

APRIL, 1960

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# BROADCAST ENGINEERING

THE TECHNICAL JOURNAL OF THE BROADCAST INDUSTRY

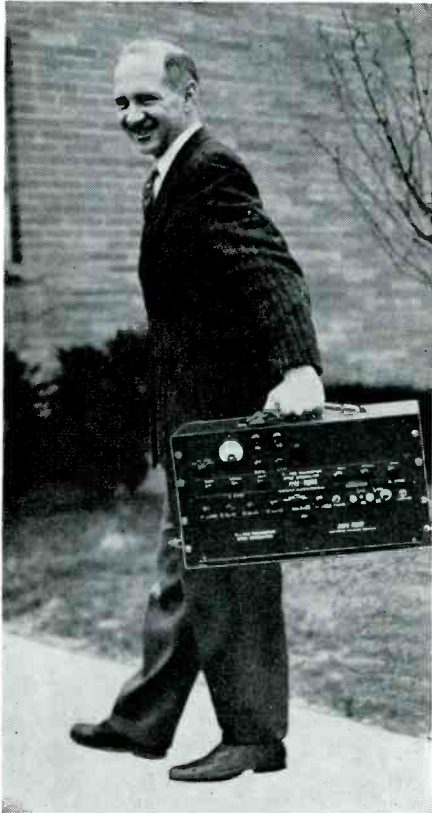


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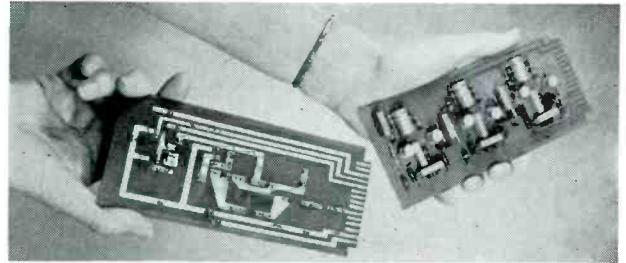
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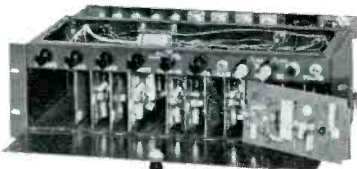
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V-700 EIA  
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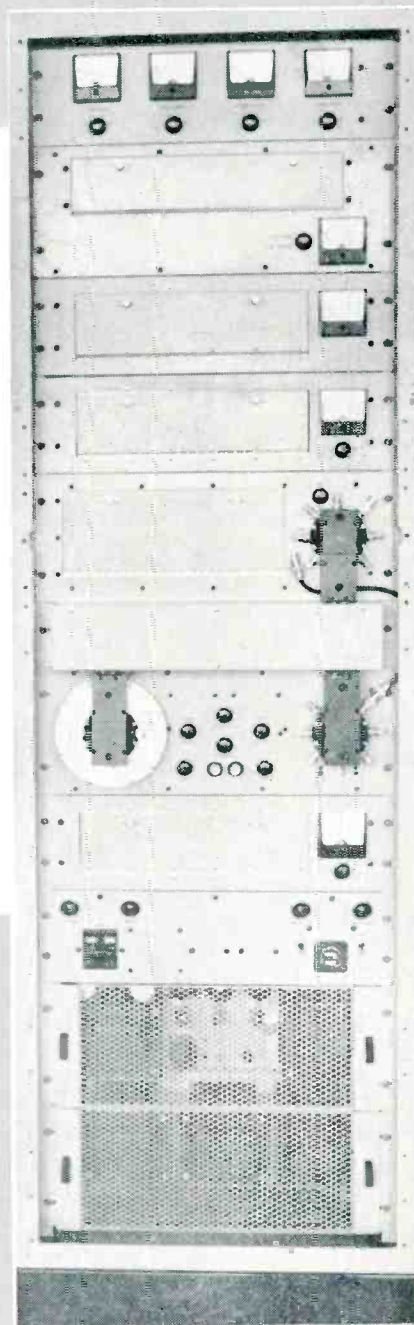
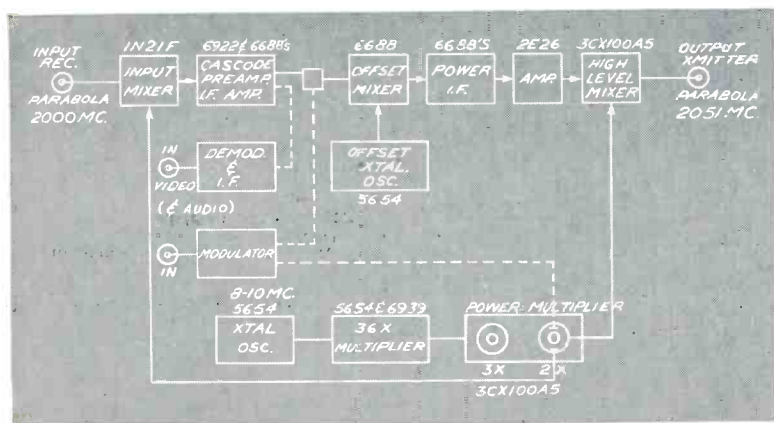
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Broadcast Equipment Division



# SARKES TARZIAN INC

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# BROADCAST ENGINEERING

THE TECHNICAL JOURNAL OF THE BROADCAST INDUSTRY

VOLUME 2

APRIL, 1960

NUMBER 4

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## Cover

A. Prose Walker, NAB manager of engineering, presents the 1960 Broadcasters' Engineering Achievement Award to T. A. M. Craven while Warren L. Braun, chairman of the Broadcast Engineering Conference, presides. Mr. Craven, a member of the Federal Communications Commission, was given the award in recognition for his distinguished career as a broadcast engineer and for his leadership in both domestic and international affairs to the lasting benefit of the industry and his country. Among his contributions to the broadcast industry was the research and development in the field of directional antennas which led to the authorization by the F. C. C. of this type of antenna for AM broadcasting. As chairman of the U. S. delegation to last year's International Telecommunications Union Administrative Radio Conference in Geneva he led a team of allocations experts to the ultimate achievement of every significant United States objective in the allocation of the radio spectrum from 10 kilocycles to 40,000 megacycles. Mr. Craven has twice been an FCC Commissioner and served on the staff of the prior Federal Radio Commission. He was also chief engineer of the Federal Communication Commission.

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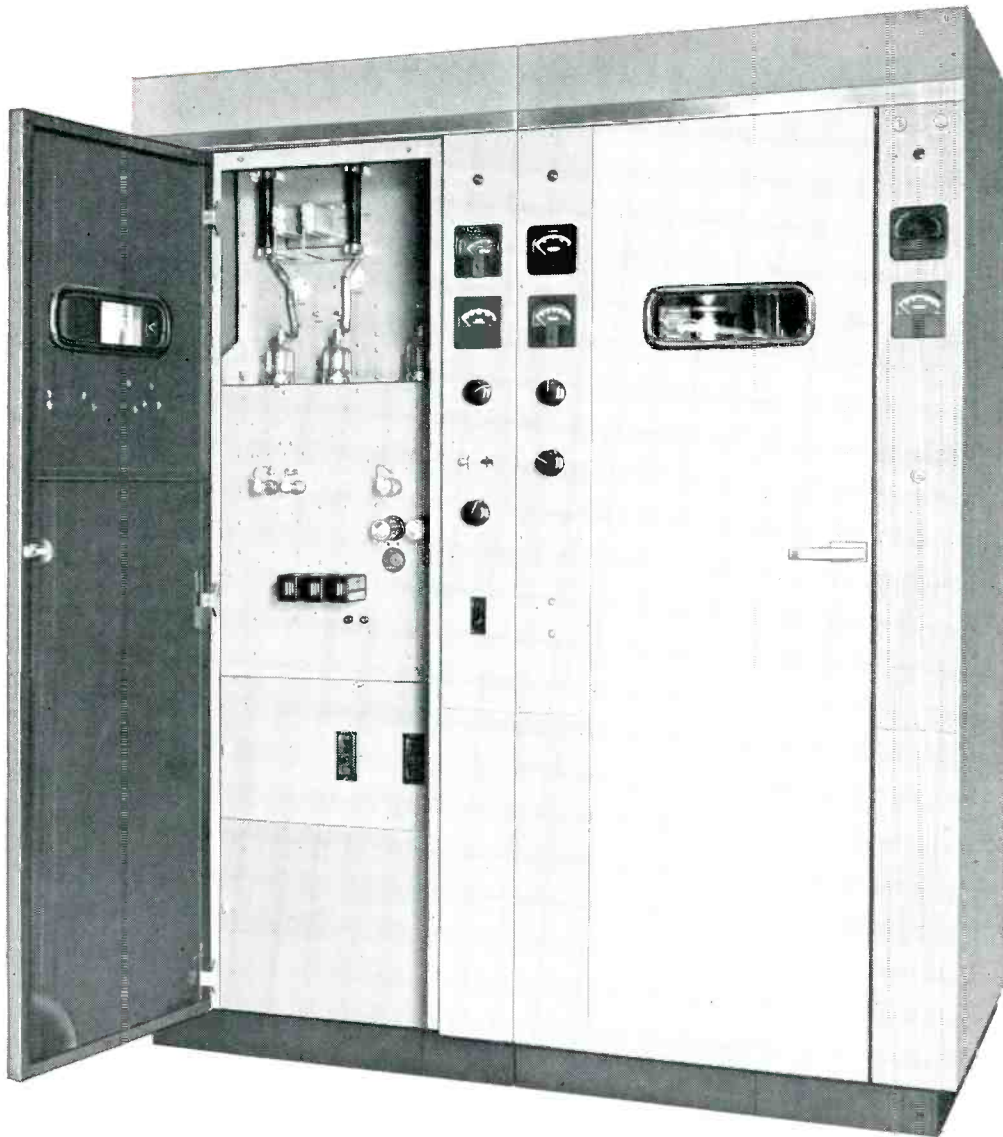
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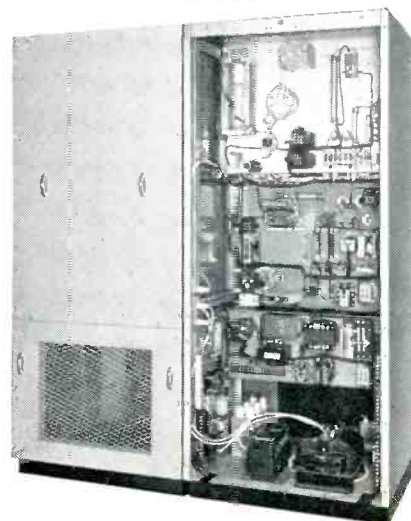
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**How It Works:** The increase in efficiency in the BTA-5T Transmitter is achieved by reshaping the modulated amplifier plate current pulse to reduce the power loss in the power amplifier tube during the conduction interval. A harmonic trap in the cathode circuit squares up the wave shape of the grid driving voltage, and another trap in the plate circuit further shapes the plate current pulse. Consequently, when the tube begins to conduct current, the power loss in the tube plate circuit is low and remains so throughout the cycle.



