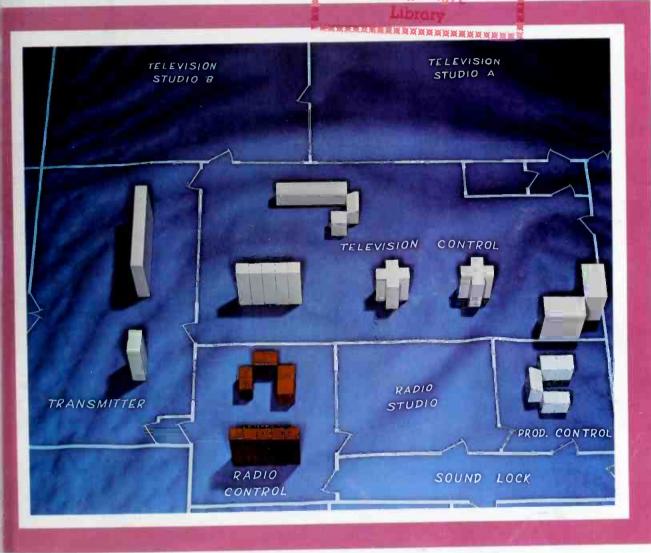
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the technical journal of the broadcast-communications industry

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Indiana University

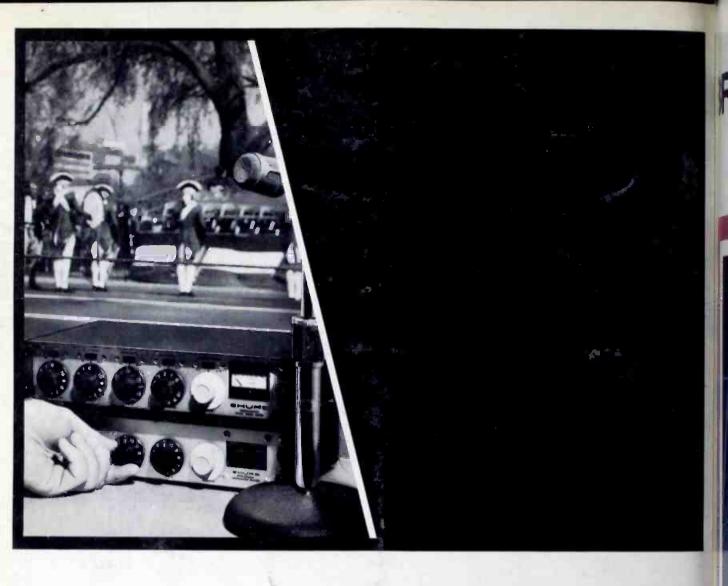
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NV AV



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Eureka! A complete remote and studio production console for a fraction of what you'd expect to pay for a console with comparable features and performance! Simply purchase a new Shure M675 Broadcast Master and the extremely popular Shure M67 Professional Microphone Mixer. By combining these two units*, you get inputs to handle microphones, turntables, phone lines and tape machines — with cuing provision on line and magnetic phono inputs. Result? A versatile low-noise, low-distortion broadcast production console for in-studio, remote, and standby assignments; a complete CATV console; a studio production console. All for \$312! For complete technical data, write:

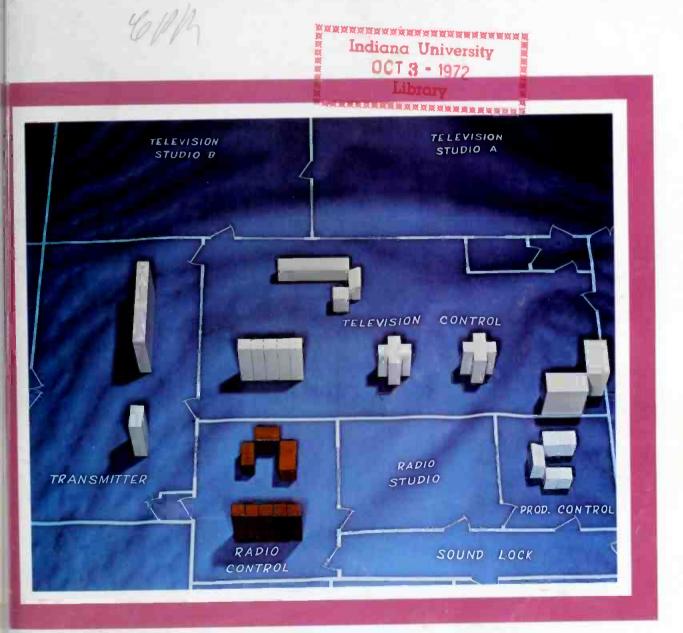
Shure Brothers Inc., 222 Hartrey Ave., Evanston, III. 60204.



*Each model is also available separately: M67 — \$162 net; M675 — \$150 net. Circle Number 3 on Reader Reply Card

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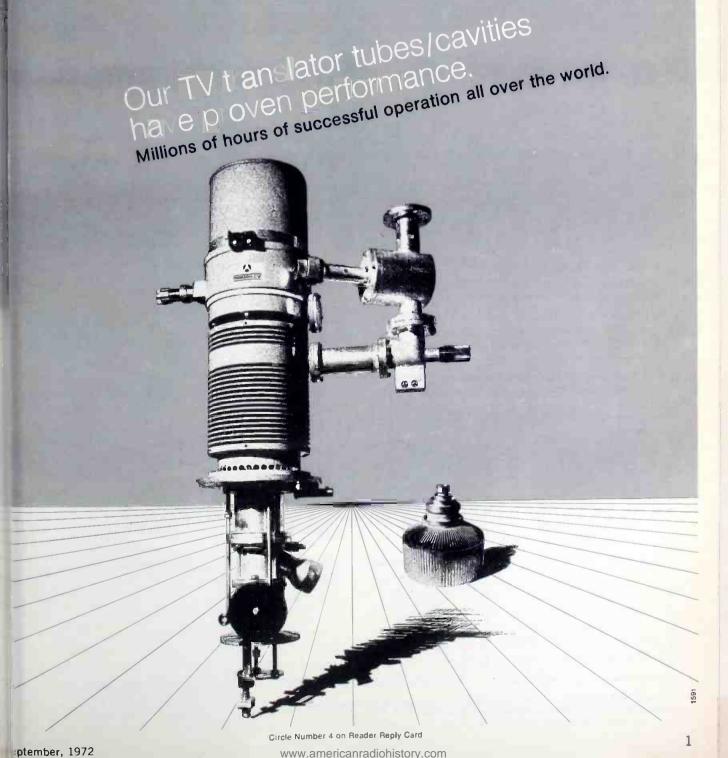
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BROADCAST engineering.

The technical journal of the broadcast-communications industry

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ABOUT THE COVER

This month's cover depicts the theme of the Buyer's Guide. The extensive revisions and enlargement of the Guide will make it a real asset for your station files. Cover by Webb Streit.

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EDITORIAL

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And it's a large one. Color and monochrome monitors from 9 to 25 inches. Rack-mounted, frame-mounted, broadcast or information display. All Miratel monitors feature over-design of critical circuitry for exceptional long-term performance. Each unit is power aged, and subjected to quality control checkout before shipping. Miratel monitors are designed to

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Circle Number 5 on Reader Reply Card

DIRECT CURRENT FROM D. C.

September, 1972

by Howard T. Head

Environmental Approval To Be Required for Future Tower Construction

The Commission has proposed new rules intended to implement the National Environmental Policy Act of 1969. Under the new rules, all applications filed with the Commission involving the construction, abandonment, or razing of a structure would require a showing by the applicant as to local measures taken to determine environmental effects.

Reports submitted by the applicants would be reviewed by the Commission. In such a review, the Commission might require the submission of additional information or to consider alternative approaches. In any event, action on applications would be deferred until questions on environmental impact have been satisfactorily resolved.

Cable Standards Committees Proliferate

The Electronics Industries Association (EIA) has formed a Cable TV Standards Committee. The new committee is a joint undertaking of EIA's Broadband Communications Section and the Consumer Electronics Group (television receivers). The mission of the committee is a study of the feasibility of standards for interaction between viewing devices and cable delivery systems.

The EIA committee is the latest addition to a growing list of industry, government, and professional study groups. Committees to study the problem of cable technical standards are now in operation at different levels (the FCC/Industry Cable TV Advisory Committee, The IEEE Coordinating Committee on Cable Communications Systems (CCCCS), as well as committees organized by NCTA, JTAC, and others.

Pilot Sub-carrier Rules Proposed During Monophonic Transmissions

The Commission has proposed to incorporate into Part 73 of its rules specific requirements prohibiting the transmission of the stereo pilot sub-carrier at 19 kHz during periods of monophonic transmission. The new rules would continue to incorporate an existing "rule-of-thumb" which provides an exception during periods no longer than five minutes in duration (see 12/69 D.C.). In proposing the new rules, the Commission stated the transmission of the sub-carrier other than for actual stereo transmission is contrary to the intent of the Commission rules, serves no purpose, and can be misleading to listeners.

Optimize your color video performance:



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Control your film chain light level automatically

Rapid corrections for film and slide density changes are yours with the BEI Auto Light Control. The servo operated neutral density wheel keeps the video level virtually constant with no change in color hue. Picture quality and color fidelity are optimized for both large and small image islands. And, it's compatible with any film chain camera.

Display color vectors on your oscilloscope or waveform monitor

Now you can have the benefits of a vectorscope at half the normal cost. BEI's model 531 Vector Display provides a vector presentation of NTSC or NTSC compatible chroma. This polar coordinate type display allows you to obtain the correct phase and amplitude relationship of the chrominance signal.



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Circle Number 6:on Reader Reply Card

The Commission also has ruled against the transmission of discrete four-channel quadraphonic transmission without specific Commission authority in individual cases. The Commission emphasizes, however, that the ruling does not apply to "pseudo four-channel systems," which are not true quadraphonic systems but simply rely on manipulation of two-channel material to achieve simulated four-channel effects.

Deletion of Television Channels 70-83 Proposed for Receivers

The EIA has proposed that the Commission amend its all-channel receiver rules so as to restrict the requirement for all-channel reception capability to the band of Channels 2-69, inclusive. EIA urges that UHF tuner design will be simplified if the tuners are required to function only from Channels 14-69 rather than Channels 14-83.

The Commission has assigned the frequency spectrum formerly occupied by television Channels 70-83 to the land mobile radio services. However, approximately 1000 UHF translators continue to operate in this band, and under present plans will not be displaced until such a move is dictated by interference with the new land mobile stations.

EIA has proposed that these translators be moved to frequencies below Channel 70, a nice trick if they can figure out how to do it without disrupting established TV broadcast allocations.

Short Circuits

A Midwest daytime-only station on a Canadian clear channel has been fined for operating prior to sunrise without specific authorization...The Commission has assigned the bands 72-73 MHz and 75.4-76 MHz, adjacent to television Channels 4 and 5, respectively, for low-power classroom operation for training hard-of-hearing persons...Western Union has filed applications for three domestic satellites...The Commission is readying a proposal which would include master antenna television systems within the Commission's CATV jurisdiction if those systems import or originate programs...The 21st Annual IEEE Broadcast Symposium will be held at the Washington Hotel, Washington, D.C., September 21 and 22.

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ucer recording mixer. essional-quality audio mixer regned to fill the void for uction recording, dubbing, and monitoring equipment. imputs to four mixing channels.





Criterion 80. All solid state. Direct capstan drive comparable to the finest reel-to-reel machines. Speed accuracy of 0.2%. With 1, 2, or 3 tone signals for automatic equipment.

eo Statesman console. 5-channel, solid state stereo audio cisole. 9 stereo, 2 mono inputs. Response 20 to 20,000 Hz dB. Complete stereo monitoring facilities. All channels are tisstereo.



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Gatesway 80. 8-channel monaural console; 100% translstorized; 18 Inputs. Frequency response ± 1.0 dB, 20 Hz to 20 kHz. Ideal for the typical AM/FM or TV station that broadcasts monaural programs.



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Quincy, Illinois 62301, U.S.A.

TO THE EDITOR

If You Don't Know, Ask

Dear Editor:

It is with great pleasure that I read Broadcast Engineering, and I look forward to comments on the articles and on engineering.

I have been very interested in articles in the past few months dealing with the title "Broadcast Engineer".

I am a staff announcer with a First Class License, and have been with this station for over two years. During my first year I worked with our engineer and learned many things. He left, and I was asked to keep the equipment up, do some maintenance, etc. And I was given the number of an engineer to call for help on the more serious problems.

Although I have been working under this arrangement for a year, I have learned a lot, but it is still difficult for me to take the reins. In the first few months of my new responsibility, the title of Chief Engineer was too fancy for me. I really did not know enough to warrant it.

I have been called a "90 day wonder", and I agree, I was, I still don't know it all, but I have some advice for those who may be in the same situation. . . or who may not have anyone to call for those serious technical problems.

The number one thing on the list is to be observant and ask questions. Don't be afraid to ask; what

may seem basic to someone else could be a breakthrough for you.

Visit other stations. Find out what equipment they use. They may even have some of the same problems you are experiencing. Meet if with other engineers. I haven't found one yet who won't give you some pointers.

Join a chapter of a broadcast engineering technical society, if there's one near you. Read your equipment manuals, magazines serving the industry, and read any other articles dealing with the industry. Try your local library. They have good material. It may so be old, but it may be just what you a.A. need to get results.

Sometimes when I have fixed in what may be a minor thing to some wo people, it's an accomplishment to me. I used to stare at the transmitters and wonder what they are all about. Now I am able to understand what makes them function.

With a daytime AM and an 18 lk hour FM plus a 6 to 12 midnight airshift, engineering can be tough...but rewarding.

consoles - cabinets



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Amco, a leader for years, in modular electronic enclosures introduces a long needed practical and styled cabinet system complete with accessories, color guide and color selections.

Featured is a system of custom styling the exterior visual portions of consoles while utilizing standard cabinetry for instrumentation. This unique combination, supplemented by a wide selection of standard colors, affords a means for creating attractively custom styled consoles at a practical cost, and savings in delivery time.

Of particular interest is a unique "Poly-Dimensional" cabinet. This series, styled to blend with other consoles and cabinets offered in this system, is available in standard sizes that may be used individually or stacked. Readily modified to non-standard sizes in height, width or depth.

The whole system is amazingly easy to apply and order.

Selection of chassis mounting hardware completes the system.

Delivery lead time averages 4 weeks.

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AMCO

Yes, I agree, a chief engineer sould be someone who is compeit in his field, but I do think there froom for us "learners". Remem-Ir - when the ship sails smoothly, u're just another member of the ew. But when the sea gets rough, lother, Your It!

I give my thanks to those chief gineers who have helped me.

Bill Kloop WIXK AM/FM New Richmond, Wis.

litor's Note: It takes courage to so honest about your profeson. And in the small market staons it is not unusual to find air talit with a First. Trouble is, in too any cases - and this is not limited small market stations - there are cketed but nonprofessional igineer-operators. These stations ly on contract engineers every ne something breaks down.

The feeling in many engineering parters is that quality sound is on roller coaster: it hits its peak after Proof and it goes steadily down Ill until a major breakdown occurs

r the next Proof is pulled.

Certainly, it is important for wners to hire both engineering nd air talent. But the combination f talents is rare and the budget ay be tight. This is why we have many consultants and contract ngineers today.

But it has become apparent to ie that some states are closing the oor on people who offer their talnts under these titles. This magaine has expected the state and naonal professional associations to peak out on the general question f titles and licensing. Little has een forthcoming, but we keep

ooking for it.

eptember, 1972

We will continue to seek timely tters to the editor, but we suggest ou send a carbon to the FCC and ne to your association. If you are ot currently a member of a profesional association, we suggest you ead through those covered in this sue. Also, you may find it easier o affect changes in your local or tate area by voicing your opinions vithin your state association. And when in your meetings you get round to it, why not discuss how

(Continued on page 10)



... meet the AEL FM-2500 watt and FM-1000 watt transmitters.

Here are the newest members of the AEL Advanced Equipment Line with the answer to efficient, economic Class A operation (up to 3kw ERP).

High transmitter power, low antenna gain or low transmitter power, high antenna gain (you name it) AEL offers solid state reliability, easy accessibility and high quality standards of

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- single phase power supply

The FM-2.5KD and FM-1KD Transmitters have the built-in capabilities to give you true Sound Fidelity for the Seventies.



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Letters To The Editor

(Continued from page 9)

and where we get our engineering talent today. Among the types and titles of engineers today, what kinds of educational experiences are usually tied to what kinds of titles?

The Editor

Stations Seek Equipment Protection

The following letter is one more important chapter in the continuing effort to protect your facility and equipment from burglars and vandals. The more BE asks for comments, the more we find that this kind of letter does not represent an isolated example.

In the owners words, here's the problem that hit KOLA and the way he hopes to keep it from happening again.

I read your article about Radio

Station KSST, in Sulphur Springs, Texas. The same thing happened to our station January 5, 1970, 11:05 PM. We were on the air at the time when our transmitter was stolen.

The transmitter is remote controlled and when they cut the wires to the remote control it took us off the air. So when we couldn't calibrate, we put the blame on the telephone company. When the telephone company checked the line (approximately a half hour later) they found it open at the transmitter.

It takes a half hour to get to the transmitter site, so that gave the thieves an hour to cut the wires and haul out what they could. They broke into the transmitter building first, and took what wasn't tied down (spare tubes, parts, etc...). Then they killed the power and started cutting wires. I had the transmitter completely retubed just one month before the burglary.

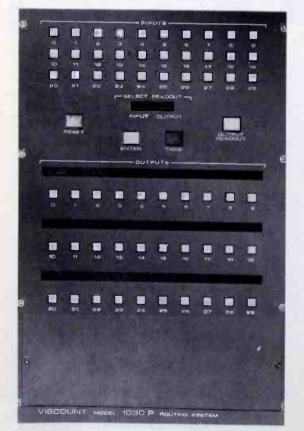
They had CB two way radios; two guys were at the studio watch-

ing to see when someone would leave to go up to the transmitter. Another four guys were on the hill lugging things out. I met them on the road coming down from the transmitter, but I never suspected anything. The traffic looked heavier than usual coming down from the transmitter for so late at nite, so I got the license plate number of the second car.

When I first entered the transmitter building, I thought that I was having a bad dream. I couldn't believe my eyes, the racks were empty and all spare parts were gone. Somehow I managed to call the California Highway Patrol, but it was out of their jurisdiction and the sheriff didn't know the way to the transmitter site. Finally after two hours wait, the sheriff arrived at the transmitter site. I was one number off the license plate, so they couldn't check it out.

I was up for three days (without sleep) working around the clock trying to get back on the air. I got spare parts for the transmitter from

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This VISCOUNT system installed in the centre of a Canadian city switches broadcast TV, CATV and microwave links.

The video switches are in standard 10 x 10 matrix units, enabling the system to be block-built or expanded after installation. The module includes input and output amplifiers and connectors, and address and reset circuits.

But each control is unique. This one features X-Y address with Select, Salvo, and Switched Memories. A solid state numerical display verifies each selection. The ENTER button puts selections into the Salvo Memory; the TAKE button operates the crosspoints. Other control systems are available; computer language address, binary coded decimal, touchdial or thumbwheel.

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at r stations, but I needed a crys-I had two spare ones, but they been stolen, too. I called every tti on West of the Mississippi on in frequency 99.9 for one, but it useless; no one had a spare atal. Even RCA didn't have one ock. Finally, I had one ground holly that took twelve hours after ulding how urgently needed it W. We borrowed an exciter from K ST in Los Angeles, the IPA section from KDUO in San Beralino, and KGIL in the valley runteered to run the commercial amouncements we missed, but in t were local, and wouldn't help onadvertisers.

onree AM, three days later we gooack on the air. We were mono, buwe were on the air. I then took mylong needed sleep. I slept fifted hours and was awakened by a phne call stating that the equipment had been returned.

the thieves were six teenagers, alfrom prominent local families. It y got off scot free because they we all under age.

o now with all the equipment lang in the middle of the floor of the front office (badly scratched aridented), the job started all over agin; putting the equipment back the transmitter and returning the browed equipment.

little over a week later the job w complete. Then to top things the FCC made a surprise injection the next day.

asked the sheriff why the boys ated the equipment. He said titt they had plans of building a h powered CB transmitter.

The transmitter now has an a m which will ring a bell in the dio when the door of the building is opened. This is connected though the remote control on a re-position on the metering cir-

feel stealing broadcast equipment should be a more serious oflese. I took quite a loss and the bis got off free. My loss should be been justified somehow, but law protects minors.

Frederick R. Cote KOLA Stereo Riverside, Calif.

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Nortronics also offers VTR audio head stack relapping services.

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404 / 261-1429 Circle Number 13 on Reader Reply Card

NAB Committee Will Hold Six Conferences

License challenges and renewals, counteradvertising and other prime issues like consumerism and political broadcasting will be discussed along with the nuts and bolts problems of day-to-day station operations during six 1972 Fall Conferences sponsored by the National Association of Broadcasters.

A key member of the Senate or House of Representatives will be invited to address the luncheon in each Conference city.

Tentative plans announced by the NAB Study Committee call for separate Early Bird Radio and Television sessions followed by a joint meeting of all delegates during the morning hours at each of the oneday conferences. The joint Radio-TV afternoon session will feature a quiz on difficult practical matters facing station management and a rap session moderated by NAB President Vincent T. Wasilewski. Tentatively scheduled to follow is a question-and-answer session with a member of the Federal Communications Commission.

A separate Radio Management Development Seminar, sponsored by NAB's Small Market Radio Committee, will be held the afternoon before in each of the six Conference cities.

The series opens in Denver, Colo., on Tuesday, Oct. 30, moves to Las Vegas, Nev., on Thursday, Nov. 2, then switches to Boston, Mass., on Thursday, Nov. 9. The final three Conferences will be held in San Antonio, Tex., Tuesday, Nov. 14, in St. Louis, Mo., on Thursday, Nov. 16, and in Atlanta, Ga., on Tuesday, Nov. 21.

The agenda for the Early Bird Radio Session includes a discussion of radio regulation and other matters of major interest. Cable television is among subjects to be taken up at the concurrent Early Bird Television Session. Both begin at 8:00 a.m. local time.

The Joint Meeting will open at 9:30 a.m. with a twin-purpose discussion on broadcast legislation

and broadcast regulation. It will include such issues as license renewal, license challenges, consumer legislation, counter-advertising, political broadcasting, etc.

The morning program will also include a discussion by a sports personality of this important element of radio and television programming. A large market and small market broadcaster also will participate, outlining practices in sports programming at their stations.

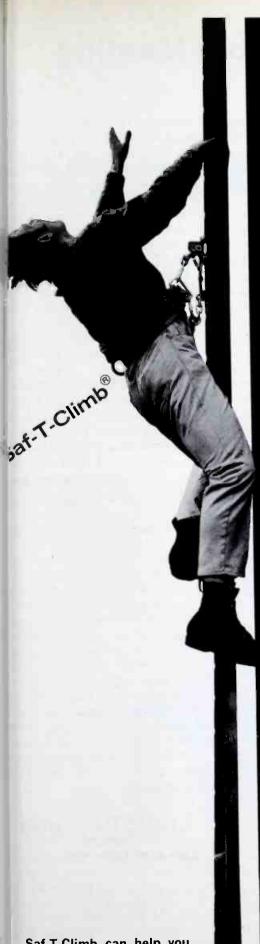
The afternoon session will begin with broadcast operations quiz. After the questions have been asked and each participant has filled in his response, the correct answers will then be discussed by a staff or Board member. The open rap session will follow. FCC Commissioners are being asked to attend one of the six conferences for remarks and a question-answer period.

Sherril Taylor of CBS Radio, Chairman of the study committee, said: "Attendance at last year's conferences increased about 16 percent over the previous year. We believe this was due to the quality and variety of the program presented. This year we are aiming at another increase. We believe this will be the most informative single day a broadcaster can spend away from his station."

Each of the conferences will be preceded by a reception the evening before.

Registration for the Radio Management Seminar preceding each conference is being limited to 45 participants. The \$25 registration fee includes course material and a text book.

The purpose of the seminars is to provide radio managers the opportunity to learn more about the basics of management development and to assist each participant in the task of analyzing, developing, and refining his personal working philosophy of management.



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SMPTE Ready For October Meeting

SMPTE Conference Vice-President Harry Teitelbaum, Hollywood Film Co., and SMPTE Editorial Vice-President Richard E. Putman, General Electric Co., have jointly announced the names of committeemen who will put together the program and handle all the details of the upcoming SMPTE Technical Conference in Los Angeles.

The Conference is set for the Century Plaza Hotel, Oct. 22-27, 1972.

The appointment of Dr. Frank P. Brackett, Jr., Association of Motion Picture and Television Producers (AMPTP), as Program Chairman had been announced earlier. Working with Brackett will be Ralph Westfall, Eastman Kodak Co., as Associate Program Chairman, and Frank P. Clark,

AMPTP, as Chairman of the twoday (Thursday-Friday) Symposium on Communications Satellites and CATV.

Newly appointed topic chairmen, who bring together the papers for the technical sessions, are Winton Hoch, for Motion-Picture Studio Practices, Lighting, Exposure, etc.; Petro Vlahos, AMPTP, for Sound Recording and Reproduction; Julian D. Hopkinson, Agfa-Gevaert, Inc., for Photosensitive Materials for Motion-Picture and TV Practice; Fred J. Scobey. DeLuxe General, Inc, for Laboratory Practice; Paul H. Preo, Eastman Kodak Co., for Theater Presentation Practices; John H. Donlon, Technicolor, for Small-Format Films; and Melvin G. Sawelson, Consolidated Film Industries, for Television Systems and Editing.

The names of the Arrangements

Chairman Tony Bruno, Eastmar Kodak Co., and the Exhibit Chairman Warren Strang, Holleywood Film Co., had been previously announced. Working under Brund as Assistant Arrangements Chairmen are Don Henderson, Eastmar Kodak Co., and Fred Detmers Technicolor.

Ed Burns, Eastman Kodak Co. is handling Hotel and Motel Arrangements; Dick Sullivan, Eastman Kodak Co., the Hotel Reservations; C. Carroll Adams III, the Public Address and Recording and Phil Singer, Agfa Gevaert, the Opening Films.

Jack Hall, Producers Service Co., is in charge of the Get-Together Luncheon; Don Kloepfel DeLuxe General Inc., heads up the Projection Committee, and Mrs. Anthony Bruno and Mrs.

(Continued on page 16)

Mountain Prime Time Set

In amendments to Section 73.658(k), "Prime Time Access Rule", the FCC has redesignated the "prime time" hours in the Mountain zone as 6 to 10 p.m. local time instead of 7 to 11 p.m. (Docket 19475).

The new rule becomes effective October 1, 1972.

On October 6, 1971, the Commission granted the nine stations involved (three each in Denver, Phoenix and Salt Lake City) an option to redesignate 6-10 p.m. as prime time. None of the Salt Lake City stations changed their prime time hours resulting in frequent requests for waivers of the rule, "uncertainty, confusion, and some disruption," the Commission said. It stated that as long as one of the Salt Lake City stations remains on a 7-11 p.m. schedule, there will continue to be problems in the operation of the rule.

Most of the waiver requests from the Salt Lake City stations involved material preempting NBC's Tonight show, and overruns of prime time network programs which occur outside of prime time in the Eastern and Central zones but fall within it in the Mountain zone for stations observing 7-11 p.m. as prime time. The 6-10 p.m. prime time would permit mountain time stations to carry this material outside of prime time without the



need to request waiver of the rules.

The Commission said that the majority of the parties directly involved supported the change to 6-10 p.m., with only the Salt Lake City and Denver CBS affiliates opposing the change and urging that the "option" be retained. Stating that the option arrangement wouldn't work any better in the future than it has in the past, the Commission said that 6-10 p.m. will minimize the problems since it represents a better approximation of what really are prime hours in the Mountain zone and responds more closely to prime-time scheduling practices.

Logic Reprints

BROADCAST ENGINEER-ING now has a limited supply of reprints on the four-part series Digital Logic Basics written by E.S. Busby, Jr. The series started in the September 1971 issue and ended with the January 1972 issue.

If you would like to receive a copy free of charge, write to: The Editor, 1014 Wyandotte St., Kansas City, Mo. 64104.

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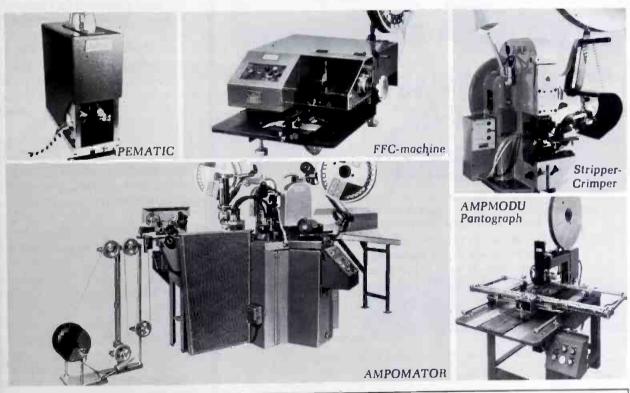
Some more examples of AMPECONOMATION: a Pantograph to apply AMPMODU bus connector (***) on print plates (Max. 4,000 an hour) and the FFC

machine, a semi-automatic machine for putting the bus connector on a cable.

Finally, we also mention the TAPEMATIC, a machine that handles the semi-automatic cable connectors that are applied on a plastic carrier.

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The machines shown here are on demonstration at Booth No. 95 during the FIAREX. Our experts will be glad to give you any information about all the other AMP products and applications.



(Continued on page 14)

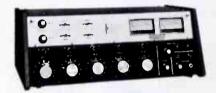
Kenneth Mason are co-chairmen of the Ladies Committee.

Harry Lehman is Publicity Chairman; Carleton Wright, Agfa Gevaert, and Ken Erhardt, NBC, are handling the hospitality and foreign delegations; and Whiting, Jr., 3M Co., and Marvin Jacobs, are in charge of membership. Transportation is being taken care of by Scott Robertson, Eastman Kodak Co.; and Mardi Rustam, American Film Industries, will be the Auditor, assisted by Russell F. Dubes.

The Conference will feature five days of technical sessions, plus a 92-booth equipment exhibit. For information on the Program, the equipment exhibit, registration and hotel reservations, write to SMPTE Conference, 9 E. 41st St., New York N.Y. 10017



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Predictions For the '70's

A wide-ranging look at current trends and future prospects for the economic growth of the U.S Electrical / Electronics industrie and the potential impact this growth might have on the overa U.S. economy is documented in report now available from the IEEE. An ad hoc committee of to industrialists who completed this comprehensive report detaile their principal findings for the 1970's.

In summarizing its deliberation the Committee arrived at the fo lowing views for the decade of th 1970s—

1. The demand for engineers wi be increasing at a rate of about percent per year, a slower pac than in past years.

2. Supply and demand of electrical engineers will be reasonably ibalance, perhaps with some short ages.

3. Government spending in the domestic areas will not offset de creases that have occurred or an expected in military and space programs until late in the decade, i then.

4. The electrical/electronics in dustry will show a 7.5 to 8.0 per cent average annual growth, with some areas showing growth substantially above this amount.

5. There is a need to reduce th number of individual sources of data on manpower and characteristics of the industry, and to establis a more comprehensive and reliable data base to serve a multiplicity of users.

6. There is a need for aggressive governmental action to reduce trade barriers so that competition can be as open and fair as possible.

7. There is an enormous demand for capital that can best be met by stable economy and incentives to investment.

8. To maintain our technica leadership, more support for research and development, probably in the form of tax incentives, in needed. A level of R & D expenditures in relation to GNP, at leas comparable to that of the mid 1960s, would be more appropriate.

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The new BE450 compares identical SMPTE Edit Codes on the two tapes and adjusts the speed of one of the recorders until the tapes are in frame to frame lock. It keeps the tapes in sync, or in manually adjusted offset, regardless of normal tape stretch or slippage.

In the audio-sweetening example above, the SMPTE Edit Code on the quad master has been recorded both on the slant track dub and the multi-channel audio tape. The Synchronizer then keeps every production step in exact timing keyed to final audio recording on quad master.

The BE450 capabilities are too good to keep secret from anyone with audio sweetening problems or any other audio/video sync requirements. Send now for descriptive literature.



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Circle Number 17 on Reader Reply Card

Commission Explains "Lowest Unit Charge"

Community Broadcasting Company, licensee of KRSN, Los Alamos, N. Mex., has been informed by William B. Ray, Chief of the Complaints and Compliance Division of the Broadcast Bureau, that the "lowest unit charge" provision of Section 315(b) of the Communications Act does not apply to the rates charged for political candidates where an advertiser is not charged for any of his announcements.

The text of the letter to KRSN follows:

This is in reply to your letter of June 13, 1972. You ask whether, if you give free announcements to certain students and other individuals to advertise, you are "committing [yourself] . . . to a zero rate for political candidates." You state that the reason why you give free announcements is that "they need just a little help."

It does not appear that the "lowest unit charge" provision of Section 315(b) of the Communications Act of 1934, as amended, is applicable to situations where an advertiser is not charged an amount for any of his announcements. This of course does not apply to situations where commercial advertisers receive free "bonus" spots based upon the number or type of announcements they have purchased.

Weekly Equipment Lists

A new service, listing certified and type accepted equipment on a weekly basis has been initiated by the Technical Division of the Office of Chief Engineer. The listings will be distributed by the Public Information Officer.

Certification and type acceptance are two of the equipment approval procedures used by the Commission. Certification means that the manufacturer or user has filed with the Commission a report of measurements to show that the equipment in question complies with the technical specifications in the Commission's rules.

Type acceptance for equipment is granted after a review of representations and measurement data submitted to the Commission by the applicant shows that the equipment is capable of complying with the applicable rules.

In This Issue
Is Good For
One Year

Satellite Conference Set For November

The second International Conference on Digital tellite Communications will be held at the UNES-D Building in Paris, France, November 28-30. The ret will be sponsored by the International Telecomunications Satellite Consortium (INTELSAT).

About 400 people attended the first Conference held ree years ago in London. In light of the increasingly pid expansion of satellite technology, the second inference will be of even greater importance.

The conference will provide a forum for the excange of information on at least the following topics: cerall systems description; modulation systems; codis and error control; synchronization; transmission d channel effects; interference; base-band equipent; speech interpolation; demand assignment; sig-Illing; operations; and economics.

For further information, contact: W.L. Pritchard, DMSAT Laboratories, Box 115, Clarksburg, Mary-

and 20734.

Politics For Politicians

The FCC has told Joseph A. Califano, Jr., General ounsel of the Democratic National Committee, that ere is no basis for his request for the disqualification Chairman Dean Burch from the political broadcast rase of an inquiry into the Fairness Doctrine (Dock-19260).

The Commission made the ruling in a 5-0 vote in

hich Chairman Burch did not participate.

Califano had contended that Burch's service as hairman of the Republican National Committee from 164 to 1965 would make it difficult for him to act ojectively on a Democratic National Committee fairess inquiry request that the FCC provide an automatright to respond to broadcast appearances by the resident. The Republican National Committee oposed the proposal of the Democratic National Com-

In a separate statement, Chairman Burch said that e had found no basis for disqualifying himself, but ad submitted Califano's request to the full Commis-

on for its consideration.

The Commission noted that Califano did not suggest nat the Chairman had shown personal bias or prejuice toward any party participating in the proceeding r had taken any other action that could adversely afect the confidence of the public in the integrity of the iovernment. The entire basis of Califano's request or disqualification was the political party position eld by the Chairman before his appointment to the

"We see nothing in any of the authorities relied pon by you or in any relevant decision of the courts f which we are aware which would indicate that past olitical activity of a Commissioner is disqualifying in roceedings in which his and other political parties nay be participants", the Commission told Califano.

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Circle Number 18 on Reader Reply Card

Audio monitoring and monitoring distribution

By Pat Finnegan*

All broadcast stations require audio monitoring to hear the on air product, and for auditioning and maintenance purposes. A good, reliable monitor system is similar to good test equipment when it can reproduce accurate results. While there are many reasons for audio distribution within a station, this article will concern itself only with audio monitoring and distribution of monitor signals.

Classes of Monitoring

Monitoring can be divided into four general classes: control room, house, special and maintenance.

Control room monitoring includes the studios directly associated with the control room and its console. This monitoring is for the direct benefit of those involved in the production of the air product.

House monitoring is generally from the off air signal and distribution throughout the station at comfortable listening levels. The signal will be provided at many locations for all to hear and use according to their needs.

Special monitoring would include specific areas or circuits to be monitored, such as a network line or remote line, or perhaps the signal from a sister station.

Maintenance monitoring would encompass all the special techniques and check points used throughout the system.

System Ingredients

Regardless of the size and complexity of the monitor system or systems in use, there are some basic ingredients common to all of them.

In all cases except headphone monitoring, there will be a monitor amplifier. The power output of this amplifier will be dictated by the amount of audio to be distributed and at what levels. The control console monitor is usually a part of the console itself and its power output prescribed by the console manufacturer. This amplifier is basically designed to supply three or four speakers only in the control room and the studios associated with that console.

