St. Ft. Lauderdale Fla. 33315 (305) 764-7755 Carl Taylor

Lumar Electronics, Inc. 5801 Annapolis Rd., Suite 306 Bladensburg Md. 20710 (301) 864-0997 Steve Kincaid

Martin Audio Co. 320 W. 46th St. New York N.Y. 10036 (212) 541-5900

Midwest Telecommunications 1395 Air Rail Ave. Virginia Beach Va. 23455 (804) 464-9323

Montreal Video 4950 Bourg Montreal, Que. H4T 1J2 Canada (514) 342-4420

SAVCO Box 427 Richardson Tex. 75080 (214) 234-1841 Nathan Hughes

Southeast Electronics, Inc. 1125 Rosselle St. Jacksonville Fla. 32204 (904) 356-3007 Clark Overton

W. J. Wolfenbarger 1100 S.W. Florida St. Seattle Wash. 98134

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**Rank Cintel Div.**, 411 E. Jarvis Ave., Des Plaines, Ill. 60018

Neal Kempt (312) 297-7720

**Rank Precision Industries, Inc. (N.Y.)**, 260 No. Rte. 303, West Nyack, N. Y. 10994

**Rapid-Q, Edco Products, Inc.**, 680 Bizzell Dr., Lexington, Ky. 40504

**Raven Screen Corp.**, 124 East 124th St., New York, N.Y. 10035

**Raytheon Data Systems Co.**, 1415 Providence Turnpike, Norwood, Mass. 02062

**Recording Supply Co.**, 1233 Rand Rd., Des Plaines, Ill. 60616

Ray Kaiser (312) 297-0955

**Recortec Inc.**, 777 Palomar Ave., Sun-nyvale, Calif. 94086 Eldon Carl. V.P. Ron Troxell. Program Mgr. (408) 735-8821

**Rek-O-Kut Inc.**, 1568 N. Sierra Vista Ave., Fresno, Calif. 93703

**Re-Play Video Cartridge Service**, 328 Meritt Ave., Pittsburgh, Pa. 15227

**Research Technology, Inc.**, 4700 Chase, Lincolnwood, Ill. 60646  
Thomas W. Boyle (312) 677-3000

**Rex Rheostat & Co., Inc.**, 149 Babylon Turnpike, Roosevelt, N. Y. 11575

**Reynolds/Leteron Co.**, 13425 Wyandotte St., North Hollywood, Calif. 91605

**Rhoades National Corp.**, Box 817, Hendersonville, Tenn. 37075  
David Rhoades. Pres (615) 824-1735

**Richmond Hill Laboratories Ltd.**, 1240 Ellesmere Rd., Scarborough, Ont., Canada M1P 2X4

**Richmond Sound Design, Ltd.**, 1234 W. 6th Ave., Vancouver, B.C., Canada V6H 1A5

**Rivers Associates, Inc.**, Box 58, Leominster, Mass. 01453

**Robins Broadcast & Sound Equip. Corp.**, 75 Austin Blvd., Commack, N. Y. 11725

Steve Friedman (516) 543-5200

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Martin Audio 320 W. 46th St. New York N.Y. 10036 (212) 541-5900. (800) 223-9823

SAVCO Box 427 Richardson Tex. 75080 (214) 234-1841 Nathan Hughes

Modern Mass Media 315 Springfield Ave. Summit N.J. 07901 (201) 277-6300

Ted Myers Sales 16840 McKeever St. Granada Hills Calif. 91344 (213) 363-8793

Mid West Telecommunications 5200 Mitchelldale Houston Tex. 77092 (713) 686-9278

Mid West Telecommunications Virginia (304) 623-3781

Mid West Telecommunications Florida (305) 592-5355

Mid West Telecommunications Ohio (513) 742-2300

Sound Systems, Inc. 4212 28th St. Long Island City N.Y. 07047

General Electronics Sys. Inc. 1440 San Pablo Ave. Berkeley Calif. 94704

Hollywood Sound Systems 1526 N. Ivar Ave. Hollywood Calif. 90028

Klopf Audio 3381 Successful Way Dayton Ohio 45414

Langevin Co. 1050 Howard St. San Francisco Calif. 94103

Pierce Phelps, Inc. 2000 N. 59th St. Philadelphia Pa. 19131

Rich, Inc. 3531 N. Martens St. Franklin Park Ill. 60131

Sound Eng. Service 2021 First Ave. S. Birmingham Ala. 35233

Telesco International Corp. One Dupont St. Plainview N.Y. 11803 (516) 484-4920

Technical Service Corp. 2618 S. 4th St. Louisville Ky. U.S. Recording Co. 1347 S. Capitol St. Washington D.C. 20003

**Rockwell International, Collins Commercial Telecommunications Group**, Dallas, Texas 75207

**Rodelco Corp.**, 356 A Comac Road, Deer Park, N.Y. 11729

**Rohde & Schwarz Sales Co.**, 14 Gloria Lane, Fairfield, N.J. 07006

**Rolane Sales Corp.**, 1 Du Pont St. So., Plainview, N.Y. 11803

**Roll-A-Reel**, 7881 Reading Rd., Cincinnati, Ohio 45237

**Roscor Corp.**, D3, 4, 6160 Oakton, Morton Grove, Ill. 60053

**Ross Broadcast Products Ltd.**, 9 Iroquois Plaza, Iroquois, Ont., Canada KOE 1K0

**Russco Electronics Mfg. Inc.**, 1070 Brookhaven Drive, Clovis, Cal. 93612

Russell C. Friend. Barbara Davis (209) 299-2167

**Rycom Instruments**, 9351 E. 59th St., Raytown, Mo. 64133

**Ryder Magnetic Sales Corp.**, 1147 N. Vine St., Hollywood, Cal. 90038

## S

**SC Electronics, Inc.**, 530 Fifth Ave., N.W., St. Paul, Minn. 55112

**SGL Waber Electric**, 300 Harvard Ave., Westville, N. J. 08093

**SPI-ITT, Metrix Instruments Div.**, P.O. Box 30, 74010 Annecy, France

**SSAC Inc.**, Box 395, Liverpool, N.Y. 13088

John Arnold (315) 622-1000

**Sadelco, Inc.**, 299 Park Ave., Weehawken, N. J. 07087

**Saki Magnetics, Inc.**, 1649 - 12th St., Santa Monica, Calif. 90404

Trevor J. Boyer (213) 451-8611

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Accurate Sound Corp. 114 5th Ave. Redwood City Calif. 94063 (415) 365-2843

Ron Newdell Techniarts 8555 Fenton St. Silver Spring Md. 20910 (301) 585-1118 Bill Moore

Broadcast Supply West 2711 Locust Ave. W. Tacoma Wash. 98466 (206) 565-2301 Irving D. Iaw

**Howard W. Sams & Co., Inc.**, 4300 West 62nd St., Indianapolis, Ind. 46268

Tom Eastwood (317) 291-3100

**Sansui Electronics Corp.**, 55-11 Queens Blvd., Woodside, N. Y. 11377

**Saxton Products Inc.**, 215 N. Route 303, Congers, N.Y. 10920

**Schafer**, -see **Cetec Broadcast Group**, 75 Castilian Dr., Goleta, Calif. 93017

**Scala Radio Corp.**, 1970 Republic Ave., San Leandro, Cal. 94577

**Schneider Corp. of America**, 185 Willis Ave., Mineola, N. Y. 11501

**Jos. Schneider & Co., P.O. Box 947**, D-6550 Bad Kreuznach, West Germany

**Scientific-Atlanta, Inc.**, 3845 Pleasantsdale Rd., Atlanta, Ga. 30340

**Scientific Radio Systems, Inc.**, 367 Orchard St., Rochester, N.Y. 14606

Neal E. Garman (716) 458-3733

**Scientific Systems, Inc.**, 191 Westfield Ave., Clark, N. J. 07066

**Scully Recording Instruments, Div. of Dictaphone Corp.**, 475 Ellis St., Mountain View, Calif. 94040

Homer Hull (415) 968-8389

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Scully Recording Instruments 285 County Rd. Tenafly N.J. 07670 (201) 568-4414 Bill Hamilton

Scully Recording Instruments 1005 8th Ave. S. Nashville Tenn. 37203 (615) 244-1546 Bill Shute

Scully Recording Instruments 3434 W. Peterson Ave. Chicago Ill. 60645 (312) 583-7878 Gareth Nelson

Scully Recording Instruments 548 Kingsley Dr. Los Angeles Calif. 90020 (213) 380-7980 Phil Flad

**Sencore Inc.**, 3200 Sencore Drive, Sioux Falls, S. D. 57107

**Sennheiser Electronic**, 10 West 37th St., New York, N. Y. 10018

J. Hofman. V.P. Mktg. (212) 239-0190

**Sescrom, Inc.**, Box 590, Gardena, Calif. 90247

**Shallico, Inc.**, Hwy. 301 South, P.O. Box 1089, Smithfield, N.C. 27577

M. D. Sutton (919) 934-3135

**Shintron Co. Inc.**, 144 Rogers St., Cambridge, Mass. 02142

Eckhard Konkel. Peter Choi (617) 491-8700

**Shively Laboratories, Inc.**, Route 302, Raymond, Me. 04071

**Shure Brothers Inc.**, 222 Hartrey Ave., Evanston, Ill. 60204

**Sigma Electronics, Inc.**, 1830 State St., East Petersburg, Pa. 17520

**Sinai-Johnson**, Box 5218, Redwood City, Calif. 94063

**Singer Instrumentation**, 5340 Alla Rd., Los Angeles, Calif. 90066

**Singer Products Co., Inc.**, One World Trade Center Suite 2365, New York, N.Y. 10048

**Sintron Corp.**, 212 Welsh Pool Rd., Lionville, Pa. 19353

T. R. Humphrey. VP. Marketing (215) 363-0444

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John Humble Radford Associates 3203 Lanier Dr. Atlanta Ga. 30319 (404) 237-6097 Lew Radford

Radford Associates 1331 Otter Creek Rd. Nashville Tenn. 37215 (615) 373-0231

Ralph L. Hucaby H. M. Dyer Electronics 31185 Ten Mile Dr. Farmington Hills Mich. 48024 (313) 478-2157 Mike Dyer

**Sitco Antenna Co.**, Box 20456, Portland, Ore. 97220

**Sitler's Supplies, Inc.**, Box 10-B, Washington, Iowa 52353

Wm C. Sitler (319) 653-2123

**Skotel**, Box 310, Sta. Rosemont, Montreal, Que., Canada H1X 3B8

**Eric Small & Associates**, 680 Beach St., Suite 365, San Francisco, Calif. 94109

**Sono-Mag Corp.**, 1005 W. Washington St., Bloomington, Ill. 61701

Stephen S. Sampson. Exec. V.P (309) 829-6373

#### REGIONAL SALES CONTACTS:

Sono-Mag Corp. 491 Elbow Ct. Weatherford Tex. 76086 (817) 441-8052 Pete Charlton

Sono-Mag Corp. Box 4468 Columbia S.C. 29204 (803) 788-5683 Joe Toher

Sono-Mag Corp. 850 Yale Ln. Highland Park Ill. 60035 (312) 433-1253 Bob Poppe

Empressas J. L. Juan de la Barrera 113 Mexico. 11. DF. Mexico (905) 553-8905

Guillermo Chacon Azeta Electronics Piazza Bra 26 Verona Italy Silvio Grngioni



**Sony Corp. of America, VTR Div., 9 W. 57th St., New York, N.Y. 10019**  
David K. McDonald, Gen. Mgr., Broadcast Products (212) 371-5800

**REGIONAL SALES CONTACTS:**

Sony Corp. of America West 700 W. Artesia Blvd. Compton Calif. 90222 (213) 537-4300 Bob Mueller, video: W. J. Crane, broadcast  
Sony Corp. of America 230 W. Hill Place Brisbane Calif. 94005 (415) 467-4900 Mat Ceterski, video  
Sony Corp. of America 9004 Ambassador Row Dallas Texas 75247 (214) 631-3431 Bill Hanlow, video  
Sony Corp. of America 20 Perimeter Pl. Atlanta Ga. 30341 (404) 457-7501 Lee Manning, video  
Sony Corp. of America 10610 Galaxie Ave. Ferndale Mich. 48220 (313) 548-9325 Max Harris, video  
Sony Corp. of America Midwest 6801 W. Jarvis St. Niles Ill. 60648 (312) 792-3600 Roger Phyr, video: Felix Bonvouloir, broadcast

**Sound Dynamics, Inc., D8, 9, Box 32055, San Jose, Calif. 95152**

Ron Golick (408) 926-3588

**Sound Genesis, D8, 9, 445 Bryant St., San Francisco, Calif. 94107**

**Sound Technology, 1400 Dell Ave., Campbell, Calif. 95008**

Michael S. Hogue (408) 378-6540

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Henry Joncas Co. 12058 Lake City Way N.E. Seattle 98125 (206) 363-9200  
Jackson Keith & Associates, Inc. 365 Walnut Box 65 Zionsville Ind. 46077 (317) 873-4079 Jackson Keith  
Kodo Associates, Inc. 8100 Penn Ave. S. Minneapolis Minn. 55431 (612) 881-1255 Kodo Kawamura  
Charles Lucas Sales Co. Box 24632 Dallas Tex. 75224 (214) 330-8181 Charles Lucas  
Maish Sales 500 Madison St. Box 186 Mulberry Ind. 46058 (217) 296-2322 Charles Maish  
William Menezes & Associates 9901 Horton Ave. Overland Park Kans. 66207 (913) 649-2680 Bill Menezes  
Frank McCabe 7 Cobb Terr. Walpole Mass. 02081 (617) 668-6736  
Partridge Electronic Sales 8659 Grand Oak Dr. Box 21205 Salt Lake City Utah 84121 (801) 278-0901 Clark Partridge  
Mark Pitkow Co. 1580 Buck Hill Dr. Huntington Valley Pa. 19006 (215) 464-8921 Mark Pitkow  
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The Irving W. Rose Group 8137 Ridgeway Ave. Skokie Ill. 60076 (312) 674-6790 Irving Rose  
Shea Sales 552 Prospect St. Maplewood N.J. 07070 (201) 762-2382 Tom Shea

**SoundScriber Magnetic Recording Co., Inc., 85 Willow St., New Haven, Conn. 06511**

**Sparta, --see Cetec Broadcast Group, 75 Castilian Dr., Goleta, Calif. 936003**

**Specialized Industries, Inc., 6565 Santa Monica Blvd., Los Angeles, Calif. 90038**

**Spectra Sonics, 770 Wall Ave., Ogden, Utah 84404**

**Spectra-Vision Corp., 1528 Belfield Ave., Philadelphia, Pa. 19141**

**Sphere Electronics, 20201A Prairie, Chatsworth, Calif. 91311**

**Spindler & Sauppe, Inc., 13034 Satcoy St., North Hollywood, Cal. 91605**

**Spin Physics, Inc., 11633 Sorrento Valley Rd., San Diego, Calif. 92121**  
Wm. W. Heywood (714) 453-5410

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Spin Physics, Inc. 1414 Northridge Carrollton Tex. 75006 (214) 245-1816 LeRoy Koonsman  
Spin Physics, Inc. 2 S. 063 Valley Rd. Lombard Ill. 60148 (312) 325-1009 Ray Kundrot  
Spin Physics, Inc. 1969 Scott Lane Los Altos Calif. 94022 (415) 961-7794 Ken Thompson  
Spin Physics, Inc. 5629 Woodforest Dr. Sacramento Calif. 95842 (916) 332-0885 Dave Franssens  
Spin Physics, Inc. 1286 Camino Palomera Santa Barbara Calif. 93111 (805) 964-3316 Ed Gehle  
Spin Physics, Inc. Spriederweg 11, Putten Netherlands (03418) 3689 William Kroon