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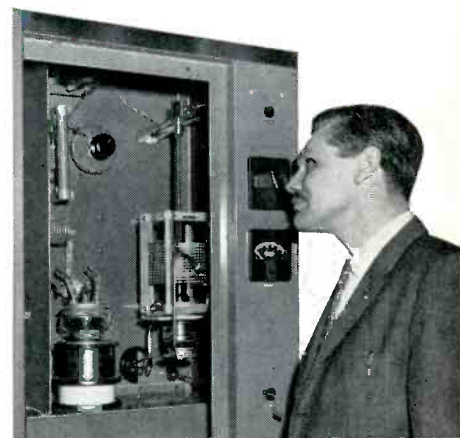
# NEW HIGH-PERFORMANCE 5 KW AM TRANSMITTER

This new transmitter incorporates the only significant development in Class "C" power amplifier design in 20 years. A new circuit provides a plate efficiency of 90%.

With continuous operation, savings of approximately 15,000 kilowatt hours per year are realized. Only 1 PA tube is needed.

Other improvements, including all silicon rectifiers and improved protective circuits, enhance performance and extend operating life.

Functional styling provides a choice of red or grey doors to suit station decor and add a harmonious note.



### Some of the fine features of the New BTA-5T

**1. FEWER TUBES**—Fewer tubes—a total of twelve—save on replacement cost. Only one 5762 PA Tube for lower operating cost.

**2. QUIET-OPERATING BLOWER**—Very low plate dissipation in the output stages reduces heat within the transmitter, and also permits use of a slow-speed blower for quiet operation.

**3. SILICON RECTIFIERS**—All silicon hermetically sealed rectifiers of proven reliability are ideal for remote control.

**4. OVERLOAD PROTECTION**—Complete overload protection is provided for all circuits. All line breakers carry

an instantaneous over-current protection, while main breakers retain instantaneous and thermal protection. Remaining circuits are protected by fast-acting overload relays with provision for external indicators.

**5. REMOTE CONTROL PROVISION**—Built-in provision is made for *remote control* and conversion to Conelrad, power cut-back and a carrier off monitor.

**6. FCC OK**—Meets all new FCC Spurious Emission requirements.

**7. SPACE SAVING**—New style cabinets offer excellent accessibility to all components and allow a great saving in floor space.

*Your RCA Broadcast Representative will gladly provide further particulars about this new transmitter. Or write to RCA, Dept. F-367, Building 15-1, Camden, N. J. In Canada: RCA VICTOR Company Limited, Montreal.*



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## RADIO CORPORATION of AMERICA

BROADCAST AND TELEVISION EQUIPMENT • CAMDEN, N. J.

# A NEW UNIDIRECTIONAL

Increased directivity and sensitivity is obtained in a newly designed microphone which uses the qualities of cardioid and slotted-line types.

ONE of the most difficult problems faced by broadcast and television engineers today is that of microphone *reach*. This highly non-technical term refers to the distance a microphone can be satisfactorily used from the source of sound.

When the average studio microphone is used two to three feet from the source of sound, the sound pressure actuating the diaphragm or ribbon is great enough that room acoustics are of small consequence. Stated differently, under those conditions the sound level at the microphone is so much greater than the level of reverberant sound that the latter has little effect. Beyond three feet, particularly on large television sets and in theatres, the room acoustics become a serious problem and reverberation, especially, degrades audio quality beyond acceptable limitations. Loss of level and "presence," too, become a serious problem.

Since the advent of television, unidirectional cardioid microphones have become the workhorse for boom use in both large and small studios. The cardioid pattern provided an angle of pickup or acceptance of about  $45^\circ$  each side of the front axis of the microphone and increasing attenuation of sounds arriving from the sides and back. Under studio conditions these microphones answered most requirements, since acoustics were controlled, which meant that reverberation, too, could be held to a tolerable minimum.

But so often sound pickup had to be made under conditions far from ideal, such as those on large tele-

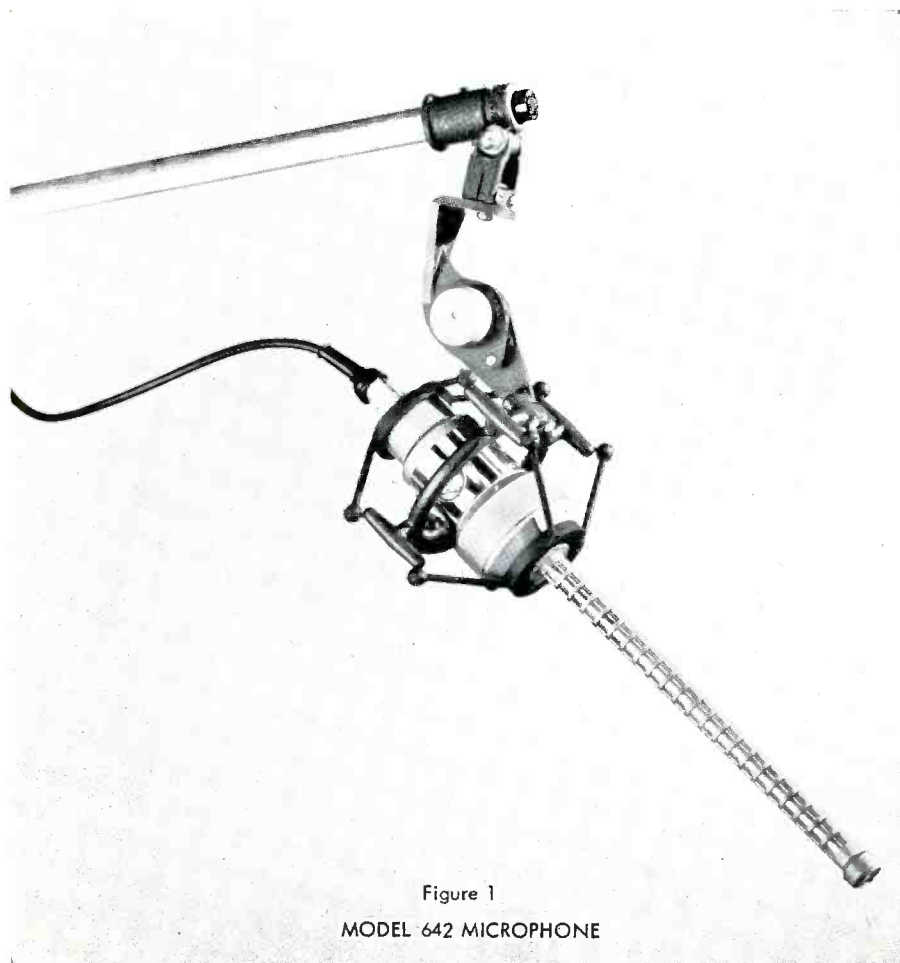


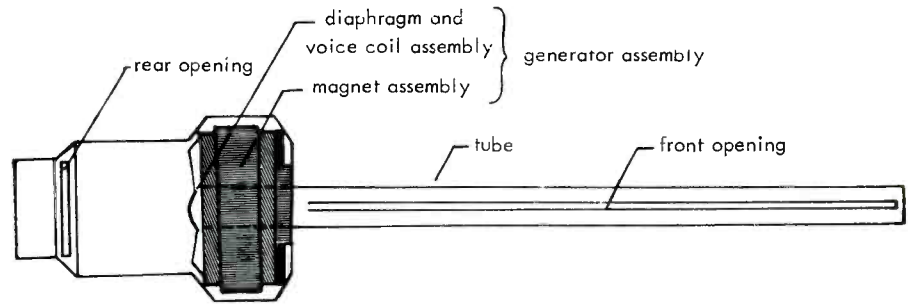
Figure 1  
MODEL 642 MICROPHONE



# MICROPHONE

Figure 2

CROSS SECTION OF MODEL 642 CARDILINE MICROPHONE



vision sets, in theatres and outdoors. The only answer was to use high quality cardioid microphones and crowd close to the performer, keeping the microphone just out of the picture frame. In fact, microphone crowding has become so necessary at times that it is not unusual to see a star rehearsing with a bruised forehead from a microphone that was swung improperly or not moved quickly enough. In the years since television was introduced, boom operation on large sets has become an art as has microphone placement on the small sets.

The obvious answer to the problems at hand was a microphone with increased sensitivity and directivity over a studio cardioid but with approximately the same angle of acceptance on the front axis. Increased attenuation for sounds arriving from the sides *as well as* the back of the microphone would help to remove room reverberation as a limiting factor to increased microphone working distance. Highly directional microphones had been available in the form of parabolic and the so-called "machine gun" types; however, these were not designed for studio use and their necessarily large size, high cost and limited frequency range response defeated their use for this purpose. A new approach was needed.