House monitor systems often make use of high power amplifiers and in some cases, there may be more than one amplifier. Amplifiers for special purpose monitoring, on the other hand, may be a low power unit to supply a single, small speaker.

Speakers will be needed and at

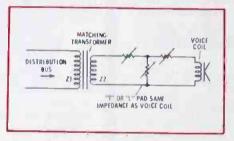


Fig. 1 The T or L speaker pad should be wired between the matching transformer and the volce coil so as not to disturb the bus. The pad impedance should be the same as the voice coil impedance.

many locations. The power handling ability of individual speakers will depend upon how much signal level will be needed at a given location. Many inexpensive speakers and cabinets are available and these have reasonable quality. Yet, there may be some locations, such as a client auditioning room, where a high quality speaker is desired.

Control of signal level at each speaker is most desirable. These controls can either be an operational control mounted on the front of the speaker cabinet or a set up control mounted out of sight at the rear of the speaker. Such controls permit the individual level to be adjusted at a speaker location without

affecting the remainder of the system. In a house monitoring system once the main amplifier level controls have been set, there should be little reason for readjustment.

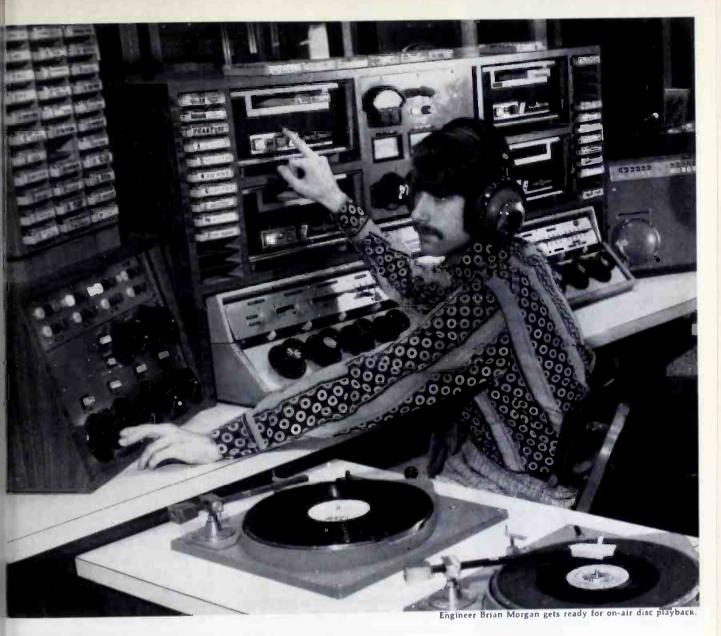
The monitor in the control room will be used to monitor many things, so its level controls will be I adjusted quite regularly. Even so. the speakers associated with the console should have individual b controls at the speaker so they can be adjusted for studio listening levels. A comfortable level in the studio may be entirely too low for control room use. Speaker controls of both the "L" and "T" pad varieties are commercially available. The pad selected should match the speaker impedance and should be wired between the matching transformer and the voice coil.

Impedance matching throughout the system is important. The system must be matched, because a matched system will give an efficient transfer of power and will maintain the correct frequency response. This match must be across the entire speaker system. The amplifier output transformer will ordinarily provide a number of impedance taps. A simple system using one speaker would match or connect the speaker voice coil impedance to that impedance tap on the output transformer. As the system becomes more complex, the impedances become very important.

Aside from the fact speaker systems operate with high currents and transformers, they are the amplifier load and can be computed by using Ohm's law. Thus, in a one speaker system using an 8 Ohm voice coil connected to the 8 Ohm tap of the amplifier, the system is matched and an efficient transfer of power will take place.

If a second 8 Ohm speaker is connected in parallel with the first speaker, the combined load impedance is now 4 Ohms and a mis-

*BE Maintenance Editor



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The Stanton Dynaphase headsets seen in both photos, enjoy professional acceptance for their true and full-bodied reproduction. They are lightweight and comfortable.

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ELECTRONIC PRODUCTS, INC. 1568 NORTH SIERRA VISTA. FRESNO. CALIFORNIA 93703 • Phone: 209 251-4213 A Subsidiary of CCA match has occurred. Adding two more 8 Ohm speakers in parallel with the original two, the load impedance on the amplifier is now 2 Ohms instead of 8 Ohms. The power transfer is now very inefficient.

Correction of the mismatch can be by either of two methods. First, move the connection or the output transformer to the 2 Ohm tap (if such is available) or add a matching transformer at each speaker.

The packaged systems often supplied with the console will include matching transformers in each speaker. The monitor output impedance of the console may be listed at 16 Ohms. This is generally set up for four speakers. You might conclude from these specifications that the tap on the monitor output transformer is set for 16 Ohms; instead, it is set for 4 Ohms. This anticipates that the amplifier will "see" four 16 Ohm speakers in parallel or 4 Ohms. Since most speaker voice coil impedances are 6 to 8 Ohms, it would require a matching transformer to translate the 6 or 8 Ohm to the 16 Ohm impedance.

Amplifiers designed for use in broadcast stations usually have a large number of impedance taps available, while those designed for Public Address work often have fewer taps. Small amounts of mismatch will not be noticeable as the amplifiers usually have enough reserve gain to make up for the loss caused by mismatch. Only when the system becomes more complex and there is little attention to

matching will the problems become serious. If the mismatch is very far off, the amplifier output tubes may be seriously overloaded, resulting in distortion, short tube life or short transistor life. At this point it might be well to say that tubes are more tolerant of an overload and still come back for more. Transistors are not so tolerant and will probably fail.

The distribution system is a very important ingredient in a complex speaker system. Any low impedance, power circuit will carry high current. This can easily be computed by Ohm's law. Thus, the resistance of the connecting wire rises in importance with the length of the wire. Power will be lost in long runs of high resistance wire.

As a matter of practice, when a very low impedance is to be used on a long wire run, the wire should be fairly heavy so as to reduce wire losses from the high current. An alternative method would be to use a higher impedance run and a matching transformer at the speaker. The higher impedance will produce a lower current circuit and the transformer will restore the circuit at the speaker. One can go as high as 600 Ohms if a transformer is available to match 600 Ohms to the voice coil. Go to higher impedances than 600 Ohms and other problems will arise, with frequency response due to capacity of the wire shunted across the signal.

The 70.7 Volt System

The constant voltage system used in Public Address systems

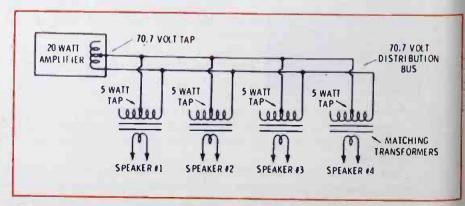


Fig. 2 Components of the 70.7 volt constant voltage bus. The power taps on each transformer are set for the power required at each speaker. The total of all the taps along the bus should equal the power rating of the amplifier.

the used in a house monitoring tem. In recent years, the 25 lt system has also come into us. Transformers in the constant tage system are marked in poweraps rather than impedance taps. So markings allow the system digner a simpler method and reduce computation to a minimum.

The amplifier output transformer marked in either 70.7 Volt or 25 blt tap. The system is based on a nstant voltage bus at the maxiim output of the amplifier into a operly matched load. While most plifiers are not operated at their nximum output power, some lge systems may do so. Generalit is better to have some reserve the amplifier rather than operate mat its maximum rating. In the instant voltage system, the total eaker power load must be made ual to the maximum rated power itput of the amplifier-even ough the amplifier may not opere at its maximum power.

Speaker Selection

Installation or design of a speakdistribution system is a simple latter, if you select components ecifically marked for one of the instant voltage systems. Each eaker transformer will have its imary taps marked in power, hile the secondary will have taps match various speaker impedices.

In the system installation, simply innect the primary taps to the ed bus at the power level selected r that speaker. The only requireent is that the sum of all the

speaker power taps must equal the amplifier maximum rated power output.

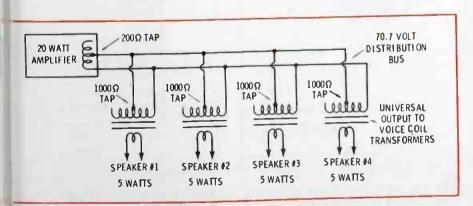
For example, a 50 Watt rated amplifier and 10 speakers will be used in a system and each speaker will receive equal power. 50 Watts divided by 10 speakers will be 5 Watts to each speaker. The tap on each transformer will be set to the 5 Watt position. Unequal distribution of power can just as easily be made, just so long as the total power taps equal the maximum rated output of the amplifier. There is no need to worry about the actual power rating of the speaker transformer since there will be no tap higher than what it can actually handle:

You can still use a constant voltage system even though components are not on hand or readily available that are marked for the system. A little more computation is required, some good quality universal output to voice coil transformers of adequate power rating, and an amplifier with a suitable impedance tap. These are the same basic components that go into the constant voltage system with the difference of markings.

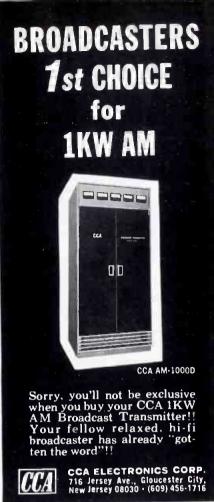
A Constant Voltage System With Unmarked Components

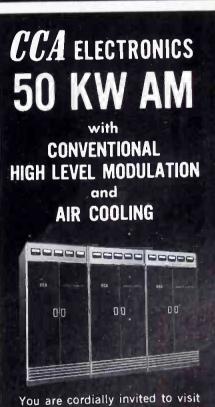
Here is how to design a constant voltage system with "unmarked" components. The 70.7 Volt system will be used.

The first thing is the amplifier and its output transformer and as-



Indeed, and the substant voltage distribution bus using unmarked components. The output inpedance tap on the amp is found by computation. The primary impedance tap of each matching transformer also by computation. Otherwise, this system is identical to that shown in figure 2.





our plant and watch the AM

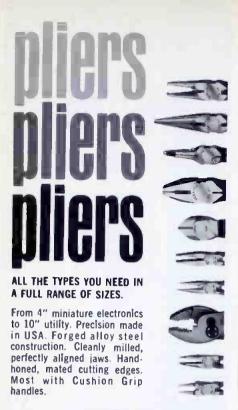
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suming the amplifier has no tap marked 70.7 or 25 Volt system. Compute the impedance tap required on the output transformer by the use of ordinary power formulas. $Z = E^2/P$. P is the amplifier maximum output power rating, E is the bus voltage, Z will be the impedance tap on the output transformer. For example, a 50 Watt amplifier and a 70.7 Volt line. $Z = 70.7 \times 70.7 / 50 = 5,000 \text{ (approx)/50} = 100 \text{ Ohms. Find a tap as near to } 100 \text{ Ohms as possible.}$

You should note that since the design is for a constant voltage bus, the impedance will change directly with the amplifier power rating. In our previous example, if there is no 100 Ohm tap available, you can try for a 25 Volt system. The impedance for the 25 Volt system would be: $Z = 25 \times 25 / 50 = 625/50 = 12.5$ Ohms. The amplifier would most likely have a tap very close to this, so a 25 Volt system could be used.

As was stated earlier, the impedance tap will vary with the amplifier output rating. To demonstrate this, assume a 25 Watt amplifier: Z = 5000/25 = 200 Ohms for a 70.7 Volt system, and Z = 625/25 = 25 Ohms for the 25 Volt system. It is obvious that there is no "standard" impedance for a constant voltage bus. A statement could be made that any amplifier of a given maximum power output rating will

have one impedance value for 70.7 Volt system, and one impedance value for a 25 Volt system.

In normal use, the voltage on th bus will certainly not be constar and may not be anywhere near th 70.7 Volt figure. The constant volt age figure is a maximum design figure, just as the amplifier maximum power output is a design figure For example, a 100 Watt amplifie is supplying a 70.7 Volt bus. Th output impedance tap will be 5 Ohms.

In operation, the amplifier gain controls may be set so that the amplifier is actually supplying only 50 Watts to the bus and load. B use of power formulas: $E = \sqrt{P_{\lambda}}$ = $\sqrt{50}$ \times 50 = 50 Volts. Thus, al though the design is for a 70.7 Vol system, the bus voltage is actually only 50 Volts. In the computations 5,000 is used. This figure is easie to remember and work problem than 4998.49, which is the true square value of 70.7. The error i small enough to cause no problem in the system. The 25 Volt figure squares out evenly to 625.

Going back to our original system design, we now know that our 50 Watt amplifier needs a 100 Ohm output tap to supply a 70.7 Voltbus. Assume the amplifier does have such an impedence tap, we can now design the speaker system. Also, assume that no constant voltage transformers are available.

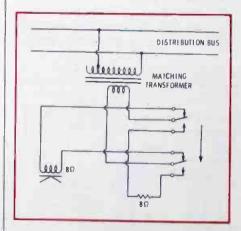


Fig. 4 A simple switch at a speaker location. The switch should be placed between the matching transformer and the voice coil. The switch substitutes a resistor equal in value to the voice coil impedance to keep a constant load on the amplifier.

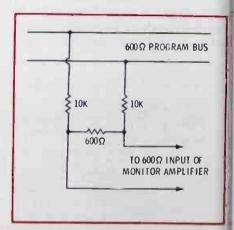


Fig. 5 A simple bridging connection to a program bus with fixed resistors. The low impedance input of the monitor amplifier will have no effect upon the bus. The values shown will drop the program level of the monitor about 20 dB.

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without ordering some, while there are a number of good quality universal output transformers available on the shelf.

Here again, we can use ordinary power formulas to arrive at the correct primary impedance taps on each transformer. We will use the same power formula as just used to find the output impedance of the amplifier transformer, except this time, the power figure in the formula will be the power desired in that speaker.

The impedance factor of the formula will be the primary tap of the transformer, while the voltage will be the bus voltage. Thus: $Z = E^2/P$ or $P = E^2/Z$. Our system has a 50 Watt amplifier and there will be 8 speakers and there will be unequal power distribution. There will be (2) 10 Watt, (1) 7.5 Watt, (1) 2.5 Watt, (4) 5 Watt speaker locations. The total of this wattage distribution equals 50 Watts, the am-

plifier maximum rating.

Using the formula, the primary impedance tap for the 10 Watt speaker will be: $Z = E^2/P = 5000/10 = 500$ Ohms. The 7.5 Watt speaker will be: 5000/7.5 = 640 Ohms, etc. Of course, if a 25 Volt system was to be used, the 25 Volt figure would be used instead of 70.7 Volts.

Maintenance

Control room system: Speakers fed from the console monitor amplifier usually number only 3 or 4. These are located in the control room and studios. It is necessary that the studio speaker be muted when a microphone is opened in the studio, otherwise, there will be positive feedback. Relays normally do this muting and are located inside the console. When these speakers are muted by the relay, the relay disconnects the speaker and substitutes a resistance in its

place so that the load on the amplitude fier will remain constant. If th were not done, the level of the unmuted speakers would increased Should it be necessary to replace one of these resistors for some rei or son, the replacement resistors should have a value equal to the speaker load impedance. This va ue would be the input value of the matching transformer, and not the voice coil impedance. Thus, if the input impedance of the transformer is 16 Ohms, the resistor should be 16 Ohms. Also, it should have power rating equal to the speaker power rating.

Switch Mute: Sometimes it may be desirable to shut a speaker of completely in a studio. There may be times when someone is reheared ing and the air program would be distraction. Many of the "T" and "L" pads for speaker use will not like completely shut the speaker off. Simple switch arrangement can built at the speaker location which will completely mute the speaker of the switch should substitute a resistor of the proper value and power rating in place of the speaker.

Jacks: If the individual studious speakers do not have a cutout switch in the studio, the speakers input leads should be routered through a jack field. Should the mute relay become defective for any reason during a program, may patch cord plugged into the jack will open the speaker. A plug with a terminating resistor could be used a also to plug into the jack and terminate the amplifier, so the amplificilly load would remain constant.

Muting relays: These will giv problems when the contacts be come dirty. The sound in the speaker can become intermittent of distorted. Contacts should be cleaned with a small relay burnishing tool if the monitor amplifier cap be turned off. If the amplifier cannot be turned off, a piece of paperun between the contacts will ofte do the job. It is especially important with transistors in the outpustages that the output does not become shorted. This can blow the transistors.

Other systems: There may be sit uations where a separate monitor is out

(Continued on page 88

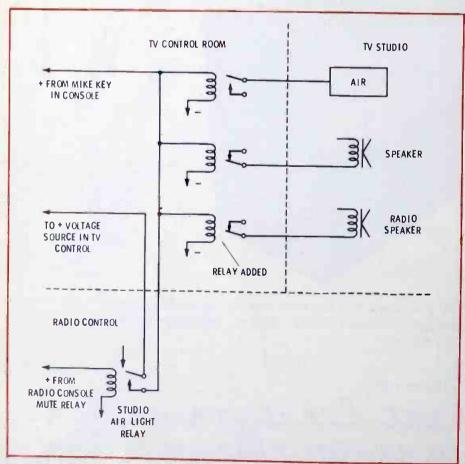


Fig. 6 A single studio in use for two different services can be muted from either Control Room by the addition of a single relay. Turning on a mike key in either console will operate all the necessary relays.

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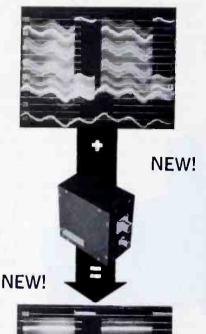
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All of the television pictures from the various venues coming through individual mobile vans or fixed studio installations, will be relayed by microwave units to receivers on the lower deck of the Munich Television Tower (Fersehturm). This almost 900 foot tower located near the television switching center within the Olympic site, will act as the major relay point for incoming and outgoing signals. The upper deck of the tower adjacent to the television transmitting aftenna, will provide a superb platform for a few TV cameras that can scan the whole area from a unique angle.

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Television Firsts At The Summer Olympics XI Olympiad Berlin 1936 First use of television First mobile TV unit First monochrome receivers

XVII Olympiad Rome 1960

First multiple site coverage First video tape recording First network transmission First monochrome standards conversion First video tape editing

5/5/995 a.

XVIII Olympiad Tokyo 1964
First color coverage
First satellite transmission
First monochrome slow and stop

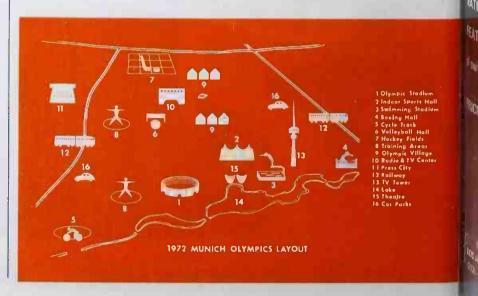
motion
First separate luminance color camera

First color video tape recording First electronic VTR editing First helical recording (monochrome)

XVIV Olympiad Mexico City 1968
First portable color cameras
First portable quad VTR's
First disc slow/stop instant
replay
First 3 continent satellite
hook-up
First electronic color standards
conversion

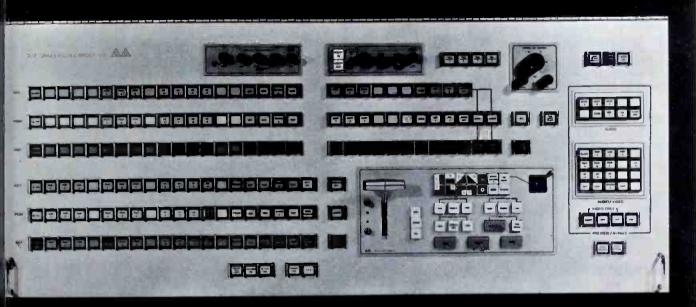
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Operator Rules Change Update

A. D. Ring & Associates, a consulting firm located in Washington, D. C., has put together some reference material we think will be especially important to management and engineering.

Last month we went into a review of the new operator rules and included several charts that should help each station understand how the rules will affect them. In this issue we want to expand that coverage of the rules to include a chart that can be used as a reference guide for the new and old FCC rules regarding operator requirements.

We also are emphasizing management here, because it is the responsibility of the station licensee to insure that each operator is fully instructed in the performance of all the required adjustments as well as in other required duties (such as reading meters and making log entires).

This responsibility includes making certain that printed step-bystep instructions for those adjustments the lesser grade operator is permitted to make, and a tabulation or chart of upper and lower limits required to be observed and logged, shall be posted at the operating position.

The emmissions of the station shall be terminated immediately when the transmitting system is observed operating beyond the posted parameters, or in any manner inconsistent with the rules of the station authorization and these adjustments are not effective in correcting the improper condition when a First Class Operator is not on duty.

At all FM broadcast stations, a complete inspection of the transmitting system and required monitoring equipment in use shall be made by an operator holding a First Class license at least once

each day, five days a week, with a rinterval of not less than 12 hourd between successive inspections.

This inspection shall included such tests, adjustments, and r b pairs as may be necessary to insure operation in conformance with the provisions of the current stational authorization.

In all cases, it pays for the owner and/or manager to know the Part 1 is Rules. The FCC does expect your to know. If there are other types to reference material that would be helpful, drop the editor a line and we will do our best to include it in lighter issue.

Rule Changes Chart And Forms—See Pages 34, 46

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	changes; modulation level.	BRIGARY BRIGARY)	(Manny)	(EXEXEXE)	I	73.934	19 245 (QUY)	2	73 & Sex(2/1)	_		_	3.565(e.m.)	75 % 5(e)
	requiring manual restoration; James voltage, plate current, afterna or common point or annual restoration; fraction:	73.93(4)	75.93(4)	73 934)	-	73.9315	73 245(c)	73.265ie	73 265ie)	73.565(e)	73.565(c)	73 545.0	73 54516)	73 746.0
			13.113	73.113	ļ	73.115	73.283	73.283	73.283	73 503	73.583	_	_	73.563
		1		7393(6)		73.95/61	1			1	1	1	1	1
	Management requirements for stations using reduced classes of operators													
	A If contract first-class operators are employed, file contracts.			I										
	B If DA or high bower, assign chief operator and file contracts;	73.75(c)		1		73.93(c)	73.265(c)	1	73.265(c)	73.5650)	73.545(c)	73.565(c)	-	73.565(c)
	C Give chief operator authority and facilities to supervise station		73.93(d)	73.73 (4)	1	73,93(4)	Ī	73.265(4)	73.265(4)		I		73.54514) 7	73.565141
	D Post written instructions for duty operators.	1	73 93 (h)(z) 73 93 (h)(z)	73 93 (A)(Z)		73.93(4)(2)		73.265(4)	75.265(4)	1	I		73.545 WX3) 7.	13.545(dX3)
	E Measure field strength at monitoring points at least once each 30 days	73 9319) 7	73.73(3)	_		73.93493	73.2654)	73.265(5)	79.265(5)	73.565(€)	73.56546)	73.545(6) 7	73.545(4) 7.	73.56.5(5)
	F Make partial proof of performance each year.	1		73. 9 3ke X5) 2	LICENSE 7	73 93(e)(5)	I	1	Ī	-	1		1	1
				77 93(e)(5)		73.46(4)	1			-	I		1	I
														1

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RPT-40 TRANSMITTER



R-30/150 RECEIVER

FEATURES All Solid State ★ Direct FM Modulator ★ 40 Watts RF Output ★ 4 Audio Mixing Inputs ★ Plug-in Modular Construction * Broadcast Quality - Continuous Duty * Completely Self Contained.

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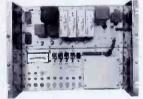
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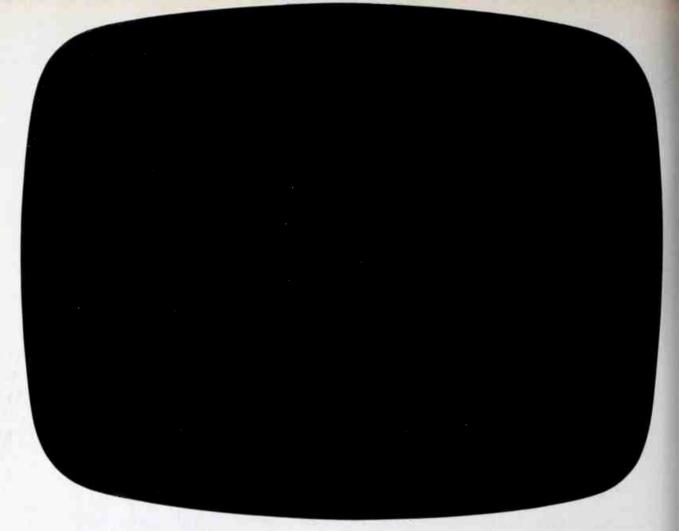
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That's where Onan standby power comes in. It provides "insurance" against a crippling power outage.

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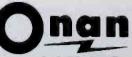
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Choosing professional audio controls involves complex compromises between noise, life, accuracy, and price. No one design can achieve all the alternatives. To satisfy all requirements, a full range of attenuator models is required, and that's what Waters offers: a complete line of attenuators, all of which feature MystR® —a proprietary conductive plastic resistance element.

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MystR's glass-hard, smooth wlping surface achieves noise levels below $20\mu V$ (at least 100db down) over a trouble-free life of at least ten million operations.

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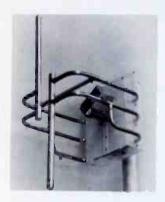
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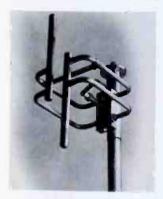
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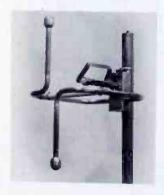
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Network Election Coverage

By Robert Burns

The major change in election coverage in 1972 is utilization of the newly developed televisioncompatible character generator by ABC and CBS. The unit provides a real time capability with a signal format that is ready for broadcast without the use of a camera to convert artwork or titles into video signals. Early character generators could convert computer-generated, dot matrix characters, into video signals. But, there was some problem with the standard dot pattern when it appeared on the home screen. It lacked clarity and flexibility as to the style of type and character size available.

With the development of the CBS Laboratories stroke matrix concept, a display that looks like a graphic display was evolved. This produces electronic characters that are both flexible and legible. The character generator can be interfaced with a computer and provides an instantaneous "on the air" reporting system.

The Vidifont system eliminates the need for graphic arts and "flapboard" systems that do not have the flexibility and immediacy required for news reporting.

Old Method

Incoming votes on N.E.S. (National Election Service) lines (they were five minute updates) were printed out on teletype machines and physically carried across the studio to a "Solari" board operator who operated thumb switches to physically set up the boards. The director then had a cameraman show the board and the director would then cue the camera for "on the air". This meant a delay of almost two minutes for up-dating vote totals.

The titles (lower third) were prepared by the art department and 35mm slides were made. They were then loaded into a carousel projector. The director would call for graphics for a particular title. Il graphics called for slide No. 152 for example, a camera would be focused on slide No. 152 on the screen. The director would ther cue control to switch to the slide.

New Method

To update the returns as soon as possible directly on screen with 51 presidential and 52 senator/gubernatorial races in 1972 there is a requirement for 103 separate for mats or "boards". At ABC these boards can be called up by any of the 16 terminals on demand. The terminals are:

- 10 Anchor support position (2 each)
 - 2 Central control room
 - 2 Computer Central
 - 2 Spare units

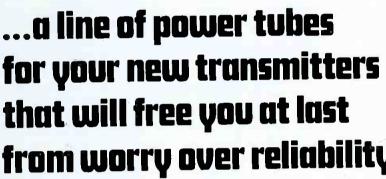
The time required for any or all terminals to ask for and receive information is less than one second.

This is accomplished by the following: 8 teletype lines from N.E.S. are fed to the mini-computer which has been programmed for each of the 103 board formats. These contain the percent of precincts reporting, the state name and the candidates names. The computer will enter the raw vote total and the percent of the vote calculated up to the instant. The control room terminals, which are located next to the director, control the display that goes on the air. These signals appear at the switcher as video signals, ready for broadcast without the use of any cameras. These signals can be matted, supered, and distributed as any other standard video signal.

The titles (lower third) are also programmed and placed in storage in the computer so that a "hands off" operation is maintained. The director needs only to call up the "board" and the title by having the terminal operator type the required board code and title code and the



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8812	6.25	8.75				
8813	12.5	17.5				
8915	17.5	25.0				

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Delivers 30w RMS/channel at 8Ω Takes 134" rack space, weighs $8\frac{1}{2}$ lbs. IM distortion less than 0.05% from 1/10w to 30w at 8Ω S/N 106dB below 30w output

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D150



Delivers 75w RMS/channel at 8Ω IM distortion less than 0.05% from 0.01w to 75w at 8Ω S/N 110dB below 75w output

S/N 110dB below 75w output Takes 51/4" rack space, weighs 20 lbs. \$429 rack mount

DC300



Delivers 150w RMS/channel at 8Ω IM distortion less than 0.05% from 0.01w - 150w at 8Ω S/N 110dB below 150w output

Lab Standard performance and reliability

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All Crown amplifiers are warranteed 3 years for parts and labor. They are 100% American-made to professional quality standards. All are fully protected against shorts, mismatch and open circuits. Construction is industrial grade for years of continuous operation.



Circle Number 34 on Reader Reply Card

Election Coverage

(Continued from page 38)

complete display will appear all ready for broadcast.

The anchorman has two video monitors at his desk but no computer control terminals. The director can call up any one of the 103 board to check for any major change in votes. He then cues the anchorman about the change and the director cues the control room terminal operator and the particular board is called up. The character generator displays the board and sends the signal to the switcher ready for broadcast.

The predictions desk is used for the specialized group who are completely familiar with selected precincts in each area that are used to forecast the vote. Each person has a monitor that is connected to a computer in New Jersey that has been pre-programmed for specific precincts or states.

In the computer control center, there are two teletype machines and two control terminals. The NES lines come into the center to a patch panel and are connected to the mini-computers and the teletype machines. The programmer is stationed in this area and is responsible for the complete operation. If any of the remote positions fail he can take over and operate the system from the computer center. He will be responsible for any troubles that involve the computer terminals. He will also enter predicted winners as they are given to him via the teletype machine to the computer so that they will appear, as called up, on the boards that are in storage in the mini-computer.

The CBS Vidifont System

The need for real-time visual titles for special events, news, weather and sports has been a problem for broadcasters for a long time. When the dot-matrix display produced by computer terminals was introduced, it provided a step in the right direction. This display lacks the flexibility and clarity desired for normal home viewing.

CBS Laboratories studied the problems and evolved the stroke matrix system of visual display. This creates graphic arts style

characters. It eliminates the need for preparing slides and expensive artwork that cannot be changed without time and money being expended. For independent station that have local origination news and special programs the need for an extensive art department is eliminated. It also frees a camera for other uses since the Vidifon produces video signals that are sen directly to the video switching equipment.

The Vidifont X system now ir production is a second generational unit that uses plug-in modules to give an almost unlimited number of languages and type fonts. The basic system can also provide wordby-word color, automatic centering, vertical roll, horizontal crawl and selective flashing of any particular words or portions of the display. The unit can be used in a very simple configuration or can have several peripheral devices such as a mini-computer that has a storage unit capable of pre-programming as many lines as might be required for any program or series of programs.

The final design of the type fonts had to be analyzed and the final evaluation was made directly from a viewing screen. Certain tradeoffs had to be made in the type fonts in order to prevent degradation that would be unacceptable to the viewer. Since one of the under sirable effects of poor linearity or focus is a build-up of light along the scanning lines, the weight of the horizontal strokes had to be deemphasized. A system of corner dots at all of the inside corners is used to minimize the effects of halation and flux. These dots absorb the excess light which tends to build up at the letter stroke intersections.

The upper and lower case letters are 28 TV scan lines high and the smaller, upper case only, letters are 18 lines height. The proportional characters and spacing make it easier for the viewer to distinguish between characters.

Although many of the candidates' faces will be the same as in 1968, the "type" faces on television screens will be new.

w showing...the Reliables

monochrome r features three n rackmount ation. Small size eless rack space lar units and nonitoring of 3 video signals. lity, all-purpose with Setchell JNIT-IZED® ircuit modules.

New 10" monochrome video monitors offer horizontal resolution of 640 lines or better plus 100% solid-state circuitry for long-life reliability. Unit is available in rackmount or in attractive metal cabinet. A 12" model is also available.

In addition to 640-line resolution, the 16" monochrome monitors have all major operating controls located on the front panel for ease of operation. Front-panel screwdriver adjustments for vertical linearity, vertical height, and focus provide protection against accidental misadjustment.

Nineteen inch monochrome video monitors offer traditional Setchell Carlson quality, including exclusive UNIT-IZED® plug-in circuit modules for easy maintenance. Horizontal resolution is 640 lines or better. Available in rackmount or attractive cabinet models

Professional quality 19" color video monitors offer broadcast quality at a modest price. Horizontal resolution is 300 lines (color) and all set-up controls are located behind a hinged front panel to prevent accidental misadjustment. Also available in 25" model.





















monochrome onitor offers lat picture quality active styling at a cost. Circuitry is olid-state and the ctal resolution is 640 lines or Monitor has a tof applications **Inultitude of** ional-quality

Regulated circuitry in the 25" color monitor provides extremely stable operation and prevents raster size or brightness deviations due to line voltage fluctuations. Horizontal resolution is 300 lines (color). Set-up and operating controls are front-mounted for ease of operation.

"Educator" Monitor/ Receiver, 23" monochrome model, is designed specifically for educational and training applications. Controls are front-located. Tamper-proof control compartment door with lock is optional. Horizontal resolution is 600 lines or better with video signal input. Also available in 25" color

The Color "Educator" is a 25" model offering big-screen, sparkling color - 300-line (color) resolution - plus big-room audio. Designed specifically for educational and training applications, the "Educator" series Monitor/Receivers offer the utmost in reliability, flexibility, and ease of operation.

Setchell Carlson's solid-state UHF/VHF television receiver and RF demodulator provides a high-quality composite video signal and separate audio signal, assuring excellent monochrome and color picture quality. It is ideal for video recording and as a signal source for video monitors.

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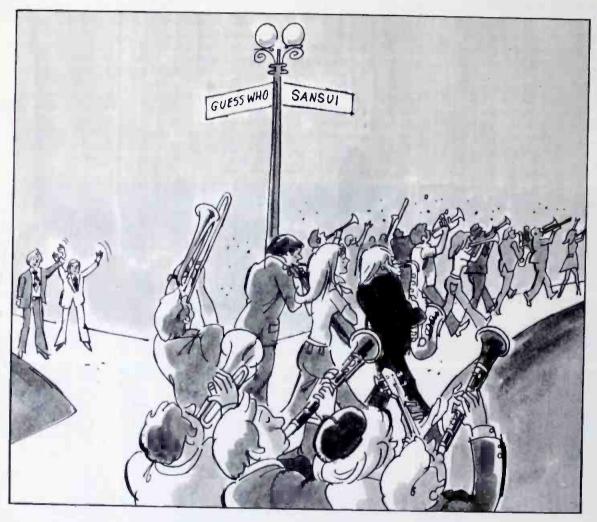
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look who's going



You may have heard it already—or you may not have—but more and more recording artists, more and more recording labels, and more and more engineers and producers are using Sansui's QS four-channel technique to encode their records in the four-channel mode. The list, growing from week to week, is quite impressive. But more important than the list itself is the fact that all these independent artists and companies have conducted extensive testing and actual use procedures before they made up their minds. What speaks for Sansui's QS System is not the pressure of a major software company nor exaggerated statements and promises; it's simply the performance.

Whether it is such an outstanding artist as Carole King or Joan Baez; or perhaps eminent musicians and producers like Enoch Light or Dick Schory add to the list such a beloved figure as B. B. King—they all are going Sansui's QS way because they think it is the best way. Some of these artists have actually produced with other matrix four-channel encoding methods, but have found that the most satisfactory results, in terms of the freedom of the producer and the artistic results, are in the one and only balanced and symmetrical system—that is, Sansui's QS method.

e QS way - and why

(Report on the Sansui QS Coding System)

here are now almost three hundred - yes, three undred - Sansui-type matrixed four-channel recrd albums available all over the world, most of nem encoded with Sansui QS encoders. In this ountry alone, almost 30 albums are already on the parket. And we hate to hold anything back from you, ut there are a number of artists who will, in the very ear future, be on the market with their QS fourhannel recordings. Also, major labels.

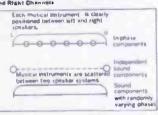
While we do not know the particular reasons each f these artists and producers selected Sansul's QS system, we know that it could be any or all of those numerated here. These are the qualifications that nake Sansui's QS matrix system uniquely efficient nd effective and musically satisfying. In fact, we elieve Sansui's QS System is the only matrix sysiem that can claim that it has no known major drawacks, that are not subject to refinement. These are he features of Sansui's QS system:

TOTAL, ACCURATE SOUND-SOURCE LOCALIZA-FION in every direction and at any point inside the sound field. No dropouts, cancellations or Irritating shifts in position. The "overhead" effect, with a per-

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former in the dead center. is readily achieved. This means there are no problems about having to place performers in some positions and avoiding other areas. It means that the total acoustic perspective is the same as that for discrete tape.