**Stainless, Inc., Third & Montgomery Sts., North Wales, Pa. 19454**

Jess C. Rodriguez (215) 699-4871

**Stancil-Hoffman Corp., 921 N. Highland, Hollywood, Calif. 90038**

**Standard Electric Time, 89 Logan St., Springfield, Mass. 01101**

**Stanton Magnetics Inc., Terminal Drive, Plainview, N.Y. 11803**

Pete Bidwell, Prof. Prod. Mgr. (516) 681-0200

**Stantron Div., 6914 Beck Ave., North Hollywood, Calif. 91605**

Daniel V. Fury, Nat'l. Sales Mgr. (213) 875-0800

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Berndt Associates 6200 N. Hiawatha Ave. Chicago Ill. 60646 (312) 283-0713 Gene Sochor  
Gislason Sales, Inc. 82 St. Paul St. Rochester N.Y. 14604 (716) 454-4741 L.M. Slocum  
ENSCO Rep., Inc. 11714 Lackland Ind. Dr. St. Louis Mo. 63141 (314) 567-3935 Bob Dillon  
Robbins & Associates Box 948 Aurora Colo. 80010 (303) 399-6618 Paul Robbins  
Don Smith Sales 711 N. Northlake Way Seattle Wash. 98104 (206) 633-3160 Don Smith  
Barry Sales Co. 709 Lingco Dr. Richardson Tex. 75081 (214) 234-0255 Jack Barry G. T. Associates, Inc. 1341 Hamburg Turnpike Wayne N.J. 07470 (201) 694-6040 Arthur Tambe  
TEKDATA 14 Lakeside office Park Wakefield Mass. 01880 (617) 245-5940 John H. Cormack  
John O. Olsen Co. 16201 Shaker Blvd. Cleveland Ohio 44120 (216) 752-5444 John Olsen  
Sheffer-Kahn Co. Box 1587 Phoenix Ariz. 85001 (602) 257-9015 Herb Kahn  
Wallace Electronic Sales 13902 N. Dale Mabry Hwy. Tampa Fla. 33624 (813) 961-1037 William C. Jaudon  
Ed Landa Co. 1618 Cotner Ave. Los Angeles Calif. 90025 (213) 879-0770 Ed Landa  
Moulthrop Sales, Inc. 1530 East 12th St. Oakland Calif. 94606 (415) 261-7676 Bud Moulthrop

**Storeel Corp., 4993 New Peachtree Rd., Atlanta, Ga. 30341**

Ruth E. Schaeffer (404) 458-3280

**Strand Century, Inc., 20 Bushes Lane, Elmwood Park, N. J. 07407**

Bob Schiller (213) 776-4600

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Strand Century, Inc. 303 W. Greenfield Lombard Ill. 60148 (312) 629-1664 Larry Brown

Strand Century, Inc. 20 Bushes Lane Elmwood Park N.J. 07407 (201) 791-7000 Bob Dente  
Strand Century, Inc. 4618 Conwell Dr. Annandale Va. 22003 (730) 941-9025 Gene Hanna  
Strand Century, Inc. 2025 Clubview Dr. Box 634 Carrollton Tex. 75006 (214) 242-0505 Tom Folsom

**Studer Revox America, 1819 Broadway, Nashville, Tenn. 37203**

Raymond M. Updike (615) 329-9576

**REGIONAL SALES CONTACTS:**

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Studer Revox America, Inc. 14046 Burbank Blvd. Van Nuys Calif. 91401 (213) 780-4234 William Van Doren

**Studio Tape Exchange, D2, 630 9th Ave., 8th Floor, New York, N.Y. 10036**

**Suda Seisakusho Co., Ltd., No. 2-4, 4-chome, Kachidoki, Chuo-ku, Tokyo 104, Japan**

**Super8 Sound, Inc., 95 Harvey St., Cambridge, Mass. 02140**

**Superscope, Inc., 20525 Nordhoff St., Chatsworth, Calif. 91311**

Hal Loman (213) 998-9333

**Surcom Associates, 305 Wisconsin Ave., Oceanside, Calif. 92054**

August J. Link (714) 722-6162

**Swager Tower Corp., Box 656, Fremont, Ind. 46737**

**Switchcraft Inc., 5555 N. Elston Ave., Chicago, Ill. 60630**

Clyde Schultz (312) 792-2700

**Systa-Matics, Inc., 510 N. Sheridan Rd., Tulsa, Okla. 74115**

**System Concepts Inc., 395 Ironwood Dr., Salt Lake City, Utah 84115**

**Systron-Donner, 10 Systron Dr., Concord, Calif. 94518**

**T**

**TDK Electronics Corp., 755 Eastgate Blvd., Garden City, N. Y. 11530**

**TEAC Corp of America, 7733 Telegraph Rd., Montebello, Cal. 90640**

**T.I.I. Corp., 100 N. Strong Ave., Lindenhurst, N. Y. 11757**

**TM Systems, Inc., 25 Allen St., Bridgeport, Conn. 06604**

**TRW Electronics Supply Co., 414 N. 13th St., Philadelphia, Pa. 19108**

**TT Electronics, Inc., 2214 S. Barry Ave., Los Angeles, Calif. 90064**

S. J. Sodaro (213) 478-8224

**REGIONAL SALES CONTACTS:**

Sodaro Co. Box 180 Culver City Calif. 90230 (213) 478-7733 J. F. Sodaro

**Taber Mfg. & Engr. Co., 2081 Edison Ave., San Leandro, Cal. 94577**

Robert H. Kearns, Mkt. Mgr. (415) 635-3831

**Tandberg of America, Inc., Labriola Court, Armonk, N. Y. 10504**

**Tangent Systems, Inc., 2810 S. 24th St., Phoenix, Ariz. 85034**

Will Hegarty (602) 287-0653

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Paul Westbrook Professional Audio Rt. 3, Box 105 Victoria Tex. 77901 (512) 585-6305 Paul Westbrook  
Bananas At Large 802 4th St. San Rafael Calif. 94903 (415) 457-7600 J. D. Sharp  
Martin Audio 320 W. 46th St. New York N.Y. 10036 (212) 541-5900 Tony Hawkins  
Ro Cel Electronics 731 Voice of the Theatre Bldg. Pittsburgh Pa. 15223 (412) 781-2326 Rod  
BSC 2932 River Rd. River Grove Ill. 60171 (312) 452-5551 Paul Bergetz  
Nashville Studio Systems 16 Music Circle S. Nashville Tenn. 37203 (615) 256-1650 Emil Handke  
Milam Audio 1504 N. 8th St. Pekin Ill. 61554 (309) 346-3161 Jerry Milam

**Tape City, Inc., 404 Park Avenue South, New York, N. Y. 10016**

**Tape-Athon Corp., Box 814, Inglewood, Cal. 90301**

**Tapecaster TCM, Inc., Box 662, Rockville, Md. 20851**

**Tapex Corp., Box 246, West Des Moines, Iowa 50265**

**Tasker Systems, 20131 Sunburst St., Chatsworth, Cal. 91311**

**Taylor Instrument, Arden, N.C. 28704**

**Tech Laboratories Inc., Bergen & Edsall Bldvs., Palisades Park, N.J. 07650**

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Spectrum Assoc. 1823 E. 17th St. Santa Ana Calif. 92701 (213) 323-0603  
Inverness Mktg. 14 Inverness Dr. E. Englewood Colo. 80110 (303) 770-2300  
NBS Assoc. Main St. New Preston Conn. 06777 (203) 868-0501  
Reynolds & Assoc. 476 N. A1A Satellite Beach Fla. 32937 (305) 773-4700  
Grady Duckett Sales Box 29067 Atlanta Ga. 30358 (404) 451-3529  
Crimson Eng. Co. Box 286 Glenview Ill. 60025 (312) 724-1780  
Habco Electronics 603 Alleghany Ave. Towson Md. 21204 (301) 825-9637  
Norwood Scroggs Co. 2221 Arbor Hills Rd. Jackson Mich. 49201 (517) 750-1170  
Quantum Sales 7710 Computer Ave. Minneapolis Minn. 55435 (612) 831-8583  
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Floyd W. Churchill Box 43 Haddonfield N.J. 08033 (609) 429-7871  
Net Sales Box 7485 Rochester N.Y. 14615 (716) 467-4538  
L. K. Haner Assoc. Box 101 Commack N.Y. 11725 (516) 864-2220  
A. C. Wahl & Assoc. Box 15220 Cincinnati Ohio 42515 (513) 761-5500  
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Waggoner-Verrill Assoc. 3550 Laketon Rd. Pittsburgh Pa. 15235 (412) 241-5202  
Southwest Elect., Inc. 9226 Markville Dr. Dallas Tex. 75243 (214) 690-9881  
Southwest Elect., Inc. Box 35353 Houston Tex. 77035 (713) 729-1670  
Solid State Engr. Box 355, Sta. NDG Montreal, Que. Canada (514) 481-3313  
ab Elektronik Enheter Torogatan 13, Enskede Sweden 08/48 4839  
Rapac Elect. Ltd. Box 18053 Tel-Aviv Israel 7771 151617

**Technics by Panasonic, One Panasonic Way, Secaucus, N.J. 07094**

**Teknekron/TRAX, 2020 Milvia St., Berkeley, Calif. 94704**

**Tektronix Inc., Box 500, Beaverton, Ore. 97077**

**Telatronics, 924 Cost Ave., Stonewood, W. V. 26301**

**Tele-Cine Inc., 5434 Merrick Rd., Massapequa, N.Y. 11758**

**Telecommunications Industries Ltd., 6335 Homewood Ave., Suite 204, Los Angeles, Calif. 90028**



**Telectro Systems Corp.**, 96-18 43rd Ave., Corona, N.Y. 11368  
**Teledynamics**, 1140 Talbert Ave., Fountain Valley, Calif. 92708  
**Teledyne Camera Systems**, 131 N. Fifth Ave., Arcadia, Calif. 91006  
**Teledyne Energy Systems**, 110 W. Timonium Rd., Timonium, Md. 21093

Paul I. Bessert (301) 252-8220

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Warren H. Davis  
C. T. Carlberg & Assoc. 3177 Albuquerque N.M. 87110 (505) 265-1579 Carl Carlberg  
The Cunningham Co. 4400 Spring Valley Rd. #101 Dallas Texas 75240 (214) 233-4303 Mike O'Shaughnessy  
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Robert Slater Co. World Trade Center San Francisco Calif. 94111 (415) 392-9145 Robert R. Slater  
Davis Associates 123 Littleton Colo. 80120 (303) 795-1400 Donald Davis  
The Cunningham Co. 9440 Old Katy Road Houston Texas 77055 (713) 461-4197 John Cunningham

**TeleMation, Inc.**, Box 15068, Salt Lake City, Utah 84115

George G. Elsaesser (801) 972-8000

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TeleMation, Inc. 4681 170th St. N. Hugo Minn. 55038 (612) 426-4519 Lawrence W. Ehnstrom  
TeleMation, Inc. 3930 Knowles Ave. Kensington Md. 20795 (301) 933-5250 Gordon A. Bates  
TeleMation, Inc. R2 maltbie Rd. Newtown Conn. 06470 (203) 426-8566  
TeleMation International TeleMation Ltd. 293 Regent St. London W1V 2HR England 01-636-9447 Donald E. Lefebvre

**Tele-Measurements, Inc.**, B-2, 145 Main Avenue, Clifton, N.J. 07014

William Endres, Vice-Pres. (212) 581-9020

**Telemet, a Geotel Co.**, 185 Dixon Ave., Amityville, N.Y. 11701

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Telemet a Div. of Geotel, Inc. 2640 Northdale Blvd. Coon Rapids Minn. 55433 (612) 574-1794 John Nash  
Telemet a Div. of Geotel, Inc. 6350 L.B.J. Freeway Dallas Tex. 75240 (214) 387-1389 William Culbertson  
Telemet a Div. of Geotel, Inc. Western States (408) 249-1559 Paul Welcom

**Telescript, Inc.**, 20 Inasley St., Democrat, N. J. 07627

**Television and Computer Corp.**, 191 Westfield Ave., Clark, N. J. 07066

**Television Equipment Associates**, Box 260, South Salem, N.Y. 10590

**Television Products Co. Inc.**, 9016 Aviation Blvd., Inglewood, Calif. 90301

**Television Research International**, 1003 Elwell Ct., Palo Alto, Calif. 94303

**Television Technology Corp.**, 5970 W. 60th Ave., Arvada, Co. 80003

Dr. Byron St. Clair (303) 423-1652

**Telex Communications, Inc.**, 9600 Aldrich Ave. S., Minneapolis, Minn. 55420

Don Merere (612) 884-4051

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Moulthrop Sales, Inc. 7080 Commerce Dr. Pleasanton Calif. 94566 (415) 846-0550 David Grubbs  
Alan Sarlaty & Associates 83-15 98th St. Woodhaven N.Y. 11421 (212) 846-1952 Alan Sarlaty  
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McLoud & Raymond Co. 2020 S. Pontiac Way Denver Colo. 80222 (303) 756-1589 W. Cliff McLoud  
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J. Y. Schoonmaker Co., Inc. 10710 Sand Hill Rd. Dallas Tex. 75238 (214) 349-1650 E. Jess Spoonits  
Technical System Repts 2065 Peachtree Ind. Ct., Suite 215 Chamblee Ga. 30341 (404) 457-0426 Norman R. Schneider  
Telak Electronics Ltd. 690 Progress Ave., Unit 3 Scarborough, Ont. M1H 3A6 Canada (416) 438-3804 Murray Balcom  
World Wide Products, Inc. 10818 N.W. 6th Ct. Box 279 Miami Fla. 33168 (305) 754-5475 Jerry Zeidman

**Telonic Altair**, Box 277, Laguna Beach, Calif. 92652

**Teltron Inc.**, Box 416, Douglassville, Pa. 19518

**Temtron Electronics**, D 1-9, 138-69 Francis Lewis Blvd., Rosedale, N.Y. 11422

Relf Vilaire (212) 978-5896. (800) 221-8376

**Tentel**, 50 Curtner Ave., Campbell, Calif. 95008

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Communications Consultants 26A Hubert Rd. P.O. Box 25048 Ferreirastown, Johannesburg 2001 S. Africa H. J. Venter

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**Texas Electronics**, Box 7225, Dallas, Tex. 75209

Jack Hayward (214) 631-2490

**Texscan Corp.**, 2446 N. Shadeland, Indianapolis, Ind. 46219

**Texwipe Co.**, 51 Prospect Place, Hillsdale, N. J. 07642

**Thermodyne International Ltd.**, 12600 Yukon Ave., Hawthorne, Calif. 90250

**Thomson-CSF Electron Tubes**, 750 Bloomfield Ave., Clifton, N. J. 07015

**Thomson-CSF Laboratories, Inc.**, 37 Brownhouse, Stamford, Conn. 06902

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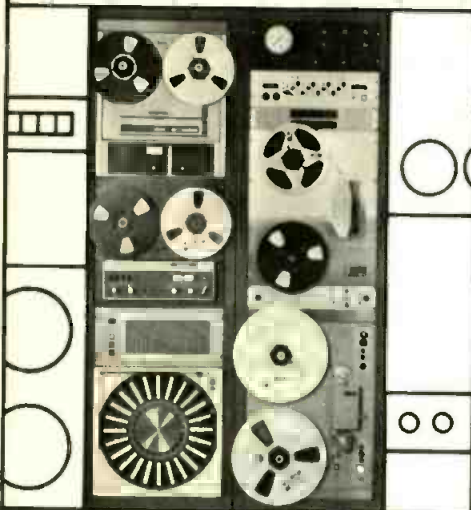
Any questions, write. Scully Recording Instruments. Division of Dictaphone Corp., 475 M Ellis Street, Mountain View, CA. 94043. (415) 968-8389. TLX 34-5524.