Ideally, such a microphone would provide an angle of acceptance of approximately  $90^\circ$  ( $45^\circ$  each side of the front axis), high axial sensitivity, wide frequency range response and good wind noise characteristics. Physically, it would need to be small

and lightweight enough for easy manipulation on the longest booms and sufficiently rugged to absorb a great amount of accidental mistreatment. In addition, these features would have to be provided without extensive compromise at a reasonable cost—which in itself is a challenge to engineering.

Extensive development and field-testing evolved the microphone illustrated in Figure 1 in its finished form. Actually, it is a combination of two microphones, a cardioid and a slotted-tube or "line" microphone. The reason for this combination will be pointed out. This microphone fulfills the performance requirements outlined previously and field testing throughout the past two years has proved it to be superior to the cardioid unidirectional type under conditions of poor acoustics, where extended working distance is of advantage or cannot be avoided, or where a combination of both appears. In some applications satisfactory pickups of performers were made over distances of 15 to 40 feet without serious loss in presence or level (as compared to studio cardioid types). In one case, the m.c. of a long-popular variety program became so enthused over performance of the microphone that he, himself, directed it toward each member of his band and asked them to greet the listening audience, thus adding a personal touch impractical before because of the large number of microphones that would be required.

The basic operation of this line microphone is necessarily quite complex but should be reviewed to pro-

vide a foundation for specific applications. Figure 2 is a simplified cross-sectional diagram of the working parts of the Model 642 Cardiline microphone. As can be seen, the front opening extends along the tube which feeds into the microphone generating element. All points along this slot or line are equally sensitive and equal sound pressures at any given points along this line will result in equal output from the generating element. Also, all points along this line are acoustically coupled to the diaphragm by the common tube. This fact results in introduction of an acoustic delay between points on the line and the diaphragm.

The resulting effect of this arrangement produces the polar pattern shown in Figure 3. As this diagram illustrates, sound pressures arriving at the microphone along the front axis enter the tube and travel in phase along the entire length. As the source of sound is moved off axis, however, interference within the tube occurs. This interference begins to be noticeable when the direction of the sound source is moved to approximately  $45^\circ$  off the front axis and increases rapidly beyond that angle. The resulting attenuation at  $90^\circ$  is the same as that of a studio cardioid microphone at  $180^\circ$ . On this polar chart, the increased attenuation at any angle over that of a studio cardioid microphone can readily be seen.

The polar curve shown in Figure 3 must necessarily show the operation of the microphone at only one frequency. In this chart the fre-

Figure 3

COMPARATIVE POLAR PATTERNS OF DIRECTIONAL MICROPHONES

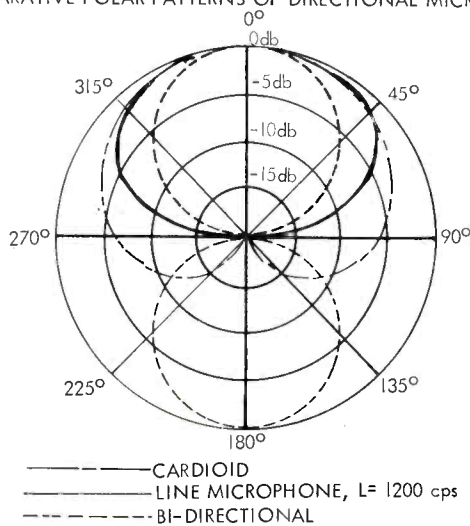
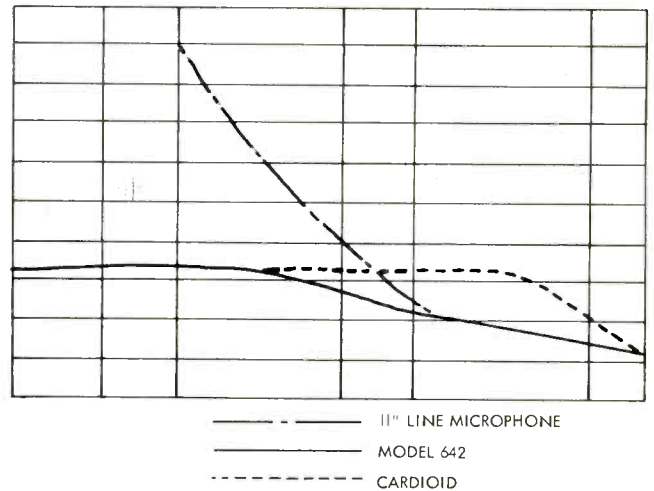


Figure 4

DIRECTIVITY INDEX FOR CARDIOID, LINE AND CARDILINE MICROPHONES



quency is 1200 cps at which the 11-inch length of the tube approximately equals the wavelength of sound at this frequency. Above this point, the microphone becomes more directional and at very high frequencies is truly a tear-drop configuration. Below this frequency, however, the line microphone itself rapidly loses directivity. Unless the tube is made greater in length, which is undesirable, some other means must be used to produce directivity below this frequency.

The solution to this problem was found in designing the microphone to operate as a cardioid type in the range where the line microphone directivity seriously falls off. The combination produced a unidirectional microphone with the same directional characteristics of a studio microphone up to approximately 500 cps where it changes over to the highly directional line microphone characteristics. The over-all increase in directivity throughout the sound spectrum proved highly advantageous and the combination evolved the name "Cardiline."

A more accurate description of this combined action can be given by introducing the new term "Directivity Index." This term is merely a ratio used to describe how well a directional microphone operates and a nondirectional microphone is used as a basis of comparison. To determine this ratio, the directional mi-

crophone is placed in a sound field which arrives at the microphone with equal intensity from all directions. The nondirectional microphone is placed in this same sound field under the same conditions. The output energy of each is then combined in the form of a ratio and the smaller the numerical value of this ratio, the narrower is the polar response of the directional microphone.

By determining the Directivity Index over a broad range of frequencies, the directional effects can be charted and examined visually as shown in Figure 4. This chart shows the comparison in directivity of an 11-inch line microphone, the Model 642 Cardiline, and a studio cardioid microphone.

As mentioned previously, increased directivity is not the complete answer to obtaining greater working distance for the microphone. However, increased sensitivity of the microphone itself provides the remaining performance feature needed to complete an advanced design. This is obtained in the Cardiline microphone by use of a large magnetic structure utilizing an Indox V ceramic magnet. The magnet itself is over 2½ inches in diameter and weighs one-half pound. This rather large magnet assembly permits the use of a 1¼-inch diameter diaphragm and ¾-inch voice coil. The combination results in an assembly which provides an output

level of -48 db referred to 1 mw, 10 dynes. As compared to conventional studio microphones in general use, this represents a gain of approximately 7 db.

Under some room conditions where reverberation is high, a great improvement in reproduction can be obtained by introducing a roll-off for frequencies below 100 cps. Also, while wind noise characteristics of this microphone are excellent, this roll-off greatly reduces what rumbles may appear. To effect this conveniently, a two-step bass roll-off filter is included in the microphone case with an external screwdriver adjustment. By means of this adjustment, attenuations of 0, 5 or 10 db at 100 cps may be selected. A similar switch is included for impedance adjustment.

The design features incorporated in the Model 642 Cardiline microphone have in effect created a new class of "long reach" microphones. Field tests throughout the past two years have proved the great advantage of utilizing line microphone performance to effect greater working distance without significant compromise. As with most things, these features, useful as they may be, are not the answer to all problems involved in sound pickup. However, they can be very highly useful as a tool to provide very satisfactory solutions to past problems for which no solution has yet been found.

now  
you  
can

# Freeze TV Action!



## NEW Hughes Storage Monitor

Tape advantages are well-known—superior "live-quality" picture reproduction, immediate playback and greatly reduced costs. One of the major difficulties to date has been development of efficient tape editing methods and techniques. Now, Hughes makes available to the industry a Storage Monitor for use as a key unit in the design of tape editing systems.

The new Hughes Storage Monitor operates like any standard TV monitor until you press the button. Immediately the Hughes 5" TONOTRON® Tube freezes the image, holding it until the monitor mode is restored.

Advantages to TV engineers include: High-Speed tape processing. Better program continuity and quality. Less tape wear during editing. Highest utilization of video recording equipment.

Pictures may be held for approximately ten minutes with a minimum of 5 half tones. Input may be from separate or composite video sources. Push-button controls permit local or remote operation.

Model 201 Storage Monitor is available in several mounting arrangements—portable or rack mounted, individually or in groups, for sequential frame study. This permits rapid selection of individual frames and desired action sequences.

For additional information write to: Hughes Products, Industrial Systems Division, International Airport Station, Los Angeles 45, California.

Now! A television monitor with a memory... capable of freezing any TV action.

- Video Signal .... Positive Video or Positive Composite Video (sync. neg.) coaxial cable input, 1-volt p-p.
- Separate Sync Inputs ..... Negative sync, coaxial cable input.
- Input Impedance .... 100 ohms each on Separate Sync Inputs, 1000 ohms on Video Input (with parallel terminal for 75 ohm matching termination).
- Video Bandwidth ..... Approximately 6 mc.
- Vertical Scanning Frequency ..... 60 cps. interlaced.
- Horizontal Scanning Frequency ..... 15,750 cps.
- Picture Size ..... 4 inch useable diameter.
- Power Requirements ..... 115 V 50/60 cps. 130 watts.
- Dimensions (Model 201) ..... 14" x 8-1/2" x 16-1/2" wt. approx. 40 lbs.
- Mounting (Model 201-R) ..... Standard 19" relay rack
- Phosphor ..... P-4 (Television black and white)

INDUSTRIAL SYSTEMS DIVISION

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# New Trends in Broadcast

The 1960 National Association of Broadcasters Convention unveiled many new equipment items for every broadcast activity.