TOTAL COMPATIBILITY. Sansui's QS Coding Sysem is compatible with two-channel stereo playback of encoded recordings. With four-channel playback (ambience synthesis) of conventional twochannel recordings. With other matrix decoders. With all existing home hardware and with all existing Location of Verious Bound Components in Laft and Right Channels



professional equipment. With present broadcast standards and equipment.

There are many important implications in this comprehensive situation. For

example, when QS-encoded material is played back in conventional two-channel stereo, it produces an entirely correct stereo perspective. The rear-channel information serves to produce a broadened and enhanced stereo perspective instead of jamming rear-channel information unnaturally into the wrong places to confuse directionality and obscure the stereo effect.

We believe that it is in the interest of the entire industry that the very best system be selected, regardless of politics, regardless of cross-currents and undercurrents, regardless of alliances and pride or even some dent in someone's reputation.

We have no other ax to grind than to play the fiddle that will make the best music for the industry. If you care to know more about Sansui's QS System, please contact our New York office for a demonstration and materials. It may interest you that the RIAJ (Record Industry Association of Japan) has adopted the Sansui system under the name of Regular Matrix to be the standard for recordings in Japan. An application for acceptance of our standards is now with the Recording Industry Association of America.

It's no wonder, then, that everybody who is anybody in the four-channel medium is going the QS way. Why not join the trend? The QS encoder is very simple to adjust, easy to use and reliable. Try It. Check out our claims with your own material, in your own way. Learn for yourself what the present members of the Sansui QS bandwagon have already discovered.

Labels Using Sansui QS Encoding

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The Washington office of the FCC is: 1919 M Street N.W., Washington, D.C. 20554. Their information number is 632-0002.

DISTRICT OFFICES

Field Engineering Bureau

District No. 1

Gerard Sarno, Engineer-in-Charge, Customhouse, Boston, Mass. (02109). Phone: 233-6608.

District No. 2

Henry Paulisen, Engineer-ii Charge, Federal Bldg., New You City, (10014). Phone: 620-5745.

District No. 3

Vernon P. Wilson, Engineer-in Charge, U.S. Customhouse, Phi adelphia, Pa. (19106). Phono 597-4410.

District No. 4

Benjamin Berkowitz, Enginee in-Charge, 819 Federal Bldg Baltimore, Md. (21201). Phone 962-2727.

(Continued on page 4



Circle Number 200 on Reader Reply Card

Revised Section 73.93(g) of the Commission's rules now requires that a notice similar to the following be posted at the operating position of all radio stations whenever a lesser grade operator is on duty:

Duty operators holding second-class ticenses or thirdclass permits endorsed for broadcast operation are permitted to make only the following adjustments:

- 1. Turn the transmitter on and off
- Compensate for voltage fluctuations in the primary power supply (to maintain station power within the licensed value)
- Maintain modulation levels within prescribed limits
- 4. Change power as required by the license
- Change from directional to non-directional operation and vice versa, or change from one directional pattern to another. (You are not permitted to tune the transmitter final amplifier or to make any adjustment to the antenna phasor.)

The transmitter must be turned off immediately whenever the limits listed below are exceeded, if a first-class radiotelephone operator is not present:

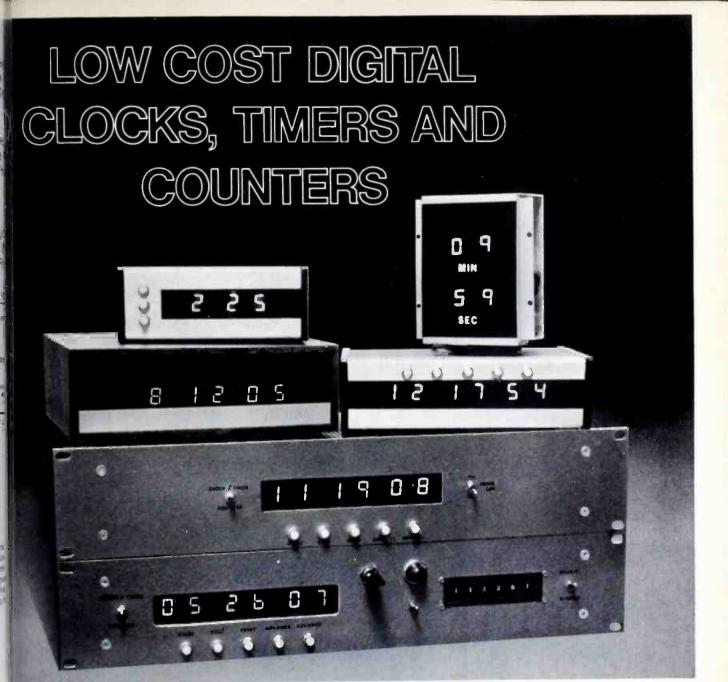
Non-Directional Operation (AM):

Antenna Base Current

		Antenna B	ase current		
Night			Day		
Limit A	Licensed Value	Upper Limit	Lower <u>Limit</u> A	Licensed Value	Upper Limit
Direction	al Operation (A				
		Common P	oint Current'		
Night		-	Day		
Lower Limit A	Licensed Value	Upper Limit	Lower Limit	Licensed Value	Upper Limit
		Antenna or Remot	e Antenna Current'		
	Night		Day		

Lower Licensed Upper Limit A A A

"The antenna base current for non-directional operation and the common point current must be no more than 5% below nor more than 2.5% above the license values, individual entenne currents for directional operation.



ESE digitals are designed and constructed using the latest solid state extronic components and circuitry. This equipment is perhaps the most nomical line of digital clocks, timers and counters available. Circuit efficacy and lasting quality are designed into every ESE digital product. Constucted with the built-in ruggedness necessary for studio use. No moving parts.

who unique display configuration, 12 and 24 hour clocks or timers, 10 minute hers, 3 digit, 4 digit, 6 digit, record seconds in tenths, hundredths or tusandths... Even a station ID reminder, all available from ESE. Options hude: Thumbwheel switch programming, BCD outputs, relay closure outputs, 1 solid state buffered outputs. Many products available in kit form.

THESE STANDARD ESE PRODUCTS ARE AVAILABLE FOR IMMEDIATE SHIPMENT:

MINIER DEE TON MINIE THE TENTE	
ES-112/124, 12 hour or 24 hour clock: 6 digit — Records hours, minutes, seconds	100.00
ES-300, 100 minute up/down counter: Displays up to 99:59 — Easy pushbutton: Reset — Count up — Count down — Advance seconds — Advance minutes — Stop.	125.00
ES-400, 10 minute timer: Displays up to 9:59 — Pushbutton: Start — Stop — Reset	68.50
ES-500, 12 hour clock/timer: 6 digit — Records hours, minutes, seconds. Start — Stop — Reset — Slow and Fast Advance buttons. Displays up to 12:59:59	110.00
ES-510, 60 minute timer: Displays up to 59:59 — Push- button: Start — Stop — Reset, Only 33/4" deep for flush	95.00

WRITE, WIRE OR CALL TODAY FOR DETAILS:



506 MAIN ST. • EL SEGUNDO, CA. 90245 / (213) 772-6176

FCC Offices (Continued from page 44)

District No. 5

J. J. Freeman, Engineer-in-Charge, Military Circle, 870 N. Military Hwy., Norfolk, Va. (23502). Phone: 420-5100.

District No. 6

Arthur T. Cline, Jr., Engineer-in-Charge, 1602 Gas Light Tower, 235 Peachtree St., Atlanta, Ga. (30303). Phone: 526-6381.

District No. 7

Arthur G. Gilbert, Engineer-in-Charge, 51 S.W. First Ave., Miami, Fla. (33130). Phone: 350-5541.

District No. 8

William J. Simpson, Engineerin-Charge, Federal Office Bldg., New Orleans, La. (70130). Phone: 527-2094.

District No. 9

(Vacancy), Engineer-in-Charge, New Federal Office Bldg., Houston, Tex. (77002). Phone: 226-4306.

District No. 10

Gerald M. Howard, Engineer-in-Charge, New Federal Court-house & Office Bldg., Dallas, Tex. (75202). Phone: 749-3244.

District No. 11

J. Lee Smith, Engineer-in-Charge, Room 1758, U.S. Court-house, 312 N. Spring St., Los Angeles, Calif. (90012). Phone: 688-3276.

District No. 12

Ney R. Landry, Engineer-in-Charge, Customhouse, San Francisco, Calif., (94111). Phone: 556-7700.

District No. 13

Francis H. McCann, Engineer-in-Charge, 314 Multnomah Bldg., 319 S.W. Pine St., Portland, Ore. (97204) Phone: 221-3097.

District No. 14

Robert C. Dietsch, Engineer-in-Charge, 8012 Federal Office Bldg., First Ave. & Marion, Seattle, Wash. (98104). Phone: 442-7653.

District No. 15

Warren D. George, Enginee in-Charge, New Customhouse Denver, Colo. (80202). Phone 837-4053.

District No. 16

Harold E. Allen, Engineer-in Charge, 691 Federal Bldg. & U.S Courthouse, 4th & Robert Sts St. Paul, Minn. (55101). Phone 725-7819.

District No. 17

Paul F. Hampton, Engineer-in Charge, Federal Bldg., Kansa City, Mo. (64106). Phone: 374 5526.

District No. 18

Ernest J. Galins, Engineer-in Charge, 1872 Everett McKinle Dirksen Bldg., 219 S. Dearbon St., Chicago, III. (60604). Phone 353-5388.

District No. 19

Edward Atems, Engineer-in Charge, Federal Bldg., Detroit Mich. (48226). Phone: 226-6077.

(Continued on page 82)

Meve installs consoles in hoursnot weeks



Neve Console in André Perry's Studio "A," Montreal, Canada.

Rupert Neve, Inc.: Berkshire Industrial Park, Bethel, Conn. 06801. (203) 744-6230. Hollywood: Suite 616, 1800 N. Highland Ave., Hollywood, Ca. 90028. (213) 465-4822. Rupert Neve & Co., Ltd., Cambridge House, Melbourn, Royston, Herts, England. Rupert Neve of Canada, Ltd., P.O. Box 182, Etobicoke, Ontario, Canada.

Can't believe it? We'll prove it.

Neve can install a sophisticated, perfected, thoroughly tested Sound Mixing Console (like the one shown) in your studio in less than a day.

So you can start using it immediately. Instead of waiting indefinitely.

Reason: All modular components are built precisely to specs. Designed for ultra-fast installation. Another surprise: no bother with in-studio modifications later on. Neve Console craftsmanship is unmatched. For example: fantastically low distortion (never above 0.075% at 1 kHz).

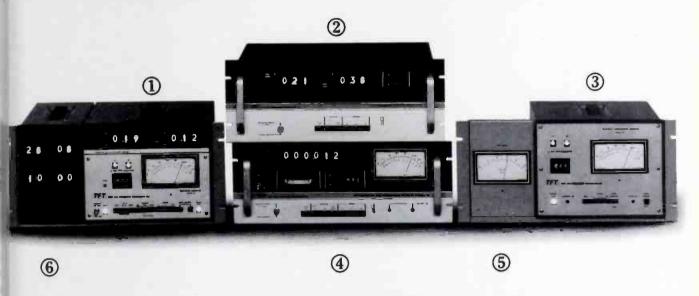
On-time delivery? It's always a matter of policy with Neve. And a matter of honor as well. We'll custom-design a console for your particular needs. We also offer a wide choice of stock audio control consoles. Neve Consoles are used in major studios for music recording, broadcasting, ad commercial, and motion picture production — in 24 countries.

The sound of Neve is world wide. Write for more facts. Now. You'll never be disappointed — with Neve.

Neve

Write for Bulletin BE-1

UHF-VHF TV and AM monitors optimized for remote operations



TFT's 3rd generation monitors give you off-the-air monitoring without an RF amplifier. Result? A significant reduction in the interference problems caused by the intermodulation products of undesirable signals. And that's only part of the story. TFT instruments are wow accepted as the standard of the broadcast industry convenience, reliability and accuracy.

) Model 701 TV Frequency and Modulation Monitor

onitors visual and aural frequency and percent aural odulation off-the-air: 250 $\mu\nu$ sensitivity. Digital readout frequency errors with 1 Hz resolution. Internal time ase stability is 1 PPM/year. Useable as 6-digit pression frequency counter to 10 MHz input. FCC Type oproval 3-187.

2) Model 709 TV Frequency Only

state-of-the-art instrument for non-remote monitoring f aural, visual and inter-carrier frequency: 500 mv ensitivity. Has all the performance and convenience latures of the Model 701 frequency capability. An conomical way to upgrade operations at stations with xisting aural modulation monitoring capability.

Model 702 TV Aural Modulation Only

onitors percent aural modulation: 250 μv sensitivity. leal for stations which need to add remote aural moniring capability to existing frequency monitoring equipent. FCC Type Approval 3-189.

ther 701 and 702 Features

Demodulation of aural modulation from inter-carrier.

Exclusive "aural carrier only" switch for detecting Inter-carrier noise.

Digitally-settable flashers display plus and minus peaks simultaneously.

Built-in aural modulation calibrator.

Provision for SCA output.

(4) Model 713 AM Broadcast Monitor

Monitors carrier frequency and percent aural modulation off-the-air: 2.5 mv sensitivity. And digital display of frequency error. Frequency accuracy is ± 2 Hz per year. Instrument also has digitally-settable peak flashers to 129% positive peak, and a 100% negative peak modulation indicator.

Like the Models 701 and 709, the 713 can be used as a precision 6-digit frequency counter to 10 MHz. Other features include built-in modulation calibrator; remote meter and peak flasher outputs; and provision for automatic logging, BCD or analog outputs. Options include off-frequency alarm and +5% and -10% carrier level and carrier off alarm. FCC Type Approval 3-195.

ACCESSORIES

(5) AGC Meter

Indicates relative input level. Meter is driven by AGC circuits of the Model 701 or Model 702.

6 Model 725 Automatic Logging Adapter and Digital Clock

Converts visual carrier and inter-carrier measurements to analog signals. Also has digital clock showing day, hours, minutes, and seconds. Clock has BCD outputs to drive parallel clocks or a character generator for displaying information on TV monitor screens. Model 725 clock holds a stability of ± 10 seconds per year. Version also available (Model 725A) with super stable time base (frequency stability of 1 x 10 $^{-9}$ per day).

(7) Model 704 and 704A Remote Panels (not shown)

Duplicates Modulation Meter and Peak Modulation lamps of monitor. FCC Type Approved.

NOTE: TFT Monitors comply with all relevant FCC requirements for local and remote monitoring.

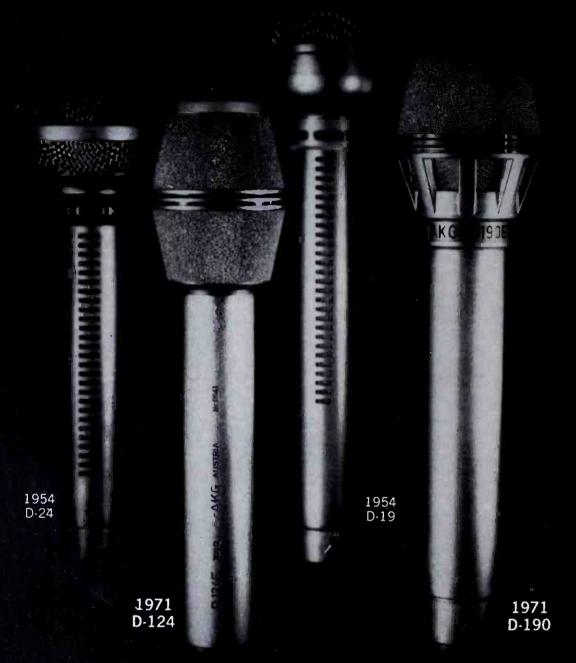
For complete specifications on TFT's optimized remote monitors, and/or a demonstration on your frequency, call or write:



TIME AND FREQUENCY TECHNOLOGY, INC.

2950 SCOTT BLVD., SANTA CLARA, CA 95050 (408) 246-6365

We admit... we have created a generation gap!



When it comes to cardioid dynamic microphone developments AKG is purposely creating a generation gap.

We have to, because we insist on staying far ahead.

Imitation is the sincerest form of flattery and while others attempted to equal the acoustical properties and duplicate the design appearance of the D-19 and D-24, AKG continued in setting the pace by developing a new family of transducers with superior performance characteristics.

The D-19 and D-24 are the finest microphones in their

class, as thousands of owners will attest. However, new techniques and materials made fundamental design changes possible. Gone is the complicated "plumbing" within the microphone requiring slots or holes along the microphone body, and these essentials are improved: smoothness of response, uniformity of directional characteristics, front-to-back ratio at all frequencies and rug-

The AKG D-124 and D-190 are the newest generation of cardioid dynamic microphones, designed for today's requirements.

For detailed information, see your authorized local AKG dealer or write to us.



MICROPHONES · HEADPHONES

NORTH AMERICAN PHILIPS CORPORATION

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1972 Broadcast Buyer's Guide

3roadcast Engineering's Reference Issue joins the

mputer Age!

This 1972 annual issue, of Broadcast Industry Buyss Guide and the Manufacturer's Address sections we been prepared for you by computer. We have en this step so that we may continue to provide you what the most complete and latest information on produs and services. Now that we can add and delete lists by computer we will be able to keep pace with the tanges taking place in the industry. Not only will you we a better directory with this issue, you will consue to see improvements in the years to come.

Our only limitation is that we send questionnaires to active manufacturers in the field. Some either fail to reive their listing notice or forget to send it in. The

result is almost 600 manufacturers in nearly 500 categories.

For CATV categories not listed in this section, see the CATV Buyer's Guide. It includes products especially designed for CATV use.

Red Listings

For the second time we are including red listings. A red listing under a category signifies that the manufacturer has an ad in this issue describing that product or service. In this way you will be able to immediately refer to specs and descriptions in categories of interest to you. Addresses of all manufacturers in this portion of the Guide are listed in the Manufacturers Address section.

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GE Electronic Components Sales Dept. Grass Valley Group, Inc. Hewlett Packard Co. Interntl. Nuclear Corp. Kapco Enterprises
Kay Elemetrics Corp. Marconi Electronics Inc. RCA Corporation RCA Broadcast Equip. Communications Systems

Div. RHG Elect Labs, Inc. Richmond Hill Laboratories Inc. Riker Communications Inc. Robert Bosch Corp. Fernseh Div. Sarkes Tarzian Inc. Broadcast Equipment Div. TeleMation, Inc. Tele Measurements Inc. Telemet Co. Video Englneering Co. Inc. Viscount Video Systems Ltd.

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Amplifier, RF Linear

Vikoa Inc.

Video Engineering Co. Inc.

Acrodyne Industries CCA Electronics C Cor Electronics Continental Electronics Mfg. Co. Subs. of Resalab, Inc. Dyma Engineering, Inc. Gates Division of Harris-Intertype LPB Inc. National Electrolab Assoc. Ltd. RHG Elect Labs, Inc. Robert Bosch Corp. Fernseh Div. Television Technology Corp. Wilkinson Electronics, Inc.

Amplifier, RF Peak Limiting

Belar Electronics Lab., Inc. Magnatech Co. Microwave Assoc. Inc. RCA Corporation RCA Broadcast Equip. Communications Systems RHG Elect Labs, Inc. Video Engineering Co. Inc. Wilkinson Electronics, Inc.

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RHG Elect Labs, Inc.
Singer Products Co., Inc.
Sparta Electronic Corp.

Television Technology Corp. Video Engineering Co. Inc. Visual Communication Products Oper. General Electric Co. Wilkinson Electronics, Inc.

Amplifier, Sensing

Applied Elect, Mechanics Broadcast Prod. Co. Inc. Bost. Division CYBRIX CORPORATION Mastertone Co. Riker Communications Inc. Tele Measurements Inc.

Amplifier, Stabilizing

American Data Corp. Ball Bros. Research Corp. Miratel Division Central Dynamics Corp. Dynasciences Corp. Video Products Div General Radio Co. Grass Valley Group, Inc.
Interntl. Nuclear Corp.
Marconi Electronics Inc.
Mincom Div. 3M Co.
RCA Corporation RCA Broadcast Equip. Communications Systems Div. Riker Communications Inc. Telemet Co. Vital Industries

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Burwen Laboratories CBS Labs Gates Division of Harris-Intertype MCA Technology, Inc. Neve Inc., Rupert Rupert Neve Incorporated Spectra Sonics Wilkinson Electronics, Inc.

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Computer Image Corp. Danscoll Ltd. Delta Electronics Inc. (N.C.)
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Dynasciences Corp. Video Products Div. Entron. Inc. Fung Engineering Co.
Gates Division of Harris-Intertype GBC Closed Circuit TV Corp.
Grass Valley Group, Inc.
Ikegami Tsushinki Co., Ltd. Export
Department

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Interntl. Nuclear Corp.
Kay Elemetrics Corp.
K'SON Corporation Lenco Inc. Electronics Division Marconi Electronics Inc. Philips Broadcast Equipment Corp. Subs. North American Philips Cor

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er Products Co., Inc.
Incer-Kennedy Labs., Inc.
I-Cine Inc.
Incyre Brown Engineering Co.
Lience & Engrg. Div.
Mation, Inc.
Io Engineering Co. Inc.
Incord Video Systems Ltd.
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K Dynascan Corp.

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analyzers, Spectrum

LTEC
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leath Co.
lewlett Packard Co.
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Aarconi Instruments

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Tekscan Corp.

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AVA Elect. & Machine Corp.
Bogner Broadcast Equipment Corp.
Collins Radio Company Broadcasting
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Continental Electronics Mfg. Co. Subs.
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Delta Electronics Inc. (Va.)
Electromagnetic Specialties
Entron. Inc.
Gates Division of Harris-Intertype
Gulf Telephone & Electronics
Hy-Power Electronics Co.
Jampro Antenna Co.
Mastertone Co.

Micro Communications, Inc.
Microwave Assoc. Inc.
Multronics, Inc.
Phelps Dodge Communications Co.
Div. Phelps Dodge Industries Inc.
Prodelin Inc.

RCA Corporation RCA Broadcast Equip. Communications Systems Div.

RF Systems, Inc.
Riker Communications Inc.
Robert Bosch Corp. Fernseh Div.
Shively Laboratories, Inc.
Singer Products Co., Inc.
Sitco Antenna Co.
Soll, Inc., Joseph M.
TACO Technical Appllance Corp. A
General Instrument Co.
Tri-Ex Tower Corp.
TV Cable Supply Co.

Tri-Ex Tower Corp.
TV Cable Supply Co.
Video Engineering Co. Inc.
Visual Communication Products Oper.
General Electric Co.

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Div. Rex Rheostat & Co., Inc. Rohde & Schwarz Sales Shively Laboratories, Inc. Wilkinson Electronics, Inc.

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CYBRIX CORPORATION
Gates Division of Harris-Intertype
Mastertone Co.
Micro-Trak Corporation (Formerly:
Gray Research & Dev.)

Antennas, Monitor

National Electrolab Assoc, Ltd. Phelps Dodge Communications Co. Div. Phelps Dodge Industries Inc. Video Engineering Co. Inc.

Antennas, Receiving FM

Anixter-Pruzan CATV Division
G.C. Electronics
McMartin Industries Inc.
RCA Corporation RCA Broadcast
Equip. Communications Systems
Div.
RCA Corporation RCA Missile &
Surface Radar Div.
RCA Corporation RCA Service
Company Div.
RF Systems, Inc.
Saxton Prod. Inc.
Scala Radio Corp.
TACO Technical Appliance Corp. A
General Instrument Co.

Antennas, Receiving LF

Andrews Tower Inc.
Delta Electronics Inc. (Va.)
Honeywell Inc. Test Instruments Div.
Singer Co., The Palo Alto Operation

Antennas, Receiving MF

Delta Electronics Inc. (Va.) Guif Telephone & Electronics Singer Co., The Palo Alto Operation Singer Products Co., Inc.

Antennas, Receiving UHF

Ameco Inc.
American Electronics Lab., Inc.
American Pamcor
Andrew Corp.
Anixter-Pruzan CATV Division
Blonder-Tongue Labs.
EMCEE Broadcast Products Div. of
Electronics, Missiles &
Communications, Inc.
G.C. Electronics
Honeywell Inc. Test Instruments Div.
Jerrold Electronics Corp. CATV
Systems Div.
Lectronic Res. Labs. Inc.
Phelps Dodge Communications Co.
Div. Phelps Dodge Industries Inc.

Prodelin Inc.
RF Systems, Inc.
RIker Communications Inc.
Robert Bosch Corp. Fernseh Div.
Rohde & Schwarz Sales
Saxton Prod. Inc.
Scala Radio Corp.
Singer Co., The Palo Alto Operation
Sitco Antenna Co.
TACO Technical Appliance Corp. A
General Instrument Co.
TV Cable Supply Co.
Video Engineering Co. Inc.

Antennas, Receiving VHF

Ameco Inc.
American Electronics Lab., Inc.
American Pamcor
Andrew Corp.
Anlxter-Pruzan CATV Division
Blonder-Tongue Labs.
CATV Equipment Co.
EMCEE Broadcast Products Div. of
Electronics, Missiles &
Communications, Inc.
G.C. Electronics
Honeywell Inc. Test Instruments Div.
Jerroid Electronics Corp. CATV
Systems Div.
Lectronic Res. Labs, Inc.
Phelps Dodge Communications Co.
Div. Phelps Dodge Industries Inc.

Div. Phelps Dodge Industries Inc.
Prodelin Inc.
RF Systems, Inc.
Riker Communications Inc.
Robert Bosch Corp. Fernseh Div.
Rohde & Schwarz Sales
Saxton Prod. Inc.
Scala Radio Corp.
Singer Co., The Palo Alto Operation
Singer Products Co., Inc.
Sitco Antenna Co.

Sitco Antenna Co. TACO Technical Appliance Corp. A General Instrument Co. TV Cable Supply Co. Video Engineering Co. Inc.

Antennas, Receiving Microwave

Andrew Corp.
Anixter-Pruzan CATV Division
Lectronic Res. Labs. Inc.
Mastertone Co.
Narda Microwave Corp., The
Prodelin Inc.
RF Systems, Inc.
Singer Co., The Palo Alto Operation
TACO Technical Appliance Corp. A
General Instrument Co.

Antennas, Remote Indicator

Gates Division of Harris-Intertype Potomac Instruments, Inc.

Antennas, Remote Pickup

Andrew Corp.
Andrews Tower Inc.
Gates Division of Harris-Intertype
Magnatech Co.
Mastertone Co.
Phelps Dodge Communications Co.
Div. Phelps Dodge Industries Inc.
RF Systems. Inc.
Scala Radio Corp.
TACO Technical Appliance Corp. A
General Instrument Co.

Antennas, STL

Andrew Corp.
Magnatech Co.
Mastertone Co.
Phelps Dodge Communications Co.
Dlv. Phelps Dodge Industries Inc.
Scala Radio Corp.

Antennas, Transmitting FM

Sparta Electronic Corp 74	CCA Electronics	Allen Avionics Inc.	Bell P/A Prod. Corp.
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Electromagnetic Specialties	Marketing,	Atlantic Research Corp. Teleproducts	Marketing, Edison Electronics, Div. of
Gates Division of Harris-Intertype Jampro Antenna Co.	Dyma Engineering, Inc.	Div.	McGraw-Edison Co., Daven &
Magnatech Co.	EMCEE Broadcast Products Div. of Electronics, Missiles &	Audio Designs & Mfg.	Measurements
Mastertone Co.	Communications, Inc.	Audio Distributor Inc. Burwen Laboratories	General Radio Co.
Micro Communications, Inc.	Gates Division of Harris-Intertype	Collins Radio Company Broadcasting	Kay Elemetrics Corp. MCA Technology, Inc.
Phelps Dodge Communications Co. Div. Phelps Dodge Industries Inc.	Jampro Antenna Co.	Marketing,	Ohmite Mfg. Co.
RCA Corporation RCA Broadcast	Lectronic Res. Labs. Inc. Marconi Electronics Inc.	Duncan Electronics, Inc.	RCA Corporation RCA Broadcast
Equip. Communications Systems	Micro Communications, Inc.	Edison Electronics, Div. of McGraw-Edison Co., Daven &	Equip. Communications Systems
Div. Scala Radio Corp.	Phelps Dodge Communications Co.	Measurements	Div. Roh Corporation
Shively Laboratories, Inc.	Div. Phelps Dodge Industries Inc.	Fairchild Sound Equipment Corp. A	Rohde & Schwarz Sales
Sparta Electronic Corp.	Prodelin Inc. RCA Corporation RCA Broadcast	Robins Industries Corp:	Shallco, Incorporated
TACO Technical Appliance Corp. A	Equip. Communications Systems	General Radio Co. Gotham Audio Corp.	Tech Laboratories Inc.
General Instrument Co.	Div.	Harvey Radio Pro A/V Div.	Texscan Corp.
	RF Systems, Inc.	Kay Elemetrics Corp.	Video Engineering Co. Inc. Waters Mfg. Inc.
Antennas, Transmitting LF	Rohde & Schwarz Sales	Langevin An MCA Technology	Weinschel Engineering Co.
Andrews Tower Inc.	Scala Radio Corp. Shively Laboratories, Inc.	Company	0 0 0
Continental Electronics Mfg. Co. Subs.	Singer Products Co., Inc.	Leader Instruments Corp. Marconi Instruments	Attenuators, Microwave
of Resalab, Inc.	Sitco Antenna Co.	MCA Technology, Inc.	
Delta Electronics Inc. (Va.)	TACO Technical Appliance Corp. A	Neve Inc., Rupert	American Electronics Lab., Inc.
Gates Division of Harris-Intertype Jampro Antenna Co,	General Instrument Co.	Ohmite Mfg. Co.	Bell P/A Prod. Corp. General Microwave Corp.
dampro Amerina Co.	Visual Communication Products Oper. General Electric Co.	Quad-Eight Electronics	General Radio Co.
Antonno Torresitti e 145	General Electric Co.	RCA Corporation RCA Broadcast	Hewlett Packard Co.
Antennas, Transmitting MF	Automore T	Equip. Communications Systems Div.	Kay Elemetrics Corp.
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Andrews Tower Inc.	Bogner Broadcast Equipment Corp.	Sennheiser Electronics Corp.	Singer Co., The Palo Alto Operation
Collins Radio Company Broadcasting	Collins Radio Company Broadcasting	Shallco, Incorporated Tech Laboratories Inc.	Tech Laboratories Inc.
Marketing, Continental Electronics Mfg. Co. Subs.	Marketing, Lectronic Res. Labs. Inc.	Terminal Hudson Corp. Terminal	Texscan Corp.
of Resalab, Inc.	Microwave Assoc. Inc.	Hudson Electronics	Video Engineering Co. Inc. Weinschel Engineering Co.
Delta Electronics Inc. (Va.)	Prodelin Inc.	Texscan Corp.	Weinseller Engineering Co.
Gates Division of Harris-Intertype	RF Systems, Inc.	TRW Electronic Supply Co. Dlv. of TRW	Attenuators PE
Gulf Telephone & Electronics	TACO Technical Appliance Corp. A General Instrument Co.	Video Engineering Co. Inc.	Attenuators, RF
Jampro Antenna Co. Marconi Electronics Inc.	General instrument Co.	Waters Mfg. Inc.	AEL Communications Corp., Subs.
RCA Corporation RCA Broadcast	Antonnes VCMD L C A.	Weinschel Engineering Co:	American Electronics Labs., Inc.
Equip. Communications Systems	Antennas, VSWR Indicator		Allen Avionics Inc. Ameco Inc.
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Bogner Broadcast	Gates Division of Harris-Intertype	Bird Electronic Corp.	Measurements
Equipment Corp	General Radio Co.	Collins Radio Company Broadcasting	Entron, Inc. General Microwave Corp.
Inc	Lectronic Res. Labs. Inc.	Marketing, Edison Electronics, DIV, of	General Radio Co.
	Micro Communications, Inc. Narda Microwave Corp., The	McGraw-Edison Co., Daven &	Hewlett Packard Co.
Alford Mfg. Co.	Shively Laboratories, Inc.	Measurements	Integral Data Devices Inc.
Andrew Corp. logner Broadcast Equipment Corp.		Gates Division of Harris-Intertype	Jerrold Electronics Corp. CATV
CA Electronics	Arms, Tone	General Microwave Corp.	Systems Div. Kay Elemetrics Corp.
CA RF Industries, Inc.	, in the profile	General Radio Co. Jerrold Electronics Corp. CATV	Lectronic Res. Labs. Inc.
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CA Corporation RCA Broadcast	Broadcast Electronics	Equip. Communications Systems	Tech Laboratories Inc. Texscan Corp.
Equip. Communications Systems	CCA Electronics	Div. Riker Communications Inc.	TV Cable Supply Co.
Div.	Collins Radio Company Broadcasting	Roh Corporation	Video Engineering Co. Inc.
F Systems, Inc.	Marketing,	Rohde & Schwarz Sales	Weinschel Engineering Co.
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itco Antenna Co.	Gray Research & Dev.)	Tech Laboratories Inc. Texscan Corp.	Ameco Inc.
ACO Technical Appliance Corp. A	RCA Corporation RCA Broadcast	Trompeter Electronics	Bristol Div. of Acco
General Instrument Co. Isual Communication Products Oper.	Equip. Communications Systems Div.	TV Cable Supply Co.	Cunningham Corp. Subs. of Gleason
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Grass Valley Group, Inc.
Mastertone Co.
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Schafer Electronics
Scully Recording Instruments Co.
Sparta Electronic Corp.
Systems Marketing Corp. And
Sono-Mag Corp.

Tane-Athon Corp. VIF International Wide Response

Automation, Transmitter Logging

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Gates Moseley Assoc. In			
Schafer Electronic			

Atlantic Research Corp. Teleproducts Div Central Dynamics Corp. Dorado Systems Gates Division of Harris-Intertype Mastertone Co. Moseley Assoc. Inc RCA Corporation RCA Broadcast Equip. Communications Systems Div. Rust Corp. Schafer Electronics Systems Marketing Corp. And Sono-Mag Corp. Time & Frequency Tech., Inc.

Automation, Video Tape Machine

Ampex Corp. Central Dynamics Corp.
CYBRIX CORPORATION Display Systems Corp.
Orbit Radio and Video
RCA Corporation RCA Broadcast Equip. Communications Systems Robert Bosch Corp. Fernseh Div. TeleMation, Inc.

Blowers and Fans

AMCO Engineering Co. American-Standard Industrial Products Div. Collins Radio Company Broadcasting Marketing, Dynacool Mfg. Co., Inc. Mole Richardson Co. Terminal Hudson Corp. Terminal Hudson Electronics

Bridge, Common Point

Collins Radio Company Broadcasting Marketing, Delta Electronics Inc. (Va.) Gates Division of Harris-Intertype

Cabinets, Consoles and Racks

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AMCO Engineering Co. American Geloso Electronics Borg-Warner Corp. Ingersoll Prods. Div. CCA Electronics COM Electronics
Comquip, inc.
Concept 70, A Div. of Dyma
Engineering, Inc.
Duotone Co. Inc. Enclosure Corp. Equipto Gates Division of Harris-Intertype Grinnan Fixture Co. Micro-Trak Corporation (Formerly: Gray Research & Dev.)
RCA Corporation RCA Broadcast
Equip. Communications Systems Sarkes Tarzian Inc. Broadcast Equipment Div. Sparta Electronic Corp. TeleMation, Inc. Video Engineering Co. Inc. Waber Electronics Inc. Div. SGL Industries, Inc. Wilson Corp., H.

Cable, Camera

Anixter-Pruzan CATV Division

Belden Corp. Electronic Division Boston Insulated Wire & Cable Co. Brand-Rex Company Robert Bosch Corp. Fernseh Div. Rome Cable Div. Cyprus Mines Co. Terminal Hudson Corp. Terminal **Hudson Electronics** Transco Products International Video Engineering Co. Inc.

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Div. Rome Cable Div. Cyprus Mines Co. Saxton Prod. Inc. Shively Laboratories, Inc. Singer Products Co., Inc. Soll, Inc., Joseph M. Sparta Electronic Corp. Spencer-Kennedy Labs., Inc. Times Wire and Cable Sub. of Insilco Corp. Transco Products International **Trompeter Electronics** TV Cable Supply Co.

RCA Corporation RCA Broadcast

Equip. Communications Systems

Cable, Coaxial Rigid

Vikoa Inc.

Video Engineering Co. Inc.