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## New Products

continued from page 228

mounted portable cameras; its focus is manually controlled, and the system is self-centering and light.

The packaged MRL accepts interchangeable manual or servo zoom and focus modules. It is the first package to incorporate the newest film wiring which is both reliable and lightweight. A set of three turret range extenders is optional.

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### Digital antenna monitor

Gorman-Redlich Manufacturing Co. has a new FCC-type-approved digital AM antenna monitor, model CM, for stations that have a transmitter attended during hours of directional antenna operation.

Model CM features true ratio reading, exceptional stability, and a compact size in a 19-inch rack panel, 3½-inches high, 6-inches deep, with power consumption of 6 watts. Weighing 7 pounds, the monitor can be mounted in a console and has LED display with continuous display of phase sign.

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## New Products

### Automatic intermixer

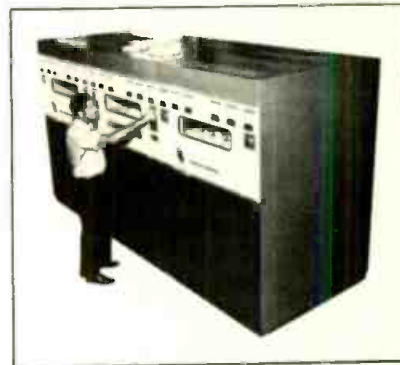
Two new VIF Intermix models (model 3000-STB stereo and model 2000-B monaural), designed for use in background music applications and radio station automation, are now available. The new models offer completely automatic intermix between three sequential and one real time program sources.

For use in background applications, transferring between the sequential program sources is keyed through silence sensing, with switching taking place approximately seven seconds after the end of each program selection. When used in radio station automation, the VIF Intermix program transfer is keyed by a 25 Hz tone, depending on the mode selected. For maximum cueing flexibility, VIF provides a built-in variable delay which operates at either the beginning or ending of the tone, depending on the mode selected. For maximum cueing flexibility, VIF provides a built-in variable delay which operates in either mode. A silence sensing back-up

*continued on page 248*

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## New Products

continued from page 247

system is also included in case program material is missing.

Other features of the VIF Intermix models include: all solid-state circuitry utilizing computer type integrated circuit logic; plug-in cards for switching capability and all program sources; photo cells for completely noise-free switching of all audio functions; built-in speaker for cueing or off-the-air monitoring; light emitting diode program stage indicators; pushbutton rapid advance; and VU meter(s) pre-set so that zero equals plus 4 dBm, with other output levels available on request at no additional charge.

For More Details Circle (340) on Reply Card

### Distribution amplifier

The Di-Tech model 170 audio D.A. features a 200K resistive input balanced or unbalanced with six 600-ohm outputs. Output type is balanced, resistive buildout.

Maximum input level is +24 dBm continuous. Distortion at these levels is 0.1% maximum. The six outputs are adjustable via a single control which is located on the front of the

unit.

A unique feature of the model 170 is the front panel headphone jack. This jack permits a simple access to the audio D.A. for listening purposes either for program identification or for troubleshooting purposes. The audio signal is not disturbed when utilizing the headphone set.

Model 170 utilizes the standard Di-Tech frames, model 101 or 103, for mounting purposes.

For More Details Circle (341) on Reply Card

### Zoom blow-up positioner

The Warren R. Smith Company has made the Zoom Blow-up Positioner available for use on telecine chain projectors. Models are available for both 16mm and 35mm projectors, including RCA FR-35, GPL, Simplex, RCA TP-66, Kodak CT-500, as well as Bell & Howell, Kodak and other AV types.

Using this unit, you can correct composition errors, zoom in or out while transferring film to tape, pan or tilt independently, reposition for title insertion, mix film with chroma-key scene and "build" commercials on telecine. The positioner also makes it possible to zoom without focus change, from twice to ¼ film frame.

It has independent pan-tilt-focus-iris controls and manual or servo motor drives. There is optional Cinemascope capability and a range of zoom lenses can be used. High resolution and ample light output are exhibited. No alteration to the projector is necessary.

A model for telecine slide projectors, which is now under development, will be available soon. With this unit any area of vertical or horizontal slides can be panned and zoomed.

For More Details Circle (342) on Reply Card

### Video edit buzz tone eliminator

A. F. Associates has developed a gated video circuit that eliminates extraneous RF buzz tones during video only edits when using an Ampex VR 2000 or VR 1200.

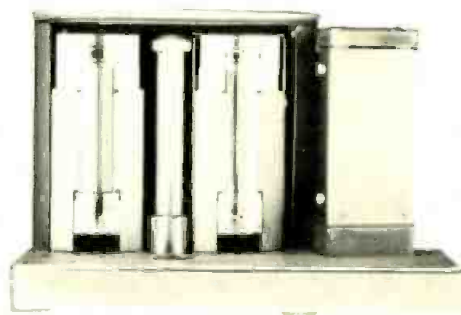
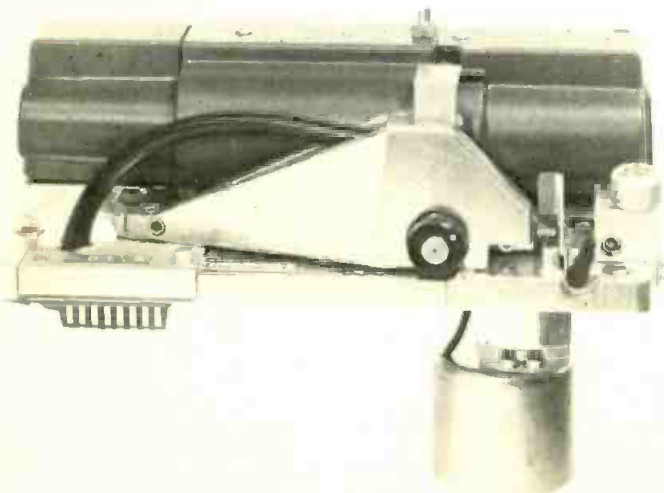
This device can be installed in less than an hour, and it features CMOS technology, RF turn-on and RF turn-off, and plug-in connectors to the VTR's RF circuits.

Designed to eliminate the 960 Hz tone in video-only edits, the device is good enough for network and post-production operations.

For More Details Circle (343) on Reply Card

## CMC Provides Unexcelled Services For:

- Refurbishing Video Head Assemblies - Mark III, Mark X, Shibaden Mark X, Mark XV, Mark XX and RCA.
- Refurbishing Audio Heads for Ampex & RCA VTR's.
- Immediate Delivery - Video Discs & Heads for HS-100.
- Line-by-Line Auto Equalizer for VR-1200 & VR-2000.
- Velocity Error Corrector for VR-1200 & VR-2000.



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### COMPUTER MAGNETICS CORP.

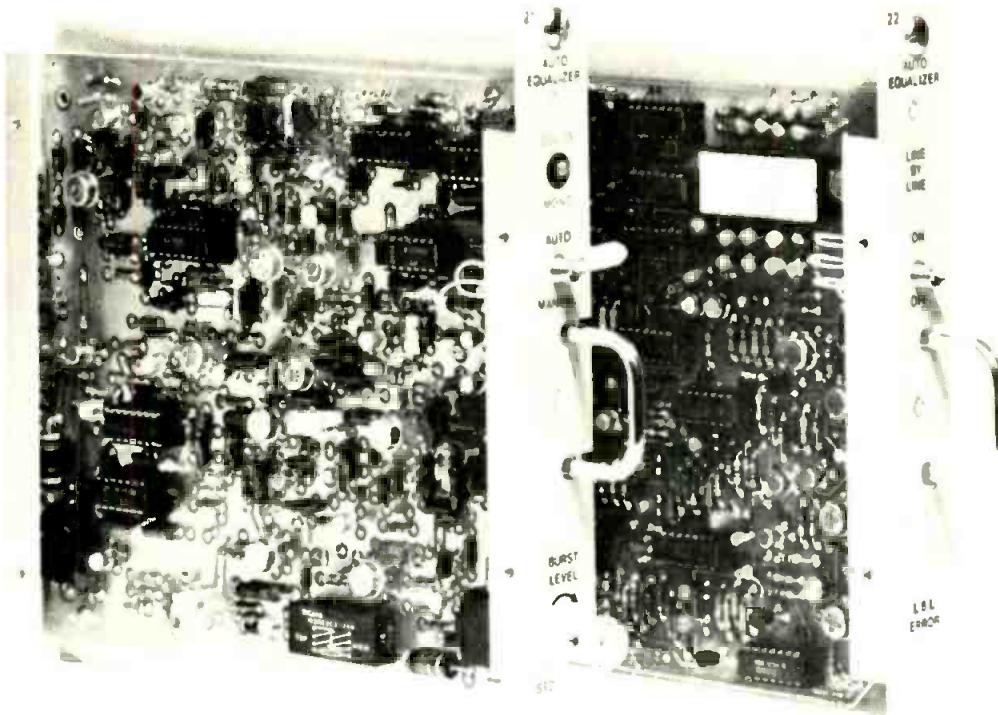
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For More Details Circle (203) on Reply Card



Easily update your VR-2000 & VR-1200 to obtain full AUTOMATIC Line by Line and Channel by Channel Chroma Level Adjustment.



## COMPUTER MAGNETICS CORPORATION

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For More Details Circle (197) on Reply Card

### Video editing controller

Panasonic's model NV-A950, an editing controller, when combined with Panasonic model NV-9500 master cassette editing recorder and NV-9200 or NV-9300 slave-player cassette recorders, combine to create an efficient 3/4-inch cassette editing system that delivers broadcast quality programming.

The unit performs insert and assembly edits automatically, preroll function backspaces each recorder so they will be up to speed and locked in sync when edit point is reached.

Features include slow rewind, fast play, and search functions, non-locking pushbutton controls with logic memory, and light emitting diode (LED) function indicators.

For More Details Circle (344) on Reply Card

### 55 kw FM transmitter

CCA Electronics Corporation has added a new 55 kw FM broadcast transmitter, model FM55000EP, to its line of AM, FM and TV transmitters.

The 55 kw FM transmitter is conservatively rated for 55,000 watts power output, and is FCC type-accepted to operate from 25,000 to

60,000 watts power output. The CCA FM55000EP features parallel final amplifiers to eliminate downtime due to single amplifier design. Optional exciter and amplifier switching get around failures of individual component parts in the system which can cause transmitter shutdown.

The CCA FM55000EP utilizes a 100-watt solid-state frequency synthesized exciter with regulated power supplies. Stereo performance can be added with the optional CCA Optimod-FM stereo generator. Simultaneous SCA operation can also be added with the CCA SCA-1E sub-carrier generator.

The transmitter consists of two cabinets containing independent high-power amplifiers, a center cabinet housing the 100-watt exciter(s), hybrid splitter, exciter switching and system status and control equipment.

For More Details Circle (345) on Reply Card

### Character generator

A television character generator with four times the memory capacity of its predecessor has been developed by 3M Company.

The new model D-3016 character

generator features a 16-page capacity memory. Like the model it replaces, the D-3000, which had a 4-page memory, the new system is designed for professional television systems that require quality titling/captioning capability. From a character-quality point of view, both units are identical.

Three font styles are available with the D-3016: Video Gothic, Piper Roman and Helvetica Semi-Bold. All are available in upper-case style with matching lower-case characters. The D-3016 can accommodate either two different upper-case font styles or a matching upper and lower case font.

Like the D-3000, the new unit displays up to 22 characters in a row and 10 rows per page. It also features 3-speed vertical roll and horizontal crawl movements and automatic centering.

For More Details Circle (346) on Reply Card

### Low drain weighting filter

A low profile C-message weighting filter, requiring  $\pm 3$  mA of current from power supplies between  $\pm 5$  and  $\pm 18$  VDC, is now available

*continued on page 250*

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For More Details Circle (198) on Reply Card



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For More Details Circle (199) on Reply Card

## New Products

continued from page 249

from Frequency Devices, Incorporated.

Specifically designed for use in portable telephone circuit test instrumentation, the model 581-3 frequency response characteristic simulates, to within  $\pm 1$  dB, the perceived response of the human ear to telephone noise in accordance with Bell Technical Reference 41009.

Other key specifications include input impedance: 10 kilohms minimum, output noise: 50 $\mu$ V DC to 50 kHz, rated output:  $\pm 10$  volts at 2 mA, output impedance: less than 1 ohm. Over the 0°C to +70°C operating temperature range, output drift is 100 $\mu$ V/°C.

This encapsulated modular package measures 0.4"x2"x2".

For More Details Circle (347) on Reply Card

### Flying spot color film chains

Three new Rank Cintel MK3 Flying Spot Color Telecines have been installed by Rank Precision Industries, Incorporated.

These installations are in New York City at Magosound, and in Los Angeles at MCA Discovision and Ruxton Limited. This brings the total number of MK3 Telecines operating in North America to seven. The other machines are located at Rombex (New York City); Transworld (Las Vegas); and Motion Picture Video and Advertel (Toronto).

Rank's Flying Spot MK3 Telecine reportedly gives excellent reproduction from color or mono, positive or negative, 16 or 35mm film, or from slides with the use of the same transport mechanism.

The MK3 uses a flying spot system which eliminates the camera together with the problems of lag, color registration and noise in the picture low lights. The single scanning tube utilizes a short afterglow phosphor with the high intensity required for reproducing dense material.