WITH nearly \$15,000,000 in equipment exhibited by 49 different manufacturers, broadcasters had the opportunity of viewing the latest engineering developments at the 1960 NAB exhibition at the Conrad Hilton hotel in Chicago, April 3rd to 6th.

New equipment has been developed for every phase of broadcasting and whether the individual interest was AM, FM, or TV, the broadcaster found many ideas to improve his operation and solve equipment problems.

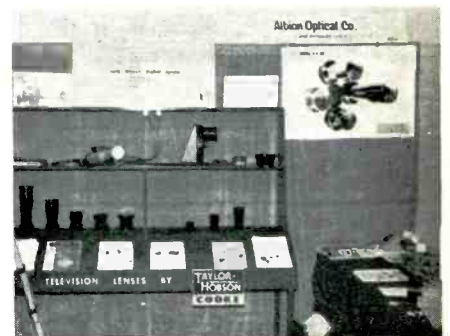
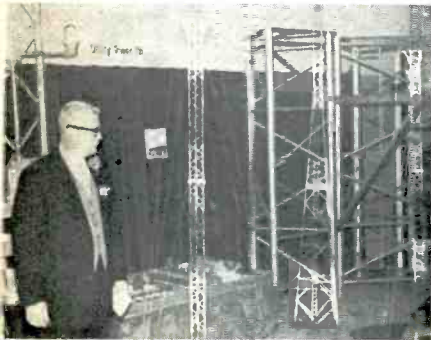
For the AM broadcaster new cartridge tape units, new transmitters, microphones, automatic logging equipment, automation, leveling amplifiers, transistorized remote ampli-

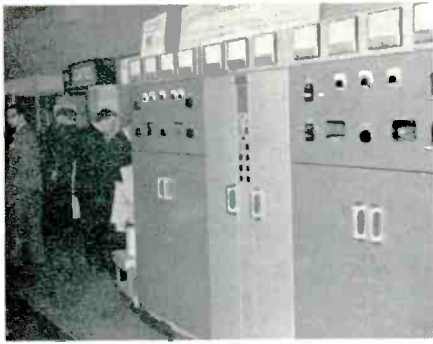
fiers, stereophonic conversion equipment, automatic Conelrad control, tape recorders, and other items were displayed.

New transmitters, multiplex exciters and receivers, relay receivers, monitors, and audio equipment were available for those looking for FM equipment.

Manufacturers of television equipment presented improved television recorders, cameras, projectors, microwave equipment, lighting, switching apparatus, special effects equipment, test equipment, automation and other items.

Continuing the trend towards increased use of magnetic tape for broadcasting, many new tape cartridge units were shown for the first





## Equipment

time. The single cartridge recorder and/or playback unit was shown by four manufacturers. Collins Radio, Gates Radio, and Broadcast Electronic's units are compatible in that they use interchangeable Fidelipac cartridges and are controlled by a tone on the second track of the tape. A unit introduced by Shafer Custom Engineering Co. also uses the Fidelipac cartridge but uses a silver cue-dot instead of a tone and records with a full track head. Two companies showed multiple cartridge units driven by a common capstan. The multiple unit showed by Collins uses a Fidelipac cartridge and the Mackenzie program repeater uses a custom cartridge.

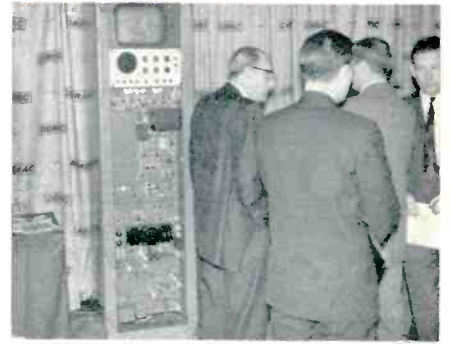
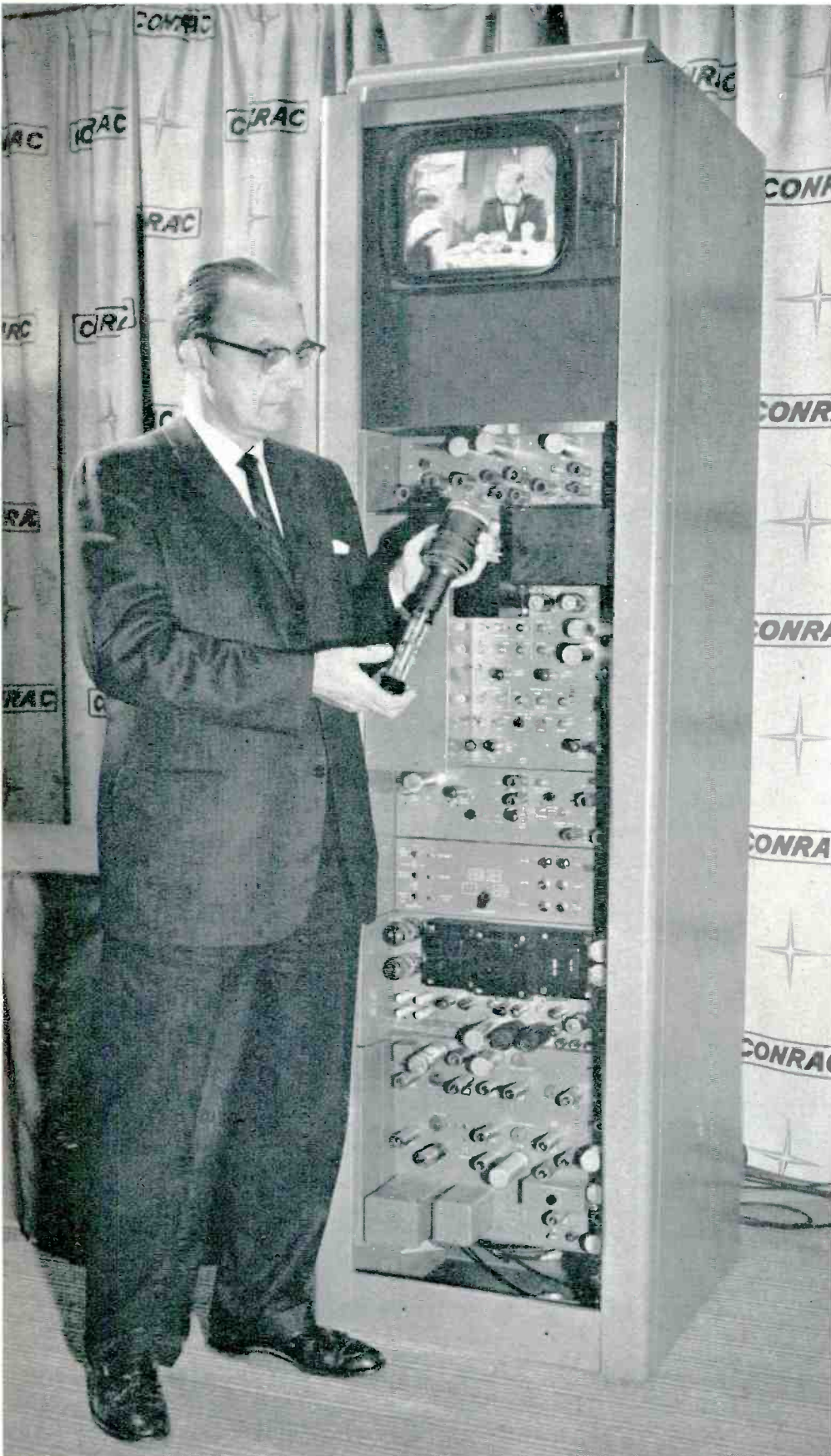
A completely automatic program



The new Ampex VR-1001A compact Videotape recorder.



William J. Moreland, president of Conrac, Inc., holds the picture-memory tube which is the heart of the Video-Chek Storage Unit used for tape editing.



system was demonstrated by Shafer Custom Engineering Division of Textron Electronic, Inc. With this equipment a complete day's programming can be dialed and cued in any sequence. The Shafer Spotter S200 in conjunction with the Shafer Automation system which controls other tape units, and/or record changers will provide a semi-automatic or fully automatic program system. Collins Radio Co. also displayed its tape cartridge units in an automatic program installation using an Autosperser to control the program sequence. In addition to the magnetic tape equipment, RCA again showed its magnetic disc line which combines the advantages of magnetic recording and ease of handling of discs. Gates Radio Co. also displayed its spot tape recorder which uses a 13-inch wide magnetic belt and will play 101 spots which can be up to 90 seconds in length. The spots are selected from the front panel by an indexed control knob. Automatic cueing and rewind are



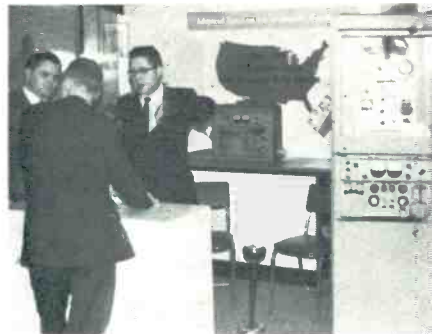


accomplished by two photo-electric cells.

New AM transmitters were shown by Bauer Electronics Co., Continental Electronic Mfg. Co., Gates Radio Co., and RCA. Bauer Electronics scored a first in the field of AM transmitters by introducing a one kilowatt transmitter kit. According to the company it is an established design based on its FB-1000-J transmitter. The kit includes detailed assembly instructions, a coded wiring harness, premarked component boards for individual transmitter sections, a factory assembled and checked oscillator-buffer section, a complete set of operating tubes, crystal, and a special tool kit. The transmitter is designed for power reduction to 500 or 250 watts. Continental Electronic introduced its new one kilowatt AM transmitter and Gates Radio Co. showed its new 50 kilowatt transmitter which features dry rectifiers throughout, compact size, external or internal air cooling and the use of only 15 tubes of six



A half-sized model of the Tiros weather satellite is photographed with the new RCA camera which uses a 4 1/2-inch image orthicon tube.