Pace Wire & Cable Corp. .. Shively Laboratories, Inc. Andrew Corp. Anixter-Pruzan CATV Division A-Tel-A-Matic CATV Equipment Co. Cohu, Inc. Electronics Division Collins Radio Company Broadcasting Marketing, Comm-Scope Corp. Dyma Engineering, Inc. Essex International Inc Communication & CATV Div. General Cable Corp.
Gulf Telephone & Electronics Jampro Antenna Co. Jerrold Electronics Corp. CATV

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Phelps Dodge Communications Co. Div. Phelps Dodge Industries Inc. Plastoid Corporation Prodelln Inc. RCA Corporation RCA Broadcast Equip. Communications Systems Div. Rome Cable Div. Cyprus Mines Co. Shively Laboratories, Inc. Soll, Inc., Joseph M. Sparta Electronic Corp. Times Wire and Cable Sub. of Insilco Corp. Transco Products International

Cable, Direct Burial

Video Engineering Co. Inc.

TV Cable Supply Co.

Anixter-Pruzan CATV Division A-Tel-A-Matic Brand-Rex Company CATV Equipment Co. Collins Radio Company Broadcasting Marketing, Columbia Electronic Cbl. Comm-Scope Corp. Essex International Inc. Communication & CATV DIv. General Cable Corp. Gulf Telephone & Electronics Jerrold Electronics Corp. CATV Systems Div Pace Wire & Cable Corp.
Phelps Dodge Communications Co.
Phelps Dodge Communications Co. Div. Phelps Dodge Industries Inc. Plastoid Corporation Rome Cable Div. Cyprus Mines Co. Singer Products Co., Inc. Spencer-Kennedy Labs., Inc.
Times Wire and Cable Sub. of Insilco Corp Transco Products International TV Cable Supply Co. Video Engineering Co. Inc. Vikoa Inc.

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Alpha Wire

Amphenol Corp.

Brand-Rex Company

A-Tel-A-Matic

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Belden Corp. Electronic Division

Birnbach Co. Inc. Boston Insulated Wire & Cable Co.

Collins Radio Company Broadcasting Marketing, Columbia Electronic Cbl. Comm-Scope Corp Electrodyne Div. of MCA Technology, Inc. Essex International Inc. Communication & CATV Div. Franz Vertriebs-gesellschaft m.b.H. G.C. Electronics General Cable Corp. Gotham Audio Corp. Gulf Telephone & Electronics Nortronics Co., Inc. Pace Wire & Cable Corp. Prestolite Company RCA Corporation RCA Broadcast Equip. Communications Systems Div. Rome Cable Div. Cyprus Mines Co. Saxton Prod. Inc. Singer Products Co., Inc. Sparta Electronic Corp. Terminal Hudson Corp. Terminal **Hudson Electronics** Times Wire and Cable Sub. of Insilco Corp. Transco Products International Video Engineering Co. Inc. Vikoa Inc.

Cable Laying Equipment

Anixter-Pruzan CATV Division

Ditch Witch Div. of Charles Machine Works, Inc. Roll-A-Reel F. B. Ryan Mfg. Co. Inc. Terminal Hudson Corp. Terminal Hudson Electronics

Calibration Service, Instrument

American Electronics Lab., Inc. Bird Electronic Corp. B & K Dynascan Corp. Comm. Radio Monitoring Eidson Electronic Co. Honeywell Inc. Test Instruments Div. Instrument Laboratories National Electrolab Assoc. Ltd. Potomac Instruments, Inc. Simpson Electric Co.

Camera Dollies, Stands and Tripods

Babcock & Wilcox Co.

Ameco inc.
Behrends, Inc.
Comqulp, Inc.
Cosmicar Optical Co., Ltd.
Diamond Power Speciality Corp. Subs.

Ameco Inc.

F&B/Ceco Industries, Inc GBC Closed Circuit TV Corp. General Microwave Corp. Innovative Television Equipment, Inc. Javelin Division Apollo Lasers, Inc. Jerrold Electronics Corp. CATV Systems Div. Listec TV Equip. Corp.
O'Connor Eng. Labs. Inc. Photographic Division Philips Broadcast Equipment Corp. Subs. North American Philips Corp. Precision Laboratories Precision Cine Equipment Corp. Quick-Set Inc. R. H. Tyler Co. Div. of Weather Scan, Inc. Riker Communications Inc. Shibaden Corp. of America Sylvania Comm. Electronic Technology Incorporated HF Photo Systems Div. Tele-Cine Inc. Teledyne Camera Systems TeleMation, Inc. Television Equipment Associates Television Products Co. Inc. Video Engineering Co. Inc. Vikoa Inc. Waber Electronics Inc. Div. SGL Industries, Inc.

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Technology Incorporated HF Photo Systems Div.

Camera Remote Control Equipment

Bristol Dlv. of Acco

Comquip, inc.

Cunningham Corp. Subs. of Gleason Works Diamond Power Specialty Corp. Subs. Babcock & Wilcox Co. F&B/Ceco industries, Inc. GBC Closed Circuit TV Corp. Ikegami Tsushinki Co., Ltd. Export Department Innovative Television Equipment, Inc. Jerrold Electronics Corp. CATV Systems Div. Listec TV Equip. Corp. Moseley Assoc. Inc.
Philips Broadcast Equipment Corp. Subs. North American Philips Corp. Power-Optics Inc. RCA Corporation RCA Broadcast Equip. Communications Systems Div Robert Bosch Corp. Fernseh Div. Shibaden Corp. of America

Sylvania Comm. Electronic Tele-Cine Inc. TeleMation, Inc. Tele Measurements Inc. TRACOR, Inc. Instruments Group Trepac Corp. America Video Engineering Co. Inc.

Cameras, Closed Circuit B&W Admiral Corporation Ameco Inc. Anixter-Pruzan CATV Division A-Tel-A-Matic ATV Research Audiotronics Corp. CATV Equipment Co. Cohu, Inc. Electronics Division Colorado Video Inc. Commercial Elect Computer Image Corp. Compuip, Inc. Concord Elect. Corp. Denson Electronic Corp. Diamond Power Specialty Corp. Sub-Babcock & Wilcox Co. GBC Closed Circuit TV Corp. Gen. Electrodynamics GPL Div. Singer Gen. Gulf Telephone & Electronics International Video Javelin Division Apollo Lasers, inc. Jerrold Electronics Corp. CATV Systems Div.
K'SON Corporation
Panasonic, VTR/CCTV Dept.
Matsushita Electric Corp. of America Philips Broadcast Equipment Corp. Subs. North American Philips Con RCA Corporation RCA Broadcast Equip. Communications Systems Div. RCA Corporation RCA Electromagne & Aviation Systems Div.
R. H. Tyler Co. Div. of Weather Scan. Inc. Riker Communications Inc. Robert Bosch Corp. Fernseh Div. Sarkes Tarzian Inc. Broadcast Equipment Div. Shibaden Corp. of America Singer Co. Simulation Products Div. Sony Corp. of America Teledyne Brown Engineering Co Science & Engrg. Div.

Cameras, Closed Circuit Color

Westinghouse Electric Corp. Electric

Teltron, Inc. Video Engineering Co. Inc. Visual Communication Products Ope

TeleMation, Inc.

Telesync Corp.

Tele Measurements Inc.

General Electric Co.

Visual Educom Inc.

Tube Div.

Ameco Inc. Ampex Corp.
A-Tel-A-Matic
CHESTER ELECTRONIC LABS., INC. GTE Information Systems Inc. Cohu, Inc. Electronics Division Commercial Elect. Denson Electronic Corp.

GBC Closed Circuit TV Corp. GPL Div. Singer Gen. International Video K'SON Corporation Mincom Div. 3M Co. Norelco, Philips Broadcast Equipmer Corp. Panasonic, VTR/CCTV Dept. Matsushita Electric Corp. of Philips Broadcast Equipment Corp. Subs. North American Philips Cor

Equip. Communications Systems DIV RCA Corporation RCA Electromagne & Aviation Systems Div.
R. H. Tyler Co. Div. of Weather Scan

RCA Corporation RCA Broadcast

Robert Bosch Corp. Fernseh Div.

Systems Div.

Micro Communications, Inc.

Phelps Dodge Communications Co.

Pace Wire & Cable Corp.

s Tarzian Inc. Broadcast Ipment Div. den Corp. of America r Co. Simulation Products Div. Corp. of America yne Camera Systems lation, Inc. Measurements Inc. ync Corp. # Engineering Co. Inc.
Communication Products Oper.
neral Electric Co. Lectronics Corp. Inghouse Electric Corp. Electric

eras, Film Chain

INTER ELECTRONIC LABS., INC. E Information Systems Inc. mercial Elect N Corporation Video Systems, Inc. Tyler Co. Div. of Weather Scan,

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tert Bosch Corp. Fernseh Div. Idyne Camera Systems

Measurements Inc. or Duncan, Inc.

neras, Film Still

D. Inc. e & James quip, Inc. man Kodak Co. Corp. ard incorporated ps Broadcast Equipment Corp. bs. North American Philips Corp. Corporation RCA Broadcast gulp. Communications Systems Tyler Co. Dlv. of Weather Scan,

neras, Image Motion ompensation

asciences Corp. Video Products

Closed Circuit TV Corp. Div. Singer Gen.

neras, Surveillance

el · A · Matic Research liotronics Corp. Closed Circuit TV Corp. Electrodynamics
IIIn Division Apollo Lasers, Inc. co Enterprises se Dynamics Mfg. Corp.

RCA Corporation RCA Broadcast Equip. Communications Systems

Div. R. H. Tyler Co. Div. of Weather Scan. Inc.

Riker Communications Inc. Sarkes Tarzian Inc. Broadcast

Sarkes Tarzian Inc. Broadcast
Equipment Div.
Shibaden Corp. of America
Singer Co. Simulation Products Div.
Teledyne Brown Engineering Co.
Science & Engrg. Div.
Teledyne Camera Systems
TeleMation, Inc.

Telesync Corp.

Teltron, Inc. Video Engineering Co. Inc.

Cameras, TV B&W Portable **Broadcast**

Audiotronics Corp.
CATV Equipment Co.
Cohu, Inc. Electronics Division
Denson Electronic Corp. International Video K'SON Corporation
Panasonic, VTR/CCTV Dept.
Matsushita Electric Corp. of America Philips Broadcast Equipment Corp. Subs. North American Philips Corp. RCA Corporation RCA Broadcast Equip. Communications Systems Div. R. H. Tyler Co. Div. of Weather Scan, Inc. Riker Communications Inc. Robert Bosch Corp. Fernseh Div. Shibaden Corp. of America Sony Corp. of America Teledyne Camera Systems TeleMation, Inc. Tele Measurements Inc. Teltron, Inc. Video Engineering Co. Inc. Visual Communication Products Oper. General Electric Co.

Cameras, TV B&W Studio **Broadcast**

Ameco Inc.

Ampex Corp Cohu, Inc. Electronics Division Denson Electronic Corp. GBC Closed Circuit TV Corp. GPL Div. Singer Gen. International Video K'SON Corporation Marconi Electronics Inc. Panasonic, VTR/CCTV Dept. Matsushita Electric Corp. of America Philips Broadcast Equipment Corp. Subs. North American Philips Corp.
RCA Corporation RCA Broadcast Equip. Communications Systems Div. R. H. Tyler Co. Div. of Weather Scan. Inc. Robert Bosch Corp. Fernseh Div. Sarkes Tarzian Inc. Broadcast Egulpment Div. Shibaden Corp. of America Sony Corp. of America TeleMatlon, Inc. Tele Measurements Inc. Teltron, Inc. Video Engineering Co. Inc. Visual Communication Products Oper. General Electric Co.

Cameras, TV Color Portable Broadcast

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Inc.

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Marconi Electronics Inc. Mincom Div. 3M Co. Norelco, Philips Broadcast Equipment Corp.

Philips Broadcast Equipment Corp. Subs. North American Philips Corp. RCA Corporation RCA Broadcast Equip. Communications Systems

Div. R. H. Tyler Co. Div. of Weather Scan, Inc.

Robert Bosch Corp. Fernseh Div. Sarkes Tarzian Inc. Broadcast Equipment Div. Shibaden Corp. of America Soll, Inc., Joseph M. TeleMation, Inc.
Tele Measurements Inc. Video Engineering Co. Inc.
Visual Communication Products Oper.

General Electric Co.

Cameras, TV Remote Control Broadcast

Commercial Elect. International Video Marconi Electronics Inc. Philips Broadcast Equipment Corp. Subs. North American Philips Corp. Robert Bosch Corp. Fernseh Div. Shibaden Corp. of America TeleMation, Inc. Tele Measurements Inc. Teltron, Inc.
Video Engineering Co. Inc.
Visual Communication Products Oper. General Electric Co.

Cartridge Machine, Dual Deck

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Alto Communications Inc. Broadcast Marketing Div. Ampro Corp. Broadcast Products Inc. CCA Electronics Clne Sonic Sound Inc.
Collins Radio Company Broadcasting Marketing, Dyma Engineering, Inc. Gates Division of Harris-Intertype International Tapetronics Corp. Joa Cartridge Service MacKenzie Laboratories, Inc. Mastertone Co. McCurdy Radio Ind. Inc. Peripheral Data Machines, Inc. (PER

DATA)
RAPID-O Div. of Garron Electronics

RCA Corporation RCA Broadcast Equip. Communications Systems Div. Schafer Electronics Singer Products Co., Inc. Sparta Electronic Corp. Spotmaster Broadcast Electronics Systems Marketing Corp. And Sono-Mag Corp. Visual Electronics Corp.

Cartridge Machine, Multiple Deck

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Broadcast Electronics Broadcast Products Inc. CCA Electronics
Cine Sonic Sound Inc. Collins Radio Company Broadcasting Marketing. Dyma Engineering, Inc. Gotham Audio Corp. IGM International Tapetronics Corp. Joa Cartridge Service MacKenzie Laboratories, Inc. Radio Mfg. Co.
RAPID-Q Div. of Garron Electronics RCA Corporation RCA Broadcast Equip. Communications Systems Div.

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Telex Communications Division

VIF International Visual Electronics Corp.

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Equip. Communications Systems Div. Schafer Electronics Singer Products Co., Inc. Sparta Electronic Corp.
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Gates Division of Harris-Intertype IGM International Tapetronics Corp. Joa Cartridge Service LPB Inc. MacKenzle Laboratories, Inc. McCurdy Radio Ind. Inc. Peripheral Data Machines, Inc. (PER DATA) Radio Mfg. Co. RAPID-Q Div. of Garron Electronics RCA Corporation RCA Broadcast Equip. Communications Systems Div Schafer Electronics Schultz Inc., Albert Singer Products Co., Inc. Sparta Electronic Corp.
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Electronic Wholesale Corp.

Cramer Division Conrac Corp. Duotone Co. Inc. Fidelipac Div. of TelePro Industries, Inc.

Gates Division of Harris-Intertype IGM

International Tapetronics Corp. Joa Cartridge Service MaCarta

Magnatech Co. Magnetic Prod. Div. 3M Company Marathon Broadcast Equip. Mastertone Co. Memorex Corp.

Radio Mfg. Co. RCA Corporation RCA Broadcast Equip. Communications Systems Div.

RCA Corporation RCA Electronic Components Schultz Inc., Albert Singer Products Co., Inc. Sparta Electronic Corp.

Spotmaster Broadcast Electronics Systems Marketing Corp. And Sono-Mag Corp.
Tapecaster TCM, Inc. TelePro Industries, Inc. Telex Communications Division Wilkinson Electronics, Inc.

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Bell Sound Studios A & B Duplicators Div. Bourns Inc. Broadcast Electronics CCA Electronics Collins Radio Company Broadcasting Marketing, Duotone Co. Inc. Electro-Voice Inc. Div. of Gulton Industries, Inc. Gates Division of Harris-Intertype QRK Electronic Prod. RCA Corporation RCA Broadcast Equip. Communications Systems Div Rek-O-Kut Inc. Schultz Inc., Albert

Cartridges, Stereo

Shure Brothers Inc.

Singer Products Co., Inc.

Stanton Magnetics Inc. Terminal Hudson Corp. Terminal

Sparta Electronic Corp.

Hudson Electronics

Fidelipac Div. of TelePro Industries, Gates Division of Harris-Intertype International Tapetronics Corp. Marathon Broadcast Equip. Mastertone Co. ORK Electronic Prod. Rek-O-Kut Inc.

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Dyma Engineering, Inc. Electronic Engineering Co. of California Kapco Enterprises Marconi Electronics Inc. Mincom Div. 3M Co.

RCA Corporation RCA Broadcast Equip. Communications Systems Div. SPI-ITT Instruments Metrix Division Spotmaster Broadcast Electronics Sterling Television Presentations Inc.

Sterling Communications Co. TeleMation, Inc.
TELESTRATOR Industries Television Equipment Associates Video Devices Co. Video Engineering Co. Inc.

VIF International Visual Electronics Corp.

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Cooke Engineering Co.
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Gates Division of Harris-Intertype General Time Service A Talley Industries Co. IGM Langevin An MCA Technology Company Logiconcepts, Inc.

MCA Technology, Inc.

Racine & Co., Inc., Jules Radio Mfg. Co. Riker Communications Inc. Standard Electric Time Div. of Johnson Service Co. Systems Marketing Corp. And

Sono-Mag Corp. Tapecaster TCM, Inc. TelComp Division Television and Computer Corp. Television Equipment Associates Time & Frequency Tech., Inc. Video Devices Co.

Video Engineering Co. Inc. Visual Electronics Corp. Clocks, Digital and Digital Driver

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Systems Marketing Corp. And
Sono-Mag Corp.

Color Correction Equipment

Datatek Corp. Marconi Electronics Inc. Philips Broadcast Equipment Corp. Subs. North American Philips Co Rank Cintel Rank Precision Ind. Ltd Broadcast Div. Rank Precision Ind. Broadcast Div. Riker Communications Inc. Robert Bosch Corp. Fernseh Div

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Communication Systems, Land Mobile

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Moseley Assoc. Inc.

Alpha Electronic Services Inc.

American Geloso Electronics Andrew Corp. Andrews Tower Inc. Atlantic Research Corp. Teleproduc Div. Belcom Electronics Mfg. Co. CCA Electronics Comquip, Inc. Dyma Engineering, Inc. General Electric Co. Mobile Radio Dept. Miles Reproducer Co. Moseley Assoc. Inc.
Phelps Dodge Communications Co.
Phelps Dodge Communications Co.
Div. Phelps Dodge Industries Inc
RCA Corporation RCA Broadcast Equip. Communications Systems Div. Scientific Systems, Inc. Broadcast Equipment Div. Scintrex Inc. Communications Div. Singer Products Co., Inc.

Communication Systems, Microwave

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Moseley Assoc. Inc.

Acrodyne Industries Alcor Inc. Andrew Corp. Andrews Tower Inc. Atlantic Research Corp. Teleproduc

Coastcom Division Scott-Buttner Co Dyma Engineering, Inc. GTE Lenkurt Incorporated Moseley Assoc. Inc.
Phelps Dodge Communications Co.

Raytheon Company Raytheon Data Systems Co. RHG Elect Labs, Inc. Soladyne International Tele Measurements Inc. Varian Solid State Div. Micro-Link

Products Visual Electronics Corp.

Communication Systems, Multiplex

Catel, a Div. of United Scientific Coll

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er Products Co., Inc.	Marketing Div.	Gately Electronics Gates Division of Harris-Intertype	General Electric Co.
ac Corp. America	AMCO Engineering Co. Ampro Corp.	Gotham Audio Corp.	Console, Audio Recording
nmunication Systems, STL	Arbor Systems Inc.	Ikegami Tsushinki Co., Ltd. Export	Console, Agaio Recording
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browave Assoc. Inc.	Robins Industries Corp.	RCA Corporation RCA Broadcast	AMCO Engineering Co.
Beley Assoc. Inc. Plps Dodge Communications Co.	Gately Electronics	Equip, Communications Systems Div.	Ampro Corp.
Mips Dodge Communications Co.	Gates Division of Harris-Intertype Gotham Audio Corp.	Riker Communications Inc.	Arbor Systems Inc. Audio Designs & Mfg.
viv. Phelps Dodge Industries Inc.	Granger Assoc.	Rupert Neve Incorporated	Audio Distributor Inc.
B) Elect Labs, Inc. Szer Products Co., Inc.	IGM Francis Co. Ltd. Francis	Scientific Systems, Inc. Broadcast Equipment Div.	Behrends, Inc.
Adyne International	Ikegamî Tsushinki Co., Ltd. Export Department	Singer Products Co., Inc.	Blanchard Electronics Broadcast Prod. Co. Inc. Bost. Division
Te Measurements Inc.	Langevin An MCA Technology	Sparta Electronic Corp. Spectra Sonics	CCA Electronics
Epac Corp. America Man Solid State Div. Micro-Link	Company	Spotmaster Broadcast Electronics	Central Dynamics Corp.
oroducts	LPB Inc. Mastertone Co.	TelComp Division Television and	Collins Radio Company Broadcasting Marketing.
lual Electronics Corp.	MCA Technology, Inc.	Computer Corp. Tele Measurements Inc.	Comquip, Inc.
a contract	McCurdy Radio Ind. Inc.	Tri-Tronics	Concept 70, A Div. of Dyma Engineering, Inc.
Immunication Systems,	McMartin Industries Inc. Neve Inc., Rupert	Ultra Audio Products	Elecktromesstechnik E M T Wilheim
Feleprinter	Orbit Radio and Video	United Radio Supply Inc. Visual Communication Products Oper.	Franz G M B H
fantic Research Corp. Teleproducts	Philips Broadcast Equipment Corp. Subs. North American Philips Corp.	General Electric Co.	Electrodyne Div. of MCA Technology. Inc.
Div. Badcast Products Inc.	Radio Mfg. Co.	Visual Electronics Corp.	Fairchild Sound Equipment Corp. A
BRIX CORPORATION	RCA Corporation RCA Broadcast	WilkInson Electronics, Inc.	Robins Industries Corp. Gately Electronics
E Lenkurt incorporated morex Corp.	Equip, Communications Systems Div.	Console, Audio Portable	Gates Division of Harris-Intertype
ager Products Co., Inc.	Riker Communications Inc.		Gotham Audio Corp.
pac Corp. America	Rupert Neve Incorporated	See Adv. Page	Harvey Radio Pro A/V Div.
	Sarkes Tarzian Inc. Broadcast Equipment Div.	American Electronics,	Lang Electronics Inc.
Imputer Equipment	Scientific Systems, Inc. Broadcast	Inc117 Fairchild Sound	Langevin An MCA Technology
Intral Dynamics Corp.	Equipment Div.	Equipment Corp	Company LPB Inc.
Impu/Net, Inc. BRIX CORPORATION	Singer Products Co., Inc. Sparta Electronic Corp.	Gates 88	Magnatech Co.
Ita Disc Inc.	Spectra Sonics	Sparta Electronic Corp 74	Magna-Tech Electronic Co., Inc. Mastertone Co.
Itavision, Inc.	Spotmaster Broadcast Electronics TelComp Division Television and	Alcor Inc.	MCA Technology, Inc.
fass Valley Group, Inc.	Computer Corp.	AMCO Engineering Co.	McCurdy Radio Ind. Inc.
hstertone Co.	Telectro Systems Corp.	American Electronics, Inc. Ampro Corp.	Nemo Recording Labs Neve Inc., Rupert
hmorex Corp. ytheon Company Raytheon Data	Tele Measurements Inc. Trl-Tronics	Audio Designs & Mfg.	Orbit Radio and Video
Systems Co.	Ultra Audio Products	Behrends, Inc.	Philips Broadcast Equipment Corp. Subs. North American Philips Corp
A Corporation RCA Missile &	United Radio Supply Inc.	CCA Electronics Central Dynamics Corp.	Quad Eight Electronics
Surface Radar Div.	Visual Communication Products Oper. General Electric Co.	Collins Radio Company Broadcasting	Radio Mfg. Co.
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Catel, a Div. of United Scientific Corp.
CATV Equipment Co. C Cor Electronics Fung Engineering Co. GE Electronic Components Sales Dept. General Microwave Corp. Honeywell Inc. Test Instruments Div. Jerrold Electronics Corp. CATV Systems Div.
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Phelps Dodge Communications Co.
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Television Equipment Associates
Television Microtime, Inc. Subs.
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Terminal Hudson Corp. Terminal

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Joa Cartridge Service Lafayette Radio Electronics Marathon Broadcast Equip. Minnesota Mining & Mfg. Co. Nortronics Co., Inc.
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American Electronics Lab., Inc. GE Electronic Components Sales Del General Microwave Corp. General Radio Co. Hewlett Packard Co. Lectronic Res. Labs. Inc. Microwave Assoc. Inc.
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Narda Microwave Corp., The
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Texscan Corp.
Thomson-CSF Electron Tubes

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Edit Code Receiver

Central Dynamics Corp. Electronic Engineering Co. of California

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ore Inc.
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TT Instruments Metrix Division
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Riker Communications Inc.
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Gen. Electrodynamics
Hickok Elect. Instrument
Internti. Nuclear Corp.
K'SON Corporation
RCA Corporation RCA Broadcast
Equip. Communications Systems

Div. R. H. Tyler Co. Div. of Weather Scan. Inc. Rohde & Schwarz Sales

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Equip. Communications Systems Revox Corporation

R. H. Tyler Co. Div. of Weather Scan. Scintrex Inc. Communications Div. Sennheiser Electronics Corp. Singer Products Co., Inc. Sony/Superscope

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Revox Corporation R. H. Tyler Co. Div. of Weather Scan, Inc

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Collins Radio Company Broadcasting Marketing. Comquip, Inc Electrodyne Div. of MCA Technology,

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Nortronics Co., Inc RCA Corporation RCA Broadcast Equip. Communications Systems

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Video Englneering Co. Inc.

Headset with Microphone

AKG Division North Amer. Philips

American Geloso Electronics Comquip, Inc. David Clark Co., Inc. Magnatech Co. Mastertone Co.

RCA Corporation RCA Broadcast Equip. Communications Systems Div.

R. H. Tyler Co. Div. of Weather Scan, Inc.

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Concord Elect. Corp.
DYNAIR Electronics, Inc.
GBC Closed Circuit TV Corp. General Electric Co. Mobile Radio

Dept. Gen. Electrodynamics GPL Div. Singer Gen. Gulf Telephone & Electronics lkegami Tsushinki Co., Ltd. Export Department

Internti. Nuclear Corp. Janson Industries Javelin Division Apollo Lasers, Inc. Jos. Schneider & Co. Optische Werke Div.

Kapco Enterprises
K'SON Corporation
Orbit Radlo and Video
Panasonic, VTR/CCTV Dept. Matsushita Electric Corp. of America

Philips Broadcast Equipment Corp. Subs. North American Philips Corp. RCA Corporation RCA Broadcast Equip. Communications Systems Div.

Riker Communications Inc. Robert Bosch Corp. Fernseh Div. Rust Corp.

SC Electronics, Inc. Subs. of Audiotronics Corp. Scientific Systems, Inc. Broadcast Equipment Div.

Shibaden Corp. of America Shintron Co. Inc. Singer Co. Simulation Products Div. Sylvania Comm. Electronic Tasker Industries Systems Division Tektronix Inc.

Teledyne Brown Engineering Co. Science & Engrg. Div. TeleMation, Inc.

Tele Measurements Inc. Teltron, Inc. Video Engineering Co. Inc. Vikoa Inc. Visual Communication Products Oper. General Electric Co.

Visual Educom Inc.

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American Electronics Lab., Inc. Ampex Corp. A-Tel-A-Matic Collins Radio Company Broadcasting Marketing, Hewlett Packard Co. Melcor Electronics Corp. Motorola Semiconduct Motorola Inc.

Raytheon Company Raytheon Data Systems Co. RCA Corporation RCA Broadcast

Equip. Communications Systems Div.

RCA Corporation RCA Electronic Components

Solltron Devices Inc. Semiconductor Div.

Terminal Hudson Corp. Terminal **Hudson Electronics** Texas Instrument Components Grou Thor Electronics Corp.

Transco Products International
Visual Communication Products Open General Electric Co.

Intercom Systems

Bogen Division Lear Siegler Inc. Central Dynamics Corp. David Clark Co., Inc. Fisher Berkeley Corp. G.C. Electronics Heath Co. RCA Corporation RCA Broadcast Equip. Communications Systems Div. Roh Corporation Sarkes Tarzian Inc. Broadcast Equipment Div. Shintron Co. Inc. Television Equipment Associates

Terminal Hudson Corp. Terminal

Hudson Electronics

Visual Electronics Corp.

ITFS System

Andrew Corp.
Audiotronics Corp. CHESTER ELECTRONIC LABS., INC. GTE Information Systems Inc. EMCEE Broadcast Products Div. of Electronics, Missiles & Communications, Inc. RF Systems, Inc. TeleMation, Inc. Varian Solid State Div. Micro-Link **Products**

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Cooke Engineering Co. Delta Electronics Inc. (Va.)
Gates Division of Harris-Intertype
Gulf Telephone & Electronics Holland Electronics Lectronic Res. Labs. Inc.

Mastertone Co.
McCurdy Radio Ind. Inc.
Potomac Instruments, Inc.
RCA Corporation RCA Broadcast Equip. Communications Systems

Div. Sarkes Tarzian Inc. Broadcast Equipment Div. Switchcraft Inc.

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Corporation RCA Broadcast
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C Closed Circuit TV Corp.
Evelin Division Apollo Lasers, Inc.
Errold Electronics Corp. CATV

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F&B/Ceco Industries, Inc. GBC Closed Circuit TV Corp. Javelin Division Apollo Lasers, Inc. Jerrold Electronics Corp. CATV

Systems Div.

Jos. Schneider & Co. Optische Werke

Philips Broadcast Equipment Corp. Subs. North American Philips Corp. Rank Precision Industries Rank Precision Ind. Broadcast Div.

RCA Corporation RCA Broadcast Equip. Communications Systems Div. R. H. Tyler Co. Div. of Weather Scan,

Inc. Shibaden Corp. of America Tele-Cine Inc.
Teledyne Camera Systems
Tele Measurements Inc. Television Equipment Associates Victor Duncan, Inc. Video Engineering Co. Inc. Visual Educom Inc.

Lighting, Preset Dimmer

Kliegl Bros, Lighting Skirpan Lighting Control Corp. Tele Measurements Inc. Video Engineering Co. Inc.

Lighting, TV Controls

Behrends, Inc. Berkey-Colortran Inc. Century Strand, Inc. F&B/Ceco Industries, Inc. Janson Industries Kliegl Bros. Lighting Mole Richardson Co. RCA Corporation RCA Broadcast Equip. Communications Systems Div. Skirpan Lighting Control Corp. Tele Measurements Inc. Ultra Audio Products Utility Tower Co.
Video Engineering Co. Inc.
Waber Electronics Inc. Div. SGL Industries, Inc.

Lighting, TV Portable System

Comquip, Inc. GBC Closed Circuit TV Corp. Harwood Mfg. Co. Kliegl Bros. Lighting Mole Richardson Co. R. H. Tyler Co. Div. of Weather Scan. inc. Skirpan Lighting Control Corp. TeleMation, Inc. Tele Measurements Inc. Union Connector Co., Inc. Video Engineering Co. Inc.

Lighting, TV Studio System

Bardwell McAlister Inc. Behrends, Inc.
Berkey-Colortran,Inc.
Century Strand, Inc.
F&B/Ceco Industries, Inc. GTE Sylvania Inc. Lighting Products
Group Janson Industries Kliegt Bros. Lighting Mole Richardson Co. RCA Corporation RCA Broadcast Equip. Communications Systems R. H. Tyler Co. Div. of Weather Scan, Inc. Skirpan Lighting Control Corp. TeleMation, Inc. Tele Measurements Inc. Union Connector Co., Inc. Utility Tower Co.

Video Engineering Co. Inc.

Lightning Arresters

Andrews Tower Inc. Collins Radio Company Broadcasting Marketing,
Cook Electric Co.
G.C. Electronics
GE Electronic Components Sales Dept.
Jerrold Electronics Corp. CATV Systems Div. Joslyn Electronic Sys. Siemens Corporation Utility Tower Co. Vikoa Inc.

Lightning Protection Systems

GE Electronic Components Sales Dept. LightNing Elimination Associates
Wilkinson Electronics, Inc.

Lights, Studio Set

Comquip, Inc. GTE Sylvania Inc. Lighting Products Group Kliegl Bros. Lighting Mole Richardson Co. R. H. Tyler Co. Div. of Weather Scan, Inc. TeleMation, Inc. Union Connector Co., Inc. Video Engineering Co. Inc.

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Fort Worth Tower Co.. Inc.
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Hughey & Phillips Inc.
Jampro Antenna Co.
Poho Manufacturing Div. of Unarco Rohn Manufacturing Div. of Unarco Industries Inc. Sola Basic Industries Dielectric Communications Div. Utility Tower Co.

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Maintenance Services, AM

Tri-Tronics

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Broadcast Prod. Co. Inc. Best, Division Collins Radlo Company Broadcasting Marketing. Gates Division of Harris-Intertype International Tapetronics Corp. Joa Cartridge Service Liberty Industries Marathon Broadcast Equip. Mastertone Co. Nortronics Co., Inc. RCA Corporation RCA Service Company Div. Sparta Electronic Corp. Trl-Tronics

Maintenance Services, FM

American Electronics Lab., Inc. Collins Radio Company Broadcasting Marketing, Fort Worth Tower Co., Inc. Liberty Industries Nortronics Co., Inc RCA Corporation RCA Service Company Div. Soll, Inc., Joseph M. Taber Mfg. & Engr. Co. Tri-Tronics Utility Tower Co.

Maintenance Services, Microwave

American Electronics Lab., Inc. Collins Radio Company Broadcasting Marketing. Fort Worth Tower Co., Inc. Liberty Industries Microwave Assoc. Inc. Raytheon Company Raytheon Data Systems Co. RCA Corporation RCA Service Company Div. Utility Tower Co.

Maintenance Services, TV

Alcor Inc.

Alcor Inc.
Angenieux Corp. of America
Fort Worth Tower Co., Inc.
GBC Closed Circuit TV Corp.
Liberty Industries
Nortronics Co., Inc. RF Systems, Inc.
Soll, Inc., Joseph M.
Taber Mfg. & Engr. Co.
Teledyne Brown Engineering Co. Science & Engrg. Div. Tele Measurements Inc. Television Technology Corp. Utility Tower Co.
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Meters, Flutter and Wow

Video Engineering Co. Inc.

ELPA Marketing Industries, Inc. Franz Vertriebs-gesellschaft m.b.H. Gotham Audio Corp. Kay Elemetrics Corp. Leader Instruments Corp.

Lectronic Res. Labs. Inc. Micom Inc. Mincom Div. 3M Co. Rek-O-Kut Inc. Sentinel, Inc. Tascam Corporation

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Meters, Frequency Calibrating

Edison Electronics, Div. of McGraw-Edison Co., Daven & Measurements General Radio Co. Lampkin Lab. Inc. Lectronic Res. Labs. Inc. Marubeni America Corp. Miida Electronics Narda Microwave Corp., The RCA Corporation RCA Broadcast Equip. Communications Systems Div. RF Systems, Inc. Rohde & Schwarz Sales Singer Co. Los Angeles Operation

Meters, Grind Dip

Leader Instruments Corp.

Meters, Intermodulation

Heath Co.

Meters, Line Voltage

Alco Electronic Products, Inc. Heath Co.

Lectronic Res. Labs. Inc. RCA Corporation RCA Electronic Components Terminal Hudson Corp. Terminal **Hudson Electronics**

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Bird Electronic Corp. **Boonton Electronics CCA Electronics** Collins Radio Company Broadcasting Marketing, Dranetz Engineering Labs., Inc. Engineering Associates General Microwave Corp. Hickok Elect. Instrument Lectronic Res. Labs. Inc. Marconi Instruments Narda Microwave Corp., The National Electrolab Assoc. Ltd. RCA Corporation RCA Broadcast Equip. Communications Systems Div. Rohde & Schwarz Sales Simpson Electric Co. Terminal Hudson Corp. Terminal **Hudson Electronics**

Meters, Standing Wave

Bird Electronic Corp. CCA Electronics Collins Radio Company Broadcasting Marketing. Delta Electronics Inc. (Va.) General Microwave Corp. General Radio Co. Hewlett Packard Co. Lectronic Res. Labs. Inc. Narda Microwave Corp., The RCA Corporation RCA Broadcast Equip. Communications Systems Div. Rohde & Schwarz Sales SPI-ITT Instruments Metrix Division Weinschel Engineering Co.

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Microphone Stand and Boom

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Audio Distributor Inc. Behrends, Inc. CATV Equipment Co. CCA Electronics Century Strand, Inc. Collins Radio Company Broadcasting Marketing, Comquip, Inc.

Electro-Voice Inc. Div. of Gulton Industries, Inc. F&B/Ceco Industries, Inc. Gately Electronics
Gates Division of Harris-Intertype G.C. Electronics Gotham Audio Corp. Innovative Television Equipment, Inc. Jerrold Electronics Corp. CATV

Custom Craft Designs

Dyma Engineering, Inc.

Systems Div. Mole Richardson Co. Philips Broadcast Equipment Corp. Subs. North American Philips Corp. Primo Co. Ltd.