Of particular interest to the U.S. market is the machine's built-in capability to reproduce 16mm or 35mm Cinemascope films full frame with electronic panning. Its ability to handle negative stock safely opens possibilities for grading direct from camera original to videotape for editing.

The Telecine operates on either 625/50 or 525/60 standards. On 625 lines 50 Hz field rate, the film



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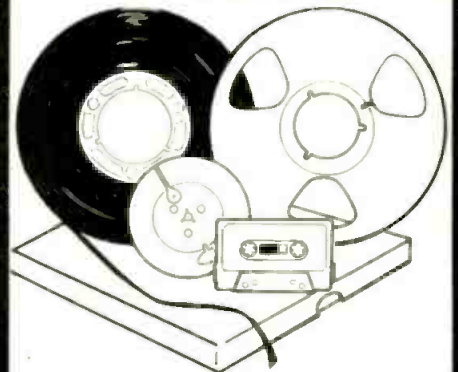
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For More Details Circle (200) on Reply Card

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For More Details Circle (201) on Reply card



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## POTOMAC INSTRUMENTS

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For More Details Circle (266) on Reply Card

travels at a constant 25 frames per second, and two rasters alternate in position to scan each film frame twice as it passes over the vision gate aperture. On 525 lines 60 Hz, the film travels at 25 frames per second, and film frames are scanned alternately 3 times and 2 times.

While the mechanism is in motion the raster height is half normal, the other half being made up by the motion of the film. When the mechanism is stationary, a normal 4x3 raster is generated. Frame position information is derived from a film driven sprocket fitted to each format gate. Electronic framing is provided by changing system phase. The entire transport and scanning system references to station syncs and is independent of power supply frequency.

For More Details Circle (348) on Reply Card

### Racks and cabinets

Amco Engineering, an old-line equipment rack and cabinet manufacturer, has several new versions of their standard lines.

These cabinets are strictly professional, with designs, contours and colors to match most broadcast

needs. The company also has data input and work desks.

While Amco offers several options, the three most popular are the vertical racks (with side panels and with or without a door), and sloped and low silhouette versions that can be ordered with a writing surface that extends from the cabinet at typical table top heights.

For More Details Circle (349) on Reply Card

### Two-channel receiver

Edcor's new two-channel wireless receiver, model ST-3B2, allows two wireless microphones to be used at one time. The crystal-controlled receiver has both a high and low impedance audio output for each channel.

The unit has an external telescoping antenna split internally for two channels. Other features include: AC or DC operation, lightweight construction, easy installation, and it can be used with any Edcor wireless microphone.

For More Details Circle (350) on Reply Card

### Microphones

Audio-Technica's new microphones are available in three elec-

*continued on page 252*

## AGAIN & AGAIN POTOMAC INSTRUMENTS IS

**First** FCC Approved Antenna Monitor AM-19(204)

**First** Harmonic Reading Standard Broadcast Field Strength Meter FIM-41

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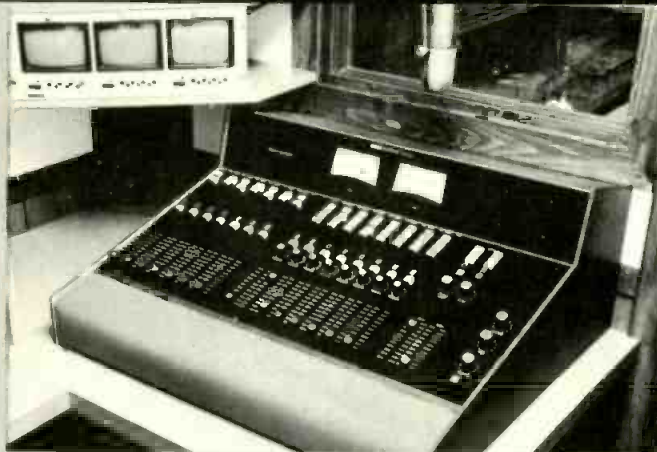
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For More Details Circle (267) on Reply Card

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This Model 6022, 16 Channel, Dual Output TV Audio Control Center is one of 3 new main frame configurations. Available fully wired. Or in do-it-yourself kit form.



For complete details contact Rick Belmont

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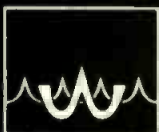
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For More Details Circle (244) on Reply Card

## Take a Waters slim-line space-saver



New MM thin-line faders are great for small portable mixers or lighting consoles. Only half the width of conventional faders, our 3/4-inch wide MM series lets you build a lot of mixing or control capability into a limited space. No performance compromise, either. You get Waters' proprietary MystR™ conductive plastic resistance elements. Glass-hard. Smooth. Long-lasting. You get Waters' computer-controlled curve shaping for highest tracking accuracy. And, you can choose 2 3/4-inch or 4-inch travel; 600 ohm or 10,000 ohm impedance; linear, audio, or true log characteristic. For complete information, circle the reader service card, or call Don Russell at (617) 358-2777.



**WATERS MANUFACTURING, INC.**  
LONGFELLOW CENTER, WAYLAND, MA 01778

For More Details Circle (245) on Reply Card

## New Products

continued from page 251

tret condenser and two dynamic "moving coil" models. Each type is available with cardioid (unidirectional) and omnidirectional acceptance patterns.

A-T's initial offerings of electret condenser mics are designated AT801, AT811 and AT813. All have aluminum alloy bodies.

The AT801 is Audio-Technica's omnidirectional electret condenser microphone. Listing for \$50, the AT801 yields a frequency response of 40-18,000 Hz. Sensitivity is rated at -48 dB. The output, balanced, is 600 ohms (nominal). Weight is 5.6 ounces, less cable and clamp.

The AT811 is a cardioid (unidirectional) electret condenser mic. Listing for \$75, it yields a frequency response of 50-20,000 Hz. Sensitivity is rated at -54 dB. The output, balanced, is 600 ohms (nominal). Weight is 6 ounces, less cable and clamp. A special feature is a built-in protective screen with multi-stage filters to reduce wind noise and "pops" from close-up use.

For More Details Circle (351) on Reply Card

### 10-Station intercom

N.O.V.A. Corporation's new NOVA-COM is a 10-station speaker intercom system. Touch-tone operation requires only pushing the button for the desired station, talking into the microphone and releasing the button to listen. When the conversation is over, push the "off" button. There is an "all call" which when released is also an all listen. Every station is a master.

Installation requires a 4-conductor cable. A single 24 VDC power supply is needed. Additional stations can be added at any time.

For More Details Circle (352) on Reply Card

### Production switcher

Shintron has announced the model 375 Chromatic Production Switcher for medium scale broadcast applications.

The model 375 switcher is a 12-input, all vertical interval switcher that will withstand continuous use in remote pick-up or ENG vans. Electrical specifications are fully broadcast. The electronic circuitry is packaged separately from the remote control panel.

Notable features of the model 375 are: built-in chroma keyer, soft and edge wipes, two independent color background generators (one for main matte, the other for down-



stream matte), and autotake.

The wipe generator is equipped with 10 patterns all with wipe limit controls. Patterns can be modulated by the built-in audio generator.

The main matte keyer uses a complementary color from the background generator. The downstream matte key can be dissolved to black for panic situations.

The front panel design is human engineered for easy use and uses professional, high-reliability components. PAL version is also available.

For More Details Circle (353) on Reply Card

### Color videomonitor

Incorporating the 25-inch Trinitron picture tube, the PVM-2550 has the largest screen-size of any color video monitor Sony has ever offered in the United States. The dual input color unit has external synchronization capability.

The PVM-2550 employs a color picture tube with a beam scanning velocity modulation system. This innovation improves resolution, providing a sharp picture over the entire screen area. The new modulation system also suppresses white color distortion and eliminates "snow" noise.

The monitor offers flexibility as a display device for video use at trade shows, point of purchase displays or wherever any large size displays are required.

For More Details Circle (354) on Reply Card

### Digital troubleshooting videotape program

"Digital Troubleshooting," a color videotape program with accompanying textbook and lab workshop designed to provide training in the growing field of digital instrumentation, is available in a completely updated version from the Hewlett-Packard Company.

This 14-videotape program has a total running time of 5 hours and 31 minutes, and includes a 180-page textbook, lab workbook and study guide.

The curriculum is designed to provide instruction for individuals learning digital troubleshooting for the first time and for technicians needing a refresher course on digital (versus analog) techniques.

Topics discussed in the tapes include an introduction to digital electronics and the binary system; the basics of transistors and ICs; logic gates and symbols; digital IC families; troubleshooting digital ICs; flip flops; counters; shift registers; combinational logic circuits; display technologies; IC manufacturing; and memories.

Each videotape is available in 3/4-inch videocassette. Other formats can be supplied on request. The videotapes, text and workbook may be purchased individually.

For More Details Circle (355) on Reply Card

### English command control system

"BASIC" is IGM's new system control which uses English commands, virtually eliminating coding of information, event numbers or other alpha-numeric encoded data. Working with Intel and utilizing the latest microprocessor computer-

based technology, IGM engineers designed BASIC systems A and B to perform more tasks than most existing systems.

BASIC A is programmed, controlled and monitored from a single enclosure rack, using a standard keyboard with 18 special-function keys. It can handle 16 sources, expandable in increments of 16. Capacity of the static RAM memory system is 4,000 schedule entries, expandable to 8,000 in increments of 2,000. Programmable audio fade control for each source with un-

*continued on page 254*

## what, no light?

try the FUJINON 6mm f/1.4

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it stays in focus, from 6" to infinity

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For More Details Circle (268) on Reply Card

## New Products

continued from page 253



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Developed by Telcom Research, The Time Code Centre performs a variety of time code functions integrally. A single unit contains a Generator, a high speed Reader and a Calculator. They operate independently and are also able to "talk to each other." THE TIME CODE CENTER lets you do things you couldn't before. Call us at (416) 444-8497 for a free trial.

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For More Details Circle (246) on Reply Card

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For More Details Circle (247) on Reply Card

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891	5919	7007
891R	6420	7480
892	6421	7560
892R	6422	7804
893AR	6423	7805
1089	6424	8461
5667	6425	8550
5671	6426	8795
5681	6427	23185
5682	6696	23431
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For More Details Circle (248) on Reply Card

limited real-time switching abilities is standard. English print-out logging is also standard.

BASIC B stores memory on floppy discs for up to 6,000 schedule entries per day with 8,000 format or subroutine entries common to all days and offers color CRT.

Four types of control procedures are included:

- Normal audio or external relay, and whether this event must be followed by another regularly scheduled event. Audio Fade-on and OFF controls and up to 30 classification descriptions like COMMERCIAL, PAS, ID, etc.;

- Branching control for switch "JUMP TO" subroutines;

- Real-time event control, including five functions: immediate, approximate, external, dead-roll and switch voice track; and

- Conditionals which remain in the system indefinitely and are only used under special conditions.

For More Details Circle (356) on Reply Card

#### Audio-video head cleaner

The recorder care division of Nortronics Company, Inc., is offering a new QM-35 Foam & Cleaner, an all purpose tape head cleaning combination for audio, video, instrumentation and digital recording equipment.

The kit contains a quantity of reusable cellular foam swabs, for removing oxide and dirt accumulations that build up on recorder heads, capstans and guides when used in conjunction with the liquid head cleaner supplied to loosen these accumulations.

Once the liquid cleaner breaks deposits away, the nonabrasive foam swabs permit heavy scrubbing action. The liquid head cleaner is specially formulated for safe use on rubber parts and tape heads and will not leave any residue. A special orifice on the cleaner bottle prevents accidental contamination.

For More Details Circle (357) on Reply Card

#### Microwave tower warning light control

Hughey & Phillips have developed a solid-state microwave tower warning light control and alarm unit for unattended microwave radio-relay stations.

The unit is designed so it does not have to be removed from the housing for repair. Plug-in "modular-type" components are used for



major broadcasting stations & networks on five continents are now specifying

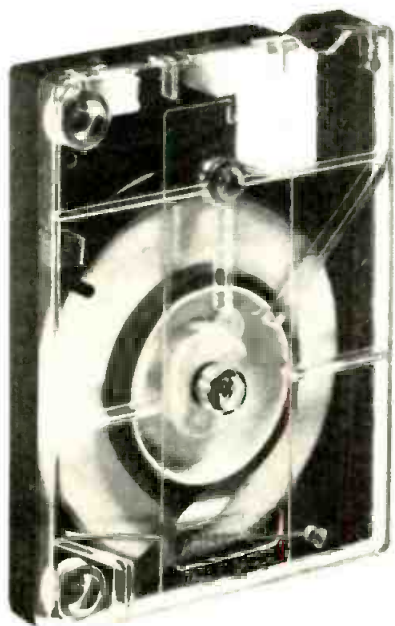
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For More Details Circle (226) on Reply Card

September, 1977

all relays, photo-control PC board and solid-state beacon flasher. The main panel's power relays, terminal blocks, solid-state timer, and solid-state beacon flasher connect with surface wiring for easy access. There is no wiring or components on the back of the panel.

All control circuits are on the PCB and operate at 12 VDC derived by the small power transformer mounted on the PCB. The dry contacts on the alarm circuits are rated at 5 amps 120 VAC resistive load. All input power and tower lighting circuits are protected from line surges and surges coming from the tower lights with GE's MOVs.

For More Details Circle (358) on Reply Card

**Acoustic coupler**

A new telephone coupler by Shure Brothers, Incorporated features improved transmission quality and ease in feeding recorded material into a telephone for remote broadcasting.

Called the Shure 50AC, the coupler may be strapped to any telephone in seconds. Connect it to a cassette tape recorder, flip the "play" switch and the recorded material is automatically fed into the phone.

There is no need to tie into the telephone wiring system or to remove the telephone mouthpiece. The 50AC completely covers the telephone mouthpiece. There is no background noise, no loss in intelligibility and the unit has no induction coils. The 50AC may also be driven by the Shure SM82 Line Level Microphone.

A lever built into the 50AC also allows adding live commentary without interrupting the transmission of a taped interview or message. In addition, the 50AC may be used as a microphone by speaking directly into the unit while its "mini-plug" is connected to the MIC input of a recorder. A 300 to 3,000 Hz tailored frequency response approximates the response of the telephone.

For More Details Circle (359) on Reply Card

**ENG color camera**

A three-tube color TV camera weighing only 21.1 pounds, including 10X1 zoom lens and built-in camera control unit, has been developed by JVC Industries Company.

The CY-8800U is equipped with three 3/8-inch magnetic-focus, magnetic-deflection Plumbicon® tubes. Saticon tubes will also be available.

The CY-8800U is a self-contained

continued on page 256

Low Cost High Performance Professional Degaussers

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- Save Money

WRE's wide range of degaussers are designed for years of dependable service for clean and simple erasure of magnetic film and tapes in just about any configuration.

Backed by years of proven reliability, these units are the answer to cutting man-hours and reducing material costs by allowing reuse of prerecorded media.



TYPE 9205A Degausser is ideally suited for complete erasure of program and residual noise from video, audio, and data recording tape and magnetic film—in reels, cartridges and cassettes. This unit will bulk erase reels up to 2 inches thick and 17 inches in diameter. Available for 115 or 230 volt operation.