The 4 1/2-inch image orthicon tube displayed with new TK-12 RCA camera.

types. RCA showed its new BTA-5T five kilowatt transmitter which has a newly designed PA circuit operating with a plate efficiency of 90 per cent. According to RCA this represents an improvement of 20 per cent over normal class C operation. Power savings of approximately 15,000 kilowatt hours per year would thus be realized. The high efficiency is achieved through the use of a third harmonic resonator in the plate circuit of the single ended power amplifier stage and another in the cathode circuit. The purpose is to provide a flat waveform near the peak of the cycle instead of the normal Class C sinusoidal waveform.

Automatic transmitter equipment has been under test the past year at WTOP in Washington, D. C., and the equipment was displayed at the exhibit and the experiences at WTOP described by Granville Klink, chief engineer of WTOP. WTOP uses the

recording system on five transmitters for AM, FM, and TV. They measure 35 different parameters. Fifteen of the measurements for two AM transmitters are sent over a single pair of telephone lines by means of a telemetering servo unit. The recording equipment is installed at the studio with the FM and TV transmitters. The recorder, manufactured by Minneapolis-Honeywell Regulator Co., fits into a standard 19-inch wide relay rack. The transmitter unit is 20 inches high. With remote system, recorder plus annunciator is 19 inches high. With consolidated system, recorder plus annunciator and auxiliary equipment panel is approximately 30 inches high. Up to 16 points can be recorded on a multipoint strip chart which has as many as eight adjustable alarm circuits. Each point is identified by numbers printed on the chart. In front of each number is a

mark which indicated the point on the chart representing the value of the variable and the time. A red lamp on the alarm panel, identifying the variable, lights whenever the variable is discovered to be off normal. An audible signal feature is also available. Future developments could provide automatic adjustment of parameters which deviate from normal.

Stereo for AM broadcasting was demonstrated by Kahn Research Laboratories with their Model STR-59-1A stereo exciter-driver system which is in use in a number of other countries. The system permits compatible stereophonic broadcasts over a single AM transmitter and can be received on two standard AM receivers. The system produces two independent sidebands individually modulated by each stereo channel. To receive the signal each receiver is tuned to one of the sidebands. A







single receiver tuned in the conventional manner receives the full program.

An automatic Conelrad control unit which will interrupt the transmitter carrier in the prescribed sequence and transmit the Conelrad tone signal was shown by Collins Radio Co. The unit uses a tape cartridge unit.

An AM receiver designed specifically for broadcast applications was announced by Kahn Research Laboratories. The receiver is a fixed tuned Single-Sideband unit which is intended for radio relay service, quality monitoring in difficult reception areas, Conelrad monitoring, and other purposes where a professional receiver is desirable. The receiver minimizes fading distortion and improves signal-to-noise ratio.

Gates Radio Co. presented a paper and displayed its constant level amplifier which offers advantages over

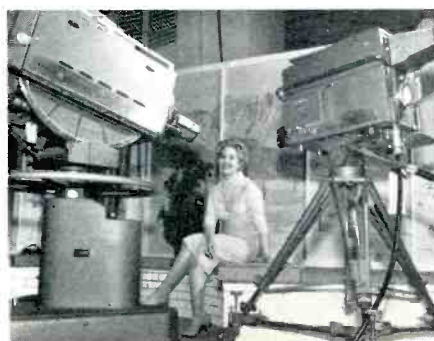
peak limiting type amplifiers in that the noise level does not rise in proportion to gain reduction. Advantages claimed are the elimination of background noise fluctuation due to changes in program level, an expander to provide additional automatic gain control, fast attack time and a high ratio of compression for use as a peak limiter in TV and FM applications.

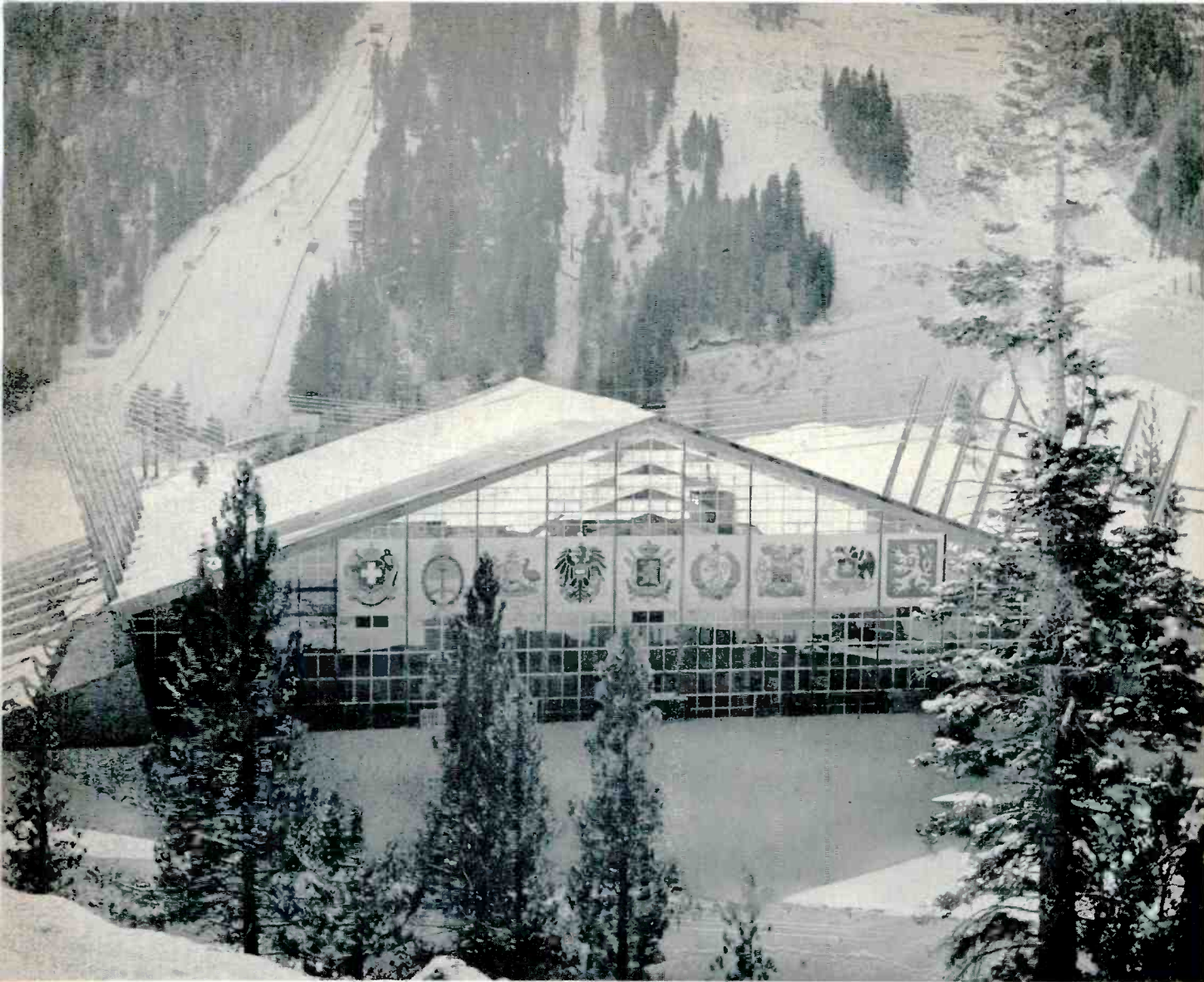
The General Electric Co. showed a new completely transistorized portable amplifier for remote use. Features include a built-in tone generator, P.A. system feed, plug-in transistors, four mike inputs and one high level input, and a laminated plastic front panel for ease of control designation.

The rosy future predicted for FM broadcasting by many industry leaders was reflected in the many new FM transmitters and other equipment for FM being offered by manu-

facturers. RCA is offering two new FM transmitters in the one kilowatt and ten kilowatt range. In addition RCA is offering a 20 kilowatt transmitter which consists of two 10 kilowatt amplifiers dplexed together. The two amplifiers are driven by a common 250-watt exciter-driver stage. RCA states that this is an economical and dependable method of producing a high power transmitter. Collins Radio Co. has entered the FM transmitter field with a line of transmitters from 10 watts to 15 kilowatts. Industrial Transmitters & Antennas also is offering FM transmitters in this range. Gates Radio Co. has FM transmitters from 10 watts to 5000 watts. General Electronic Laboratories is offering 15,000-watt and 1000-watt transmitters and Standard Electronics exhibited a line of FM transmitters from 250 watts to 10 kilowatts. All manufac-

*(Continued on page 21)*





Millions of listeners heard world-famous commentator Lowell Thomas in his daily newscasts from the radio recording studios in the Winter Olympics press building.



Sportscaster Tom Harmon made his daily broadcasts over the CBS radio network direct from the recording studios.



## Radio and TV Coverage of

# 1960 OLYMPIC WINTER GAMES

One of the most complex pooled broadcast facilities was set up by the Olympic Committee's radio-television staff, broadcast equipment manufacturers, telephone companies and the U. S. government for use by American and foreign broadcasters.

FOREIGN broadcasters got a good look at American broadcast techniques and equipment during the 1960 Olympic Winter Games at Squaw Valley, Calif., last February, and they liked what they saw.

The visiting announcers, using American equipment exclusively, broadcast over 300 hours to their home-lands during the 11-day Games. The technical arrangements at Squaw Valley were probably the most complex ever set up in the United States for foreign broadcasting, and were accomplished through the contributions and cooperation of the Olympic Committee's radio-television staff, broadcast equipment manufacturers, telephone companies and the U. S. government.