RCA Corporation RCA Broadcast Equip. Communications Systems Div. RCA Corporation RCA Service

Company Div. Revox Corporation R. H. Tyler Co. Div. of Weather Scan,

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Hudson Electronics Turner Division Conrac Corporation Victor Duncan, Inc.

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ner Division Conrac Corporation	Revox Corporation R. H. Tyler Co. Div. of Weather Scan,	Industries, Inc. Gately Electronics	Microwave Assoc. Inc.
or Duncan, Inc. To Engineering Co. Inc.		Gates Division of Harris-Intertype	Moseley Assoc. Inc.
THE ENGINEERING CO. INC.	Inc. Ryder Magnetic Sales Corp.	G.C. Electronics	Narda Microwave Corp., The North Amer. Electronics
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TT Electronics, Inc.

Ohmmeters

Anixter-Pruzan CATV Division California Instruments Co.
Collins Radio Company Broadcasting Marketing, Edison Electronics, Div. of McGraw-Edison Co., Daven & Measurements Franz Vertriebs-gesellschaft m.b.H. Heath Co. Hewlett Packard Co. Hickok Elect, Instrument Honeywell Inc. Test Instruments Div. ITT Jennings Leader Instruments Corp. Lectronic Res. Labs. Inc. RCA Corporation RCA Broadcast Equip. Communications Systems Div. RCA Corporation RCA Electronic Components Rohde & Schwarz Sales Simpson Electric Co.
SPI-ITT Instruments Metrix Division

Operating Impedance Bridge

Dranetz Engineering Labs., Inc. General Radio Co. Heath Co. Rohde & Schwarz Sales

Oscillators, AM

Triplett Corporation

Alltech (Formerly: Microdot) Arbor Systems Inc. Bulova American Time Products CCA Electronics Collins Radio Company Broadcasting Marketing.
CYBRIX CORPORATION Dyma Engineering, Inc. Engineering Associates Gates Division of Harris-Intertype Glbbs Mfg. & Research Co. Heath Co. Instrument Laboratories Kay Elemetrics Corp. Leader Instruments Corp. Marconi Instruments RCA Corporation RCA Broadcast Equip. Communications Systems Div. Rohde & Schwarz Sales Singer Products Co., Inc. Trepac Corp. America

Oscillators, FM

Alltech (Formerly: Microdot)
Belar Electronics Lab., Inc.
CCA Electronics
Collins Radio Company Broadcasting
Marketing,
Gates Division of Harris-Intertype
Heath Co.
Kay Elemetrics Corp.
Leader Instruments Corp.
Marconi Electronics Inc.
Marconi Instruments
Microwave Assoc. Inc.
RCA Corporation RCA Broadcast
Equip. Communications Systems
Div.
Rohde & Schwarz Sales
Singer Co., The Palo Alto Operation
Singer Products Co., Inc.

Oscillators, Tone

Belcom Electronics Mfg. Co.
Bulova American Time Products
Gates Division of Harris-Intertype
General Radio Co.
MCA Technology, Inc.
Neve Inc., Rupert
Phase Corporation
Radio Mfg. Co.
Rupert Neve Incorporated
Total Technology
Trepac Corp. America

Oscillators, TV

Heath Co.
Kay Elemetrics Corp.
Lectrotech Inc.
RCA Corporation RCA Broadcast
Equip. Communications Systems
Div.
Riker Communications Inc.
Rohde & Schwarz Sales
Tektronix Inc.

Oscilloscope Camera

Entron, Inc.
Hewlett Packard Co.
Polaroid
SPI-ITT Instruments Metrix Division
Tektronix Inc.

Oscilloscopes, Dual Trace

B & K Dynascan Corp.

Elco Elect. Inst. Co., Inc. Entron, Inc. Heath Co. Hewlett Packard Co. Hickok Elect, Instrument Leader Instruments Corp. Lectronic Res. Labs. Inc. Lectrotech Inc. Marconi Instruments Marubent America Corp. Milda Electronics RCA Corporation RCA Broadcast Equip. Communications Systems Div. SPI-ITT Instruments Metrix Division Tektronix Inc.
Telonic Industries Inc. Terminal Hudson Corp. Terminal **Hudson Electronics** Troy Electronic Sales Co.

Oscilloscopes, Rack Type

Hewlett Packard Co.
Hickok Elect. Instrument
Lectronic Res. Labs. Inc.
Marubeni America Corp. Miida
Electronics
RCA Corporation RCA Broadcast
Equip. Communications Systems
Div.
Robert Bosch Corp. Fernseh Div.
SPI-ITT Instruments Metrix Division
Tektronix Inc.
Terminal Hudson Corp. Terminal
Hudson Electronics
Video Engineering Co. Inc.

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B & K Dynascan Corp.
Eico Elect. Inst. Co., Inc.
Entron, Inc.
Heath Co.
Hewlett Packard Co.
Hickok Elect. Instrument
Leader Instruments Corp.
Lectronic Res. Labs. Inc.
Lectrotech Inc.
Marubeni America Corp. Milda
Electronics
RCA Corporation RCA Broadcast
Equip. Communications Systems
Div.
SPI-ITT Instruments Metrix Division
Tektronix Inc.
Troy Electronic Sales Co.

Oscilloscopes, Wideband

B & K Dynascan Corp. Eico Elect, Inst. Co., Inc. Entron, Inc. Heath Co. Hewlett Packard Co. Hickok Elect. Instrument Leader Instruments Corp. Lectronic Res. Labs. Inc. Lectrotech Inc. Mercury Electronics
RCA Corporation RCA Broadcast
Equip. Communications Systems
Div.
RCA Corporation RCA Electronic
Components
SPI-ITT Instruments Metrix Division
Tektronix Inc.
Terminal Hudson Corp. Terminal
Hudson Electronics
Troy Electronic Sales Co.

Oscilloscopes with Plug-ins

California Instruments Co.
Entron, Inc.
Hewlett Packard Co.
Lectronic Res. Labs, Inc.
SPI-ITT Instruments Metrix Division
Tektronix Inc.

Patch Panel

Atlantic Research Corp. Teleproducts Div.
Audlo Accessories Inc.
AVA Elect. & Machine Corp.
Cooke Engineering Co.
Gates Division of Harris-Intertype
Phelps Dodge Communications Co.
Div. Phelps Dodge Industries Inc.
Potomac Instruments, Inc.
Sarkes Tarzian Inc. Broadcast
Equipment Div.
Shively Laboratories, Inc.
Switchcraft Inc.
Terminal Hudson Corp. Terminal
Hudson Electronics
Trompeter Electronics
Video Engineering Co. Inc.
Virginia Panel Corporation

Phasing Units -- See also Networks, Phasing

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Wilkinson Electronics,

American Electronics Lab., Inc.

A-Tel-A-Matic
CCA Electronics
Collins Radio Company Broadcasting
Marketing.
Continental Electronics Mfg. Co. Subs.
of Resalab, Inc.
Hy-Power Electronics Co.
Multronics, Inc.
RCA Corporation RCA Broadcast
Equip. Communications Systems
Div.
Robert Bosch Corp. Fernseh Div.

Photographic Processing Chemicals, B&W

Wilkinson Electronics, Inc.

Hunt Chemical Corp., Philip A.

Photographic Processing Chemicals, Color

Hunt Chemical Corp., Philip A.

Power Supplies, AC

Advanced High Voltage Co.
ALTEC
Ameco Inc.
American Data Corp.
Anaconda Electronics
Anixter-Pruzan CATV Division
Behrends, Inc.
Bulova American Time Products
California Instruments Co.
Cascade Electronics
C Cor Electronics
C Corlins Radio Company Broadcasting
Marketing,
Comquip, Inc.

David Clark Co., Inc. Delta Electronics Inc. (N.C.) Edison Electronics, Div. of McGraw-Edison Co., Daven & Measurements Eico Elect. Inst. Co., Inc. Electrodyne Div. of MCA Technology, Engineering Associates Entron, Inc.
Essex International Inc. RBM Div. F&B/Ceco Industries, Inc. Fisher Berkeley Corp. G.C. Electronics GE Electronic Components Sales Dept. Heath Co. Honeywell Inc. Test Instruments Div. Ikegami Tsushinki Co., Ltd. Export Department
Lectronic Res. Labs. Inc.
Magnavox Company CATV Division
Melcor Electronics Corp. Mole Richardson Co. Raytheon Company Raytheon Data Systems Co. RCA Corporation RCA Broadcast Equip. Communications Systems Div. Terminal Hudson Corp. Terminal Hudson Electronics Topaz Electronics Video Engineering Co. Inc.

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Advanced High Voltage Co. ALTEC American Data Corp. Beston Electronics Inc. Bristol Div. of Acco Bulova American Time Products Burwen Laboratories Collins Radio Company Broadcasting Marketing,
Engineering Associates
Heath Co.
Hewlett Packard Co. Lectronic Res. Labs. Inc. Lectrotech Inc. MCA Technology, Inc.
Precision Laboratories Precision Cine Equipment Corp. Raytheon Company Raytheon Data Systems Co. RCA Corporation RCA Broadcast Equip. Communications Systems Div. Resalab Inc.
Roh Corporation
Spectra Sonics
SPI-ITT Instruments Metrix Division Troy Electronic Sales Co. Video Engineering Co. Inc.

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Audio Designs & Mfg.
Bell P/A Prod. Corp.
Bogen Division Lear Siegler Inc. Bradford Information Systems Broadcast Electronics **Burwen Laboratories CCA Electronics** Collins Radio Company Broadcasting Marketing, Concept 70, A Div. of Dyma Engineering, Inc. Crown International

Denrad Mfg. Co. Inc. Dyma Engineering, Inc.
DYNAIR Electronics, Inc.
Edison Electronics, Div. of
McGraw-Edison Co., Daven & Measurements Electrodyne Div. of MCA Technology. Inc Fairchild Sound Equipment Corp. A Robins Industries Corp. Gately Electronics Gates Division of Harris-Intertype Interntl. Nuclear Corp. Koss Corp Lang Electronics Inc. Langevin An MCA Technology Company Leader Instruments Corp. LPB Inc. Marti Electronics MCA Technology, Inc. McCurdy Radio Ind. Inc. McMartin Industries Inc. Melcor Electronics Corp. Micro-Trak Corporation (Formerly: Gray Research & Dev.)
Neve Inc., Rupert
Orbit Radio and Video
Philips Broadcast Equipment Corp. Subs. North American Philips Corp. Precision Elect. Inc.
Precision Laboratories Precision Cine Equipment Corp. QRK Electronic Prod. Quad-Eight Electronics RCA Corporation RCA Broadcast Equip. Communications Systems RCA Corporation RCA Electromagnetic & Aviation Systems Div. RHA Audio Communications Corp. RHG Elect Labs, Inc. Riker Communications Inc. Roh Corporation
Rupert Neve Incorporated
Russco Electronics Mfg. Inc. Sansui Electronics Corp. Schafer Electronics Schultz Inc., Albert Scientific Systems, Inc. Broadcast Equipment Div. Shure Brothers Inc. Sony/Superscope Sparta Electronic Corp. Spectra Sonics Systems Marketing Corp. And Sono-Mag Corp. Tape-Athon Corp. Telex Communications Division Total Technology United Recording Electronics **Industries** Video Engineering Co. Inc. VIF International Visual Communication Products Oper. General Electric Co. Wilkinson Electronics, Inc.

Danscoll Ltd:

David Clark Co., Inc.
Delta Electronics Inc. (N.C.)
Delta Electronics Inc. (Va.)

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Ampro Corp. Broadcast Electronics Burwen Laboratories
CCA Electronics
Dyma Engineering, Inc.
Gately Electronics
Gates Division of Harris-Intertype
Lafayette Radio Electronics Marathon Broadcast Equip. Masterton Foodcast Equip.
Masterton Foodcast Equip.
Masterton Co.
MCA Technology, Inc.
Micro-Trak Corporation (Formerly:
Gray Research & Dev.)
Neve Inc., Rupert
QRK Electronic Prod.

Ramko Research

RCA Corporation RCA Broadcast Equip. Communications Systems Div Roh Corporation Rupert Neve Incorporated Russco Electronics Mfg. Inc. Sparta Electronic Corp. Spotmaster Broadcast Electronics Video Engineering Co. Inc. Wilkinson Electronics. Inc.

Preamplifiers, Video

Acrodyne Industries Ameco Inc. **AMF Electrical Products Development** Division C Cor Electronics Gen. Electrodynamics Interntl. Nuclear Corp. Kay Elemetrics Corp. Philips Broadcast Equipment Corp. Subs. North American Philips Corp. RCA Corporation RCA Broadcast Equip. Communications Systems RHG Elect Labs, Inc. Riker Communications Inc. Robert Bosch Corp. Fernseh Div. Shintron Co. Inc.
Tele Measurements Inc.

Pressurization Equipment, Transmission Line

TV Cable Supply Co.

Video Engineering Co. Inc.

Andrew Corp.
Collins Radio Company Broadcasting
Marketing, Cook Electric Co. Gates Division of Harris-Intertype Jampro Antenna Co. Phelps Dodge Communications Co. Prodelin Inc. RCA Corporation RCA Broadcast Equip. Communications Systems Soll, Inc., Joseph M. Sparta Electronic Corp.

Probes, Oscilloscope

Arbor Systems Inc. Eico Elect. Inst. Co., Inc. Entron, Inc.
Heath Co.
Hewlett Packard Co.
Hickok Elect. Instrument Leader Instruments Corp. Lectronic Res. Labs. Inc. Lectrotech Inc. Mercury Electronics RCA Corporation RCA Broadcast Equip. Communications Systems Div. RCA Corporation RCA Electronic Components Sencore Inc. SPI-ITT Instruments Metrix Division Tektronix Inc. Terminal Hudson Corp. Terminal Hudson Electronics Texscan Corp. Troy Electronic Sales Co.

Processing Chemicals, Film

Hunt Chemical Corp., Philip A.

Processors, Film B&W

Comquip, Inc. F&B/Ceco industries, Inc. Filmline Corp.
Photo-Pic Systems
Precision Laboratorles Precision Clne Equipment Corp. Technology Incorporated HF Photo Systems Div. Treise Engineering

Processors, Film Color

Comquip, Inc. F&B/Ceco Industries, Inc. Filmline Corp. Innovative Television Equipment, in Jamieson Film Co. Photo-Pic Systems Precision Laboratories Precision Ci Equipment Corp. Technology Incorporated HF Photo Systems Div. Trelse Engineering

Processors, Silver Recovery U

Filmline Corp. Photo-Pic Systems Profit Recovery Systems Div. of CF Technology Incorporated HF Photo Systems Div. Treise Engineering

Processors, VTR

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Danscoll Ltd.

Danscoll Ltd.

Projectors, Film Comquip

ABTO, Inc. Arriflex Company of America Behrends, Inc. Christle Electric Corp. Comquip, Inc. Eastman Kodak Co. F&B/Ceco Industries, Inc. GAF Corp. Kalart Victor Corp. Lipsner Smith Corp.
Listec TV Equip. Corp.
L-W Photo, Inc.
Magna-Tech Electronic Co., Inc. Paillard Incorporated
Palmer Films, Inc., W. A.
Philips Broadcast Equipment Corp.
Subs. North American Philips &
Precision Laboratories Precision Cli Equipment Corp.
RCA Corporation RCA Broadcast Equip. Communications Systems R. H. Tyler Co. Div. of Weather Sca

Projectors, Film Cassette Loading

Video Engineering Co. Inc.

Robert Bosch Corp. Fernseh Div.

Tele-Cine Inc. TeleMation, Inc.

Comquip, Inc.
Hokushin Elect. Co.
LIstec TV Equip. Corp.
RCA Corporation RCA Broadcast
Equip. Communications Systems

Projectors, Film Rear

Behrends, Inc. Christle Electric Corp. Comquip, Inc. F&B/Ceco Industries. Inc. Kalart Victor Corp.
RCA Corporation RCA Broadcast Equip. Communications Systems Div. Video Engineering Co. Inc. Wilson Corp., H.

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Spindler & Sauppe, Inc.

ABTO, Inc.
Christie Electric Corp.
Comquip, Inc.
Eastman Kodak Co.
F&B/Ceco Industries, Inc.
GAF Corp.
Harwald Company Kalart Victor Corp.

Bros. Lighting TV Equip. Corp. ip. Communications Systems

Tyler Co. Div. of Weather Scan.

Tarzian Inc. Broadcast Doment Div. & Sauppe, Inc. ation, Inc. a enc Corp.

victors, TV Large Screen

eco Industries, Inc. al Television Ntwk. : Wiv. Singer Gen. shin Elect. Co. inh Industries an/leasurements Inc. Engineering Co. Inc.

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Corporation RCA Missile & rface Radar Div. ly Laboratories, Inc.

dulp. Communications Systems

livers, AM

P/A Prod. Corp.
n Division Lear Slegler Inc. e Engineering Co. iro-Voice inc. Div. of Gulton dustries, inc. On Co. Research Lab. Inc. Ioni Instruments eley Assoc. Inc.

Potomac Instruments, Inc. RCA Corporation RCA Electromagnetic & Aviation Systems Div. RHA Audio Communications Corp. RHG Elect Labs, Inc.
Rohde & Schwarz Sales Schultz Inc., Albert Singer Products Co., Inc. Terminal Hudson Corp. Terminal Hudson Electronics Time & Frequency Tech., Inc. Wilkinson Electronics, Inc.

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Trepac Corp. America

Receivers, EBS

Ball Bros. Research Corp. Miratel Division Mastertone Co. Tri-Tronics

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American Geloso Electronics
Bell P/A Prod. Corp.
Bogen Division Lear Siegler Inc.
Cooke Engineering Co.
Eico Elect. Inst. Co., Inc.
Electro-Voice Inc. Div. of Gulton Industries, Inc.
GTE Lenkurt Incorporated Heath Co. Lafayette Radio Electronics Lectronic Res. Labs. Inc. Marconi Instruments Marti Electronics
McMartin Industries Inc.
Permadynne Electronics Corp. Potomac Instruments, Inc. Precision Elect. Inc.
RCA Corporation RCA Electromagnetic & Aviation Systems Div. RCA Corporation RCA Service Company Div. Revox Corporation

RHG Elect Labs, Inc. Rhde & Schwarz Sales Sansul Electronics Corp. Schultz Inc., Albert Singer Products Co., Inc. Tandberg of America Inc. Terminal Hudson Corp. Terminal **Hudson Electronics** Wilkinson Electronics, Inc.

Receivers, HF

American Electronics Lab., Inc. Collins Radio Company Broadcasting Marketing. Cooke Engineering Co. Engineering Associates Karg Laboratories, Inc. Marconi Electronics Inc. Marconi Instruments Narda Microwave Corp., The RHG Elect Labs. Inc. Rohde & Schwarz Sales Singer Products Co., Inc.

Receivers, Multiplex

Belar Electronics Lab., Inc. Eico Elect, Inst. Co., Inc. Electro-Voice Inc. Div. of Gulton Industries, Inc. GTE Lenkurt Incorporated Heath Co.
Johnson Electronics, Inc.
Karg Laboratories, Inc.
McMartin Industries Inc. Permadynne Electronics Corp. RHG Elect Labs, Inc. Schultz Inc., Albert

Singer Products Co., Inc. Sony/Superscope Trepac Corp. America

Receivers, SCA

Belar Electronics Lab., Inc. Bell P/A Prod. Corp. Eico Elect, Inst. Co., Inc. Karg Laboratories, Inc. Marti Electronics McMartin Industries Inc. Permadynne Electronics Corp. Singer Products Co., Inc.

Receivers, Time Signal

Lectronic Res. Labs. Inc. Radio Mfg. Co. SIMEX/COAST NAVIGATION SCHOOL Singer Products Co., Inc.

Receivers, TV Color

Admiral Corporation

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SC Electronics, Inc. 41

Audiotronics Corp. CHESTER ELECTRONIC LABS., INC. GTE Information Systems Inc. Cohu, Inc. Electronics Division Concord Elect. Corp.
Dlamond Power Specialty Corp. Subs.
Babcock & Wilcox Co. Heath Co. Jerrold Electronics Corp. CATV Systems Div.
Panasonic, VTR/CCTV Dept.
Matsushita Electric Corp. of America RCA Corporation RCA Service Company Div. SC Electronics, Inc. Subs. of Audiotronics Corp. Singer Co. Simulation Products Div. Soll, Inc., Joseph M. Sylvania Comm. Electronic Tele Measurements Inc. Video Engineering Co. Inc.

Receivers, TV Monochrome

Admiral Corporation

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Anixter-Pruzan CATV Division Audiotronics Corp. Cohu, Inc. Electronics Division Concord Elect. Corp. Heath Co. Javelin Division Apollo Lasers, Inc. Nemo Recording Labs Panasonic, VTR/CCTV Dept. Matsushita Electric Corp. of America Rank Precision Ind. Broadcast Div. SC Electronics, Inc. Subs. of Audiotronics Corp. Shibaden Corp. of America Singer Co. Simulation Products Div. Sony Corp. of America Sylvania Comm. Electronic Telesync Corp. Video Engineering Co. Inc.

Recorder Replacement Motor

Broadcast Products Inc. Minarik Elect. Sparta Electronic Corp. Tapecaster TCM, Inc.
Telectro Systems Corp.

Recorders, Camera Tape to Film

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Mediatech Palmer Films, Inc., W. A. Teledyne Camera Systems Victor Duncan, Inc.

Recorders, Cassette

Astrocom Electronics, Inc. Audiotronics Corp. Bell Sound Studios A & B Duplicators Div. Comquip, Inc. Cramer Division Conrac Corp. CYBRIX CORPORATION Heath Co. International Tapetronics Corp. Lafayette Radio Electronics Martel Electronics Inc.
MCA Technology, Inc.
Mincom Div. 3M Co.
MINNEAPOLIS MAGNETICS, INC. Panasonic, VTR/CCTV Dept. Matsushita Electric Corp. of America RAPID-Q Div. of Garron Electronics RCA Corporation RCA Broadcast Equip. Communications Systems Div. R. H. Tyler Co. Div. of Weather Scan, Inc. Sansui Electronics Corp. Schafer International Sony/Superscope Telectro Systems Corp.

Recorders, Disc Magnetic

Hudson Electronics

Telex Communications Division

Terminal Hudson Corp. Terminal

CMX Systems Colorado Video Inc. Comquip, Inc. Data Disc Inc. Data Memory Inc. Dyma Engineering, Inc. Memorex Corp. Peripheral Data Machines, Inc. (PER DATA) Schultz Inc., Albert Systems Marketing Corp. And Sono-Mag Corp. Telectro Systems Corp. TeleMation, Inc.

Recorders, Film Light

Comquip, Inc. Magna-Tech Electronic Co., Inc. Mincom Div. 3M Co. RCA Corporation RCA Broadcast Equip. Communications Systems

Recorders, Film Magnetic

Behrends, Inc. Comquip, Inc. Langevin An MCA Technology Company Magna-Tech Electronic Co., Inc. Precision Laboratories Precision Cine Equipment Corp.
RCA Corporation RCA Broadcast Equip. Communications Systems Div. Stancil-Hoffman Corp. Tele-Cine Inc. Telectro Systems Corp. Victor Duncan, Inc.

Recorders, Logging Magnetic

Alto Communications Inc. Broadcast Marketing Dlv. Ampex Corp. Broadcast Products Inc. CCA Electronics Gould Inc. Instrument Systems Div. Harvey Radio Pro A/V Div. Honeywell Inc. Test Instruments Div. Lang Electronics Inc., Magnatech Co. Metrotech/Scully Div. of Dictaphone Corp.
Miles Reproducer Co.
Nagra Magnetic Recorders, Inc.
Philips Broadcast Equipment Corp.

Subs. North American Philips Corp. Radio Mfg. Co.

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RCA Corporation RCA Broadcast Equip. Communications Systems Div. Richmond Hill Laboratories Inc. Scully Recording Instruments Co. Soundscriber Corporation Stancil-Hoffman Corp. Systems Marketing Corp. And Sono-Mag Corp. Tape-Athon Corp. Telectro Systems Corp.

Recorders, Magnetic Tape Logging

Alto Communications Inc. Broadcast Marketing Div. Ampex Corp. Broadcast Products Inc. **CCA Electronics** Collins Radio Company Broadcasting Marketing. Honeywell Inc. Test Instruments Div. Magnatech Co. Mastertone Co Metrotech/Scully Div. of Dictaphone Corp. Philips Broadcast Equipment Corp. Subs. North American Philips Corp. Radio Mfg. Co. RCA Corporation RCA Broadcast Equip. Communications Systems Schafer Electronics Singer Products Co., Inc. Soundscriber Corporation Sparta Electronic Corp. Stancil-Hoffman Corp. Systems Marketing Corp. And Sono-Mag Corp. Tape-Athon Corp. Telectro Systems Corp. Telex Communications Division

Recorders, Magnetic Tape Video

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Akai America, Ltd. Alcor Inc. Ampex Corp. Audiotronics Corp. BSC Incorporated CATV Equipment Co. Concord Elect. Corp. Diamond Power Specialty Corp. Subs. Babcock & Wilcox Co.

GBC Closed Circuit TV Corp.

General Television Ntwk.

GPL Div. Singer Gen.

Harvey Radio Pro A/V Div. Ikegami Tsushinki Co., Ltd. Export
Department International Video Javelin Division Apollo Lasers, Inc. Mincom Div. 3M Co. Panasonic, VTR/CCTV Dept. Matsushita Electric Corp. of America Philips Broadcast Equipment Corp. Subs. North American Philips Corp. Rank Cintel Rank Precision Ind. Ltd., Broadcast Div. RCA Corporation RCA Broadcast Equip. Communications Systems Div. R. H. Tyler Co. Div. of Weather Scan, Inc. Riker Communications Inc. Robert Bosch Corp. Fernseh Div.
Scully Recording Instruments Co.
Shibaden Corp. of America
Singer Co. Simulation Products Div.
Sony Corp. of America

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B & K Dynascan Corp.

Telectro Systems Corp.

Visual Electronics Corp.

Video Engineering Co. Inc.

Bristol Div. of Acco GE Electronic Components Sales Dept. General Radio Co. Gould Inc. Instrument Systems Div. Heath Co. Lectronic Res. Labs. Inc. Moseley Assoc. Inc. Rust Corp. Rustrak Instrument Gulton Ind. Inc. Simpson Electric Co. Systems Marketing Corp. And Sono-Mag Corp.

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Cine Sonic Sound Inc. Collins Radio Company Broadcasting Marketing, Comquip, Inc. Concord Elect. Corp. Crown International CYBRIX CORPORATION Denson Electronic Corp. Electrodyne Div. of MCA. Technology, Gates Division of Harris-Intertype

General Radio Co.

Gotham Audio Corp. Harvey Radio Pro A/V Div. IGM. Lang Electronics Inc. Langevin An MCA Technology Company Magnatech Co Magna-Tech Electronic Co., Inc. Martel Electronics Inc. Mastertone Co. MCA Technology, Inc.

Metrotech/Scully Div. of Dictaphone Corp. Miles Reproducer Co. Nagra Magnetic Recorders, Inc. Nemo Recording Labs Orbit Radio and Video Otari of America, Ltd. Peripheral Data Machines, Inc. (PER

DATA) Philips Broadcast Equipment Corp. Subs. North American Philips Corp. Radio Mfg. Co. RCA Corporation RCA Broadcast Equip. Communications Systems

Div. Recordex Corporation Revox Corporation Roberts Div. of Rheem Mfg. Co. Ryder Magnetic Sales Corp. Sansui Electronics Corp.

Schafer Electronics Schultz Inc., Albert Scully Recording Instruments Co. Singer Products Co., Inc. Sony/Superscope Soundscriber Corporation

Sparta Electronic Corp. Stancil-Hoffman Corp.

Systems Marketing Corp. And Sono-Mag Corp.
Taber Mfg. & Engr. Co.
Tandberg of America Inc.
Tape-Athon Corp. Tascam Corporation TEAC Corp of America Telectro Systems Corp. Tele Measurements Inc. Telex Communications Division

Terminal Hudson Corp. Terminal **Hudson Electronics** Victor Duncan, Inc. VIF International

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Group Broadcast Electronics

Broadcast Prod. Co. Inc. Bost. Division Broadcast Products Inc. **CCA Electronics**

Collins Radio Company Broadcasting Marketing, Concord Elect, Corp. Contel Mfg. Div. of Continental Electronic Wholesale Corp.

Dyma Engineering, Inc. Franz Vertriebs-gesellschaft m.b.H. Gates Division of Harris-Intertype

International Tapetronics Corp. Joa Cartridge Service Lang Electronics Inc. MaCarta MacKenzie Laboratories, Inc. Mastertone Co.

MCA Technology, Inc. Nemo Recording Labs
Philips Broadcast Equipment Corp.
Subs. North American Philips Corp.

RAPID-Q Div. of Garron Electronics RCA Corporation RCA Broadcast Equip. Communications Systems Div.

Recordex Corporation Roberts Div. of Rheem Mfg. Co. Schafer Electronics Schultz Inc., Albert Scully Recording Instruments Co. Singer Products Co., Inc. Sony/Superscope Sparta Electronic Corp. Spotmaster Broadcast Electronics
Systems Marketing Corp. And
Sono-Mag Corp.
Tandberg of America Inc.
Tapecaster TCM, Inc.

Telectro Systems Corp. Tele Measurements Inc. Telex Communications Division

Recorders, Video Kinescope

Comquip, Inc.
Mincom Div. 3M Co.
Palmer Films, Inc., W. A.
Philips Broadcast Equipment Corp. Subs. North American Philips Corp. RCA Corporation RCA Broadcast Equip. Communications Systems Div. Teledyne Camera Systems Tele Measurements Inc. Video Engineering Co. Inc.

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Liberty Industries RCA Corporation RCA Broadcast Equip. Communications Systems Div. Television Equipment Associates Video Engineering Co. Inc.

Recording Services, Audio Tape

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Accurate Sound Corp. Alto Communications Inc. Broadcast Marketing Div.

Audio Magnetics Corp. Bell Sound Studios A & B Duplicator Div. Cine Sonic Sound Inc. The CnB Studios Duotone Co. Inc. **IGM** Nemo Recording Labs Orbit Radlo and Video Recordex Corporation Schafer Electronics **Ultra Audio Products**

Recording Services, Videotape

Mediatech Palmer Films, Inc., W. A.

Recording Synchronizers

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Electronic Engineering Co. of Californ

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Reels, Cable and Mike

Hannay Reels1. Roll- A - Reel1. Hännay Reels Clifford B. Hannay & Son Inc. Industrial Electric Reel RCA Corporation RCA Broadcast Equip. Communications Systems Roll-A-Reel

Reflectors, Passive

Advance Industries Andrews Tower Inc. Collins Radio Company Broadcasting Marketing, Fort Worth Tower Co., Inc. Microelect Co. Inc. Rohn Manufacturing Div. of Unarco Industries Inc. Utility Tower Co.

Regulators, Voltage Arbor Systems Inc.

B & K Dynascan Corp. California Instruments Co. Collins Radio Company Broadcasting Marketing,
GE Electronic Components Sales Del General Radio Co. Kato Engineering Co. Lectronic Res. Labs. Inc. Northlake Engineering, Inc. Terminal Hudson Corp. Terminal **Hudson Electronics** Topaz Electronics Total Tcchnology Video Engineering Co. Inc.

Remote Control Monitors, VIT

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Gates Division of Harris-Intertype Telemet Co. Video Engineering Co. Inc.

Remote Control Systems

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I Dynamics Corp.
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Systems Corp.
Systems
mering Associates
Division of Harris-Intertype
ectronic Components Sales Dept.
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-Tech Electronic Co., Inc.
Electronics
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intial Electrolab Assoc. Ltd.

Corporation RCA Broadcast

ms Marketing Corp. And So-Mag Corp. Corp. America Engineering Co. Inc.

Nisev Assoc, Inc.

ente Pickup Systems, Radio

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salElectronics

harberation Systems

Distributor Inc.

Iniid Sound Equipment Corp. A

Foins Industries Corp.

winders, Film

ehnds, Inc.

uip, Inc.
o Ceco Industries, Inc.
hald Company
alt Victor Corp.
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Corporation RCA Broadcast
hip. Communications Systems

Bonders, Tape

Seliound Studios A & B Duplicators

Included in the control of the contr

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rerdex Corporation
rece Inc.
receptor Products Co., Inc.
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pace Devices Inc.

mblers, Speech

Ins Radio Company Broadcasting arketing, Research Lab. Inc. Products Co., Inc. Cac Corp. America

Screens, Projection Front

Behrends, Inc.
Comquip, Inc.
F&B/Ceco Industries, Inc.
Raven Screen Corp.
Tele Measurements Inc.
Telesync Corp.
Video Engineering Co. Inc,

Screens, Projection Rear

Behrends, Inc. F&B/Ceco Industries, Inc. Raven Screen Corp. Tele Measurements Inc. Video Engineering Co. Inc Wilson Corp., H.

Semiconductors, IC's

Motorola Semiconduct Motorola Inc.
Solitron Devices Inc. Semiconductor
Div.
Terminal Hudson Corp. Terminal
Hudson Electronics
Texas Instrument Components Group
Transco Products International

Amperex Corp.
Collins Radio Company Broadcasting

Semiconductors, Rectifier General

Marketing,
GE Electronic Components Sales Dept.
Heintz and Kaufman Ltd.
Motorola Semiconduct Motorola Inc.
RCA Corporation RCA Electronic
Components
Singer Products Co., Inc.
Solltron Devices Inc. Semiconductor
Div.
Sylvania Semiconductor
Terminal Hudson Corp. Terminal
Hudson Electronics
Texas Instrument Components Group
Thor Electronics Corp.
Transco Products International
TRW Electronic Supply Co. Div. of

Semiconductors, Rectifier High Voltage Stack

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Westinghouse Electric Corp.

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Tubes
Ampex Corp.
Collins Radio-Company Broadcasting
Marketing,
Helntz and Kaufman Ltd.
Motorola Semiconduct Motorola Inc.
RCA Corporation RCA Electronic
Components
Singer Products Co., Inc.
Solitron Devices Inc. Semiconductor
Div.
Terminal Hudson Corp. Terminal
Hudson Electronics
Thor Electronics Corp.
Transco Products International
Westinghouse Electric Corp.
Wilkinson Electronics, Inc.

Semiconductors, Rectifier Power

Amperex Corp.
Collins Radio Company Broadcasting Marketing.
GE Electronic Components Sales Dept. Helntz and Kaufman Ltd.
Motorola Semiconduct Motorola Inc.
RCA Corporation RCA Electronic Components
Singer Products Co., Inc.
Solitron Devices Inc. Semiconductor Div.
Sylvania Semiconductor
Terminal Hudson Corp. Terminal Hudson Electronics
Texas Instrument Components Group

Thor Electronics Corp. Transco Products International Westinghouse Electric Corp.

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Amperex Corp.
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GE Electronic Components Sales Dept.
Heintz and Kaufman Ltd.
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RCA Corporation RCA Electronic
Components
Singer Products Co., Inc.
Solltron Devices Inc. Semiconductor
Div.

Terminal Hudson Corp. Terminal Hudson Electronics Texas Instrument Components Group Thor Electronics Corp. Transco Products International Westinghouse Electric Corp. Wilkinson Electronics, Inc.

Semiconductors, Thyristor

GE Electronic Components Sales Dept. Heintz and Kaufman Ltd. Motorola Semiconduct Motorola Inc. RCA Corporation RCA Electronic Components Singer Products Co., Inc. Solitron Devices Inc. Semiconductor Div. Terminal Hudson Corp. Terminal

Hudson Electronics
Texas Instrument Components Group
Thor Electronics Corp.
Transco Products International
Westinghouse Electric Corp.

Semiconductors, Transistor AF

Heintz and Kaufman Ltd.
Motorola Semiconduct Motorola Inc.
Raytheon Company Raytheon Data
Systems Co.
RCA Corporation RCA Electronic
Components
Singer Products Co., Inc.
Solitron Devices Inc. Semiconductor
Div.

Sylvania Semiconductor
Terminal Hudson Corp. Terminal
Hudson Electronics
Texas Instrument Components Group
Thor Electronics Corp.
Transco Products International
Westinghouse Electric Corp.

Semiconductors, Transistor FET

Amperex Corp.
Heintz and Kaufman Ltd.
Motorola Semiconduct Motorola Inc.
RCA Corporation RCA Electronic
Components
Singer Products Co., Inc.
Terminal Hudson Corp. Terminal
Hudson Electronics
Texas Instrument Components Group
Thor Electronics Corp.
Transco Products International
Westinghouse Electric Corp.

Semiconductors, Transistor General

CATV Equipment Co.
GE Electronic Components Sales Dept.
Motorola Semiconduct Motorola Inc.
Raytheon Company Raytheon Data
Systems Co.
RCA Corporation RCA Electronic
Components
Singer Products Co., Inc.
Solitron Devices Inc. Semiconductor

Sylvania Semiconductor

Terminal Hudson Corp. Terminal Hudson Electronics Texas Instrument Components Group Thor Electronics Corp. Transco Products International Westinghouse Electric Corp.