TYPE 642-21 Degausser is similar to the 9205A except it is limited to erasure of 10 1/2 inch reels. This unit is recommended where size and cost are limiting factors.



TYPE 8905 Magnetic Erasing Pencil is an excellent tool for erasing limited, small areas of tape or film and for demagnetizing record/play heads. In program material, words, complete sentences, and even syllables may be erased. This unit is equipped with a press-to-operate switch on the handle.

MODEL 22-323-1 Foot Switch is a companion accessory to the bulk degaussers that allows convenient, "hands free" operation and provides a positive means of turning the degausser off immediately after use. This is a momentary acting switch and can help extend the life of the degausser.

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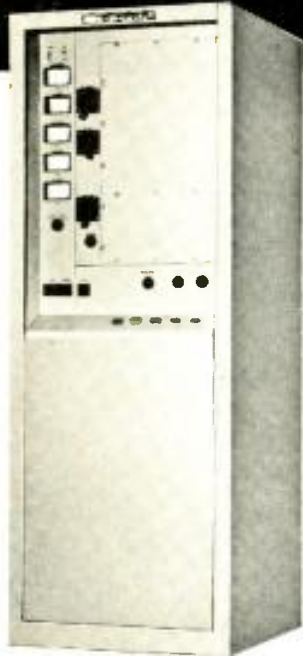
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For More Details Circle (227) on Reply Card

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For More Details Circle (202) on Reply Card

## New Products

*continued from page 255*

unit which can be activated by 12 VDC power. It features a 1.5-inch CRT view-finder that can be moved forward and back, up and down and laterally.

The camera has external synchronization capability (SC plus sync or composite video) and can be operated remote through an optional unit. It also features a built-in color bar generator and can be used as an encoder or color monitor for line checking.

Horizontal and vertical corrector circuits are provided for crisp pictures. Likewise, a circuit for indicating the wave form of the video signal is built in for constant monitoring.

The CY-8800U provides high sensitivity, high resolution color registration by combining the three-tube system with dichroic-mirror color-separating optics. It has a 49 dB signal-to-noise ratio at f/4.0 with 277 foot-candle illumination.

For More Details Circle (360) on Reply Card

### Multiplexer

TeleMation's new TMM-205 Multiplexer accepts up to three projector inputs and can accommodate 8mm, 16mm and 35mm film projectors for operation with a color or monochrome camera. Transitions between optical sources occur in approximately 0.5 of a second and are bounce-free. The entire mechanism is designed to eliminate acceleration and shock loading forces. A fiberglass cover protects the optical assembly from dust and prevents extraneous light from entering the camera lens.

A local control panel permits selection of film 1, film 2 and slide, and contains the master AC switch and fuse. All equipment is connected to a shelf or pedestal with a three-point adjustable mount, making the system installation and optical alignment of the TMM-205 simple and permanent.

For More Details Circle (361) on Reply Card

### Production switcher

3M Company's Mincom division has developed a low-cost production switcher for industrial and educational video studios.

The model 812 production switcher is capable of 12 effects which are selected by knob control, including a circle, diamond, upper left corner, and square diagonal. A joystick positioner allows positioning of five effects. Effects can be enhanced



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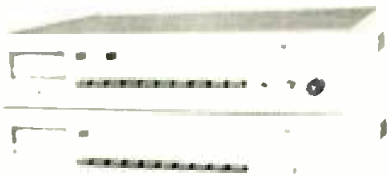
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For More Details Circle (205) on Reply Card



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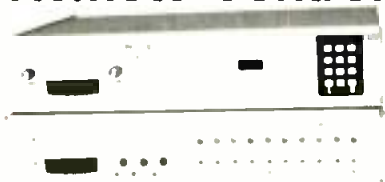
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Model DLC-9/OLT-9 "Digi-Log" Remote Control System

This all new Remote Control system achieves the ultimate in accuracy, stability, simplicity and speed, combining a unique blend of present day digital and analog technology. The MCI Automatic Transmitter System (ATS) is available as a "plug-in, add-on" unit to the Remote Control system for positive transmitter surveillance, alarm, correction or automatic shutdown if necessary

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For More Details Circle (228) on Reply Card

further by built-in softwipe and spotlight controls.

The unit has eight video inputs. The first seven are loop-through with built-in 75-ohm terminating switches. The eighth is selectable to either internal colorizer or internal color black generator signal.

The 812 features a 3-buss configuration: program, preview A and preview B. To assure a quality video output, a non-sync warning indicator alerts the operator to non-mixable video inputs.

A preset control allows for mix-to-preset-wipe and wipe-to-preset-mix operations. An auto mix/wipe button automatically mixes or wipes to the new input.

For More Details Circle (362) on Reply Card

**Field-production TV camera**

Commercial Electronics, Inc., (CEI) has agreed to manufacture the new EMI 2008 broadcast color television camera for EMI Sound and Vision who will market it primarily in Europe. The EMI 2008 is a field-production television camera system nearly identical to the new CEI-310, recently developed by CEI.

For More Details Circle (363) on Reply Card

**Satellite TV receivers**

Microdyne Corporation's new model 1100-FFC is a single frequency, stand-alone satellite TV receiver designed to reduce the cost of adding TV channels to any existing or new domestic CATV or international satellite receive-only terminal. When using channel dedicated receivers and any type of frequency agile receiver as backup for any one channel, all current channels plus others soon to follow can be readily accommodated at minimum cost.

The 1100-FFC is a compact 3½-inch rack mount unit, fully EIA and CCIR compatible. It interfaces without system modifications and offers the same video, audio and related performance specifications as the standard model 1100-TVR(VT) receiver—including the 8 dB C/N threshold.

Options offered are: ability to change frequency, composite video output, monitor output for a redundancy network and split configuration.

For More Details Circle (364) on Reply Card

**A-D and D-A converters**

Tektronix, Inc. has introduced two new video devices: the ADC 820, an 8-bit 20 MHz analog-to-

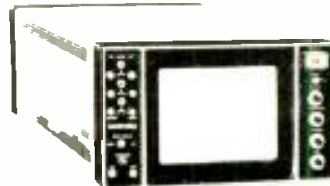
continued on page 258

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## New Products

continued from page 257

digital converter and the DAC 850, an 8-bit 50 MHz digital-to-analog converter. Both designs are optimized for video applications.

The ADC 820 is built on a single circuit board, 6"x8"x1", and dissipates less than 7 watts. Power requirements are  $\pm 12$  volts, +5 volts, -5.2 volts. It has an on-board low pass anti-aliasing filter right at the input to the quantizer. The entire quantizing and digital coding process is performed by three proprietary Tektronix LSI chips. The architecture of the chips and the surrounding circuitry eliminates the need for a Sample and Hold. Differential phase and gain are less than  $1/2^\circ$  and 1% RMS.

The DAC 850 is also 6"x8"x1", and has the same voltage requirements. Dissipation is less than five watts. It comes with three times or four times subcarrier output filters, or with no filter. Differential phase and gain are less than  $1/4^\circ$  with  $3/4\%$  RMS.

For More Details Circle (365) on Reply Card

### Real-time audio processor

A computer-based processor that eliminates unwanted noises from audio signals and recordings in real-time has been developed by Rockwell International Corporation's Electronics Research Center.

The processor can be used either to "clean" an audio signal as it is being received, or to enhance a recording that has already been made. It can remove from 40 dB to 50 dB of highly-correlated noise with minimal degradation in the desired voice signal.

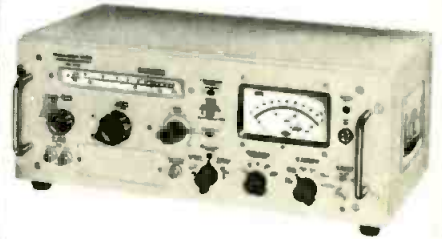
The portable Automatic Digital Audio Processor (ADAP) can be used both on-site (by police in making recordings, by on-scene reporters, or for on-location television and motion picture filming, etc.) and in a studio or sound room in conjunction with other audio equipment.

The processor removes two types of noises from voice tracks: additive sounds, such as music, traffic or other background noises; and convolutional sounds, such as resonances, room acoustics or noises inherent in recording equipment. The ADAP recognizes the undesired sound and eliminates it within 200 milliseconds.

The processor is easy to operate and fully automatic, adjusting itself to track and cancel undesired audio

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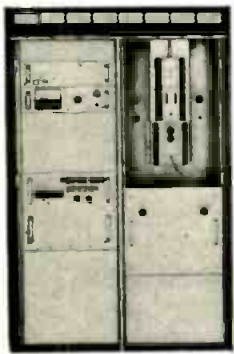
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For More Details Circle (269) on Reply Card

components. It has a full complement of panel control that may be replaced by internal plug-in switches for single-use applications.

For More Details Circle (366) on Reply Card

### Camera junction box

Sharp Electronics Corporation has introduced a rack-mounted junction box, XJB-2000. It is designed so that two junction boxes are mounted on a single 19-inch panel with all connections to the junction box made inside the rack. The only connections showing from the outside of the frame is the camera input. The XJB-2000 camera junction box is designed for use when interfacing the Sharp XC-2000 color camera into a system.

For More Details Circle (367) on Reply Card

### Portable scope

Hitachi Denshi America, Ltd. has introduced the "mini-portable" V-059B and V-158 oscilloscopes.

Weighing less than 6½ pounds, the V-059B is a 7 MHz oscilloscope designed for use in the field, as a troubleshooting tool, and as a TV waveform monitor. The TV sync separator provides automatic lockup at horizontal and vertical rates; a 2H-2V switch gives correct TV WFM presentation. Keyed DC restoration, external trigger input and external horizontal inputs are other features of this scope that may be powered from AC line, 12 VDC or self-contained rechargeable battery with built-in charger.

The V-059B also features direct or 10X probe input, vertical deflection sensitivity of 10mV/div, and sweep rates from 20ms/div to 10us/div, plus a 10X magnifier. The sweep may be triggered from internal, external or line with selection of positive or negative slope in either automatic or normal (triggered) mode. The internal graticule is an 8x10 division format with 6.35mm (.25 inch) divisions. The green light incorporates a 100-0-40 IRE graticule for TV waveform display.

For More Details Circle (368) on Reply Card

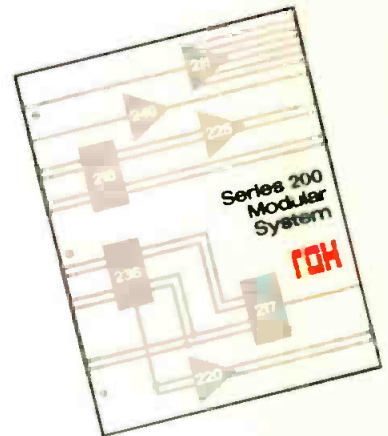
### Parametric equalizer

A second-generation Parametric Equalizer (model 622) is now available from Urban/Parasound. Encompassing all of the features of the model 621 series, the new 622 offers in/out switches on each of its four bands, standard balance input with output transformer option, extensive RF shielding, and 115/230 volt,

continued on page 260

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For More Details Circle (270) on Reply Card 259



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For More Details Circle (250) on Reply Card

## New Products

continued from page 259

50-60 Hz AC power supply included in the package.

A new proprietary parametric bandpass filter is virtually immune to the effects of control wear, and complements the unique "constant Q" design by permitting -40 dB notches to be consistently obtained. THD has been reduced to less than 0.025%, 20-20,000 Hz at +18 dBm.

All other features of the 621 series are retained: four cascaded sections, each with non-interacting, continuously variable center frequency, bandwidth, and amount of boost or cut. Each section tunes over a 25:1 frequency range, with broadly overlapping coverage for maximum flexibility. An overload light is provided which monitors all potential overload points in the circuit, and overloads can be easily corrected with the integral gain control.

For More Details Circle (369) on Reply Card

### Video monitor

A newly-styled 14-volt professional monochrome monitor for VTR over-console mounting in a tape bridge is available from Conrac.

Model DZB offers the broadcast engineer a dependable, performance-stabilized picture. Modular design and quick-disconnect circuit boards permit rapid replacement of circuits.

The all solid-state, ultra-rectangular 15-inch D6500 phosphor CRT

monitor features horizontal and vertical delay switches, linearity within  $\pm 1\%$  picture height and modular high voltage supply. A front panel selector switch, optionally remote, allows either of two matched video inputs to be viewed for picture comparison.

Since the model DZB utilizes a keyed back-porch clamp, the black level will not vary more than 1 fL as the duty cycle is changed from 10% to 90% APL over a temperature range of 20°C to 55°C. The unit will display hum, noise and spurious signals on the incoming line. DC restoration can be cut in or out by a switch on the chassis deck. Sync signal analysis is accomplished through a front panel control which permits the operator to shift the picture one-half line, while simultaneously increasing the oscillator horizontal time-constant to display tape recorder jitter.

For More Details Circle (370) on Reply Card

### Directional wattmeter

Bird Electronic Corporation's model 4431 is a new Thruline® RF directional wattmeter for the measurement of forward or reflected CW power with the additional feature of an adjustable RF sampling output for frequency analysis on a scope, spectrum analyzer or frequency counter.

The wattmeter is designed for  $\pm 5\%$  power measurement from 100 milliwatts to 5000 watts from 2 to 30 MHz and up to 1000 watts from 30 to 1000 MHz, using the same standard plug-in elements in dis-



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For More Details Circle (271) on Reply Card

crete bands and power-levels as catalogued with model 43. No plug-in elements are needed for RF analysis. The sample signal is adjustable from 15 dB to over 70 dB below the main line signal, offering protection from overload for high-sensitivity instrument inputs.

The model 4431 has a low insertion VSWR of 1.07 at most settings. A major feature resulting in this low VSWR value is the use of the QC Quick-Change Connectors, which permit mating with male or female N, BNC, TNC, UHF, C, SC, HN, GR, Type 874 and 7/8-inch EIA lines without the need for performance-degrading adapters.

For More Details Circle (371) on Reply Card

**Condenser microphone system**

Electro-Voice's "System C" is a modular professional microphone system. It consists of a number of elements which can be interchanged to fit specific applications. Elements in the system include two electronic preamplifiers—one for handheld applications and one for boom use. The boom preamplifier operates from either phantom or AB remote power. Four interchangeable capsules are available: omnidirectional, cardioid, hyper-cardioid and Cardi-line® shotgun. Accessories, including windscreens and shock mounts, are also available.

System C is backed by a two-year, unconditional warranty.

For More Details Circle (372) on Reply Card

**Remote pick-up transmitter**

McMartin Industries has engineered a portable remote pick-up transmitter, the RPU-1103, to meet all the FCC requirements effective August 1, 1977. The unit is a 3-watt, 150 MHz solid-state, dual frequency transmitter. The RPU-1103 comes with a rechargeable nicad battery which will provide eight to ten hours on-the-job reporting at a 30% duty cycle.

Standard equipment includes a shoulder strap and whip antenna which can be replaced with the lower profile rubber duck type antenna. Two-frequency operation is achieved with a front panel switch when the optional second channel frequency element is installed.