The foreigners were profuse in their appreciation of the broadcasting set-up, according to Don Reeves, who directed the radio-television operation at Squaw Valley.

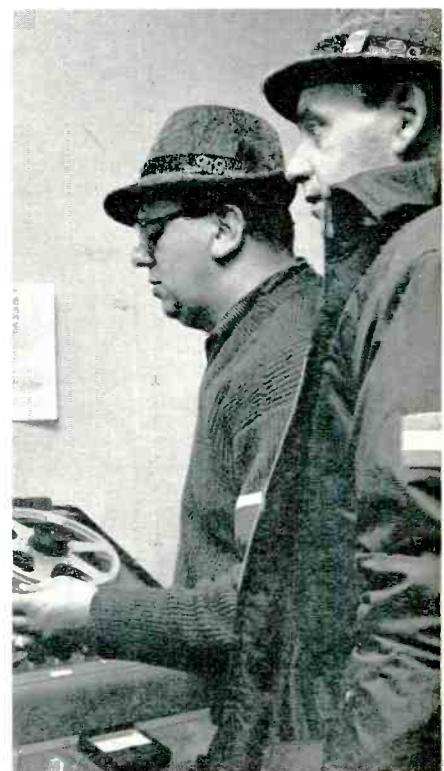
"The foreign commentators were very grateful for the services and equipment furnished," Reeves said, "and without exception to my



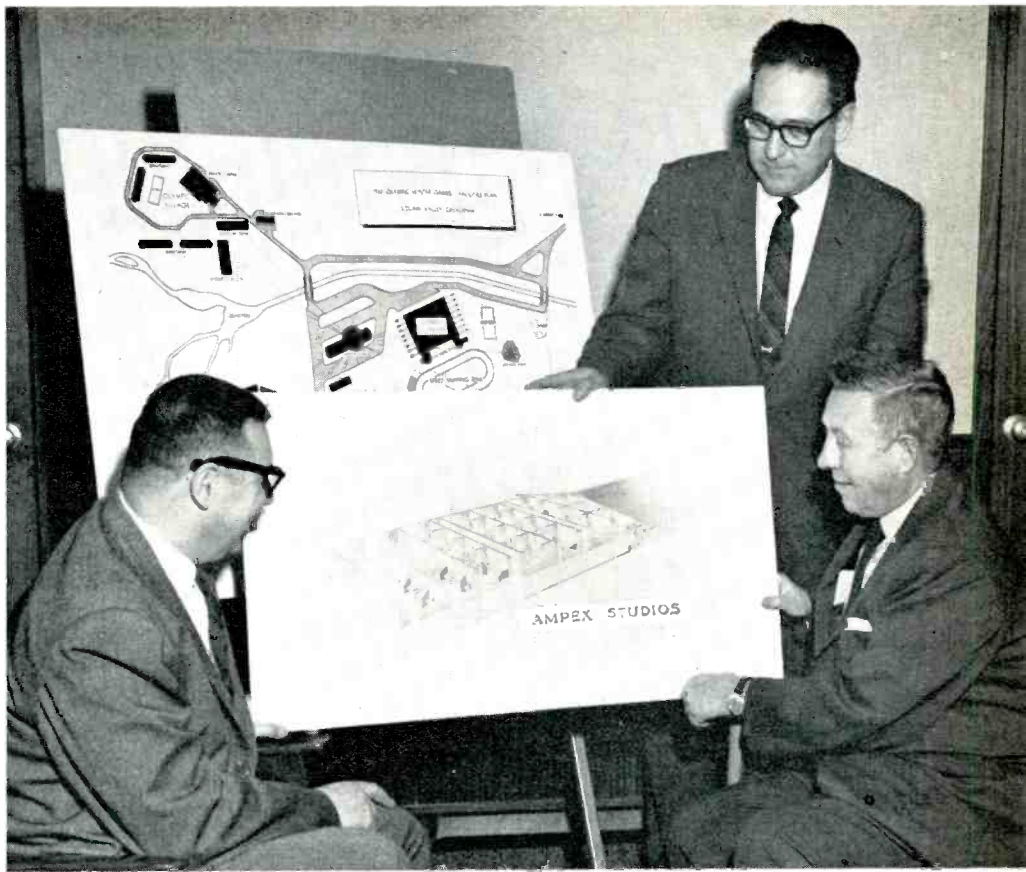
Opening day ceremonies of the Winter Olympic Games held in Blythe Arena at Squaw Valley.



U. S. and foreign broadcasters shown using the facilities provided by U. S. equipment suppliers.



Russ Hodges (right), Franklin Mieuli (left) and Neal K. McNaughten inspect the plans for the special recording facilities at Squaw Valley, Calif.



knowledge stated that our set-up was the best ever provided—and some of them had broadcast from nine former Olympics, summer and winter.

“We have received many letters expressing the foreigners’ opinions that things here at Squaw Valley were the best, and that the foreign radio operation was as nearly perfect as it was possible to make it and still remain practicable,” Reeves said.

The preparation for such a successful operation, as well as the anticipation of problems that could mushroom into international proportions, were considered in the initial design of the Olympic village.

The broadcasters, all of whom were announcers and spoke English, lived in dormitories built by the Olympic Committee for visiting foreigners on Olympic business. They were also assisted in obtaining interviews with athletes and officials.

The foreign announcers arrived on Feb. 10—eight days before the Games began—to be briefed on the Olympic area and become accustomed to the facilities and American equipment. Pacific Telephone & Telegraph Co. provided 15 management level technicians to advise the foreign broadcasters, and the U. S. Army Signal Corps furnished technicians, maintenance personnel and laid lines for the operation.

A radio center in the press building included 34 broadcast booths and production studios, along with sufficient lines so that programs could be broadcast or recorded simultaneously from two points.

Three lines were installed at each of the 114 positions at eight game sites, with a total of 240 terminations at 21 points throughout the Olympic Village area. All these lines terminated at a central patch panel in the press building and were fed into Pacific Telephone & Telegraph.

The costs of transmission to various points throughout the world varied considerably, depending on quality, feedback arrangements, etc. For example, speech quality transmission to Europe from Squaw Valley to the New York terminal point was about \$305 for the first hour and \$245 thereafter. From New York to most European countries by line cost \$240 an hour and \$47 an hour by short-wave.

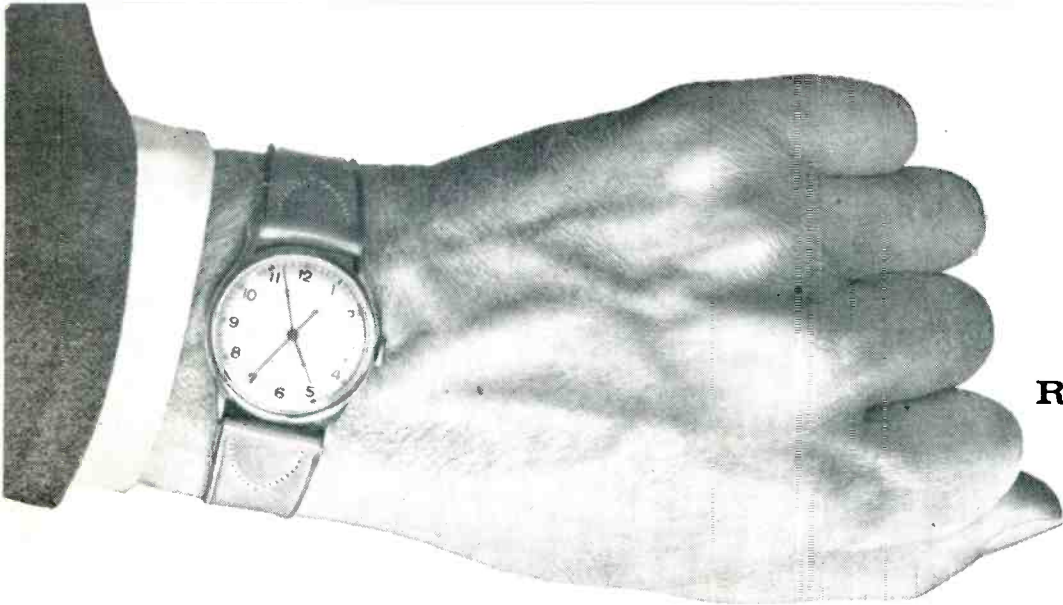
The equipment used by the foreign broadcasters was furnished free of charge by Collins Radio Co., the Ampex Corp. and Stancil-Hoffman Corp. Each of the equipments selected by the Olympic Committee, according to Reeves, was on the basis of its proven quality and reliability. “I think this operation tested all the equipment about as severely as possible,” Reeves said.

“The minor difficulties experienced with a few broadcast equipments were not unexpected, especially with the temperature dipping far below those at which the units had been designed to operate,” Reeves said, “but we were able to work around this problem without much difficulty. We had just exactly the right amount of equipment on hand and on several occasions every single item was in use as well as every member of the technical staff.”