Semiconductors, Transistor RF

Heintz and Kaufman Ltd.
Hewlett Packard Co.
Motorola Semiconduct Motorola Inc.
Raytheon Company Raytheon Data
Systems Co.
RCA Corporation RCA Electronic
Components
Singer Products Co., Inc.
Solltron Devices Inc. Semiconductor
Div.
Sylvanla Semiconductor
Terminal Hudson Corp. Terminal
Hudson Electronics
Texas Instrument Components Group
Thor Electronics Corp.
Transco Products International
Westinghouse Electric Corp.

Shifters, Phase Microwave

Andersen Labs Inc.
Collins Radio Company Broadcasting
Marketing,
General Radio Co.
Hewlett Packard Co.
Lectronic Res. Labs, Inc.
Micro Communications, Inc.
Micro Communications, Inc.
Microwave Assoc. Inc.
Narda Microwave Corp., The
Raytheon Company Raytheon Data
Systems Co.
Television MicrotIme, Inc. Subs.
Andersen Laboratories, Inc.
Welnschel Engineering Co.

Slow Scan TV Systems

Colorado Video Inc.
Gates Division of Harris-Intertype
Gen. Electrodynamics
Teledyne Brown Engineering Co.
Sclence & Engrg. Div.
Teltron, Inc.
Video Engineering Co. Inc.

Sound Systems, Outdoor

Alcor Inc.
ALTEC
American Geloso Electronics
Applied Elect. Mechanics
ATLAS Sound
Audio Distributor Inc.
Bell P/A Prod. Corp.
Bogen Division Lear Siegler Inc.
Concept 70. A Div. of Dyma
Engineering, Inc.
Electrodyne Div. of MCA Technology,
Inc.
Electro-Voice Inc. Div. of Gulton
Industries, Inc.
Jensen Sound Laboratories Div.
Pemcor, Inc.
Lafayette Radio Electronics

Langevin An MCA Technology Company Philips Broadcast Equipment Corp. Subs. North American Philips Corp. Q-TV Sales & Distributing Corp. RCA Corporation RCA Broadcast Equip. Communications Systems

Div.
Shure Brothers Inc.
Spectra Sonics
Terminal Hudson Corp. Terminal
Hudson Electronics
Ultra Audio Products

Sound Systems, Portable

Alcor Inc.
ALTEC
American Geloso Electronics
Applied Elect. Mechanics
ATLAS Sound
Audlo Distributor Inc.
Bell Sound Studios A & B Duplicators
Div.

Bogen Division Lear Siegler Inc. **CCA Electronics** Comquip, Inc.
Concept 70, A Dlv. of Dyma
Engineering, Inc.
Custom Craft Designs
Electrodyne Div. of MCA Technology, Electro-Voice Inc. Div. of Gulton Industries, Inc. Gately Electronics
Jensen Sound Laboratories Div. Pemcor, Inc. Langevin An MCA Technology Company
Neve Inc., Rupert
Philips Broadcast Equipment Corp.
Subs. North American Philips Corp. Pulse Dynamics Mfg. Corp. Q-TV Sales & Distributing Corp. RCA Corporation RCA Broadcast Equip. Communications Systems Div Roberts Div. of Rheem Mfg. Co. Rupert Neve Incorporated Shure Brothers Inc.

Sound Systems, Studio

Singer Products Co., Inc. Spectra SonIcs Tape-Athon Corp.

Hudson Electronics

Ultra Audlo Products

Terminal Hudson Corp. Terminal

American Geloso Electronics Behrends, Inc. **CCA Electronics** Cleveland Electronics, Inc. Comquip, Inc. Concept 70, A Div. of Dyma Engineering, Inc. Delta Electronics Inc. (N.C.) Edison Electronics, Div. of McGraw-Edison Co., Daven & Measurements Gately Electronics Gotham Audio Corp. Jensen Sound Laboratories Div. Pemcor, Inc. Langevin An MCA Technology Company Magna-Tech Electronic Co., Inc. Melcor Electronics Corp. Neve Inc., Rupert Phillps Broadcast Equipment Corp. Subs. North American Philips Corp. RCA Corporation RCA Broadcast Equip. Communications Systems Div. Rupert Neve Incorporated Scintrex Inc. Communications Div. Shure Brothers Inc. Singer Products Co., Inc. Sparta Electronic Corp. Spectra Sonics

Sound Systems, Theater

Total Technology (Trusonic) ACS Inc.

Visual Electronics Corp.

Alcor Inc. ALTEC American Geloso Electronics Audlo Distributor Inc. Behrends, Inc. Bell Sound Studios A & B Duplicators Bogen Division Lear Slegler Inc. Conquip. Inc.
Concept 70, A Div. of Dyma
Engineering, Inc.
Delta Electronics Inc. (N.C.)
Electrodyne Div. of MCA Technology, Electro-Voice Inc. Div. of Gulton Industries, Inc. **Gately Electronics** Jensen Sound Laboratories Div. Pemcor, Inc.
Langevin An MCA Technology
Company
Melcor Electronics Corp. Neve Inc., Rupert

Philips Broadcast Equipment Corp. Subs. North American Philips Corp. TV Sales & Distributing Corp. RCA Corporation RCA Broadcast Equip. Communications Systems RHA Audio Communications Corp.

Rupert Neve Incorporated Scintrex Inc. Communications Div. Shure Brothers Inc. Spectra Sonics (Trusonic) ACS Inc.

Speakers and Enclosures

ALTEC. American Geloso Electronics ATLAS Sound Behrends, Inc. Bogen Division Lear Siegler Inc. Cleveland Electronic Speaker Div. Collins Radio Company Broadcasting Marketing, Comquip. Inc Electrodyne Div. of MCA Technology. Electro-Voice Inc. Div. of Gulton Industries, Inc. G.C. Electronics Gotham Audio Corp. Hartley Prod. Corp. Heath Co. Jensen Sound Laboratorles Div. Pemcor, Inc. Koss Corp Lafayette Radio Electronics Langevin An MCA Technology Company Oaktron Industries Inc.
Phillps Broadcast Equipment Corp.
Subs. North American Philips Corp. RCA Corporation RCA Broadcast Equip. Communications Systems Div Schultz Inc., Albert Scientific Systems, Inc. Broadcast Equipment Div. Singer Products Co., Inc. Sony/Superscope Sparta Electronic Corp. Spectra Sonics Tandberg of America Inc. TEAC Corp of America Tele Measurements Inc. Terminal Hudson Corp. Terminal **Hudson Electronics** (Trusonic) ACS Inc.

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Marketing,
David Clark Co., Inc.
Dyma Engineering, Inc.
Electromagnetic Sciences, Inc.
GTE Lenkurt Incorporated
Magnatech Co. Marti Electronics
Mastertone Co.
Microwave Assoc, Inc.
Moseley Assoc. Inc.
Raytheon Company Raytheon Data Systems Co.
RCA Corporation RCA Broadcast
Equip. Communications Systems Div.
RHG Elect Labs, Inc.
Richmond Hill Laboratories Inc.
Singer Products Co., Inc.
Spärta Electronic Corp.
Tektronix Inc.
Trepac Corp. America Varian Solld State Div. Micro-Link Products
Visual Communication Products Oper. General Electric Co.
Visual Electronics Corp.

Studio Scenery

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Div. Audio Designs & Mfg. Ball Bros. Research Corp. Miratel Division Central Dynamics Corp. CHESTER ELECTRONIC LABS., INC. GTE Information Systems Inc. Cohu, Inc. Electronics Division Concept 70, A Div. of Dyma Engineering, Inc. Cook Electric Co. Cunningham Corp. Subs. of Gleason Works Danscoll Ltd.

General Microwave Corp. Grass Valley Group, Inc. **IGM** Internti. Nuclear Corp. Javelin Division Apollo Lasers, Inc. Kapco Enterprises Kay Elemetrics Corp K'SON Corporation Marconi Electronics Inc. McCurdy Radio Ind. Inc. Mincom Div. 3M Co. Neve Inc., Rupert RCA Corporation RCA Broadcast Equip. Communications Systems Div.

DYNAIR Electronics, Inc.

Fung Engineering Co.

Essex International Inc. RBM Div.

Gates Division of Harris-Intertype

GBC Closed Circuit TV Corp.

R. H. Tyler Co. Div. of Weather Scan, Inc.

Richmond Hill Laboratories Inc. Riker Communications Inc. Roh Corporation Rupert Neve Incorporated Sarkes Tarzian Inc. Broadcast Equipment Div.

Seacor Inc. Shintron Co. Inc. Sparta Electronic Corp. Systems Marketing Corp. And Sono-Mag Corp. TeleMation, Inc. Telemet Co.

Total Technology Video Engineering Co. Inc. Vikoa Inc. Viscount Video Systems Ltd. Visual Educom Inc.

Visual Electronics Corp.

Vital Industries

American Data Corp.

Switches, Coaxial

See Adv. F. Shively Laboratories, Inc.

Alford Mfg. Co. American Data Corp. American Electronics Lab., Inc. Andrew Corp. A-Tel-A-Matic Atlantic Research Corp. Teleproduc Div Bird Electronic Corp. Blonder-Tongue Labs. CATV Equipment Co. Collins Radio Company Broadcastin Marketing, CYBRIX CORPORATION Delta Electronics Inc. (Va.)
Electronic Inst. & Spec.
Fung Engineering Co.
Gates Division of Harris-Intertype General Microwave Corp. Integral Data Devices Inc. ITT Jennings Jampro Antenna Co.

Kay Elemetrics Corp. Lectronic Res. Labs. Inc. Magnecraft Electric Co. Matrix Systems Corp. Micro Communications, Inc. Narda Microwave Corp., The OAK Industries Inc. CATV División Prodelin Inc. RCA Corporation RCA Broadcast Equip. Communications Systems Div. Shively Laboratories, Inc. Singer Products Co., Inc. Soll, Inc., Joseph M. Sparta Electronic Corp. Terminal Hudson Corp. Terminal

Hudson Electronics Texscan Corp. Trompeter Electronics
TRW Electronic Supply Co. Div. of
TRW

TV Cable Supply Co. Virginia Panel Corporation

Switches, Crossbar

American Data Corp. Andrew Corp.
Atlantic Research Corp. Teleproduc CHESTER ELECTRONIC LABS., INC. GTE Information Systems Inc. Collins Radio Company Broadcastin Marketing, Cunningham Corp. Subs. of Gleason Works
CYBRIX CORPORATION
Delta Electronics Inc. (Va.)
Integral Data Devices Inc.

Interntl. Nuclear Corp. Marconi Electronics Inc. Matrix Systems Corp.
RCA Corporation RCA Broadcast Equip. Communications Systems

Robert Bosch Corp. Fernseh Div. Rust Corp. Tape-Athon Corp. Trompeter Electronics Video Engineering Co. Inc. Viscount Video Systems Ltd. Vital Industries

Switching Systems

See Adv. P American Data Corp. Grass Valley Group, Inc. Systems Ltd.

Alcor Inc. Alma Engineering Inc.

Corp.

Mew Corp.

Systems Inc.

Ittlc Research Corp. Teleproducts

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lal Dynamics Corp.
TER ELECTRONIC LABS.. INC.
IE Information Systems Inc.
land Electronics, Inc.
land Electronics Division
Is Radio Company Broadcasting
Irketing,
IPPT 70, A DIv. of Dyma
gineering, Inc.
Ingham Corp. Subs. of Gleason
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IX CORPORATION
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IE Electronics Inc. (Va.)
INAIR Electronics, Inc.
Division of Harris-Intertype
Iss. Valley Group, Inc.
Inc. Electronics

al Data Devices Inc.

Intl. Nuclear Corp.

Intl. Nuclear Corp.

Internal Controls

Itain Division Apollo Lasers, Inc.

Inc. Apollo Casers, Inc.

Inc. Inc.

Inc. Apollo Lasers, Inc.

Inc. Inc.

Inc. Inc.

Inc., Rupert

Inc., Rupert

Inc. Corporation RCA Broadcast

Inc. Communications Systems

Inc. Communications Systems

Inc. Communications Systems

mond Hill Laboratories Inc.

Communications Inc.
27 It Bosch Corp. Fernseh Div.
20 Corporation
11 It Neve Incorporated
20 Corp.
28 Tarzian Inc. Broadcast
10 Inc. Joseph M.
20 Inc. Joseph M.
20 Inc. Joseph M.
21 Inc. Hoseph M.
22 Inc. Hoseph M.
23 Inc. Hoseph M.
24 Inc. Hoseph M.
25 Inc. Joseph M.
26 Inc. Joseph M.
27 Inc. Hoseph M.
28 Inc. Joseph M.
29 Inc. Hoseph M.
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20 Inc. Hosep

Industries

Wie, Magnetic Recording Audio

II-Gevaert Inc.
Communications Inc. Broadcast arketing Div. ex Corp. No Devices, Inc. Mo Magnetics Corp. thends, Inc. & Howell Consumer Products MeSound Studios A & B Duplicators dcast Electronics
dcast Products Inc. Incorporated Electronics Sonic Sound Inc. ns Radio Company Broadcasting arketing, whyn International ktromesstechnik E M T Wilhelm anz G M B H Magnetic Recording Tape Div. orhan Nat'i. Sales Co. Inc.

Cartridge Service

Lafavette Radio Electronics Magnatech Co. Magnetic Prod. Div. 3M Company Mastertone Co. Memorex Corp.
Miles Reproducer Co.
Nortronics Co., Inc.
Otari of America, Ltd.
Philips Broadcast Equipment Corp. Subs. North American Philips Corp. Q-TV Sales & Distributing Corp. RCA Corporation RCA Broadcast Equip. Communications Systems Div. RCA Corporation RCA Electronic Components
Recordex Corporation
Ryder Magnetic Sales Corp. Schafer Electronics Schultz Inc., Albert Singer Products Co., Inc. Sony/Superscope Soundscriber Corporation Sparta Electronic Corp. Systems Marketing Corp. And Sono-Mag Corp. Tape-Athon Corp.
TDK Electronics Corp. Tele Measurements Inc. Transco Products International Victor Duncan, Inc. Wide Response

Tape, Magnetic Recording Audio Cartridge

Alto Communications Inc. Broadcast Marketing Dlv. American Geloso Electronics Audio Devices, Inc. Audio Magnetics Corp. Bell & Howell Consumer Products Group Bell Sound Studios A & B Duplicators Birmingham Tape Cartridge Co. Broadcast Electronics Broadcast Prod. Co. Inc. Best. Division Broadcast Products Inc. BSC Incorporated Cine Sonic Sound Inc.
Collins Radio Company Broadcasting
Marketing
Contel Mfg. Div. of Continental Electronic Wholesale Corp. Cramer Division Conrac Corp. Fidelipac Div. of TelePro Industries, Inc Gates Division of Harris-Intertype International Tapetronics Corp. frish Magnetic Recording Tape Div. Morhan Nat'l. Sales Co. Inc. Joa Cartridge Service Magnetic Prod. Div. 3M Company Marathon Broadcast Equip. Mastertone Co. Memorex Corp. Nemo Recording Labs
Nortronics Co., Inc.
Q-TV Sales & Distributing Corp.
RCA Corporation RCA Broadcast Equip. Communications Systems RCA Corporation RCA Electronic Components Recordex Corporation Schafer Electronics Schultz Inc., Albert Singer Products Co., Inc. Sony/Superscope Sony/Superscope
Sparta Electronic Corp.
Spotmaster Broadcast Electronics
Systems Marketing Corp. And
Sono-Mag Corp.
Tapecaster TCM, Inc.

TDK Electronics Corp

Visual Electronics Corp.

TelePro Industries, Inc.
Transco Products International

Tape, Magnetic Recording Computer

Arbor Systems Inc.
Audio Devices, Inc.
CYBRIX CORPORATION
Magnetic Prod. Div. 3M Company
Memorex Corp.
Nortronics Co., Inc.
RCA Corporation RCA Broadcast
Equip. Communications Systems
Div.
Systems Marketing Corp. And
Sono-Mag Corp.
TDK Electronics Corp.

Tape, Magnetic Recording Test

Ampex Corp.
G.C. Electronics
International Tapetronics Corp.
Mastertone Co.
Nortronics Co., Inc.
RCA Corporation RCA Broadcast
Equip. Communications Systems
Div.
Schultz Inc., Albert
Systems Marketing Corp. And
Sono-Mag Corp.
Taber Mfg. & Engr. Co.
Tascam Corporation
VIF International

Tape, Magnetic Recording Video

Anixter-Pruzan CATV Division Audio Magnetics Corp. **BSC** Incorporated Computer Image Corp. Comquip, Inc. Concord Elect. Corp. Diamond Power Specialty Corp. Subs. Babcock & Wilcox Co.
GBC Closed Circult TV Corp.
Irlsh Magnetic Recording Tape Div.
Morhan Nat'l. Sales Co. Inc. Javelin Division Apollo Lasers, Inc. Karex, Inc. Subs. of Rohm and Haas Co. Magnetic Prod. Div. 3M Company Memorex Corp Mincom Div. 3M Co Philips Broadcast Equipment Corp. Subs. North American Philips Corp. RCA Corporation RCA Broadcast Equip. Communications Systems Div. Recordex Corporation R. H. Tyler Co. Div. of Weather Scan, Inc. Robert Bosch Corp. Fernseh Div. Schultz Inc., Albert Shibaden Corp. of America Sony Corp. of America TDK Electronics Corp.

Tape, Recording Logging

Tele Measurements Inc.

Video Engineering Co. Inc.

Alto Communications Inc. Broadcast Marketing Div.
Audio Devices, Inc.
Broadcast Products Inc.
Cine Sonic Sound Inc.
IGM
Magnetic Prod. Div. 3M Company Metrotech/Scully Div. of Dictaphone Corp.
Philips Broadcast Equipment Corp.
Subs. North American Philips Corp.
RCA Corporation RCA Broadcast Equip. Communications Systems Div.
Richmond Hill Laboratories Inc.
Schafer Electronics
Singer Products Co., Inc.
Soundscriber Corporation
Sparta Electronic Corp.
Stancil-Hoffman Corp.

Systems Marketing Corp. And Sono-Mag Corp. Tape-Athon Corp.

Tape Cart Loaders

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Ramko Research Tape Cleaners

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Audio Magnetics Corp. Lipsner Smith Corp. Miller Stephenson Chemical Co. Recortec Inc. Taber Mfg. & Engr. Co. Television Equipment Assoclates Virginia Panel Corporation

Alto Communications Inc. Broadcast Marketing Div.

Tape Decks, Magnetic Accurate Sound Corp.

Ampex Corp.

Ampro Corp. Astrocom Electronics, Inc. Broadcast Electronics Broadcast Products Inc. **BSC** Incorporated CCA Electronics
CHESTER ELECTRONIC LABS., INC.
GTE Information Systems Inc.
Cine Sonic Sound Inc. Collins Radio Company Broadcasting Marketing. Comquip, Inc. Cramer Division Conrac Corp. Crown International Electrodyne Div. of MCA Technology. Inc.
Gates Division of Harris-Intertype Gotham Audio Corp. International Tapetronics Corp. Lang Electronics Inc. Langevin An MCA Technology Company Magnatech Co. Otari of America, Ltd.
Philips Broadcast Equipment Corp.
Subs. North American Philips Corp.
Q-TV Sales & Distributing Corp. Radio Mfg. Co. RAPID-Q DIv. of Garron Electronics RCA Corporation RCA Broadcast Equip. Communications Systems Div. Recordex Corporation Revox Corporation Roberts Div. of Rheem Mfg. Co. Sansui Electronics Corp. Schafer Electronics Schultz Inc., Albert Scully Recording Instruments Co. Singer Products Co., Inc. Sony/Superscope Soundscriber Corporation Sparta Electronic Corp. Systems Marketing Corp. And Sono-Mag Corp.
Tandberg of America Inc.
Tape-Athon Corp.
Tapecaster TCM, Inc. TEAC Corp of America Tele Measurements Inc. Telex Communications Division VIF International

Tape Duplicators

Alcor Inc.
Ampex Corp.
Audiotronics Corp.
Behrends, Inc.
Bell Sound Studios A & B Duplicators
Div.
Electrodyne Div. of MCA Technology,
Inc.
Lang Electronics Inc.
Langevin An MCA Technology
Company
Mastertone Co.
Orbit Radio and Video

Tele-Cine inc.

Philips Broadcast Equipment Corp. Subs. North American Philips Co Recordex Corporation Recortec Inc. Schultz Inc., Albert Telectro Systems Corp. Telex Communications Division)rp
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Systems Div. Tape Transport

Amoro Corn Comquip, Inc. Cramer Division Conrac Corp. Gates Division of Harris-Intertype IGM. Langevin An MCA Technology Company MCA Technology, Inc. Peripheral Data Machines, Inc. (PER DATA) Radio Mfg. Co. Sparta Electronic Corp. Systems Marketing Corp. And

Teletype Alarm Receiver

Sono-Mag Corp.

VIF International

Atlantic Research Corp. Teleproducts Audio Engineering Co. Concept 70, A Div. of Dyma Engineering, Inc. Trepac Corp. America

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American Data Corp	

Test Slides, Video

Sadelco, Inc.

Telemet Co.

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Tele Measurements Inc. Television Equipment Associates Teltron, Inc. Video Englneering Co. Inc.

Testers, Semiconductor

Acrodyne Industries

American Electronics Lab., Inc. Collins Radio Company Broadcasting Marketing.

Delta Electronics Inc. (N.C.) Delta Electronics Inc. (Va.) Eico Elect. Inst. Co., Inc. General Microwave Corp. Heath Co. Hickok Elect, Instrument Jud Williams Company Leader Instruments Corp. Lectronic Res. Labs. Inc. Lectrotech Inc. Ramko Research RCA Corporation RCA Broadcast

Equip. Communications Systems Div RCA Corporation RCA Electronic Components

Rohde & Schwarz Sales Sencore Inc. SPI-ITT Instruments Metrix Division Tektronix Inc. Terminal Hudson Corp. Terminal **Hudson Electronics**

Transco Products International Triplett Corporation Troy Electronic Sales Co.

Testers, Vacuum Tube Eico Elect. Inst. Co., Inc.

Heath Co. Hickok Elect. Instrument Leader Instruments Corp. Lectronic Res. Labs. Inc. Lectrotech Inc. RCA Corporation RCA Broadcast Equip. Communications Systems Div. RCA Corporation RCA Electronic Components Sençore Inc. Singer Products Co., Inc. SPI-ITT Instruments Metrix Division Terminal Hudson Corp. Terminal Hudson Electronics

Triplett Corporation Time Announcers

Sono-Mag Corp.

Gates 88 Ampro Corp.
CYBRIX CORPORATION ES Enterprises Gates Division of Harris-Intertype IGM Schafer Electronics Sparta Electronic Corp. Stancil-Hoffman Corp. Systems Marketing Corp. And

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Time Base Corrector, Helical Scan and Quad

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Jensen Tools & Alloys P. K. Neuses Inc. Systems Marketing Corp. And Sono-Mag Corp. Terminal Hudson Corp. Terminal **Hudson Electronics** Upson Tools Inc. Vaco Products Co. Western Electronic Prods. Co.

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Hughey & Phillips Inc.

Towers, Antenna Advance Industries

Allied Tower Co. Inc.

Antenna Products Company

Collins Radio Company Broadcasting

Andrews Tower Inc.

Marketing, Dresser Crane Hoist and Tower Div. Dyma Engineering, Inc.
E Z Way Prod. Inc.
Fort Worth Tower Co., Inc.
Gates Division of Harris-Intertype
G.C. Electronics Gulf Telephone & Electronics Jampro Antenna Co Kline Iron & Steel Co. Tower Division Magnatech Co. Mastertone Co. Microelect Co. Inc. RCA Corporation RCA Broadcast Equip. Communications Systems Div. RF Systems, Inc. Rohn Manufacturing Div. of Unarco Industries Inc. Sparta Electronic Corp. Stainless, Incorporated Swager Tower Corp. Tri-Ex Tower Corp. Up Right Scaffolds Utility Tower Cc.

Towers, Antenna Receiving

Allied Tower Co. Inc. Ameco Inc. Andrews Tower Inc. Antenna Products Company Dresser Crane Hoist and Tower Div. E Z Way Prod. Inc. Gulf Telephone & Electronics Microelect Co. Inc. RF Systems, Inc. Rohn Manufacturing Div. of Unarco Industries Inc.

Singer Products Co., Inc. Stainless, Incorporated Swager Tower Corp. TV Cable Supply Co. Up Right Scaffolds Utility Tower Co.

Towers, Antenna Transmitting AM

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Advance Industries Allied Tower Co. Inc.
Alto Communications Inc. Broadcast Marketing Div Andrews Tower Inc. Antenna Products Company CCA Electronics Collins Radio Company Broadcasting Marketing, Dresser Crane Hoist and Tower Div.
E Z Way Prod. Inc.
Fort Worth Tower Co., Inc.
Gates Division of Harris-Intertype Jampro Antenna Co. Kilne Iron & Steel Co. Tower Division Mastertone Co. Microelect Co. Inc. RCA Corporation RCA Broadcast Equip. Communications Systems Div. Rohn Manufacturing Div. of Unarco Industries Inc. Singer Products Co., Inc. Sparta Electronic Corp.

Towers, Antenna Transmitting **FM**

Stainless, Incorporated Swager Tower Corp.

Tri-Ex Tower Corp.

Up Right Scaffolds Utility Tower Co.

Advance Industries

United State Towers

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Gates 8

Allied Tower Co. Inc. Alto Communications Inc. Broadcast Marketing Div. Andrews Tower Inc Antenna Products Company CCA Electronics
Collins Radio Company Broadcasting Marketing, Dresser Crane Hoist and Tower Div. E Z Way Prod. Inc. Fort Worth Tower Co., Inc. Gates Division of Harris-Intertype Jampro Antenna Co. Kline Iron & Steel Co. Tower Division

Magnatech Co. Microelect Co. Inc. RCA Corporation RCA Broadcast Equip. Communications Systems

Div.
Rohn Manufacturing Div. of Unarco Industries Inc.

Shively Laboratories, Inc. Singer Products Co., Inc. Sparta Electronic Corp. Stainless, Incorporated Swager Tower Corp.
United State Towers
Up Right Scaffolds
Utility Tower Co.

Towers, Antenna Transmitting

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Dresser Crane Holst and Tower Div.

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State Towers Narda Microwave Corp., The Sparta Electronic Corp.
Wilkinson Electronics, Inc. Equip. Communications Systems Phelps Dodge Communications Co. Div RCA Corporation RCA Broadcast tht Scaffolds Singer Products Co., Inc. Equip. Communications Systems Sparta Electronic Corp. Tower Co. Transmitters, AM 1 kw Div. Riker Communications Inc. See Adv. Page reslator Systems, High Power Transmitters, AM 50 kw TeleMation, Inc. United Recording Electronics See Adv. Page See Adv. Page Industries Wilkinson Electronics, CCA Electronics23 Intrision Technology 6rp.111 Inc......17 Continental Electronics Transmitter Kits Mfg. Co.25 American Electronics Lab., Inc. Natus & Co., Inc.

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Contel Mfg. Div. of Continental
Electronic Wholesale Corp. Inc. 17 RCA Corporation RCA Broadcast tronics, Misslles & Equip. Communications Systems Enmunications, Inc. American Electronics Lab., Inc. eleation, Inc. CCA Electronics Gates Division of Harris-Intertype Continental Electronics Mfg. Co. Subs. Marconi Electronics Inc. Transmitters, AM Carrier of Resalab, Inc. Mastertone Co. Gates Division of Harris-Intertype firmlator Systems, Low Power RCA Corporation RCA Broadcast See Adv. Page Hy-Power Electronics Co. Equip. Communications Systems Marconi Electronics Inc. RCA Corporation RCA Broadcast See Adv. Page Div. Sparta Electronic Corp. 74 Singer Products Co., Inc. Benco Ltd. 81 Equip. Communications Systems Sparta Electronic Corp.
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Continental Electronics Mfg. Co. Subs.
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o Mfg. Co. Div. American Electronics Lab., Inc. Singer Products Co., Inc. Singer Products Co., Inc. Bristol Div. of Acco Sparta Electronic Corp. Sparta Electronic Corp. Wilkinson Electronics, Inc.

Collins Radio Company Broadcasting Marketing,	Transmitters, FM 500 Watt	Transmitters, FM 7.5 kw	Transmitters, FM 50 kw
Dyma Engineering, Inc. Fung Engineering Co.	See Adv. Page	See Adv. Page	See Adv.
Gates Division of Harris-Intertype	Gates 88	Gates 88	Gates
GTE Lenkurt Incorporated	CCA Electronics	Wilkinson Electronics,	CCA Floatenias
Marconi Electronics Inc. Mastertone Co.	Collins Radio Company Broadcasting	Inc 17	Gates Division of Harris-Intertype
Miles Reproducer Co.	Marketing,	American Electronics Lab., Inc.	Singer Products Co., Inc.
RCA Corporation RCA Broadcast	Gates Division of Harris-Intertype Mastertone Co.	CCA Electronics Collins Radio Company Broadcasting	Sparta Electronic Corp.
Equip. Communications Systems	RCA Corporation RCA Broadcast	Marketing,	Transmitters, FM 100 kw
RCA Corporation RCA Electromagnetic	Equip. Communications Systems	Gates Division of Harris-Intertype RCA Corporation RCA Broadcast	Transmitters, Tim 100 km
& Aviation Systems Div.	Div. Singer Products Co., Inc.	Equip. Communications Systems	See Adv.
Singer Products Co., Inc. Soll, Inc., Joseph M.	Sparta Electronic Corp.	Div.	Gates
Sparta Electronic Corp.	Wilkinson Electronics, Inc.	Singer Products Co., Inc. Wilkinson Electronics, Inc.	CCA Electronics
Wilkinson Electronics, Inc.		The state of the s	Gates Division of Harris-Intertype
	Transmitters, FM 1 kw	Transmitters, FM 10 kw	Singer Products Co., Inc.
Transmitters, FM 10 Watt	See Adv. Page		Transmitters, FM to order
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Inc 17	Wilkinson Electronics,	American Electronics Lab., Inc.	American Electronics Lab., Inc.
American Electronics Lab., Inc.	Inc 17	CCA Electronics	CCA Electronics Collins Radio Company Broadcastii
Ampex Corp.	American Electronics Lab., Inc.	Collins Radio Company Broadcasting	Marketing,
CCA Electronics	CCA Electronics	Marketing, Gates Division of Harris-Intertype	Gates Division of Harris-Intertype
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Gates Division of Harris-Intertype	Fung Engineering Co.	Marconi Electronics Inc.	Div.
GTE Lenkurt Incorporated	Gates Division of Harris-Intertype	Mastertone Co. RCA Corporation RCA Broadcast	Singer Products Co., Inc.
Magnatech Co. Marti Electronics	Marconi Electronics Inc.	Equip. Communications Systems	Sparta Electronic Corp. Wilkinson Electronics, Inc.
Mastertone Co.	Mastertone Co. RCA Corporation RCA Broadcast	Div.	
RCA Corporation RCA Broadcast	Equip. Communications Systems	Singer Products Co., Inc. Wilkinson Electronics, Inc.	Transmitters, TV
Equip. Communications Systems Div.	Div.		CCA Electronics
Rohde & Schwarz Sales	Singer Products Co., Inc. Sparta Electronic Corp.	Transmitters, FM 15 kw	CCA RF Industries, Inc.
Singer Products Co., Inc.	Wilkinson Electronics, Inc.	Con A.A. Boro	Gates Division of Harris-Intertype Ikegami Tsushinki Co., Ltd. Export
Sparta Electronic Corp. Wilkinson Electronics, Inc.		Gates 88	Department
	Transmitters, FM 2.5 kw		Marconi Electronics Inc. RCA Corporation RCA Broadcast
Transmitters, FM 50 Watt	See Adv. Deep	CCA Electronics Collins Radio Company Broadcasting	Equip. Communications Systems
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Gates		Equip. Communications Systems	Varian Solid State Div. Micro-Link
Inc	American Electronics Lab., Inc.	Div.	Products Visual Communication Products Op
CCA Electronics	Transmitters, FM 3 kw	Singer Products Co., Inc. Sparta Electronic Corp.	General Electric Co.
Collins Radio Company Broadcasting	Transmitters, FW 3 KW	Wilkinson Electronics, Inc.	
Marketing,	See Adv. Page		Transmitters, TV 1 Watt
Gates Division of Harris-Intertype Mastertone Co.	Gates 88	Transmitters, FM 20 kw	Acrodyne Industries
RCA Corporation RCA Broadcast	American Electronics Lab., Inc.	See Adv. Page	CCA Electronics DYNAIR Electronics, Inc.
Equip. Communications Systems	CCA Electronics	Gates	EMCEE Broadcast Products Div. of
Div. Rohde & Schwarz Sales	Collins Radio Company Broadcasting Marketing,	Wilkinson Electronics,	Electronics, Missiles &
Singer Products Co., Inc.	Gates Division of Harris-Intertype	Inc 17	Communications, Inc. Fung Engineering Co.
Wilkinson Electronics, Inc.	Magnatech Co.	CCA Electronics	Gates Division of Harris-Intertype
Transmitters 514 100 mm	Mastertone Co. RCA Corporation RCA Broadcast	Collins Radio Company Broadcasting Marketing.	GTE Lenkurt Incorporated Orbit Radio and Video
Transmitters, FM 100 Watt	Equip. Communications Systems	Gates Division of Harris-Intertype	RCA Corporation RCA Broadcast
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Gates 88	Singer Products Co., Inc. Sparta Electronic Corp.	RCA Corporation RCA Broadcast	Rohde & Schwarz Sales
CCA Electronics	Wilkinson Electronics, Inc.	Equip. Communications Systems	Television Technology Corp. Varian Solid State Div. Micro-Link
Collins Radio Company Broadcasting		Div. Singer Products Co., Inc.	Products
Marketing, Gates Division of Harris Intertype	Transmitters, FM 5 kw	Sparta Electronic Corp.	
Marti Electronics	0 01 0	Wilkinson Electronics, Inc.	Transmitters, TV 10 Watt
RCA Corporation RCA Broadcast	See Adv. Page	Transmitters, FM 40 kw	Acrodyne Industries
Equip. Communications Systems Div.	Gates	Transmitted of Tim 40 Km	CCA Electronics Delta-Benco Ltd.
Singer Products Co., Inc.	Inc 17	See Adv. Page	EMCEE Broadcast Products Div. of
Wilkinson Electronics, Inc.	American Electronics Lab., Inc.	Gates 88	Electronics, Missiles & Communications, Inc.
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Transmitters, FM 250 Watt	Collins Radio Company Broadcasting	Inc 17	GTE Lenkurt Incorporated
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Gates 88	Marconi Electronics Inc.	Marketing,	Div.
Wilkinson Electronics,	Mastertone Co.	Gates Division of Harris-Intertype Mastertone Co.	Rodelco Television Technology Corp.
Inc 17		RCA Corporation RCA Broadcast	Varian Solid State Div. Micro-Link
CCA Electronics	Div.	Equip. Communications Systems	Products
Gates Division of Harris-Intertype Mastertone Co.	Singer Products Co., Inc.	Div. Singer Products Co., Inc.	Transmittere TV 20 W-M
Wilkinson Electronics, Inc.	Sparta Electronic Corp.	Sparta Electronic Corp.	Transmitters, TV 20 Watt
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mesion Technology Corp.

msmitters, TV 60 Watt

Fyne Industries Electronics ME Broadcast Products Div. of Extronics. Missiles & mmunications, Inc. Division of Harris-Intertype Corporation RCA Broadcast bip. Communications Systems

mision Technology Corp.

fusmitters, TV 100 Watt

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dyne Industries **BElectronics** Benco Ltd. E Broadcast Products Div. of actronics. Missiles & mmunications, Inc. Corporation RCA Broadcast uip. Communications Systems avision Technology Corp.

Insmitters, TV 500 Watt

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EE Broadcast Products Dlv. of ectronics, Missiles & immunications, Inc. Os Division of Harris-Intertype oni Electronics Inc. Corporation RCA Broadcast ulp. Communications Systems

insmitters, TV 1 kw

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Corporation RCA Broadcast
quip. Communications Systems al Communication Products Oper. eneral Electric Co.

Insmitters, TV 2 kw

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insmitters, TV 5 kw

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EMCEE Broadcast Products Div. of Electronics, Missiles & Communications, Inc. Gates Division of Harris-Intertype Marconi Electronics Inc. RCA Corporation RCA Broadcast Equip. Communications Systems Div. Visual Communication Products Oper. General Electric Co.

Transmitters, TV 6 kw

Gates 88 **CCA Electronics** Gates Division of Harris-Intertype Philips Broadcast Equipment Corp Subs. North American Philips Corp. RCA Corporation RCA Broadcast Equip. Communications Systems Div. Visual Communication Products Oper.

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Transmitters, TV 10 kw

General Electric Co.