Two audio inputs are provided. One is a mic input with 25 dB of compression with an LED indicator to display proper operation. A line input is provided for use with a portable tape recorder or cassette player. When combined with the

continued on page 262

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For More Details Circle (253) on Reply Card

## New Products

continued from page 261

talk-over feature of the push-to-talk button on the microphone, the recorder of player allows for production in the field.

The unit is designed for broadcast quality type microphones and the input jack is provided so that any available microphone can be used. The unit displays typical distortion of 1% and audio response of less than 1 dB from 50 to 7500 Hz with 75 microsecond pre-emphasis.

For More Details Circle (373) on Reply Card

### Camera tripod

Based on precision-made Swiss components, the new Images Devices Inc. Super Stix Tripod features lightweight, weatherproof aluminum construction (8½ lb.) with a maximum height of 6'7½" and a minimum height of 2'2". It is supplied with a Miller F head at \$695, a Ronford F-1 head at \$995, or an O'Connor 30 head at \$960.

Other features include: removable leg wedges for low angles, adjustable leg friction, hanger hooks for paraphernalia, a reversible rising column, a balanced carrying handle, a D-ring for included leather shoulder strap, adjustable telescopic legs with rubber feet and steel spikes.

For present owners of similar Swiss tripods, IDI will modernize the units with the addition of leather shoulder strap, balanced carrying handle, hanger hooks, Velcro tieups, and extra D-ring; price: \$35.

For More Details Circle (374) on Reply Card

### Five-cavity klystrons

Varian has introduced two five-cavity vapor-cooled klystrons for use as final amplifier tubes in both



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## VIDEO TAPE TIMER

- Bright LED display
- More accurate tape time
- Optional remote display
- Hold button freezes display
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For More Details Circle (254) on Reply Card

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visual and aural sections of UHF-TV transmitters.

The VA-953H and VA-954-H offer improved linearity and higher operating efficiency by providing lower DC input power for the same transmitter power rating. Special design permits multiplexing both visual and aural signals at 50% to 75% of the visual-only rating.

Features include high gain of at least 47 dB producing a 55 kW peak-of-sync output with less than 0.7 watts of RF drive. Efficiency is up to 42% (standard tubes operate at 29% to 32% efficiency). Bandwidth of 1 dB is at least 7 MHz over the tuning range. Frequency range for the tubes is 470 MHz to 698 MHz. Peak output is 57 kW.

For More Details Circle (375) on Reply Card

### Background music tape reproducer

A new background music tape reproducer is now available from VIF International for use in radio station automation as well as background music applications.

The model 450 offers individual amplifiers for each track, each equipped with level set and high/low frequency equalization adjustments. The amplifier assemblies, as well as all control circuitry components, are mounted on plug-in type printed circuit cards and are accessible from the rear of the machine.

The model 450 Background Music Tape Reproducer features low take-up tension; capstan mounted between the head stacks; high-level audio switching at each amplifier output; automatic reversal at the end of each playing direction; and "Reel Change" actuation that will shut the 450 off automatically at the end of a complete playing cycle when the supply reel is full.

continued on page 264

MODEL 110 V.D.A. 9 dB G.

MODEL 120 V.D.A. DIFF-IN CL./EO.

MODEL 150 P.D.A. 2 TO 8 VPP INPUT

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AM MODULATION MONITOR



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For More Details Circle (209) on Reply Card

**New Products**

*continued from page 263*

The model 450 is capable of handling reels up to 14 inches in diameter, and is available in either 1/2-track monaural or 1/4-track stereo with playing speeds of either 3.75 inches per second or 7.5 inches per second.

For More Details Circle (376) on Reply Card

**Soldering pistol**

The Kager KL 3000 is a light-weight instrument as suited to precision applications in the electrical and electronics fields as it is to the production-line worker.

The solder is incorporated in the pistol. By simply squeezing the trigger, it is fed to the heated soldering tip. The precise amount of solder required for a particular joint may be selected by turning a knob. Cold soldering spots are minimized because the object being soldered or the copper lamination surrounding it is heated prior to the application of the solder.

The KL 3000 is available with power inputs of 20 to 60 watts.

For More Details Circle (377) on Reply Card

**Color Monitor**

A high-resolution 13V color monitor designed for size-limited signal evaluation applications in broadcasting and teleproduction is available in production quantities from Conrac.

The compact unit, model 5722, can be mounted over VTR consoles and is compatible with VTR instrumentation/monitor bridges. The monitor also has a cabinet configuration as an option for portable teleproduction use.

The model 5722 features a 13V high-resolution Colormatch shadow mask CRT which allows critical

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- Records at 8 times speed
- Writes both control and cue
- Saves VTR time and heads
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For More Details Circle (210) on Reply Card



signal evaluation. The unit includes preset controls for contrast, brightness, chroma, phase and aperture; horizontal and vertical delay switches; a horizontal AFC time-constant switch; and phase linear aperture correction.

For More Details Circle (378) on Reply Card

**Operational amplifier**

A low-noise, general-purpose operational amplifier offering a wider bandwidth and improved output drive capability is now available from Signetics.

The SE/NE5534 is capable of driving 10V (RMS) into 600 ohms directly, and features a small-signal bandwidth of 10 MHz and power bandwidth of 200 kHz.

Other specifications of the 5534 include: DC voltage gain, 100,000; AC voltage gain, 6,000 at 10 kHz; and supply voltage range,  $\pm 3$  to  $\pm 20V$ .

For More Details Circle (379) on Reply Card

**FM audio processor**

The broadcast products division of Harris Corporation has expanded its MSP-100 (Maximum Signal Processor) FM Audio Processor for use with AM.

The MSP-100 is an audio control package designed for ease of adjustment, enabling stations to tailor sound to individual formats.

This single unit incorporates a tri-band AGC which processes separate segments of the audio spectrum independently. Operational parameters, including frequency bandwidths, thresholds and shapes, and attack/recovery constants. The signal within the protection module, which follows the limiter, is split into two frequency bands to optimize the limiting of the high frequency signal content.

*continued on page 266*



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Ampex, MCI, Scully, Tascam, Otari and any other 19" x 15 3/4" tape transport fits our RL 500 console. Constructed with the same care as the Scully consoles which we have manufactured for the past 12 years, the RL 500 incorporates the newest design features, including front panel removal for deck access in both horizontal and vertical positions and a rear shelf for your power supplies. Add these advantages to Rus Lang's reputation for quality, and the RL 500 becomes the best value on the market. Ask for details and pricing.

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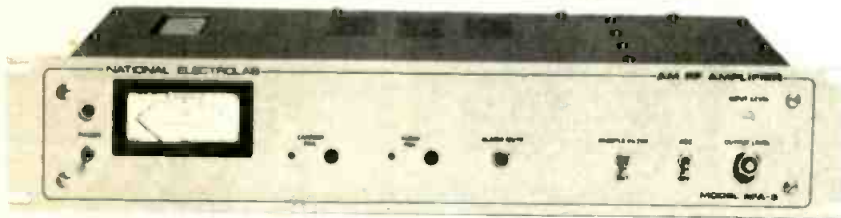
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## Set it and forget it



### The NEW RFA-5 AM RF Amplifier

- 30dB AGC Range • Signal Strength Meter • Three RF Outputs for monitors, frequency counter and oscilloscope • Optional 600 ohm Balanced Audio Output and Carrier/Audio-Fail Alarms.

"Set it and forget it" — that's the comment most often heard from AM station engineers who have installed a National Electrolab AM RF Amplifier. The new RFA-5 is even better than the previous RFA-4. AGC is now standard, and a built-in carrier level meter makes setup easy. As well as driving most modulation monitors, the RFA-5 also delivers a low level oscilloscope output and a clipped/limited output for a standard frequency counter. Four double-tuned selective stages in the preamp, combined with a MOS-FET front end, provide outstanding performance in frequency-congested areas. Over 250 radio stations in Canada and the U.S.A. are presently using National Electrolab RF amplifiers. Try one yourself — and forget it. For complete information, call any office of Gates Broadcast Equipment Div. of Harris Corp. or:



**NATIONAL ELECTROLAB LTD.**

Box 68, Blaine, Washington 98230

Canada: 1536 Columbia St., North Vancouver B.C. V7J 1A4 Phone (604) 985-0511

For More Details Circle (211) on Reply Card

## New Products

continued from page 265

The only change necessary in converting from FM to AM is to replace the FM protection module with an AM protection module.

The AM protection module contains a fast broadband peak limiter featuring low distortion and low noise. Asymmetrical limiting of the signal is achieved through the use of innovative circuitry to allow 125% positive peak modulation. Noiseless switching is achieved through zero crossing phase reversal.

In the FM version of the MSP-100, pre-emphasis is selectable at 25 microsecond intervals from 0 to 75 microseconds.

Both AM and FM employ active input and output for the best frequency and transient response. In addition, a peak reading meter is provided.

For More Details Circle (380) on Reply Card

### Stereo disc-equalizer

A stereo disc-equalizer, with a head amplifier developed especially for record reproduction in high-grade audio systems, has been introduced by Accuphase and distributed in the U.S. by TEAC.

The model C-220 has a built-in head amplifier, with a gain as high as 26 dB, and it accepts inputs from any brand of moving coil (MC) cartridge. The unit also exclusively employs a Class A symmetrical push-pull circuit and is the first MC cartridge head-amplifier to use a ring emitter transistor. The equalizer circuit employs a low-impedance differential amplification push-pull circuit, which can realize a signal-to-noise ratio of 85 dB against an input of 2 mV. The C-220 also has a large capacity power supply circuit.

Frequency response is  $\pm 0.2$  dB,

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20 Hz to 20,000 Hz, and total harmonic distortion of 0.01% at rated output level, 20 Hz to 20,000 Hz.

For More Details Circle (381) on Reply Card

#### Video distribution amplifiers

Video Aids Corporation of Colorado has introduced two new video distribution amplifiers to their line. The model VDA-1 is a VDA which can be operated from any 12-volt DC power supply capable of delivering 70 mA.

The model VDA-1P has its own self-contained power supply. These video distribution amplifiers are designed for installation in TBCs and other equipment where additional video outputs or feeds are required. The VDA-1 is priced at \$79, and the VDA-1P at \$125.

For More Details Circle (382) on Reply Card

#### Stereo headphones

Burwen Research's new family of stereo headphones includes two patented orthodynamic and three dynamic models. Produced in West Germany, the entire line features wide-range frequency response extending beyond the range of human hearing, extremely low distortion even at high sound levels, solid basses, clear trebles and precise transients.

Styling is simple, emphasizing light-weight comfort and featuring both around and on-the-ear models. Extras include solid RCA phono jacks, 10-foot cables and heavy-duty cable protection.

The orthodynamic driver used in the top-of-the-line model PMB 8 is a push-pull sound producing unit. It eliminates the cost, weight and technical complications of electrostatic or electret units. The PMB 8 utilizes an ultra thin voice coil diaphragm, positioned between two

*continued on page 268*

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- Gross error counter
- Measures cassette length
- Still useful as recorder/player

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For More Details Circle (255) on Reply Card

## New Products

continued from page 267

perforated disc magnets. The diaphragm has coaxial conductors printed on its surface. These spiral in opposite directions to ensure uniform electrical impulses.

The two disc magnets are sintered, which provides a large surface area for the active magnetic material. Perforations allow the sound waves to pass through from the headphone to the ear. The drive unit segments are joined at the center and the edge, so that the segments respond in phase.

For More Details Circle (383) on Reply Card

#### Color camera service tapes

Hitachi Denshi America, Ltd. has just completed a series of set-up and maintenance tape programs for several of its cameras. The program covers complete set-up of a camera and explains each control or adjustment. It also shows by split screen, a waveform monitor resulting from the described adjustment.

The tape presentations on video cassette format are meant to be an aid to customers and dealers in correct set-up procedure of the Hitachi color cameras.

The tapes presently cover the SK-70, SK-80 and FP-1212 systems and others are in process of production. The price is listed at \$90 and they will be available from Hitachi Denshi dealers across the country.

For More Details Circle (384) on Reply Card

#### Portable DMM

A new RFI shielded 3½-digit portable DMM has been announced by B&K-Precision, Dynascan Corporation. The model 2810 features .01 ohm resolution and selectable high-/low-power ohms.

The 2810 is a full-feature digital multimeter with a basic DC accuracy of 0.5%. The 3½-digit display uses bright .3-inch LED readouts. Twenty-nine overload protected ranges provide maximum resolution. Auto-ranging capability reduces the need for frequent range changes.

A highly valuable function of the 2810 is the 10-ohm range. This range, with its .01 ohm resolution, is ideal for locating a shorted winding in a transformer, motor or coil. A front panel 10-ohm ZERO control allows the user to zero-out the minute amount of test lead resistance.

The high-/low-power ohms switch is operated independently from the range switch, allowing high/low



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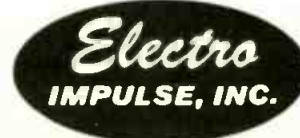


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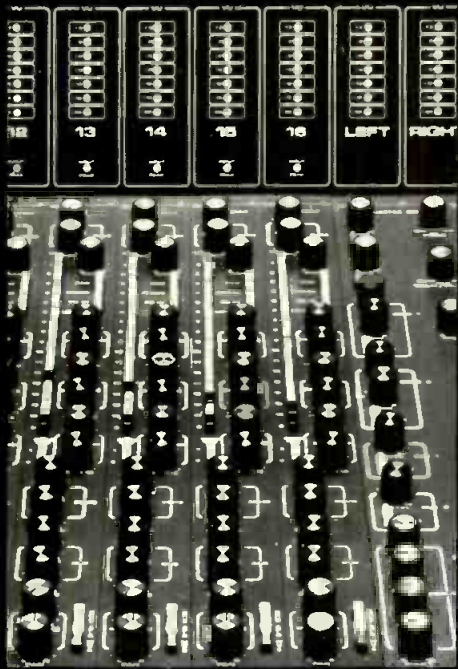
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For More Details Circle (385) on Reply Card

### Video cassette editing recorder

Panasonic has introduced model NV-9500, a high performance video-cassette editing recorder for color or black-and-white recording, editing or playback of ¾-inch video-cassettes.

Features include direct-drive video head cylinder motor for high stability and less jitter, capstan servo system to maintain precise head-to-tape speed, signal-to-noise ratio of better than 45 dB for excellent picture quality, even in second and third generation tapes, and high resolution of 330 lines monochrome and 250 lines color. Special features include a dubbing mode switch for improved dubbing and editing.

Model NV-9500 also offers automatic selection of color or black-and-white mode; vertical sync input and sub-carrier input for use with time base corrector; chroma level adjustment; dropout/noise compensator; HPF heads; diecast chassis for strength and durability; new gear tape loading system for reliable tape threading; three cooling fan blades for improved ventilation; and uniform design of printed circuit boards, with low density component layout on individually removable panels for easier servicing.