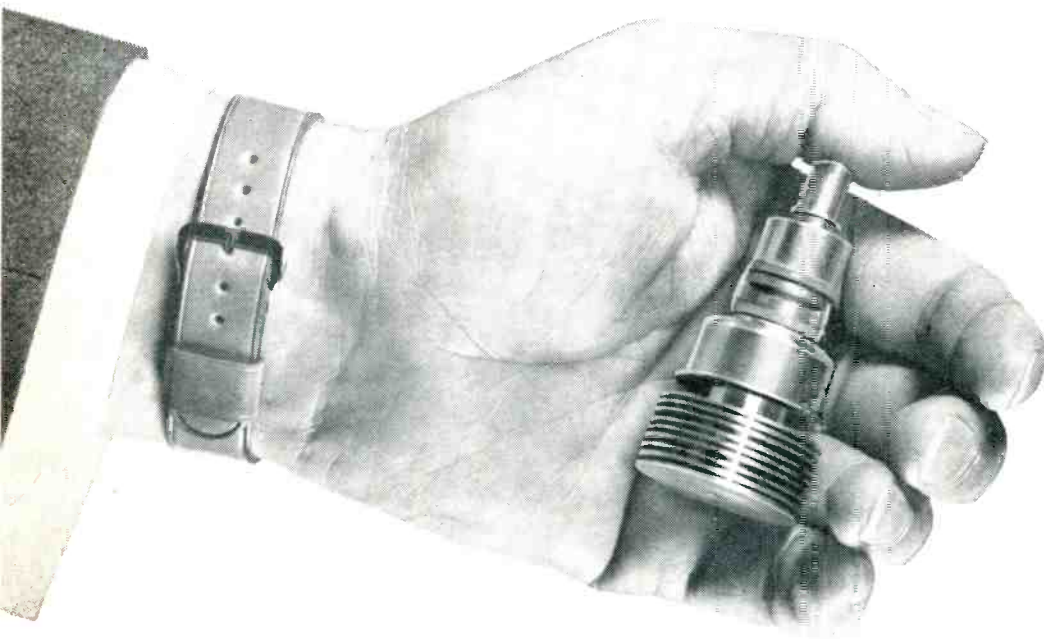
The microphones and remote amplifiers used by the foreign broadcasters were supplied by Collins, and the Ampex Corp. furnished recorders and magnetic tapes. Portable “Minitape” transistorized recorders were provided by the Stancil-Hoffman Corp.

Collins of Cedar Rapids, Iowa, provided 30 of their typewriter-sized 212Z-1 Remote Amplifiers. The four-channel amplifiers, weighing 22 pounds, were operated on either batteries or ac. A total of 141 of Collins new line of microphones were used by the foreign broadcasters. The re-

*(Continued on page 37)*



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## New Trends

Starts on page 10

turers provide multiplex exciters where desired.

In addition to transmitters, multiplex receivers were shown by Continental Mfg. Co. of Omaha and Browning Laboratories. FM Relay receivers were shown by Continental Mfg. & Electronic Applications, Inc.

As in previous years many new developments in television were shown. The art of television recording on magnetic tape continued to progress and a number of significant improvements were demonstrated. Ampex displayed its inter-sync, inter-switch, new modulator, and a new compact vertical model. The Inter-Sync feature enables several recorders to be locked together and synchronized with the output of live studio cameras, film chains, slide projectors or any other TV signal source. The pictures from these sources can be produced into a composite tape with lap dissolves, wipes, split screen effects, mattes, superimpositions and other kinds of special effects. The television recorder can be synchronized to station sync, permitting the station to cut, wipe or lap-dissolve from a program into local tape without picture roll. The synchronizer accessory is a rack mounting chassis which directly replaces the drum servo and capstan signal generator of any Ampex recorder. It locks the recorder to an external sync source with sufficient precision to permit integration of the recorder's output into normal studio programming.

The Interswitch development permits a single recorder to record and play back monochrome television signals on any of the world's four television standards which are the 405-line, 25-frame standard used in the United Kingdom and Ireland, the 525-line, 30-frame standard of North America, most of Latin America, Japan, and some other countries, the 625-line, 25-frame standard of Australia and most of Europe, and the 819-line, 25-frame standard of France.

Switching between line standards is accomplished by removing one set of modules from the front of five chassis and plugging in the appropriate set for the standard desired. Through the change in circuitry the circuits governing video recording

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head speed, capstan motor speed and video processing of TV signals are adjusted to meet the operating requirements of that TV line standard on which a recording is to be made. The feature may be ordered as a kit for field installation or may be specified for factory installation on a new recorder.

The new modulator and demodulator incorporates the newly proposed Ampex Master Video Equalization curve which adds 6 db of signal-to-noise ratio and an improvement in frequency and transient re-

sponse. Other improvements are also incorporated in the new modulator/demodulator. Ampex also supplies a new Delay Equalizer to vary the quadrature alignment of the video head assembly. The new compact VR-1001A Ampex recorder includes all of the features of the console model. It occupies 11 sq. ft. of floor space and can be operated from a sitting position.

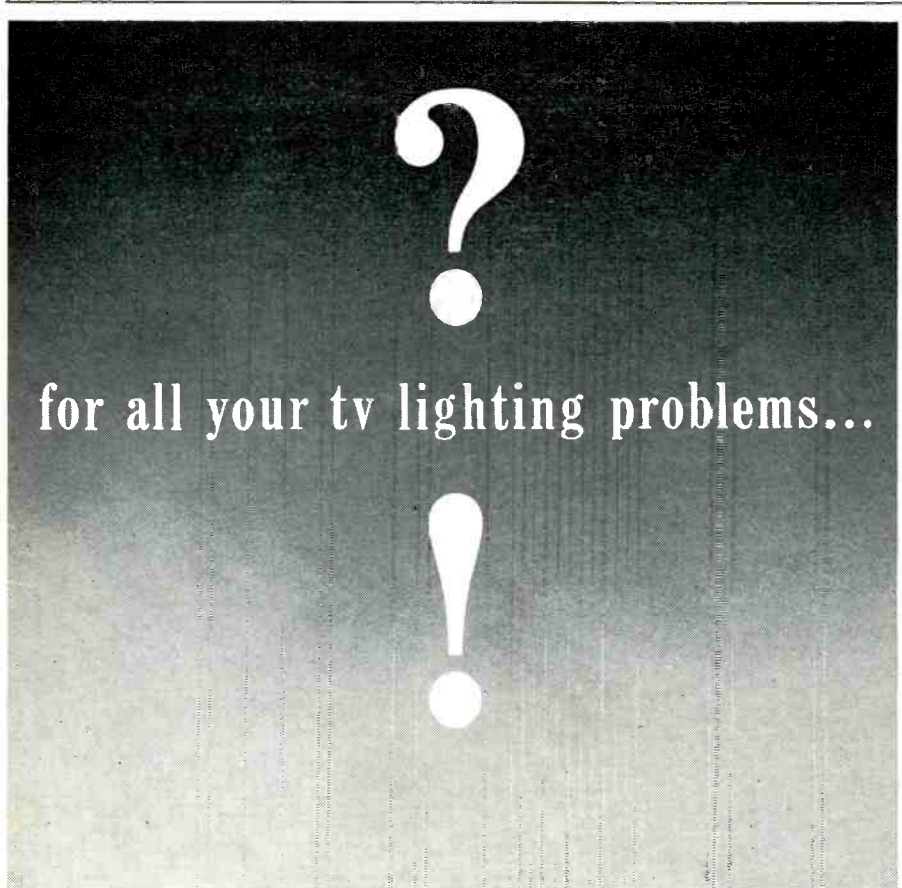
RCA has announced a frame-lock module which locks the tape signal to other video sources enabling switching, dissolves and special cut-

in effects without roll-over. Electronic editing can be accomplished by feeding two or more tape signals through a standard TV switcher into a master tape recorder. The RCA recorder has been equipped with air-bearing head wheel motors. A thin layer of air under pressure replaces the head wheel motor ball bearings. The metal guides for the tape also employ the air cushion principle. RCA also uses the electronic quadrature adjustment system to permit exact alignment with tapes recorded on other machines.

Several aids for mechanically editing video tape by splicing were introduced at this year's convention. Two problems are faced in splicing television tape. One is correctly identifying the exact frame where it is desired to make the splice and the other is precisely aligning the editing pulses on the two tapes to be spliced. Current practice is to locate the approximate frame by playing the tape and stopping it at the desired point. Since one inch of tape equals two frames or four fields it is difficult to determine which editing pulse identifies a particular field because of the tape travel after stopping the recorder. A solution to this problem is provided by the Video-Chek Multi-Frame device introduced by Conrac, Inc., and developed in cooperation with Ampex. This device uses a video storage tube to retain four frames spaced either four, eight, or 16 frames apart. The pictures can be read out and displayed on a monitor or aired if desired either singly or collectively as four quarter sized pictures.

Ampex has developed a modification for its video tape recorder that marks the exact frame on the tape which is stored by the Video-Chek device. The device can also be used in production to display stills of spectacular moments in sporting or special events.

Identifying of the editing pulse for splicing purposes is usually done by applying a metallic solution to the control track which causes the pulses to be visible due to the arrangement of the iron particles caused by the magnetic field of the pulses. A new method introduced by Telescript-CPS, Inc., identifies the pulse by displaying it on an oscilloscope tube when the tape is correctly positioned in the tape splicer. This is done by

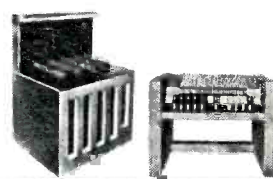


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means of a vibrating magnetic head which picks up the signal from the tape. This method simplifies the finding of the editing pulse by eliminating the use of solutions and microscope.

The need for a higher quality picture signal for TV master tapes which will allow tape copies that do not lose live quality has brought about the popularity of the 4½-inch image orthicon camera. By increasing the area of the target scanned by the electron beam an improvement in picture quality is obtained similarly to using a larger negative size in photography. The target in the 4½-inch tube provides a 50 per cent larger target for the electron beam. The same size lenses can be used for both the 3-inch and 4½-inch tube because the photo-cathode is the same size in both tubes. The 4½-inch tube uses electron magnification to increase the size of the image on the target. Increased resolution, improved signal-to-noise ratio, and a minimizing of overshoots and halos are the features offered by use of the larger image orthicon tube. Three companies are offering cameras with the 4½-inch tube. RCA introduced its new TK-12 camera which also incorporates additional features of stability and simplicity of operation. Ampex is marketing the Marconi Mark IV camera and Telechrome Mfg. Corp. has introduced the E.M.I. Model 203 4½-inch image orthicon camera to the U. S. market. Telechrome has announced that it will be responsible for the installation, planning, supply and servicing of the equipment throughout the U. S. The E.M.I. 203 camera can use either a 3-inch or 4½-inch tube and permits change of I. O. tubes through the turret without opening the camera sides. With plug in connectors the camera will operate on 625, 525, or 405 lines.