Gates 88 CCA Electronics CCA RF Industries, Inc. Gates Division of Harris-Intertype Marconi Electronics Inc. Philips Broadcast Equipment Corp. Subs. North American Philips Corp. RCA Corporation RCA Broadcast Equip. Communications Systems

Transmitters, TV 11 kw

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CCA Electronics Gates Division of Harris-Intertype Philips Broadcast Equipment Corp. Subs. North American Philips Corp. RCA Corporation RCA Broadcast Equip. Communications Systems Div. Visual Communication Products Oper.

Transmitters, TV 12 kw

General Electric Co.

Gates...... 88 **CCA Electronics** Gates Division of Harris-Intertype
Philips Broadcast Equipment Corp.
Subs. North American Philips Corp.

RCA Corporation RCA Broadcast Equip. Communications Systems

Transmitters, TV 15 kw

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Marconi Electronics Inc. Subs. North American Philips Corp.
RCA Corporation RCA Broadcast Equip. Communications Systems

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Transmitters, TV 25 kw

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CCA Electronics CCA RF Industries, Inc.

Gates Division of Harris-Intertype Marconi Electronics Inc. Philips Broadcast Equipment Corp. Subs. North American Philips Corp. RCA Corporation RCA Broadcast Equip. Communications Systems

Transmitters, TV 30 kw

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CCA Electronics CCA RF Industries, Inc. Gates Division of Harris-Intertype Marconi Electronics Inc. Philips Broadcast Equipment Corp. Subs. North American Philips Corp. RCA Corporation RCA Broadcast Equip. Communications Systems Visual Communication Products Oper.

Transmitters, TV 35 kw

General Electric Co.

Gates 88 **CCA Electronics** Gates Division of Harris Intertype Marconi Electronics Inc. RCA Corporation RCA Broadcast Equip. Communications Systems

Transmitters, TV 50 kw

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CCA Electronics CCA RF Industries. Inc. Gates Division of Harris-Intertype Marconi Electronics Inc. RCA Corporation RCA Broadcast Equip. Communications Systems

Transmitters, TV 55 kw

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CCA Electronics CCA RF Industries, Inc. Gates Division of Harris-Intertype Marconi Electronics Inc. Philips Broadcast Equipment Corp. Subs. North American Philips Corp. RCA Corporation RCA Broadcast Equip. Communications Systems Div. Visual Communication Products Oper. General Electric Co.

Transmitters, TV 100 kw

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McCurdy Radio Ind. Inc.

Micro-Trak Corporation (Formerly:
Gray Research & Dev.)

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Spotmaster Broadcast Electronics Video Engineering Co. Inc.

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Admiral Corporation Alcor Inc. American Data Corp. Anaconda Electronics Anixter-Pruzan CATV Division A-Tel-A-Matic ATV Research
Audiotronics Corp.
AVA Elect. & Machine Corp.
Ball Bros. Research Corp. Miratel Division Berkey-Colortran Inc. Boston Insulated Wire & Cable Co. Catel, a DIv. of United Scientific Corp. CHESTER ELECTRONIC LABS., INC. GTE Information Systems Inc.

Cohu, Inc. Electronics Division
Colorado Video Inc.
Comquip, Inc.
Concord Elect. Corp.
Cunningham Corp. Subs. of Gleason Works Danscoll Ltd. Davis & Sanford Co. Inc.

Delta Electronics Inc. (N.C.)
Denson Electronic, Corp.
DYNAIR Electronics, Inc. GBC Closed Circuit TV Corp. Gen. Electrodynamics Gulf Telephone & Electronics Ikegami Tsushinki Co., Ltd. Export Department

Interntl. Nuclear Corp. International Video Janson Industries

A Electronics

Javelin Division Apollo Lasers, Inc.
Jerrold Electronics Corp. CATV
Systems Div.
K'SON Corporation
Marconi Electronics Inc.
Mincom Div. 3M Co.
Mosler Electronic Systems Div.
Orbit Radio and Video
Philips Broadcast Equipment Corp.
Subs. North American Philips Corp.
RCA Corporation RCA Broadcast
Equip. Communications Systems
Div.
RCA Corporation RCA Electromagnetic
& Aviation Systems Div.
Riker Communications Inc.

DIV.

RCA Corporation RCA Electromagne & Aviation Systems Div.

Riker Communications Inc.

Robert Bosch Corp. Fernseh Div.

Sarkes Tarzlan Inc. Broadcast

Equipment Div.

Shibaden Corp. of America

Singer Co. Simulation Products Div.

Soll, Inc., Joseph M.

Sylvania Comm. Electronic

Tasker Industries Systems Division

Tektronix Inc.
Teledyne Brown Englneering Co.
Sclence & Engrg. Div.
TeleMation, Inc.
Tele Measurements Inc.
Telesync Corp.
Teltron, Inc.
Varian Solid State Div. Micro-Link

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Vikoa Inc.

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Westinghouse Electric Corp. Electric Tube Div.

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General Electric Co. Imaging Devices

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Shibaden Corp. of America
Tele Measurements Inc.
Teltron, Inc.
Terminal Hudson Corp. Terminal
Hudson Electronics
Thor Electronics Corp.

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General Electric Co.

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Amperex Electronic Corp.
Electro-Optical Devices Dlv.
Amperex Electronic Corp. Power
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Philips Broadcast Equipment Corp.
Subs. North American Philips Corp.
Shibaden Corp. of America
Tele Measurements Inc.
Teltron, Inc.
Terminal Hudson Corp. Terminal
Hudson Electronics

Thor Electronics Corp.
Transco Products International
Video Engineering Co. Inc.
Westinghouse Electric Corp.

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ATV Research
GBC Closed Circult TV Corp.
GE Electronic Components Sales Dept.
General Electric Co. Imaging Devices
Operation
Gen. Electrodynamics
Heintz and Kaufman Ltd.
ITT Electron Tube Div.

Heintz and Kaufman Ltd. ITT Electron Tube Div. Javelin Divlsion Apollo Lasers, Inc. Philips Broadcast Equipment Corp. Subs. North American Philips Corp. RCA Corporation RCA Electronic

Components Shibaden Corp. of America Slemens Corporation Teltron, Inc. Terminal Hudson Corp. Terminal

Hudson Lorp. Terminal
Hudson Electronics
Texas Instrument Components Group
Thomson-CSF Electron Tubes
Thor Electronics Corp.
Transco Products International
Video Engineering Co. Inc.

Visual Communication Products Oper. General Electric Co. Westinghouse Electric Corp. Electric Tube Div.

Vacuum Tubes, Cathode Ray Oscilloscope

Amperex Electronic Corp.
Electro-Optical Devices Div.
Heintz and Kaufman Ltd.
Lectronic Res. Labs. Inc.
RCA Corporation RCA Electronic
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Terminal Hudson Corp. Terminal
Hudson Electronics
Thomson-CSF Electron Tubes
Thor Electronics Corp.
Transco Products International
Video Engineering Co. Inc.

Vacuum Tubes, Cathode Ray TV Color

Amperex Corp.
GE Electronic Components Sales Dept.
RCA Corporation RCA Electronic
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Hudson Electronics
Thomson-CSF Electron Tubes
Thor Electronics Corp.
Transco Products International
Video Engineering Co. Inc.
Westinghouse Electric Corp. Electric
Tube Div

Vacuum Tubes, Cathode Ray TV Monochrome

Amperex Corp.
Amperex Electronic Corp.
Electro-Optical Devices Div.
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Hudson Electronics
Thor Electronics Corp.
Transco Products International
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Tube Div.

Vacuum Tubes, Rectifier

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ITT Electron Tube Div.
Joa Cartridge Service
Lectronic Res. Labs. Inc.
Raytheon Company Raytheon Data
Systems Co.
RCA Corporation RCA Electronic
Components
Singer Products Co., Inc.
Terminal Hudson Corp. Terminal
Hudson Electronics
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Terminal Hudson Corp. Terminal.
Hudson Electronics
Transco Products International
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B & K Dynascan Corp.
Boonton Electronics
Bristol Div. of Acco
Callfornia Instruments Co.
Dranetz Engineering Labs... Inc.
Elco Elect. Inst. Co., Inc.
GE Electronic Components Sales Dept.
Heath Co.
Hewlett Packard Co.
Hickok Elect. Instrument
Honeywell Inc. Test Instruments Div.
Instrument Laboratories
International Instrument Div. Sigma
Instruments, Inc.
ITT Jennings
Leader Instruments Corp.
Lectronic Res. Labs. Inc.
RCA Corporation RCA Broadcast
Equip. Communications Systems
Div.
RCA Corporation RCA Electronic
Components

Rohde & Schwarz Sales
Simpson Electric Co.
Singer Co. Los Angeles Operation
SPI-ITT Instruments Metrlx Division
Terminal Hudson Corp. Terminal
Hudson Electronics
Triplett Corporation

Voltmeters, DC A-Tel-A-Matic

B & K Dynascan Corp. Boonton Electronics Bristol Div. of Acco California Instruments Co. Eico Elect. Inst. Co., Inc. GE Electronic Components Sales De General Microwave Corp. Heath Co. Hewlett Packard Co. Hickok Elect. Instrument Honeywell Inc. Test Instruments Div International Instrument Div. Sigma Instruments, Inc. ITT Jennings Leader Instruments Corp. Lectronic Res. Labs. Inc.
RCA Corporation RCA Broadcast Equip. Communications Systems Div. RCA Corporation RCA Electronic Components
Rohde & Schwarz Sales
Simpson Electric Co.
SPI-ITT Instruments Metrix Division Terminal Hudson Corp. Terminal

Triplett Corporation Voltmeters, FET

Hudson Electronics

B & K Dynascan Corp.
Eico Elect. Inst. Co., Inc.
Heath Co.
Hickok Elect. Instrument
Leader Instruments Corp.
RCA Corporation RCA Broadcast
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Div.
Sencore Inc.
Simpson Electric Co.
Terminal Hudson Corp. Terminal
Hudson Electronics
Triplett Corporation

Voltmeters, Vacuum Tube

B & K Dynascan Corp. Boonton Electronics Edison Electronics, Div. of McGraw-Edison Co., Daven & Measurements Eico Elect, Inst. Co., Inc. Heath Co. Hewlett Packard Co. Instrument Laboratories Leader Instruments Corp. Lectronic Res. Labs. Inc.
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Industries Wattmeters

Bird Electronic Corp.
Boonton Electronics
Eico Elect. Inst. Co., Inc.
GE Electronic Components Sales Dep
General Microwave Corp.
Lectronic Res. Labs. Inc.
Micro Communications, Inc.
RCA Corporation RCA Broadcast
Equip. Communications Systems
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Wire & Cable

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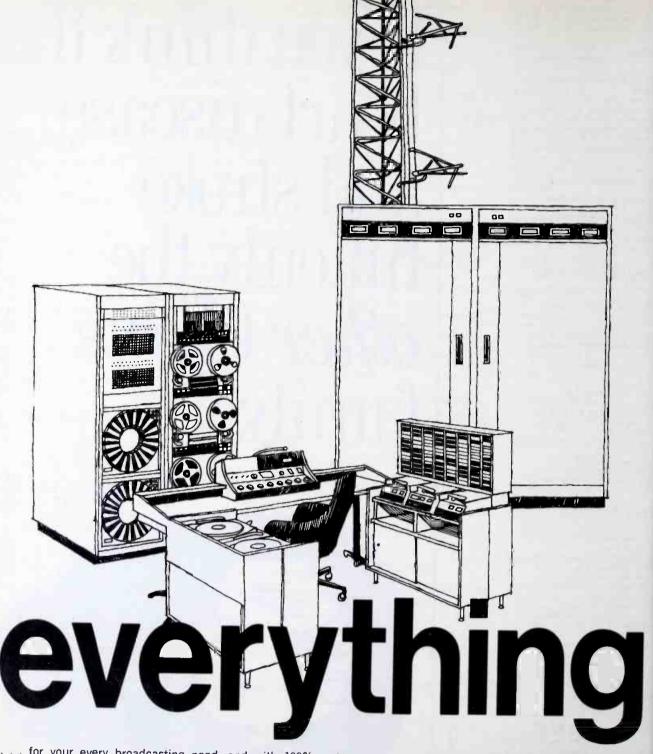
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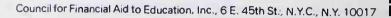
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more encores

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The nominal input video signal to any of these units is 1.0 v p-p composite video sync negative, 75 ohms terminating internally. The signal source will typically be the DEMOD or TBC output of a VTR, or the output of a standalone or integral Dropout Compensator. Applications not involving a VTR include complex video switching or teleproduction processing facilities, and satellite communication down link receivers, for continuous, automatic correction of re-routed or drifting video signals.

Delta 44 TIME BASE CORRECTOR (AVAILABLE NOW -- SEE YOUR DISTRIBUTOR)

Base product of the Delta Series. Input window ± 2.2 microseconds wide with respect to external fixed or drifting H or color subcarrier reference. Output resolution: monochrome $-\pm 25$ nanoseconds; color $-\pm 3$ nanoseconds, both with respect to selected fixed or drifting reference. Standalone Time Base Corrector for all heliscan and quad VTRs equipped with head servo systems which reference external sync in reproduce mode. All versions include adjustable color processing amplifier which rebuilds V and H blanking intervals using sync and subcarrier from reference source.

Delta 28 TIME BASE DIRECTOR (AVAILABLE IN OCTOBER)

Input processor accessory to Delta 44. Detects time phase of H pulse or burst in input video signal line by line, and derives drifting average value for use as window-shifting reference in the Delta 44 in place of fixed reference. Interfaces to heliscan VTRs equipped with "electronic editor" feature (head servo references external V sync in reproduce mode), and quad VTRs not equipped with "Intersync" or "Pixlock" head servo circuitry, both of whose maximum acceleration is less than 25 cycles/sec². Drifting reference may be looped through Delta 44 to gen lock studio sync generator, permitting limited post-production processing and dubbing of tape from v-locked VTR.

Delta 7 HEAD VELOCITY ERROR CORRECTOR (AVAILABLE IN NOVEMBER)

Input processor accessory to Delta 44, or may be used as standalone signal processor when time base correction is not required. Detects average rate of acceleration or deceleration of video head to tape velocity through line by line computation of burst phase differences in incoming video, and inserts a new, complementing, linearly varying delay in each succeeding line. This reduces the hue shift effects attributable to the head velocity error component of the total detected error to ±3 nanoseconds with respect to color burst phase at the beginning of each line. Interfaces to VTRs which reference external V and H in reproduce mode.

Delta 635 FULL LINE DRIFT CORRECTOR (AVAILABLE IN EARLY 1973)

Input accessory to Delta 44. Locates H pulse of each incoming TV line, computes its time phase with respect to stable external reference H, and delays that line appropriately to cause its arrival at the Delta 44 input within ±0.5 microseconds of the time of arrival of the next external reference H pulse. Interfaces to heliscan monochrome and color VTRs whose H frequency drift is less than 25 cycles/sec².

Delta 400 HEAD SERVO DRIFT SUPPRESSOR (AVAILABLE IN SEPTEMBER)

Output accessory for Delta 44. Utilizes the internal voltage input to the Delta 44 Delay Status Meter to generate steering voltage of ±12 VDC at 10 milliamps. This voltage is available as an input to any VTR with a V-locked head servo system. It provides a means of holding the off-tape signal of VTR in the window of the Delta 44, after-modification and adjustment of the VTR to utilize these signals.

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Associations Keep Industry On Target

The International Tape Association is a profession al trade association for the tape industry. They hav brought together for the first time a wide range of manufacturers and suppliers from throughout th world to identify and develop positions on matters of great importance. The ITA has quickly become a focation point not only for the tape industry but for consume and government interests as well.

The ITA Newsletter is sent out by-monthly to IT_L Regular and Sustaining Members. The Newslette reports industry-wide developments to its members a well as to consumer and government interests. It also contains feature articles from ITA members and from experts in the fields of government, education, training, business, insurance, medicine, and other areas of the use and application of the industry's goods and services.

In addition to receiving the associations Newsletter Sustaining Members will receive a source list of the ITA member companies, the products and service they offer.

Sustaining Memberships in ITA are welcome only from firms who are not eligible for Regular Member ship but who are interested in the Audio/Video Tapa and Video Information Medium Industry. Sustaining Members are permitted to attend ITA Seminars and functions at the same reduced fee as Regular Members. They also have access to certain information which is determined by the ITA Board of Directors but do not have the right to vote.

For further information on ITA membership, write to Larry Finley, Executive Director, Internationa Tape Association, Inc., 315 West 70th Street, New York, N.Y. 10023.

A summer FCC count of over-the-air broadcast stations shows that there is still growth in some types of service. Notably, FM has been gaining more ground. In June of 1969 there were an even 2000 FM stations on the air. A year later their number had moved to 2134. From there it went to 2258 in 1971 and now it is well over 2300.

During this same period, AM... in the freeze, has moved only from 4251 to 4367. The growth in FM probably can be attributed to the increasing profitability of FM and the fact that there has been no FM freeze. Of course, educational FM is on the move, too. This activity should translate FM into a much more viable market.

Here are the 1972 summer standings:

ioro dio ino is is summici standings.	
AM Radio	4367
FM Radio	2352
Educational FM	. 521
UHF TV Commercial	
VHF TV Commercial	511
UHF TV Educational	
VHF TV Educational	. 89

(Continued on page 90.

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FCC Offices

(Continued from page 46)

Rule Changes-See Page 32

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FCC's Washington Offices

If you would like to correspond with someone at the FCC write to: Federal Communications Commission, 1919 M Street N.W. Washington, D.C. 20554.

To telephone the FCC call the Information Operator at 655-4000. The first number (in parenthesis) is the room number, and the next is the phone number.

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(Continued on page 84)

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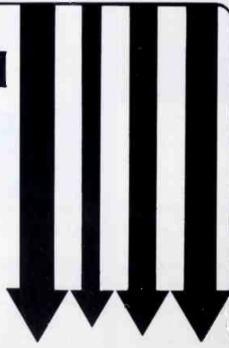
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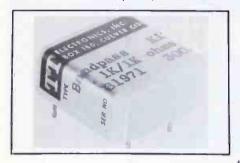
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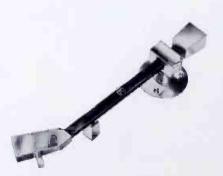
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If you've been wondering who bu should call at the FCC to give bu the specific kind of information you need, you'll find this usting most interesting. In order nat **Broadcast Engineering** produce a true reference issue, e felt it necessary to include his kind of material. If you would ske to see other types of reference material included in next lear's issue, drop the editor a line and let us know your needs.

NAB Asks For Claim Relief

The National Association of roadcasters has urged the Federal ommunications Commission to ject a claim by a citizens' group or expenses incurred in opposing a cense renewal for station WSNT Sandersville, Ga.

NAB said in a statement that CC approval of the request would mount to involuntary "exactnent" of the licensee.

"It is the NAB's position that redering a station to pay a petitionr's attorney and/or other expenses gainst its will is a sanction," the IAB statement said. "The Comnunications Act...does not inlude the power to assess attorney and other expenses in a situation where the licensee has not voluntarily agreed to pay such expenses."

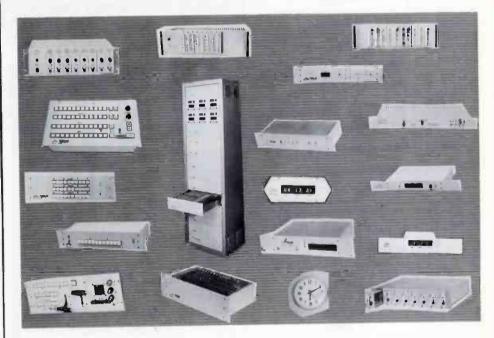
NAB urged the FCC to adhere o its past policy which said, in part, that "it would be inappropriate for the Commission to compel reimbursement of expenses in he absence of a voluntary agreement of the parties" involved.

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Page 4

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Station Monitors

(Continued from page 26)

desired for a specific service or purpose. For example, the station may use a Network service and would want constant monitoring of the Network line. The amplifier should have a gain control near the operator so that this could be reduced (or, rather, the level reduced) to a background level until it is desired for more definite listening for cues. This should be a remote gain control, unless the amplifier can be located within reach of the operator. The control can be on the speaker or on the input of the amplifier as is most suited for the situation. Although I have never had direct experience with one, there is available a single speaker unit with two voice coils into which two separate amplifiers may be fed.

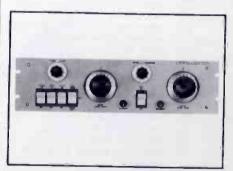
Common studio: In some stations a studio is used with another control room. For example, a TV studio may be used at times as a radio studio also. This common studio would be equipped with a speaker for TV and one for radio. The mute and on air light relays must be interlocked so that a program originating in the studio will not be bothered by a program from the sister station.

The interlocking is not difficult and can be accomplished with the addition of one single mute relay for the secondary studio speaker. The console in TV and the console in radio will have a mute relay for

its own speaker, plus relays for o air lights.

It is necessary that muting (both speakers take place when e ther the TV console or the radil console mike key is closed. The relay added would mute the sec ondary speaker (let's say it will b radio), and its coil should be wire in parallel with the mute and on air light relay from TV console. When the TV mike key is closed, this will mute both speakers. The on air light relay provided with the radio console would not have 120 VA(wired to its contacts, but instead have DC relay voltage from TV control. When this relay is closed by the radio mike key, its contact: will then provide relay voltage for the other relays and thus mute both speakers and turn on the TV studio air light.

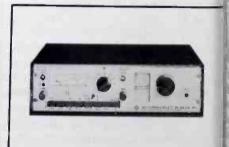
Multiple speaker muting: Ir some locations, such as News rooms, there may be a number of speakers on various monitors going on and off intermittently. It may also be desirable to do recording in the newsroom with a microphone and all this chatter from speakers can prevent this. Here is one method to mute all speakers at one time. Build a speaker cabinet and mount enough small speakers to satisfy all the needs of the newsroom. Small 3-inch speakers can be used, as that may be what is in the mobile radios that are being monitored.



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BROADCAST ENGINEERING

sconnect the speaker in each t wire it through a single ganged atch to the speaker box. Have a nged switch that will handle the nber of speakers involved.

Now, with one switching motn, all speakers can be muted mediately. Make sure there is a istor switched onto the receiver amplifier when the speaker is itched off. As an additional feaie, wire one set of contacts on switch to a light on the box to licate that the speakers are itched off. Of course, you could ount a relay at each speaker and re all the relays common to one gle switch. This would do the just as well.

Bridging: All monitor systems bould bridge the program source. enerally the audio is a bus feedprogram somewhere for proim purposes. The monitor taps o the bus. To prevent loading of ogram busses, the amplifier inits should use a bridge circuit, her transformer or resistors or th. This is a must if the amplifier a low impedance. If it is unbalced it will cause problems, as tost audio buses are balanced. se isolating transformers or resisers to prevent upsetting the balced circuits. Transformers prode the best circuit isolation. Balnced bridging controls are comercially available. These provide ial, ganged potentiometers plus ries resistors to provide both a riable as well as fixed levels.

In many cases, a fixed bridging nnection is all that is required. If e amplifier is low impedance init, three resistors will do the job. br example, an amplifier with 600 hm input. Add a 10,000 Ohm restor in series with each leg and hunt a 600 Ohm across the input. his will give approximately 20 dB ss and will not affect a 600 Ohm rcuit. If less loss is desired, one an go as low as 5,000 Ohms in ach leg. If only one amplifier will e bridged across the circuit, one an go as low as 2700 Ohms in each g, but it isn't advisable to go nuch lower than this.

Summary

Audio monitor systems are not

difficult to design or install, and require very little maintenance. The monitor amplifier should not affect the circuit it is monitoring, so its input should always be a bridge connection. The amplifier should always have a load maintained on the output, especially transistor amplifiers. The 70.7 and 25 Volt distribution systems are easily designed for house monitor systems

and require less computations than trying to derive multiple impedance matching by other methods.

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 - roll off).

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Patent #3436674

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IBS Membership Still Growing

IBS was founded in 1939 by 13 college radio stations to act as a trade association, assisting the stations in obtaining national advertising, representing them to the FCC. and furnishing information to other schools interested in educational radio or constructing campus stations. The System is a non-profit Rhode Island corporation.

Although these statistics are impressive, the real story of IBS growth is in the area of its services to the industry. These include the availability of IBS printed forms, the College Radio Placement Service (an annual poll of commercial stations on their requirements and qualifications for summer positions), a programming service, lota Beta Sigma national honorary, an annual National Convention, College Radio magazine (published monthly during the academic year),

FCC and representative ... especially Call Letter reser vation.

The System strives to expan both the depth and the scope of it programs and (an annual poll of commercia stations on their requirements an improving existing ones.

IBS Services

Two services of particular inter est to new stations are the IB general, technical and sales cor sultation service, and the IBS Mas ter Handbook. The MH is a complete manual of station operation encompassing programming, sales technical, and administrative infor mation. Since IBS's inception, prime effort has been to furnish sta tions with technical data and assis tance. The System has technical requirements (as well as othe



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es) for Voting membership, and gnificant portion of the MH is toted to engineering informa-

as has also developed a regiontivity and runs periodic regiontronferences. Regions publish telsletters, run programming exlages, regional sales offices, and m news networks.

recent addition to IBS sertes is being instituted by the teord Company Relation Departet. The RCRD is publishing a ekly IBS Charts & Review secas a feature of College Radio mazine. In addition, the RCRD furnish to Record Manufacturpromotional offices data on the member stations.

Membership

hdustry Affiliate membership is ther new facet of IBS. As a alt of a complete revision of IBS manizational structure and Bysthree years ago, the System offers Affiliate membership to firms in the industry. Three classes of Industry Affiliate membership are offered.

As outlined in the By-Laws, a broadcast group related to an institution of higher or secondary education, or an organization whose purpose coincides in whole or in part with that of the System is eligible for membership. IBS does not offer individual membership. Station dues are \$45 per year.

Conferences in IBS's 14 regions are held once a year, and a National Convention is held each spring.

Further information on the IBS may be obtained by writing to: Intercollegiate Broadcasting System, Bethlehem, Pa.

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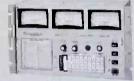
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Professional Association Officer List

The following is a list of addresses and presidents/chairmen of some of the major active na tional associations and professional societies. Since each of these annually strive to keep their membership informed on their specific slice of the state-of-the-art we recommend that interested parties contact these groups for further information on membership qualifi cation and fees. Some, such as the Audio Engineering Society and the Society of Motion Picture and Televi sion Engineers, publish technical journals at regularly scheduled intervals.

Equally important, we suggest you take an active interest in your state association. It does pay to ge together with people in your area to discuss communication cations problems. What's more, it should be easier to have your ideas heard in these smaller groups. You's can get involved.

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(Continued on page 94)

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(Continued from page 93)

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International Radio & Television Society Max E. Buck, Pres. 420 Lexington Ave. New York, N.Y. 10017

Joint Council on Edu. Telecommunications Frank W. Norwood, Exec. Sec. 1126 Sixteenth St., N.W. Washington, D.C. 20036

Motion Picture Assn. of America Jack J. Valenti, Pres. 1600 Eye St., N.W. Washington, D.C. 20006

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National Assn. of Television and Radio Announcers Alvin Dixon, Pres. 1408 S. Michigan Ave. Chicago, 111. 60605

National Assn. of Television Program Executives Inc. John Comas, Pres. 670 Valley Rd. Lancaster, Pa. 17601

National Broadcasters Club Arthur Stambler, Pres. 1737 DeSales St., N.W. Washington, D.C. 20036

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(Continued on page 96)

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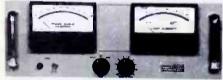
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IEEE Stays On Target

The Institute of Electrical and Electronics Engineers, Inc. is one of the largest engineering societies in the world. It was started in 1884. Today there are more than 160,000 members.

The purposes of the organization are scientific and educational, directed toward the theory and practice of electrical engineering, electronics, radio, allied branches of engineering or the related arts and

sciences.

Throughout the year the man sections of the IEEE hold man meetings, conferences and syn posiums for the purpose of keepin all members informed on the later innovations, experiments, and posible future directions.

While many groups have splinto specific interest areas, the remain aligned with the IEEE. An this includes the Canadian broad

(Continued from page 95)

Society of Broadcast Engineers Inc. Robert Flanders, Pres. 1330 N. Meridian Indianapolis, Ind. 46202

Society of Motion Picture & Television Engineers Wilton R. Holm, Pres. 9 East 41st St.
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As a member of a local IEEE ation, you may attend and parpate in meetins where matter of iticular technical interest in the hality are discussed by people no know them best. At these netings you will meet and exgange views with people who thre your interests. You may join or more of the IEEE Groups Societies, which provides the portunity to broaden knowledge twour specialty field.

There is the opportunity for persnal contributions, to serve on IEE Committees to learn what thers are doing, and to contribute nur own knowledge to the profes-

Meetings

In addition to the local Section leetings, the IEEE sponsors a rge number and variety of other leetings, symposia and conferences to meet the interests of all its members.

The world's largest technical meeting, the IEEE International Convention and Exposition, is held in New York City every March. The four-day program draws engineers and scientists from all parts of the world to learn about and discuss the latest developments in electrical and electronics engineering. Complementing the technical sessions is an exhibition of technological products by hundreds of manufacturers.

Special annual meetings sponsored by IEEE Regions and Sections at a location geographically convenient provide a smaller scale equivalent to the International Convention and Exposition.

Also, throughout the year, IEEE Groups and Societies sponsor or co-sponsor with other organizations many major conferences in areas of special interest. These meetings provide the most up-todate coverage available on their specific subjects.



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CONSOLETTE

New ITV And Lighting Associations

There are two relatively new acciations in the industry. The Idustrial Television Society (ITS) mently held their fourth annual meting in Chicago. This year's meting was aimed toward the disiness or firm embarking on viditape productions and the program was arranged to serve as an accional function and helpmate for the potential user of VTR. The itional judging of tape productons proved to be a valuable tool deducational milestone for the process.

For more information on the ITS rite to: Joseph Gorman, Pres., O. Box 542, Niagara Falls, N.Y. The second is the Illuminating Ingineering Society. They held eir eighth annual theatre, televion and film lighting symposium at May.

The Chairman of the Theater, Television and Film Lighting Committee is C. Schuyler Bramley. Salvatore J. Bonsignore is Chairman of the World Colloguium Committee.

Further information may be obtained by writing: Robert Link, Illuminating Engineering Society, 345 East 47th Street, New York, N.Y.

Audio Society An Industry Leader

AES Journal

The Audio Engineering Society started to publish its own Journal in January 1953. Started as a quarterly, it contains engineering studies and reports from audio authorities in the United States and abroad.

The AES serves members, industry and the public by stimulating and directing advances in this vital technology. It makes new developments promptly and widely

Variable-directivity condenser studio microphone provides 130 dB dynamic range.



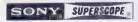
Dynamic range (130 dB + noise level (24 dB) = max. spl (154 dB)

Sony's variable-directivity (Omni-Uni) C-37P* contains an advanced FET amplifier. A switchable attenuator is placed between the capsule and amplifier to prevent distortion even at extreme sound pressure levels.

The combination of proven excellence in sound quality, and the very latest in semiconductor technology makes the Sony C-37P indispensable in today's quality-oriented recording studio.

Also Consider:

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*Must be powered by Sony AC 148A or equivalent power source.

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Conventions

AES conventions include a full program of technical sessions for the presentation and discussion of papers describing current research and developments in audio. Exhibits of professional equipment from manufacturers here and from other countries give AES members a first-hand look at the latest products for audio application.

Membership

Honorary Memberships and Fellowships are given for past contributions to the profession.

Qualifications for membership in the Audio Engineering Society are as Follows:

A Member may be any person active in audio engineering who has an academic degree, or its equivalent in scientific or professional experience in the field of audio engineering and its allied arts, and who is familiar with the application of engineering principles and data in that field.

An Associate may be any person interested in the objectives of the Audio Engineering Society.

A Student may be any student interested in audio engineering and enrolled in a recognized school, college or university.

At the present time the scope of the Society's concern, while still including the areas delineated at the time of its organization 20 years ago, has expanded in order to keep pace with new technological developments in audio and in order to better meet the Society's respons bility to the engineering communit and to society at large.

The membership of the Societ includes engineers, scientists, ac ministrators, and technicians ir volved in research, development design or operation of all forms c audio apparatus and systems; executives, sales engineers, and technical personnel involved in the production, marketing and installation of audio equipment; and educator who use audio apparatus in teaching or who teach acoustics, electronics, or other sciences basic traudio engineering, sound reproduction and allied fields.

The AES serves its membership by offering opportunities for the exchange of technical information for self-improvement and for professional recognition. The vigorou and progressive state of audio technology at this time will surely be matched by the growth and contributions of the Society during the next two decades of its existence.

For further information on AE! membership, write to: Audio Engineering Society, Room 428, 6 East 42nd Street, New York City, 10017.

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NAB Represents **Broadcast Interests**

Vhile you can't always agree h the National Association of badcasters, you must recognize t without their concerted efforts er the years there might not be sound business reason for ng an owner today.

n each decade of broadcasting tory there have been any numof challenges for owners, maners and engineers. Some chaliges nudge the state-of-the-art wly uphill. Others threaten the stence of stations.

The voice of broadcasting conintly thunders out of Washington nen the NAB's Vince Wasilewsspots another derailing FCC pposal. Trouble is, not enough of broadcasters themselves make eir individual voices heard.

The NAB started in a modest ough way with a handful of embers, back in 1922. A nonofit organization, its goal was "to ster and promote the developent of the arts of aural and visual oadcasting in all its forms: to proet its members in every lawful d proper manner from injustices d unjust exactions; to do all lings necessary and proper to acourage and promote customs d practices which will strengthen d maintain the broadcasting inistry to the end that it may best rve the public."

Association activities center on is aim, and today NAB has among its members over 3,800 radio and television stations throughout the 50 states.

Function of NAB

The function of the National Association of Broadcasters is to represent the industry before Congress, at the White House and before administrative agencies. It has been the channel through which the industry has been moved to alert the public to the effectiveness of radio and television, both as informational and entertainment media and as a means to help move the nation's goods and services. In this latter function it proves to be a very important source in stimulating and boosting the national econ-

Another vital function of the NAB is to oppose schemes to convert the American system of broadcasting from a powerful means of free communication into a medium of special interest enjoyed by a privileged few who can pay for their programs. In its stand against pay television, the Association has had the general support of the public and the leaders throughout the country.

Goals Achieved

The NAB also has been instrumental in promoting various activities leading to the betterment of the communications industry. Some of

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these are:

1. Instituting voluntary codes for radio and television which provide broadcasters with guideposts in determining acceptable programming and advertising practices.

2. Upholding the American system of broadcasting, free from government censorhip.

3. Combatting discriminatory legislation proposals.

4. Obtaining more liberal acceptance of radio and television coverage of public proceedings.

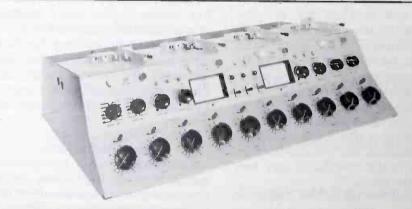
5. Improving the industry's relationship with public service groups.

6. Achieving fair labor relations laws and wage-hour regulations.

7. Improving the efficiency of broadcasting operations by gaining authorization by the FCC for remote control for radio and television stations, drafting engineering and recording standards universally acceptable by the broadcasting industry, and introducing simplified program and engineering logs which meet FCC requirements.

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T-40 Console \$450000

(Shown above)

Also available: 8 Mixer with 2 Cartridge and Stereo Versions

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airman.

The National Association of padcasters also accepts assoe members in fields allied to broadcasting.

Further information on the NAB may be obtained from its Washington headquarters at 1812 K Street, N.W. Washington, D. C. 20006.

Educational Broadcasters

The National Association of ucational Broadcasters has reeted the predictions of governnt surveys: their portion of the mmunications industry is growmore rapidly than any other.

rouble is, the national associaname often does not fit its mbership. There are those who not to be known as Public Broadters, and they are better known with the "Sesame Street" and disterogers" have made their yinto millions of homes across country.

But the membership also inides over-the-air educational rado, campus limited radio, Instruclinal TV Fixed Station, Closed dreuit, Instructional TV and on and on. With this diverse membership and through the leadership of William Harley, the NAEB has grown into one of the largest associations in the broadcast-communications field. In fact, while some refer to it as the "little NAB," the national conventions would lead you to believe that there are none larger.

The convention this year will be held in October in Las Vagas.

The need for strong, local community-based programming in public broadcasting, the crucial role that educational broadcasters must play in the educational structure of American life and the ability to change are all points president Harley will stress in the '70's. Harley warns that "if distasteful realities are what community involve-

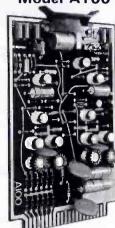


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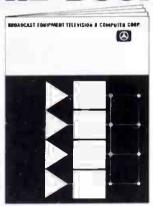
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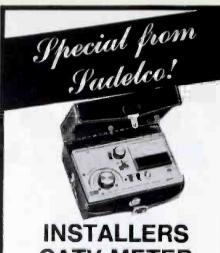


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ment yields, then that is the arena in which we must operate.