For More Details Circle (386) on Reply Card

### Crystal filter

An 8-pole switchable bandwidth crystal filter has been designed as an AM/LSB IF filter for AM-SSB CB sets. The filter, by CTS Knights, Incorporated, can be switched electrically from AM wide-band operation to SSB narrow-band operation by applying 7 VDC 50 mA to the switch terminal.

Minimum 3 dB bandwidth is 6 kHz in the AM mode and 2.7 kHz in the SSB mode. The new filter is available with center frequencies in the range of 10 to 13 MHz. Other operating characteristics include temperature range: -20°C to +60°C; band-

continued on page 270

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For More Details Circle (276) on Reply Card

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(215) 374-4932

For More Details Circle (258) on Reply Card

## New Products

continued from page 269

width at 3 dB; 6 kHz minimum with switching current off, 2.7 kHz minimum with switching current on, switching power 7 VDC 50 mA; termination: 50-ohm resistive or natural 2.5 kilohms, 4.8 pf; center frequency drift: 20 ppm maximum.

For More Details Circle (387) on Reply Card

### Patchcord system

Data Sheet 75-350 from AMP Incorporated describes standard and low-profile programming systems that provide signal and power circuit capabilities in one unit.

Mechanical and electrical specifications are provided for eight sizes ranging from 450 to 4,896 jack positions. These hybrid units have both standard (single conductor) and coaxial contacts. The standard contacts are rated at 5 amperes with a contact resistance of 6.5 milliohms. Coaxial contacts exhibit better than -60 dB crosstalk to 100 MHz (40 dB to 600 MHz) with a VSWR of 1.2 maximum to 100 MHz (1.4 to 600 MHz) when used with RG-174/U cable.

The low profile systems occupy less than 7 inches of rack height in a standard 19-inch wide cabinet.

For More Details Circle (388) on Reply Card

### Lighting Color Filters

Berkey Colortran, Inc. has extended its line of Gelatran color filter media to 60 by the addition of 30 new colors.

According to the company, the new colors were selected to form "a system of colors that would meet any possible artistic requirement of a lighting designer" in theatrical, film and television applications.

For More Details Circle (389) on Reply Card

### 12 kW VHF transmitter

A new data and specification sheet on a 12 kW transmitter, model TT-447, utilizing two hybrid combined but totally independent transmitter assemblies to achieve 12 kW

The data sheet provides information on the specially designed modulator operating at television IF frequencies; complete specifications are included on visual and aural performance along with service conditions and mechanical specifications for RCC and CCIR systems.

For More Details Circle (390) on Reply Card

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# advertisers' index

.....

AEG-Telefunken	71, 73
A. F. Associates, Inc.	32, 98
AMCO Engineering Co.	96
Accurate Sound Corp.	223
Acrodyne Industries, Inc.	188
Adda Corp.	167
Alco Electronic Products, Inc.	92
Alexander Mfg. Co.	258
All Mobile Video	271
Allen Avionics	274
Allied Broadcast Equipment	226
American Data Div.	197
Amperex Electronic Corp.	203
Ampex Corp.	22, 23
Ampro Broadcasting, Inc.	70
Amtron Corp.	257
Andrew Corp.	205
Angenieux Corp. of America	246, 247, 277
Anixter-Mark	184
Aristocart Div. Western Broadcasting Co., Ltd.	255
Artist's Engineering	275
Arvin/Echo Co.	29
Asaca Corp. of America	7
Audio Designs & Mfg.	27
Audio Distributors, Inc.	247
Audio-Video Engineering Co.	82
Audiotronics, Inc.	196
Auratone Products	274
Automation Electronics, Inc.	225

B & I Electronics, Inc.	246
BGW Systems, Inc.	58, 59
The BTX Corporation	208
Beaucart Div., UMC Electronics Co.	28, 92
Belar Electronics Lab., Inc.	264
Bogner Broadcast Equipment Corp.	212
Broadcast Component Distributors	269, 271, 273
Broadcast Consultants Corp.	83, 84, 86
Broadcast Equipment & Supply Co.	267
Broadcast Video Systems, Ltd.	214
Buhl Optical Co.	272

CCA Electronics Corp.	99, 100, 101, 102, 103, 104, 105, 106
CMX Systems	9
CRV Systems, Inc.	274
Cablewave Systems Inc.	173
Calvert Electronics Inc.	250
The Camera Mart, Inc.	64
Canon USA Inc., Optics Div.	177
Central Dynamics Ltd.	230
Cetec Audio	217
Cetec Broadcast Group	5
Collins Television Services (See TeleTec)	194
Commercial Electronics Inc.	181
Communications Limited	270
Communication Medias	269, 271, 273
Communications Technology Inc.	194
Computer Labs	81
Computer Magnetics Corp.	248, 249
Consolidated Video Systems	199
Contel Mfg.	80
Continental Electronics Mfg. Co.	204, 247, 250, 269, 271, 273
Convergence Corp.	39

D and S Corley Ltd.	202
Decca Austin Insulators	262
Delta Electronics Inc.	183
Dielectric Communications	165
Dimension-3 Recording Co.	277
DI-Tech Inc.	263
Dyma Engineering Inc.	276
Dynair Electronics, Inc.	175
Dynasciences	14
Dynatech Data Systems	192
Dytek Industries Inc.	35

ES Enterprises	63, 65
Econco Broadcast Service Inc.	229
Edutron, Inc.	213
Elcom Engineering Co.	275
Electro Impulse, Inc.	268
Electrohome Ltd.	40
Electronics Diversified, Inc.	219

Farinon Electric	85
Fidellpac	172, 261
Flash Technology Corp. of America	216
Frequency Devices Inc.	222, 273
Frezzolini Electronics, Inc.	88
Fujinon Optical, Inc.	253

Garner Industries	264
Geleco Electronics Ltd.	277
General Electric Co. Video Display Equip. Op.	87
Glentronix Ltd.	218, 222, 254

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## advertisers' index

Gorman Redlich Mfg. Co. . . . . 262  
Gould, Inc., Control & Systems Div. . . . . 44  
The Grass Valley Group . . . . . 3  
David Green . . . . . 83, 84, 86

Harris Corp. Broadcast Products Div. . . . . 191  
Heath Co. . . . . 48, 49, 50, 51  
Hitachi Denshi America, Ltd. . . . . 67  
Howe-Yin Research Co., Inc. . . . . 259  
Hughes & Phillips Inc. . . . . 200

IGM Div. of Northwestern Tech. . . . . 185  
ITT Jennings . . . . . 206  
Idaho Magnetics . . . . . 275  
Ikegami Electronics (USA) Inc. . . . . 36, 37  
Image Concepts, Inc. . . . . 270  
Image Magnification, Inc. . . . . 206  
Industrial Marketing Advisory Service . . . . . 107  
Industrial Sciences . . . . . 250  
Inovonics . . . . . 77  
International Electro-Magnetics . . . . . 184  
International Microwave Corp. . . . . 266  
International Tapetronics Corp. . . . . 54, 261

Jamieson Film Co. . . . . 170  
Jensen Tools & Alloys . . . . . 277

Kaitronics Corp. . . . . 211  
Kay Industries, Inc. . . . . 220  
Knox Ltd. . . . . 256

LPB Inc. . . . . 172  
L-W International . . . . . 46  
Rus Lang Corp. . . . . 265  
James B. Lansing Sound, Inc. . . . . 61  
Leitch Video Ltd. . . . . 201  
Lenco Inc. Electronics Div. . . . . 19  
Lipsner-Smith Corp. . . . . 60  
The London Company . . . . . 256, 258

3M Co., Magnetic Audio/Video Prod. Div. . . . . 24, 25, 52, 53  
3M Co., Mincom/Datavision . . . . . 33  
MCI Inc. . . . . 74, 75  
MICMIX Audio Products, Inc. . . . . 200  
Marconi Electronics . . . . . 41  
Marconi Instruments . . . . . 11  
Marti . . . . . 57  
Maze Corp. . . . . 270  
McCurdy Radio Industries, Inc. . . . . Cover 3  
McKay Dymek Co. . . . . 254  
McMartin Industries, Inc. . . . . 174  
Micro Consultants Inc. . . . . 187  
Micro Control Associates . . . . . 257  
Microtime, Inc. . . . . 55  
Micro-Trak Corp. . . . . 260  
Microwave Associates . . . . . 227  
Modular Audio Products . . . . . 252  
Moseley Associates, Inc. . . . . 69

NEC America, Inc. . . . . 215  
National Electrolab Inc. . . . . 266  
Rupert Neve, Inc. . . . . 203  
Nortronics Co., Inc. . . . . 68  
Nova Corp. . . . . 268  
Nurad, Inc. . . . . 221

O'Connor Engineering Labs, Inc. . . . . 209  
Oktel Corp. . . . . 274  
Opamp Labs, Inc. . . . . 277  
Optek, Inc. . . . . 196  
Orban/Broadcast . . . . . 189  
Orban/Parasound . . . . . 186  
Oregon Magnetics . . . . . 277  
Otari Corp. . . . . 207

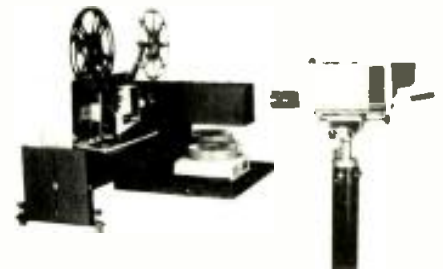
Pacific Recorders and Engineering Corp. . . . . 210  
M. Palmer & Associates . . . . . 260, 274, 276  
Panasonic Video Systems Div. . . . . 30, 31  
Phelps Dodge Communications Co. . . . . 16  
Philadelphia Resins Corp. . . . . 20  
Philips Broadcast Equip. Corp. . . . . 45  
Philips Test & Measuring Instruments Inc. . . . . 15  
Pleasantville Laboratories . . . . . 186  
Potomac Instruments, Inc. . . . . 251  
Professional Audio Services . . . . . 274  
Pulse Techniques Inc. . . . . 274

Quantum Audio Labs, Inc. . . . . 276  
Quick-Set Inc. . . . . 268

ROH Corporation . . . . . 259  
RTS Systems . . . . . 228  
Ramko Research Inc. . . . . 91, 176  
Rank Precision Industries, Inc. . . . . 90  
Recording Supply Corp. . . . . 250  
Recortec, Inc. . . . . 262, 263, 264, 265, 266, 267

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**advertisers'  
index**

.....

Research Technology Inc.	60
Rhoades National Corp.	277
Robins Broadcast & Sound Equipment Corp.	38
Rockwell International-Collins Group	21
Russco Electronics Mfg. Inc.	18

SSAC Inc.	275
Saki Magnetics, Inc.	214
Howard W. Sams & Co., Inc.	258
Scientific Radio Systems, Inc.	208
Scully Recording Instruments	94, 245
Sennheiser Electronic	168
Shallco, Inc.	263
Shintron Company Inc.	93
Sintronic Corp.	256
Sittler's Supplies, Inc.	272
Sono-Mag Corp.	188
Sony Corp. of America VTR Div.	12, 13
Sound Dynamics, Inc.	226
Sound Technology	47
Spin Physics Inc.	171
Stainless Inc.	34
Stanton Magnetics Inc.	195
Stantron Div.	190
Storeel Corp.	176
Strand Century, Inc.	193
Studer Revox America	17
Suda Selsakusho Co., Ltd.	180
Surcom Associates	271
Switchcraft, Inc.	72

TT Electronics, Inc.	275
Taber Manufacturing & Engineering Co.	174, 224
Tangent Systems Inc.	269
Tech Laboratories Inc.	276
Teledyne Energy Systems	228
Telemation, Inc.	97
Tele-Measurements Inc.	224
Telemet	79
Tele-Tec	194
Television Technology Corp.	265
Telex Communications, Inc.	8, 192
Temtron Electronics	273
Tentel	88
Texas Electronics, Inc.	267
Thomson-CSF Laboratories, Inc.	202
Time & Frequency Tech., Inc.	43
Time Tech Corp.	275

UMC Electronics Company, Beaucart Division	28, 92
Unimedia Corp.	89

VIF International	246
Vacuum Tube Industries	254
Vamco Engineering	198
VanLadder, Inc.	204
Vega Div. of Cetec	198
Video Aids Corp. of Colorado	95
Video Components Inc.	190
Video Data Systems	275
Videomagnetics, Inc.	178, 179
Videomax Div., Orrox Corp.	1
Vital Industries Inc.	Cover 4

Ward-Beck Systems Inc.	Cover 2
Waters Mfg., Inc.	252
Wide Range Electronics	255
Wilkinson Electronics, Inc.	10, 62, 182
Winsted Corp.	82
World Video Inc.	272

Yamaha International Corp.	78
----------------------------	----

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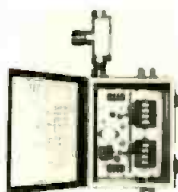




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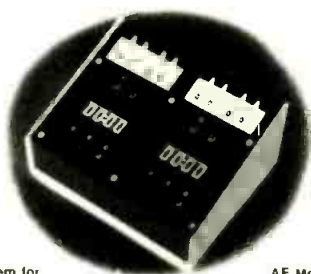
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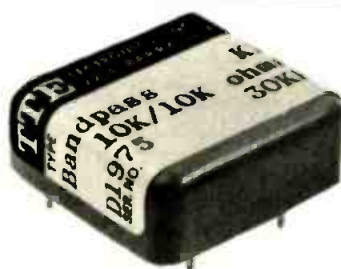
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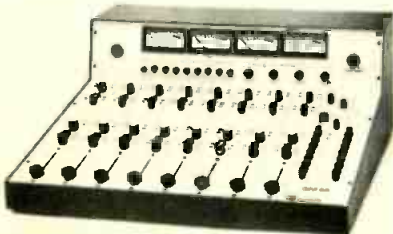
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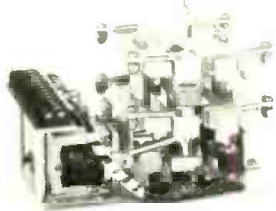
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SRL is a highly successful and professional R & D organization offering an environment of individual responsibility and continuing career development. The following excellent opportunities are available: (1) Video Systems Engineer, to be responsible for the maintenance, modification, design and operation of a unique audio/visual center used for aircraft flight simulation. Should be familiar with maintenance and operation of helical scan VTR's, color cameras, special effects generators and associated color studio equipment. (2) Video Engineer, to design unique high resolution video/television type circuitry. Should have experience in analog circuits. (3) Simulator Development Engineer, to maintain and modify visual simulation equipment utilizing high resolution video systems, integration of newly developed equipment with existing hardware, computers and software. If you are interested in any of these excellent opportunities then send your resume in strict confidence to: SYSTEMS RESEARCH LABORATORIES, INC., 2800 Indian Ripple Rd., Dayton, OH 45440. Equal Opportunity Employer M/F/H.



## HELP WANTED (Cont.)

**MATV INSTALLERS:** Want more profits with less headaches? Information \$5.00. Box 809, Boynton Beach, Fla. 33435. 9-77-eot

**BROADCAST ENGINEERING OPPORTUNITIES—**(coast to coast). We specialize in the placement of well qualified people in the Broadcast Engineering Industry. Openings at all locations—all levels. Confidential—no cost to applicant. Employer inquiries invited. Contact Alan E. Kornish, KEY PERSONNEL, 116 South Main Street, South Main Towers, Wilkes-Barre, Pennsylvania 18701, (717) 822-2196. 4-77-1f

**TELEVISION CHIEF ENGINEER,** management oriented, for leading network affiliate in Gulf Coast area. All new equipment and excellent facilities. Equal Opportunity Employer. Dept. 378, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 6-77-4t

## HELP WANTED (Cont.)

**MAJOR MARKET RADIO CHIEF ENGINEER—**New facility in Top 20 Midwest market requires person with strong audio and directional experience. FM stereo experience desirable. Group operation with excellent fringe benefits. Top pay for right man. E.O.E. Send resume to: Walter J. Ellis, Box 7630, St. Paul, MN 55119. 9-72-1f

**EXPERIENCED ENGINEERS.** Technical schooling and first phone license required. EOE. Send resume and salary requirement to KBMA-TV, 3017 Belleview, Kansas City, MO 64108. 8-66-2f

**NEW YORK VIDEO** teleproduction company wants talented, innovative and creative engineering staff. We need a Videotape Editor, Telecine Operator, Assistant Chief Engineer and Scheduling personnel. Broadcast Engineering, Dept. 391, P.O. Box 12901, Overland Park, KS 66212. 9-72-1f

## HELP WANTED (Cont.)

**TELEVISION—CCTV Video Maintenance Technicians.** Full Benefits. Greater New York, Suffolk County or New Jersey Area. Send resume to: VPC, P.O. Box 268, New Hyde Park, N.Y. 11040. 6-77-1f

**CHIEF ENGINEER—**Experienced Chief needed for 5 Kw AM, DA, and Class A automated FM. Good salary, equipment, and working conditions. Midwest small market has good school system and climate. Send resume, references, salary requirements to John David, KMPL Radio, P.O. Box 907, Sikeston, Mo. 63801. 8-77-3f

**ASSISTANT CHIEF ENGINEER** for TV station. Requires first phone, good maintenance background and supervisory experience. An equal opportunity employer. Send resume including salary history to: General Manager, KOLO-TV, P.O. Box 2610, Reno, Nevada 89505. 8-77-2f

## VIDEO STUDIO ENGINEERING LEADER

Intriguing, unusual opportunity for a true leader and innovator to plan, implement, and operate a technologically advanced recording studio. A firm, recognized for encouraging and supporting realistic creativity, is entering the home entertainment field with a major new product family using advanced technology. You will provide the leadership and make major technical decisions. Must have managerial experience or obvious managerial potential.

Minimum of 10 years' experience in video recording with intimate knowledge of systems hardware/architecture of a studio. Experience must be consistent with "leading edge" in the field in order to propose and implement innovative approaches to program objectives. Must be familiar with editing and forming process and equipment.

Company paid fee, interviewing, and relocation expenses. Starting salary 25-40K plus outstanding growth opportunity.

Please call collect or send resume to Gene Henn, 716-442-5400. Brucks Personnel Corp., 2541 Monroe Avenue, Rochester, New York 14618.

## SENIOR BROADCAST ENGINEER

Public broadcast station WIPB-TV has an opening for the right individual to oversee the operation and maintenance of the WIPB-TV audio and video equipment. 3-4 years experience with first class FCC license required. Excellent fringe benefits. Educational opportunities. Application deadline 9-20-77. Send resume to:

**BALL STATE UNIVERSITY**  
Personnel Services Office  
Muncie, Indiana 47306

An Equal Opportunity/Affirmative Action Employer

## ENGINEERS SEEKING A FUTURE IN THE FAST GROWING VIDEO FIELD

Sony Corporation of America, the largest supplier of video equipment in the world, is expanding its technical staff to service broadcast and industrial users of state-of-the-art video equipment. We are looking for engineers with strong technical backgrounds and maintenance experience with video products such as VTRs, studio color cameras, time-base correctors, and related signal-processing equipment.

*Job openings as follows:*

**MANAGER OF INSTALLATION AND SERVICE:** Direct a staff of product engineers in providing full support of all broadcast product lines. Formulate procedures to ensure that all installations are carried out according to spec and provide technical guidance to see that field people are properly trained and equipped to maintain the product with a high degree of efficiency. Candidate should possess an EE degree, have proven ability to manage a technical group and have several years of direct involvement in servicing broadcast customers.

*Location—N.Y.C. area*

**VTR PRODUCT ENGINEERS:** Assume complete product-support responsibility for specialized video tape recorders. Evaluate field problems, prepare service literature in rough form for engineering change notices, field modifications and service bulletins. Train regional engineers to understand and maintain new products. Candidates should possess an EE degree and have thorough technical knowledge of studio-type recorders and maintenance procedures with at least three years of direct maintenance experience.

*Location—N.Y.C. area*

**COLOR-CAMERA PRODUCT ENGINEERS:** Assume complete product-support responsibility for state-of-the-art ENG cameras. This includes follow-up on field and application problems, training of field people and the generation of technical support literature such as service/modification bulletins and engineering change notices. Candidates should possess an EE degree and have in-depth knowledge of modern multiple pick-up tube cameras and alignment techniques with a minimum of three years experience in direct maintenance.

*Location—N.Y.C. area*

**VIDEO ENGINEERS:** Work with customers to service video equipment at customers' location and on the bench in regional service labs. Provide on-site training for customer technicians. Candidates should possess an associate degree or equivalent, have an in-depth knowledge of video and VTR systems, and have a minimum of three years direct maintenance experience.

*Location—N.Y.C., Los Angeles, Chicago, Dallas, Atlanta*

All positions offer excellent salaries and growth potential. Employment benefits are fully paid by the company and include family-coverage hospitalization, pension plan, profit sharing, life insurance and tuition refund.

This may be your opportunity to join a technically-oriented team in which the opportunities to move forward professionally are better than can be found in most areas of the profession today.

Send your resume in complete confidence to Mr. Jerry McGinty, Sony Corporation of America, 47-47 Van Dam Street, Long Island City, New York 11101.

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# SONY

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This position will involve extensive travel, both domestically and overseas. Duties will include the installation, check-out and troubleshooting of Harris broadcast automation equipment.

Requirements are a high school degree with two years technical school, and three years experience in programming and maintaining radio automation systems. Applicant must be willing to relocate.

Starting salary will be commensurate with your education and related experience. Benefits are liberal and full expenses are given for international assignments. Relocation expense will assist you with your initial move. Please send your resume, including salary history data, to: Mr. Lawrence M. Carlstone, Professional Employment Supervisor, HARRIS CORPORATION BROADCAST PRODUCTS DIVISION, Quincy, Illinois 62301.



An Equal Opportunity Employer M/F

## VIDEO SALES ENGINEER

Choice Eastern Region Locations  
(Washington, D.C., Dayton, Ohio, New York)

Tektronix, Inc., a Fortune 500 Corporation and a world leader in the manufacturing of electronic video test and processing equipment, has several challenging and rewarding opportunities available. These positions require a very strong technical background in broadcast TV, EE degree or equivalent experience, plus successful prior sales experience in a professional broadcast engineering environment.

This position will also require an aggressive, self-motivated personality as you will be operating with a high degree of independence. We offer excellent salary, commensurate with your experience, bonus incentives, commissions and company car.

FOR IMMEDIATE ATTENTION, PLEASE DIRECT YOUR RESUME WITH EXPERIENCE AND EDUCATIONAL INFORMATION TO: AUSTIN BASSO-EASTERN REGION SALES MANAGER

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2 Research Court, Rockville, Maryland 20850

ALL REPLIES WILL BE HELD IN STRICT CONFIDENCE.

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### HELP WANTED (Cont.)

**FULL-TIME CHIEF ENGINEER:** requirements include First Class Radiotelephone License and experience in the areas of directional antenna operation, solid state devices, remote control systems, VHF, microwave and radar equipment. Full company benefits and top money for top people. Equal Opportunity Employer. Send resume to: Chester Grubbs, Director of Engineering, KTOK Radio, Box 1000, Oklahoma City, Ok. 73101. 8-77-21

**TELEVISION ENGINEER:** Community College needs TV Engineer competent in areas of systems design, installation, maintenance, technical production and training. BA degree in Broadcasting with FCC license preferred. Minimum of three years experience. Send resume to Personnel Department, St. Louis Community College, 5801 Wilson, St. Louis, MO 63110. An Affirmative Action/Equal Opportunity Employer. 9-77-21

**EXPANDING COLOR ETV FACILITY:** Soon to be broadcast, needs experienced engineering supervisor versed in 2-inch, 3/4-inch video equipment and Norelco camera system. Must be strong in solid-state maintenance. Excellent benefits, good hours, and challenging opportunity. Please send resume, including salary history, to: Mr. Aclé Earl, Director of Personnel, Black Hawk College, 6600 34th Avenue, Moline, IL 61265. We are an equal opportunity employer. 9-77-11

**TELEVISION ENGINEER** with electronic editing experience. 1st Class FCC license required. Computer training desirable. Must be familiar with Ampex Quad VTR's. Salary negotiable. Contact: Jim Masten, Net Television, Inc., 2715 Packard Road, Ann Arbor, Mi. 48104. E.O.E. 9-77-11

**TELEVISION CHIEF ENGINEER:** Outstanding opportunity for Chief Engineer highly qualified in both technical and managerial skills. Must have an excellent track record in management and be able to assume full responsibility for a metropolitan market TV station. Experience in planning, budgeting and effectively and efficiently managing staff is important. This is a unique job opening in one of the most exciting locations imaginable. It offers a tremendous professional challenge with excellent total compensation package. To be considered, please send a brief employment history to Dept. 388, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. All replies will be held confidential. An Equal Opportunity Employer, M/F. 9-77-11

**BROADCAST PRODUCTION,** post-production facility in San Francisco area seeks chief engineer, maintenance engineer, video technicians and CMX editors. Send resume to Dept. 389, Broadcast Engineering, Box 12901, Overland Park, KS 66212. 9-77-31

**WANTED, MAINTENANCE ENGINEER** for RCA Quad Tape, IVC and Sony Helical, IVC 500A Cameras and JVC E.N.G. Cameras. Salary negotiable. Position in Huntsville, AL. Contact D of E at 205/533-4848, WYUR-TV-48, 4949 Governors Dr. 35801. 9-77-21

**REPS WANTED.** Major manufacturer of Broadcast Audio Products is establishing exclusive Rep. sales force. All territories open. Send company resume and line list to: Dept. 390, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 9-77-21

**CHIEF TELEVISION ENGINEER:** The King Faisal Specialist Hospital and Research Center, Riyadh, Saudi Arabia. Immediate opening for qualified individual with B.S. in Electronic Engineering or a closely related field of study, eight years of related experience in design and maintenance of CCTV systems, and at least two years experience in a supervisory capacity. The setting is a new, modern, 250-bed, acute-care hospital and research center located in the capital city of Saudi Arabia. The Hospital and Department of Audio Visual Services are developing and expanding rapidly. Salary and benefits are exceptional. The 25-month contract includes housing, transportation and a 30-day vacation. Interested, qualified candidates should submit a resume with current salary to: Pershing P. Stahlman, Hospital Corporation International, One Park Plaza, Nashville, Tennessee 37203. 1-800-251-2561. An Equal Opportunity Employer. 9-77-11

**REMOTE TV ENGINEER.** For studio and remote operations. FCC license required. Must have technical and operating background. Send resume and salary requirements to: Chief Engineer, WTCG-TV, 1018 West Peachtree St., Atlanta, Georgia 30309. 9-77-21



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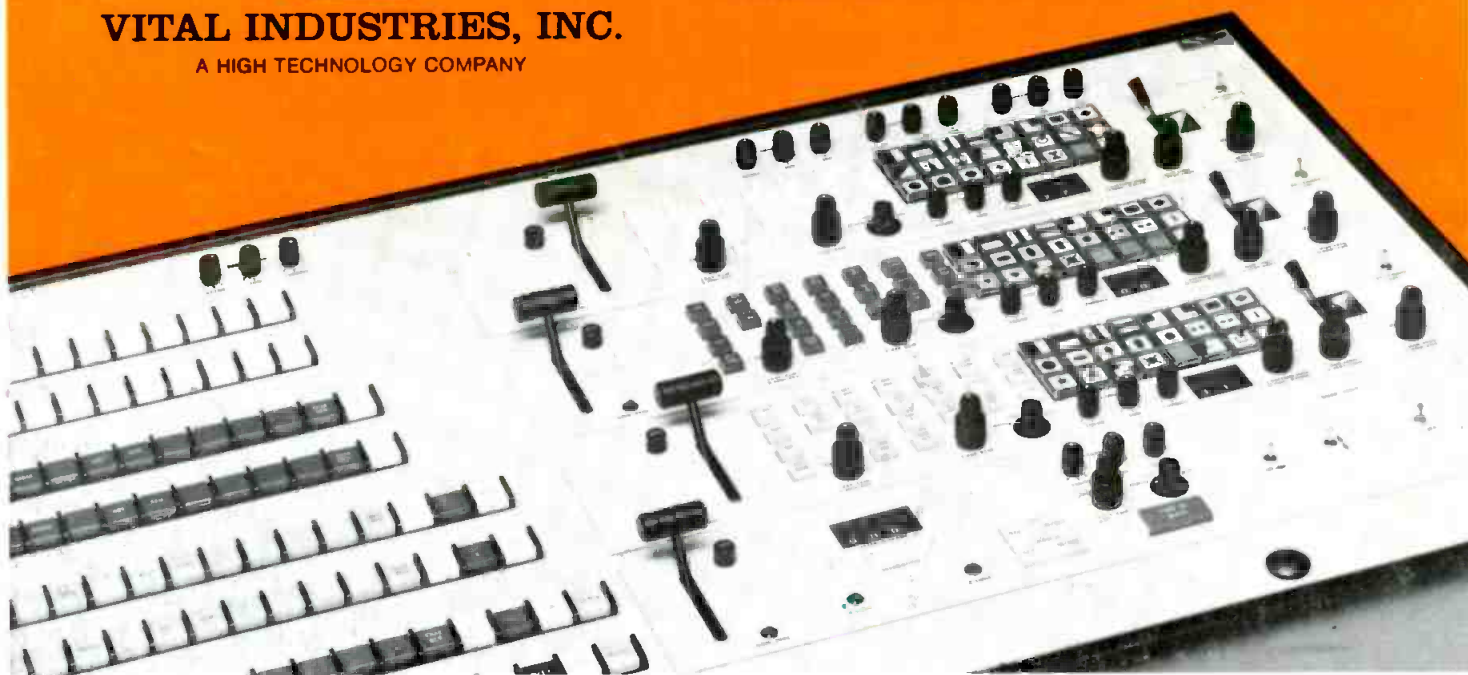
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