Harley emphasises that educational broadcasting can be a major instrument for the people's participation in the conduct of their affairs. "Such participation," he says, "can range all the way from the initial efforts to understanding problems, trends, and issues through efforts to identify and define alternative approaches and solutions. Every educational radio and television facility must be educational, public and community oriented. To expect less of ourselves is unprofessional. To do less is to fail."

And it was just two years ago when FCC Chairman Dean Burch told an NAEB convention audience, "Do not strive to compete with the commercial broadcasters for the maximum audience. Do your own thing. Don't play a numbers game." Meanwhile, just as John W. Macy, Jr. has warned, the educational, public broadcasting future is restricted mostly by funding. This condition is bound to improve, but that end is not yet in sight.

Information on the NAEB membership qualifications may be obtained by writing to: National Association of Educational Broadcasters, 1346 Connecticut Avenue, N.W. Washington, D.C. 20036.

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Special Group For FM Stations

The National Association of F Broadcasters (NAFMB) wi formed by a group of independe FM broadcasters to deal with sp cial problems of the FM broadca industry. It is a non-profit organ zation devoted to the promotion and development of FM radio.

The Association has been i volved in projects related to th FM industry such as-support fi the Federal Communication Commission's separate progran ming policy for combined AM an FM operations; launched can paign for car radios; set in motic 'all-channel' legislation whic would require that all radio se sold in the U.S. be capable of Fl reception. These are merely a fe of the efforts being initiated under the leadership and the active inte est of NAFMB members.

The Association offers continu ing services of research, prograi information, promotion, engineer ing, management and FCC liaiso specifically related to the FM ir dustry.

Monthly dues are based upo gross income. Gross income is d fined as all income resulting fro air time sales on the main FM ca

For Information on the NAFMB

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The Synchronizer compares dentical SMPTE edit codes reorded on any two mag tapes: uad, slant track, sprocketed or nsprocketed audio. If the tapes re within 30 seconds of synchroniation, the BE 450 automatically djusts control voltage to one of he recorders until tapes are in perct sync. It then keeps the tapes in ync, or manually adjusted offset, a frame to frame lock.

The BE 450, with identical MPTE edit code indexing on each ape, can provide exact synchromiation between ATR and VTR apes.

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The new model 531 vector display provides a vector presentation of NTSC or NTSC compatible chroma. This polar coordinate type display allows operator to obtain correct phase and amplitude relationship of the chrominance signal.

Beston also manufactures a long line of broadcast and closed circuit amplifiers.

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(Continued on page 106)

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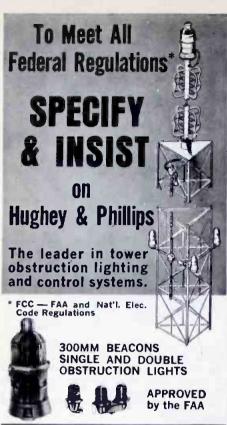
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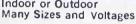
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> Modular Audio Equipment

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JENSEN TOOLS 4117 N. 44th Street, Phoenia, Avis. 85

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KCIJ	кном	WQMV
KCIM	KHOU	WRUF
WCMI	WHSY	WSAO
WDAE	WIRK	WSAV
WDAK	WIVK	WSEV
WDBO	MICM	WSMB
WEEB	WJDX	WTAE
KELI	WJLS	KTCS
KENN	WKIZ	WTIX
WENO	WKYV	WTMA
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BROADCAST ENGINEERING

Plug-in Module Broadcast Console

Fairchild Sound Equipment qurp. has developed a new approach to broadcast console degran. Their new design is based on plug-in modules (with limiters a some inputs), allowing a custom approach to each console.

The modules are assembled in ilding block fashion, according need. They provide for mic, edium level, high level, and rete inputs and output, communitions and monitoring. Each bdule is a complete channel.

Modules are available individuy, in kit form, or completely asmbled at the factory.

Equivalent noise of -127 dBm d distortion of 0.1 percent are iid to be typical of each operationamplifier used in the console. Console shells are available in andard widths up to 48 inches.

Circle Number 173 on Reader Reply Card

Four-Channel Converter

Owners of existing two-channel ereo systems need only add two ktra rear-channel speakers, in addition to the Sansui QS100, for a complete updating that accommodates all forms of four-channel cound-synthesized, matrixed or iscrete—on discs, tape or FM.

The versatile QS100, now availate from Sansui Electronics Corpotion, combines a synthesizer, a latrix decoder, two channels of ower amplification and a comflete set of controls and accessory reuits for two- and four-channel ereo performance.

The synthesizer can detect the on-direct ambient information hat already exists in most two-hannel stereo recordings and roadcasts, processing these signals for rear-channel presentation produce a remarkably realistic bur-channel effect. This is enanced by Sansui's exclusive hase-modulation technique, which propagates the sound proughout the listening space in the same way the natural, live bund field is developed.

The decoder can accurately re-

Continued on page 108)



RECYCLE YOUR USED

TRANSMITTING TUBES



3000 HOUR WARRANTY EMERGENCY SERVICE

By having your used power tubes rebuilt, you can get a second, third or fourth life from them. In making new tubes a manufacturer must use many metals such as iron, nickel, cobalt, copper, tungsten, molybdenum, zirconuim and precious metals such as gold, silver and platinum. Since Econco reuses most of the original parts in a tube, you help conserve these limited resources by sending your used tubes in for rebuilding. We will rebuild your used tubes for a price approximately half that of a new tube or we will buy your used tubes outright.

Here is a recycling program that saves you money and conserves valuable resources. Send us your tubes today!

For more information write or phone:

ECONCO BROADCAST SERVICE, INC. 200 College Street Woodland, Calif. 95695 (916) 662-4495

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Plus performance that is creating excitement in Engineers around the country! "Fantastic sound" . . . "Very Clean' 'Superb! . . Send two more

Proof? Our standard 10 day evalua-tion period lets you see and hear the performance and the full service, 2 year warranty demonstrates the reliability.

Place your order today. Then pre-pare yourself for a very satisfying experience!



TURNTABLE PREAMPLIFIERS

MP-8 (Mono) \$60 SP-8 (Sterea)\$90

Outstanding sensitivity and near perfect reproduction. RIAA/NAB equal-0.5 mv sensitivity @ 1 KHz for +4 dbm out — Balanced 600 ohm out — minus 65 db S/N ratio — -20 dbm out max 1 db frea response - Internal power supply Table top/bracket mount. Shipping weight, 31/2 lbs.



MIC/LINE AMPS

MLA:1 (Mnno) \$68 MLA - 2 (Dual) \$96

Dual function utility amp. Inputs for mic and/or line — 600 ohm balanced outputs — mic input, —65 db +4 dbm out +20 dbm out max. — ±0.5 db response, 10 Hz-20 Khz — 0.1% or less dist. — Internal power supply — Tabletop/bracket mount, MLA-2, Stereo/Dual Mono, Tabletop/bracket MLA-1, Mono. Shipping weight, 4 lbs.



DISTRIBUTION AMP 6 BALANCED OUT

DA - 6 \$95

One third the cost of comparable units. Six 600 ohm balanced outputs
— Balanced bridging input — 26 db +20 dbm out max. - Input level control — 0.1% or less dist. — ±0.5 db response, 10 Hz-20 Khz — Internal power supply — Tabletop/ bracket mount — Shipping weight,



TAPE CARTRIDGE LOADER (AUTOMATIC)

ACL - 25 \$159

Precision winding without guesswork. Dial in the minute and/or sec-onds desired, throw switch to run. That's it! The exact amount of tape is fed onto the cartridge hub to the second, and shuts off automatically No walting around, no guesswork and 1 sec. accuracy. Also has exand i sec. accuracy. Miso indo sa-clusive torsion control for proper tape pack and winding of various cart hub sizes. TTL digital control circuitry. Shipping weight, 30 lbs.



RAMKO RESEARCH

Albatross P.O. Box 6031 Sagramento, Calif. 95860 (916) 489-6695 **New Products**

(Continued from page 107)

cover and reproduce the four original channels of any compatibly matrixed four-channel recording or FM broadcast. Moving out of the experimental stage, the broadcasts

are now originating from an increasing number of FM outlets throughout the nation. Matrixed four-channel discs are also being released by a rapidly growing number of well-known recording companies. In the decoder mode, Sansui's original phase-shift network design prevents the sound dropouts and confused or lost sound-source localization that plague many matrixed systems. And the phase modulators are also operative to implement and sustain the "live sound field" effect.

Circle Number 174 on Reader Reply Card

Video Noise Meter

Rohde and Schwarz introduces a new all solid state Video Noise Meter for noise voltage measurements on composite video signals. Its main application is on TV cameras, film scanners, video tape recorders, radio and coaxial line links, TV transmitters, TV receivers and TV translators.

The Video Noise Meter, Type UPSF, is based on the same principle as its well known tube type predecessor, which is the accepted standard for cameras, video tape recorders and studio equipment. It is basically a wideband (10 Hz - 17 MHz) millivoltmeter, with two indepndent detectors, true rms and peak to peak calibration. The extremely wide measuring range of -85 dB, referred to the standard P and B value of O dB=0.714 V, is obtained by gating out the sync and blanking pulses and measuring the remaining noise level.

In addition, standard weighting filters, low and high pass filters, permit complete analysis of the noise component. A scope output is available for this purpose. Plugin filters for NTSC or PAL enable w the use of the same instrument for an different standards. A sag and tilt corrector is incorporated in the instrument. The repeatability of the Video Noise Meter is of the order

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Highest quality . . . best value

Erases Them All Reel to reel magnetic tapes, cartridges. cassettes, all magnetic film stock too. Up to 2 inches.

Erases It All with minimum residual noise because the field automatically diminishes at the end of each 30-second cycle.

Won't Overheat Internal blower activates automatically to keep unit below 71°C.

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For the distributor in your area

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Circle Number 132 on Reader Reply Card

70.1 dB, while that of equipments using a substitution method is, at est, of the order of 1 dB or more.

Circle Number 175 on Reader Reply Card

Shure Brothers Inc. has introuced a new, rugged omnidireconal dynamic microphone that rovides all the features and perrmance characteristics required r a variety of broadcast, recordg, and professional sound reinrement applications—and does with freedom from the problems mechanically induced noise.

The new microphone, called the lodel SM61, offers a smooth, ide-range frequency response and n extremely natural, uncolored bund. Frequency levels are held ionstant through varying distances etween the user and microphone. this permits the performer to work" the SM61 without variaons in tone or balance.

The SM61's shock-mount design liminates or minimizes cable, andling, and mechanical noises.

"Pop" and wind filters make the SM61 suitable for outdoor recording, public-address, and broadcasting applications. Its design protects the SM61's performance characteristics, even against a drop on its

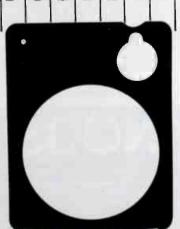
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Professional Lab Scope

The Kenwood KC-6060A Audio Lab Scope, a professional test instrument, provides an economical means of monitoring the performance of FM stations. The Lab Scope consists of a 1 kHz sine wave oscillator with variable output level from zero to 1 V rms, regulated by a front panel volume control; and a large oscilloscope with a 3-inch viewing screen for easy-tosee waveform displays up to 200 kHz.

A 5-position selector knob provides the following displays: (1) Test 0.1 V Peak-to-Peak...to

(Continued on page 110)



Over 25 million Fidelipac Automatic Tape Cartridges have already been sold and that means our goal of 1 billion isn't really that far away. Because being compatible with all standard broadcast cartridge

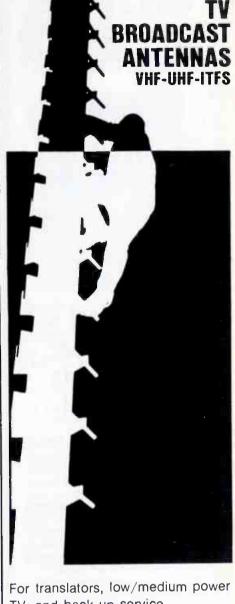
machines and available in all standard lengths, Broadcasters know Fidelipac. They

know its operating superiority, they know its true sound fidelity and they know its long-lasting life. That's why they want it. That's why they buy it. That's why it's the standard for the Broadcast Industry. Get to know Fidelipac yourself. With your help, we'll be able to say, "Only 974,999,999 to go."

For additional information on the Broadcaster Comprehensive Fidelipac Cartridge Line, call your local Fidelipac distributor or write to

a division of TelePro Industries, Inc. 3 OLNEY AVE. CHERRY HILL, N.J. 08034 (609) 424-1234

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Available in 9 standard horizontal patterns, choice of vertical patterns. power gains to over 100 and power ratings to 10KW.

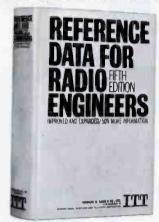
Write or check reply card for catalog and price list. You will receive complete information for planning an installation and all required filing data.

BOGNER BROADCAST EQUIPMENT CORP.

99 W. Hawthorne Avenue, Valley Stream, N.Y. 11580 (516) 561-9130

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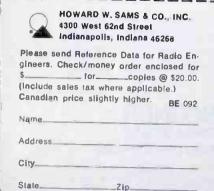
What happened when a group of experts teamed up to write this book?



They made it so practical that it's now in its 5th edition!

This completely revised 5th Edition of the world famous Reference Data for Radio Engineers is the result of 5 years work by a broad group of practicing engineers, professors, government experts and the ITT staff. Its 1196 pages and 45 chapters bring you the very latest on transistors, electroacoustics, microminiature electronics; space communication, navigation aids, quantum electronics, reliability and life testing, etc.; information you need in your work. 1350 illustrations, charts, diagrams, tables, etc. Everything cross indexed for ready reference. Practical? Valuable? 400,000 radlo engineers think so. Your money back if you don't agree with them.

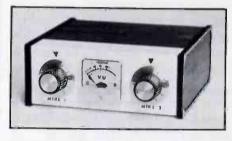
Reference Data for Radio Engineers No. 20678 \$20.00



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compare the voltage measurement of an input signal against a 1 kHz sine waveform. (2) Waveform Left...for left channel audio signal. (3) Waveform Right...for right channel audio signal. (4) Stereo Display...with left channel signal applying to the vertical section, right channel signal to the horizontal section. (5) FM Multipath...to check the performance of a tuner or to adjust the antenna correctly for minimum multipath reception.

Other important tests that can be made by the KENWOOD KC-6060A include checking an amplifier for linearity, frequency response and phase characteristics; testing by square wave signals to determine frequency characteristics; measuring phase difference between two signals; and testing a phone cartridge for frequency response, phase characteristics, er-



REMOTE BROADCAST AMPLIFIER

The type RA 303 SPORTSAMP is a compact 2 channel battery operated remote amplifier for broadcast use. In addition to the usual considerations given remote amplifier design, care has been taken to provide a unit which will also meet the difficult conditions often encountered in sports broadcasting—high background noise, limited space, and no secure a.c. power. The case size of the RA 303 is only 6 x 6¼ x 2½ inches and weighs complete with low cost battery complement just 2½ pounds. The price is \$135. Audio Engineering Co., 4112 Oak Lane, Gary, Ind. 46408

Circle Number 136 on Reader Reply Card

ratic stylus tracking, transient characteristics and optimum stylus pressure.

Circle Number 177 on Reader Reply Card

Tape Eraser

"Taberaser" is the name given to the new tape eraser introduced by Taber Manufacturing & Engineering Co. to the television and recording industries.

The new "Taberaser" is precision made to erase audio, video, instrumentation tape, and magnetic films from 150 mil to 2" widths. The new eraser is designed so that tapes on reels or in cartridges can be degaussed without the necessity of unpackaging.

According to Taber, an added feature of this tape eraser is that the field is automatically diminished slowly at the end of each 30-second cycle, thereby elminating the well-known "Thump". Between 30Hz and 15KHz the depth of erasure is 76db below saturation.

The unit will not overheat and is kept below 71°C by the "Taberaser's" Automatic Heat Limiting circuit, which activates an internal blower until the unit returns to the correct operating temperature.

The 45-lb. eraser measures 6-1/4" high by 14-1/8" wide and 16" deep. Power requirements are 95-135 VAC, 58-62 Hz, 1 phase, 3 wire and uses less than 8 amps under any condition.

Taber Mfg. & Engineering Co., based in San Leandro, California anticipates the "Taberaser" will fill a real need in the television and recording industries for a preci-



n. low-cost eraser. They expect o be received as enthusiastically their tape heads and STL test

Circle Number 178 on Reader Reply Card

Super 8 Projector

A new, sound, super 8 motionture projector, featuring a totalnew design in operation and pearance, has been announced Eastman Kodak Company.

The horizontal, low-profile dein of the Kodak Supermatic 60 unds projector eliminates the alky inconveniences of many onventional upright projectors, ovides instant loading of projecin cartridges, allows movies to be own on a large screen or on a ilt-in Kodak Ektalite projection reen, and makes the projector eal for individualized study or te in carrels.

Circle Number 179 on Reader Reply Card

Dual Channel 5-Mixer Console

McMartin Industries, Inc., Oma-I. Nebraska, announces the availplility of a dual-channel version, e Model B-503, supplementing e previously available B-501 lonaural and B-502 Stereo fiveixer audio control consoles.

The B-503 features dual program nannel capability at a nominal +8 Bm, 600 ohm balanced output. he B-503 provides extreme input exibility with plug-in modules to :commodate microphone or highvel input requirements for each of he five input mixing channels. wo inputs per channel are available through interlocked pushbutton preswitching.

Each program channel delivers frequency response characteristics of \pm 0.5 dB, 30-15,000 Hz with THD of 0.5 percent or less at a + 18 dBm output level.

Individual VU meters for each output channel are included.

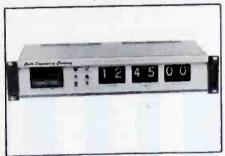
The completely self-contained unit includes 4-watt RMS monitor amplifier output and complete cue facilities.

The B-503 is particularly suited for TV production and subcontrol applications.

Circle Number 180 on Reader Reply Card

Broadcast Cassette System

International Tapetronics Corporation has available a new, broadcast oriented cassette system. The (Continued on page 118)



COOKE MODEL 7.24 DIGITAL MASTER CLOCK

Drives digital readouts and/or impulse slave clocks. ADVANTAGES: - Long-life nixie readout display in hours, minutes, and seconds — Time base is 1 MHz crystal oscillator — Accepts 1 or 5 MHz external reference — Display 12 or 24 hours - Accuracy of 1-second per month or Operates from 12 VDC standby battery 115/120 VAC, 50/60 Hz.

COOKE ENGINEERING COMPANY Lane, Alexandria, Va. 22314 — 703/548-3889

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TRANSLATORS

DESIGNERS AND MANUFACTURERS OF VHF, UHF, FM ALSO REPAIR PARTS AND UP DATING KITS FOR ALL ADLER AND LITTON TRANSLATORS FOR FULL INFORMATION:

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Brookville Road, Silver Spring, Md. 20910 (301) 588-8836

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Spotmaster

The Top Turntable



... Is Spotmaster's new Studio Pro B, offering Instant start and the tightest cue potential in the industry. Heavy duty hysteresis motor drives a 61/2 lb. machined aluminum platter in a solid-cast aluminum chassis for inaudible rumble, lowest wow and flutter. Indicator lights tell speed (33 or 45) at a glance, and speeds can be changed with platter in motion. Detachable mounting plate (accepts any tonearm), in-tegral 45 spindle and neutral cue position are other features . . . all for Just \$198.00.

And an **Outstanding New Tonearm**

is the Spotmaster stereo BE-402 (mounted on Studio Pro B above), which combines reasonable cost, rugged design and professional specs. Features include high compliance for modern stereo cartridges, minimum tracking error, anti-skating, low mass, quick-change head, easy singlehole mounting . . . for only \$54.95.

Complete line of Gray professional arms and all broadcast quality phono cartridges also available at competitive prices.

And the Best Turntable Preamp



is our new Model TT-22, atl solid state, modular, stereo equalized and completely self-contained. Features separate balance/ level controls, high output (+8dbm), phone level controls, high output (+8dbm), phone jack . . . plus switchable and remotable rumble and scratch filters. Both stereo and mono models are available, starting at \$121.50. Our time-tested TT-20B mono preamp and PR-4C power supply (will power up to 4 preamps) are also available, providing top performance at economy prices.

...all from Spotmaster

PLUS a complete range of accessories for both turntable and cartridge tape operation. Write for details.

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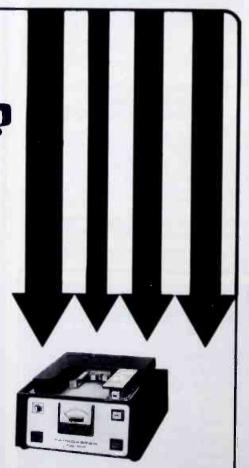
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TAPECASTER

100. AMCO ENGINEERING CO.—Amco's Color Catalog 310-A, and all new Broadcast, Monitor & Control Console Catalog 400 for the broadcast and TV studio is now available. The selection of the equipment in the Amco system is unique in itself. Each category of equipment—as an example, low silhouette monitor-has a base unit identified by number. To this one has a wide variety and selection of standard part arrangements that mount on the base unit. These various combinations, in turn, are given a console number. Thus, ordering is made extremely easy by merely ordering a given number for a complete console and adding digits, -2, -3, or -4, as an example, where multiple units are desired.

101. AMPHENOL BARNES DIV.—Barnes line of sockets, con tactors and carriers for solid state devices is described in a new 24 page catalog. The new catalog fea tures an array of rugged easy-to select sockets, carriers and contactors. Quick selection charts offer visual and preliminary specification by sight, number of pins. method of mounting, material used and part number. Barnes catalog separates flat pack, DIP and TO type sockets into two categoriestest sockets and production sockets. Contactor and carrier charts are aligned to provide instant cross referencing. The Barnes contactors and carriers offer the ability to test a solid state device without risking damage to the device. Carriers provide the best method of shipment and assure that a device can be tested without removal from the carrier.

102. ANACONDA WIRE AND CABLE CO.—Splicing of new Plus-2 cables, designed for use with T-Carrier systems, is illustrated and described in a bulletin by Anaconda. Plus-2 contains isolated send and receive units and features





NEW

- Automatic deck
- Precision adjustable head bracket
- Heavy—duty air—damped solenoid

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BROADCAST ENGINEERING

FREE Catalog
Lists over 300 top-brand items of professional movie cameras, lenses, battery belts, tripods,

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APECASTER TOM, INC.

Box 662 • 12326 Wilkins Avenue, Rockville Maryland 20851 Area Code 301 881-8888 ra pairs for interrogation of reters, and for voice order cirts. Procedures include splicing both the standard filled core nstruction, and non-filled conuction, of the cable. Protection thods are extensively explained direct burial, aerial and pedestal el end splices of filled and noned core Plus-2 cables. Preparan, splicing of cable to repeater bs, and encapsulation of these ices is fully described in a sepae section, which also lists recmmended encapsulating materi-. The bulletin also describes ecautions applicable to shield nding.

103. ASARCO-A new six-page lder describes application of arco's Acoustilead® for machinv enclosures and supplemental alls for noise reduction. Acoustihd—1/64-inch thin lead sheet—is, und for pound, the most effece barrier for airborne noise. The lder explains why Acoustilead is prime sound barrier; describes its se of use; and lists the compoents of an effective machinery closure. Panel construction and stallation and the construction of und-rated doors and supplemen-I walls are treated in detail. Spefic ways to work with leaded applemental walls, and how to eat completed joints are diaamed. Ways of improving existg, inadequate walls and construcon of new walls are described and e resultant reductions in transission loss charted.

104. BIRNBACH CO .- A bronure on the expansion of Birnbach's line of retractile cords is now available. The expanded line includes power cords, shielded and unshielded communication cords, cord sets and miniature cords. Lengths retracted, 1 to 4 feet. Expanded lengths, 6 to 25 feet.

105. COLORADO VIDEO, INC. —The CVI 1972 Short Form Cata-

log lists 27 unique video instruments including data display devices, video analysers, video disc recorders, special effects, image enhancers, test and sync generators, and TV-to-computer interface equipment.

106. CONRAC CORP.—A brochure describing the SNA Series of all solid-state television monitors, ranging from 9-inch through 23inch screen sizes is now available. Included in the brochure are dimensional drawings of 9-, 14-, 17and 23-inch units in cabinet, chassis and rack mount configurations. Features are listed, a general description is included and complete technical specifications are detailed. The SNA Series of monochrome television monitors are currently in use in professional broadcast, industrial, educational and data display applications.

107. EASTMAN KODAK CO.-"Silver Recovery with the Kodak Chemical Recovery Cartridge, Type P and Type 3" is the new title for the extensively-revised Kodak Publication No. J-9. The pamphlet outlines procedures for recovering silver from photographic processing solutions, using the Kodak

(Continued on page 117)

FIVE" MIXER CONSOLE 10 CONTROL

B-500 series e B-500 monaural \$750 the B-502 stereo \$1050 3-503 dual channel \$950 mplete information please contact



Beptember, 1972

Dept. B-50

Director of Sales

MCMARTIN INDUSTRIES INC., 605 NORTH THIRTEENTH STREET CMartin OMAHA, NEBRASKA, 68102 TELEPHONE (402) 342-2753.

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Continuously sweeps the entire audio range ELECTRONICALLY!

Or use it as a function generator.

SPECIFICATIONS & FEATURES

Functions: sine, square, triangle, positive and negative sawtooth with variable slope control

Controls: range, frequency, functions, attenuator, sweep speed (VCO frequency), VCO amplitude

Frequency Range: 0.02 Hz to 20 KHz --- all functions

Dial Accuracy: better than 2% linear Power: 115 vac, 50/60 Hz.

Output Impedance: 50 OHMS Output Voltage: 0-10 volts, peak-peak Sweep Speed: variable 1/25 sec.-10 sec.

Sweep Width: continuously variable maximum; 20Hz-20KHz. minimum: zero!

Waveform Distortion: less than 1% (sine. square, triangle)

Frequency Response: 20Hz.-20KHz ± 1 db Frequency Stability: 0.1% per °C (0-50° C) Square Wave Rise Time: less than 80 ns. Triangle Linearity Error: less than 0.5%

VCO Access: use the ASG-200 to trigger other equipment, or use other outputs to trigger the ASG-200! Added Features: smooth continuous sweep,

no external inputs needed. short-circuit proof!

Dimensions: 4¾ in. high. 8¼ in. wide, 61/2 in. deep

Weight: 48 ounces

Purchase price includes factory assembly and testing, two year warranty and a ten day money-back guarantee if not satisfied for any reason!



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113



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Microwave Study Is Available From FCC

The concluding portion of a two-part microway study carried out for the FCC by Communications an Systems, Inc., has been completed and is now avail able from the National Technical Information Service

Entitled "Frequency Assignment Techniques for Microwave Systems," Part two is concerned with the mechanics required to implement Part I. It include material on data gathering, identification of specifi data to be assembled, and storage, processing an analysis. The study emphasizes the need for a un form, comprehensive, and current data base.

The first part of the study analyzed present micro wave utilization and frequency assignment technique in the bands allocated to the fixed point-to-point radi services and recommended changes leading to mor effective use of the spectrum. It also recommended that the FCC play a more active role in determining spectrum usage through the medium of a microway spectrum management task force.

Copies of Part two may be purchased from the Na tional Technical Information Service, Springfield, Va 22151. When ordering the report, specify the followin title, accession number and price: "Frequency As signment Techniques for Microwave Systems" Phas II - PB207536 - \$3.00.



Circle Number 147 on Reader Reply Card

Motion Picture/Television Engineers

he SMPTE (Society of Motion ture and Television Engineers) non-profit organization of peocencerned with the engineering tects of motion pictures, televin, instrumentation, high-speed tography and the allied arts and pages.

he membership includes engirs, scientists, technicians and cutives in motion pictures, teleon, instrumentation and highed photography, educators and dents, and workers in many alfields

he objectives of the Society : (1) To provide an organization a climate in which persons of in interests can meet, exchange as, and present technical papers It the advancement of, and educain within, the sphere of interest the Society; (2) To provide a shnical journal for the publican of papers and the maintenance a record of progress; and (3) To ter the advancement of engipering technology and to sponsor tures, exhibitions and conferaces designed to advance the eory and practice of engineering

The Society of Motion Picture agineers was founded in 1916, ad in 1950 "Television" was addto its name to recognize the panding segment of its activities. In 1948 an engineering commiton high-speed photography was ganized in the Society to foster ientific development and to enurage better dissemination of owledge in this field. This proam has expanded to encompass merous aspects of photo-instruentation, including photography nd pictorial communication for issiles, satellites and space vehi-

From 24 members in 1916, the ociety has grown today to about 100 members. Although the marity of its members live in the nited States and in Canada, near-800 are located in over 60 other ountries thoughout the world.

SMPTE Jorunal
The Journal of the SMPTE is

sent to all members monthly. It contains technical articles keyed to the interests of Society members, new product information and industry news.

Over the years, the SMPTE Journal and its predecessor, the Transactions of the SMPTE, have become the principal technical and historical reference of the industry. Journal papers of special interest or importance are reprinted and made available from Society headquarters.

From time to time, reports and manuscripts by the engineering committees are published as special bound volumes, such as: Control Techniques in Film Processing; Elements of Color in Professional Motion Pictures; Proceedings of the Fifth International Congress on High-Speed Photography; Principles of Color Sensitormetry; Special Effects in Motion Pictures; and Motion-Picture Projection and Theatre Presentation Manual. A list of available publications may be obtained by writing to SMPTE Headquarters.

Sustaining Members

Sustaining memberships are available to individuals, firms or corporations who subscribe substantially to the financial support of the Society. Names of sustaining members are published each month in the Journal. The Society's Directory includes a descriptive listing of each the sustaining members.

For Information on the SMPTE

If you are interested in becoming a member of the SMPTE or would like more information write to: Executive Secretary, Society of Motion Picture and Television Engineers, 9 East 41st Street, New York, N.Y. 10017.

SEND YOUR
LETTERS TO THE EDITOR
to
Broadcast Engineering
1014 Wyandotte
Kansas City, Mo. 64105

Special Engineers' Group

Since its beginning, the SBE objectives have been to: Provide a forum for exchange of professional discussion of mutual broadcast engineering problems; to provide for and to maintain professional recognition of members; to group together broadcast engineers generally in a body to assist in the professional education, and to raise the technical standards of broadcast engineers and to advance the broadcast technician and novice; and to encourage a continuing interest in the broadcast engineering field by students of technical and engineering courses on broadcasting.

Membership
Because the SBE doesn't come

on as strong as some national organizations, membership has not grown by leaps and bounds. Yet every time you count them up, it's growing. More than 1,600 members at this time.

The grades of membership are: Student, Associate, Charter, Member, Senior Member, and Fellow. Qualifications for member grade are at least a First Class Phone License or equivalent and adequate experience.

Details for membership are included in the "Constitution and Bylaws" and may be received by writing to: The Society of Broadcast Engineers, PO Box 88123, Indianapolis, Ind. 46208.

Current president of the SBE is Bob Flanders, chief engineer of WFBM-TV, Indianapolis.



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Back in the 1920's there was quite a stir over a new strange device called a radio (crystal radio, if you pr fer). And as time went on that fledgling industry gre into a giant.

Cable television was on the scene long before gained any recognition. But it grew. . and grew. was represented by an association called the Nation Cable Television Association.

But when CATV finally burst into full bloom, th prophets were quick to speak of wired cities and blu sky industry predicitons too numerous to mentio here. Suddenly, many were struck by the extra far sighted potential of cable, especially broadband two way cable. Everyone wanted into the act.

With the waters muddied, with directions tangled with a shortage of technical help, and a multitude c new demands upon them, the cable operators turne ever more continuously to their national association.

It is possible that without the NCTA the industr might coast a bit further. It's possible, but not probe ble.

Every year the word is either "promise" or "poter tial". The final equation seems impossible to solv mainly because of the excessive number of unknowns

For more information on the NCTA, write to: Na tional Cable Television, Inc., 918 Sixteenth Street N.W., Washington, D.C. 20006 or call 202-466-8111.

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ch Data

tinued from page 113)

mical recovery cartridges type nd contains a new section deled to the recently-introduced 3 cartridge. The type 3 carige was designed for the convece of those users whose volrequires frequent changes of Five-gallon, type 1-P cartridges. publication explains how to all and use this equipment and to use Kodak silver estimating books. A handy table conlied the previous J-9 publication ining the type of cartridge recmended for particular types of itions has been greatly expandn the revised J-9. Specific carge capacities (in gallons) and imum flow rate (in millileters minute) for maximum efficienare included in the table.

110. MAGNAVOX CATV DIV. new and comprehensive axial Connector Catalog and e list is now available. The 18-

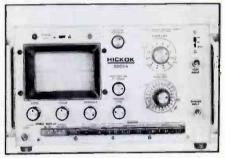
page listing includes nearly 200 connectors, terminals, adaptors and accessories. It is divided into two basic sections. Section I calls out Trunk and Distribution Connectors according to cable type and application. Section II calls out fittings according to application, fitting type, then cable type. Included are Magnavox newest 990 Series high RFI integrity connectors and some very novel and useful adaptations of the lowly "F" connector.

121. TELEX COMM. DIV.-A new catalog for the Telex broadcast and industrial line of professional magnetic tape equipment is now available. The comprehensive catalog covers the complete line of recorder/reproducers, reel and cartridge transports, amplifiers, preamplifiers and accessories. The 20-page, two-color brochure gives product information, specifications and ordering information.

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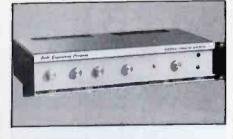


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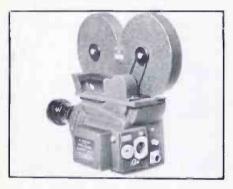


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3300A DIGITAL MULTIMETER

Rugged, portable Hickok 3300A Digital Multimeter measures AC and DC voltage, current and resistance on 27 ranges. Offers 20-hour battery operation standard. The 3300A can be used while battery is recharging. The 3½-digit Multimeter withstands shocks without damage to case or circuits. Value price of \$435 includes rechargeable battery. HICKOK ELECTRICAL INSTRUMENT CO., Cleveland, Ohio 44108. Call: (216) 541-8060.

Circle Number 159 on Reader Reply Card

(Continued from page 111)

cassette units are designed along the same rugged lines as the heavyduty ITC tape cartridge machines for strictly professional broadcast applications.

The design concept provides features that will allow the cassette recorder to perform most of the functions now provided by reel-to-reel equipment and with the automatic cueing capabilities found in cartridge equipment.

The complete line of ITC single and multiple-deck cartridge units will also be on display, including the economy Encore Series.

Circle Number 181 on Reader Reply Card

Multiplex Translator

The COASTCOM Division of Scott-Buttner Corporation recently introduced its new SBC-190 multiplex translator that offers significant cost and performance benefits to microwave users.

Designed primarily to provide local drop and insert of six or twelve voice frequency multiplex channels from super-groups I and 2 on high density microwave basebands to low density 960 MHz or 2 GHz spurs for local distribution, the SBC-190 may also be used to relocate channel groups within the baseband itself. The SBC-190 multiplex translator concept eliminates anv demodulation/modulation equipment at the super-group. group and channel levels and results in an equipment savings to the user of 80 percent in cost over traditional practices.

The compact SBC-190 unit finto two vertical spaces in a stan ard 19" equipment rack, features solid-state construction, and a or optional 36 pole highly selection.

Its design concept also simplifihigh impedance bridging practic and provides highly stable freque cy control.

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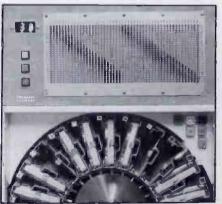
Step Attenuators

Sparta Electronic Corporation has announced new optional precision step attenuators for their entire audio console line. When the attenuators are ordered for a neconsole from the factory, the price \$20 per channel monaural. Sper channel stereo. If the mixed are purchased separately fro SPARTA for field modification an existing board, the price \$25.50 for monaural, and \$37.50 fields.

All SPARTA "B" - series cosoles will accept the high-qualit 20-step attenuator, but the factor should be consulted about install tion in earlier consoles.

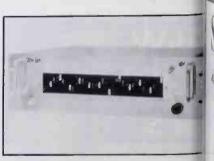
SPARTA warrants the production of the equipment. The stereo model is of concentric construction rather than ganged, allowing cleaning of the stepping points. Resisting accuracy is plus/minus 5 percent.

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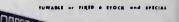


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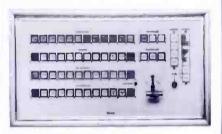
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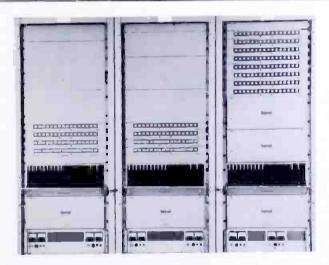
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