Telechrome also showed the E.M.I. 204 color camera using three vidicon tubes. General Electric Co. showed its new color camera which featured printed circuits and transistors to reduce its size and weight. Improvements demonstrated are an optical system which reduces shading, eliminates astigmatism and spherical aberration, transistorized preamps, simplified maintenance by swing out chassis and plug-in assemblies, and a single lightweight cable.

Dage Television Division displayed a portable back pack television unit with many unique features. The pack unit which weighs only 14 lb. contains a full EIA sync generator, 2000 megacycle transmitter, antenna and batteries. The camera has a three lens turret and uses a vidicon tube. The unit is entirely transistorized except for the transmitter klystron and vidicon tube.

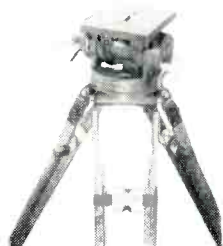
Another unique item displayed was a peak indicating volume indicator which is popular in Europe and offers more information on program

levels than can be obtained by the standard VU meter. The meter, displayed by Electronic Applications, indicates a wide dynamic range with extreme accuracy. Fast build up to indicate peaks and variable return time enables the meter to give a true level indication of non-sinusoidal program material. The meter consists of a light beam indicator and plug-in amplifier.

Other developments of this year's convention will be covered in detail in future issues of BROADCAST ENGINEERING.

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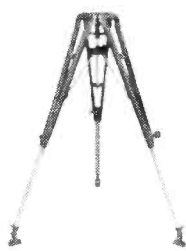


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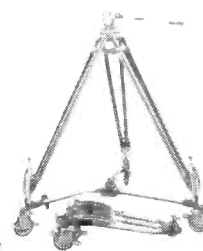
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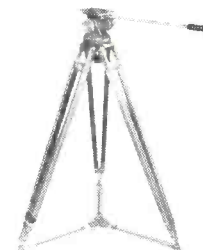
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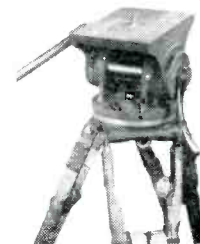


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# It Shouldn't Happen to a Dog

By PROFESSOR OSCAR VON DER SNIKRAH

The Professor describes a useful device which is guaranteed to discourage forgetful borrowers.

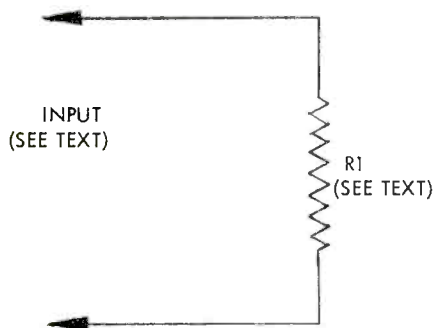


Fig. 1 — Refer to chart Fig. 3 for values.

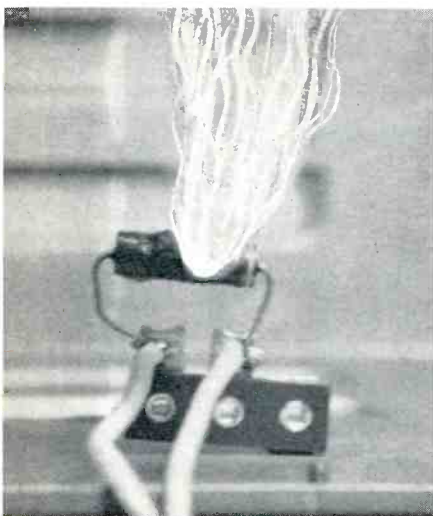


Fig. 2 — The "LITTLE PROFESSOR" is shown in action. The MARK I coated with finger nail polish produces above action for several minutes, then lingers for days and days.

How many times have you wished for a way to stop those pests that come around and want their radio or TV set repaired for free?

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To alleviate these conditions and many others that will suggest themselves to the always resourceful station engineer, our laboratory has spent several months of secret research that has now culminated in the final development of a device that is not only foolproof but has survived the most rigorous of field tests under all kinds of actual environment.

Although it is beyond the scope of this paper to discuss the mathematical analysis of the circuit parameters shown in Figure 1, a complete discussion may be found on page 2371 of Terman and in the 1927 edition of the ARRL handbook.

We are deeply indebted also to Ohms Law for making the whole thing a reality.

The device we have developed has been named the "Little Professor" by my co-workers. A prototype is shown in Figure 2 representing the professional method of application. Haywire procedures also work, but should not be used on the Mark IV or Mark IVa model since it is not our desire to start a fire.

Referring to Figure 1, the input is connected across the 117 volt AC line that enters the device that is being "rigged." It may either be installed before or after the AC switch depending on whether action is desired before or after the device is turned on.

At any rate, soon after application of the prescribed voltage to the input of the circuit, some sort of action can be expected depending upon the model chosen for the particular application.

As usual, good engineering is required in choosing the proper model to fit the desired end results.

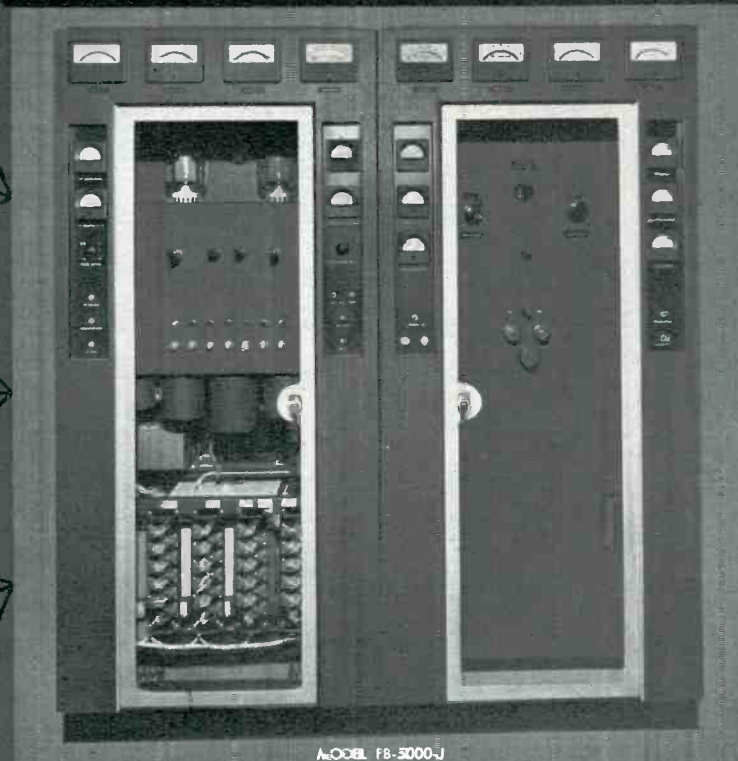
For example, the Mark I "Little Professor" will give relatively slow but lingering results that will produce days of doubt and frustration

(Continued on page 36)

TYPE	R 1	EFFECT	SUGGESTED APPLICATION
MARK I	4700 Ω 1 watt	Slow, Subtle Long lasting	Long range irritation
MARK II	4700 Ω 1/2 watt	Medium slow to suggest equipment failure	Early return of borrowed equip.
MARK III	3100 Ω 1/2 watt	Medium fast with trace of smoke	Guaranteed to produce action
MARK IV	2700 Ω 1/2 watt	Equivalent to a burn out	Run for the panic button
MARK IVa	1000 Ω 1 watt	Exploding effect with flames and purple smoke	! ! ! ! ! ! !

Fig. 3 — Using above values, a unit may be engineered for any application.

# BAUER 5000 WATT AM TRANSMITTER



## NEW DIMENSIONS IN BROADCASTING EQUIPMENT

This newest Bauer 5000 watt AM transmitter utilizes conservative design of all circuits and today's most advanced components to provide you with top performance plus minimum maintenance through operation of all components well below rating. The final RF tube, for example, is a ceramic tetrode (Eimac 4cx5000A) that provides a maximum dissipation capability twice that of conventional transmitter design. At the same time power consumption has been reduced several kilowatts. Bauer's advanced design has also reduced the tube complement by 50% and provided easy accessibility to all components. These are just a few of the many advanced features available as standard equipment, when you specify the Bauer Model FB-5000-J. Complete detailed specifications available upon request.

#### Standard Features

Vacuum Capacitors	100% Silicon Diode Rectifiers
Automatic Filament Regulation	Automatic Protective System
Built-In Remote Control	One Knob Tuning

# **Bauer**

ELECTRONICS CORPORATION  
1011 INDUSTRIAL WAY, BURLINGAME, CALIFORNIA • DIAMOND 2-5080

"DESIGNERS AND MANUFACTURERS OF AM TRANSMITTING EQUIPMENT FOR OVER 25 YEARS"

# FM TRANSMITTER MEASUREMENTS

Techniques are described for determining the deviation of an FM carrier in order to calibrate the station monitor.

By DWIGHT "RED" HARKINS\*

ONE of the unique features of frequency modulation is the fact that the carrier energy is distributed into a multitude of side carriers whenever modulation is applied. Under certain conditions all of the carrier energy is displaced and the carrier is completely absent.

When the modulation consists of a single sine wave tone, the amount of modulation or deviation can be mathematically predetermined for the various carrier "null" outs.

It is beyond the scope of this article to present the complex mathematical analysis of this fundamental behaviour of FM waves; however, it is related to the Bessel function of zero order times the modulation index.

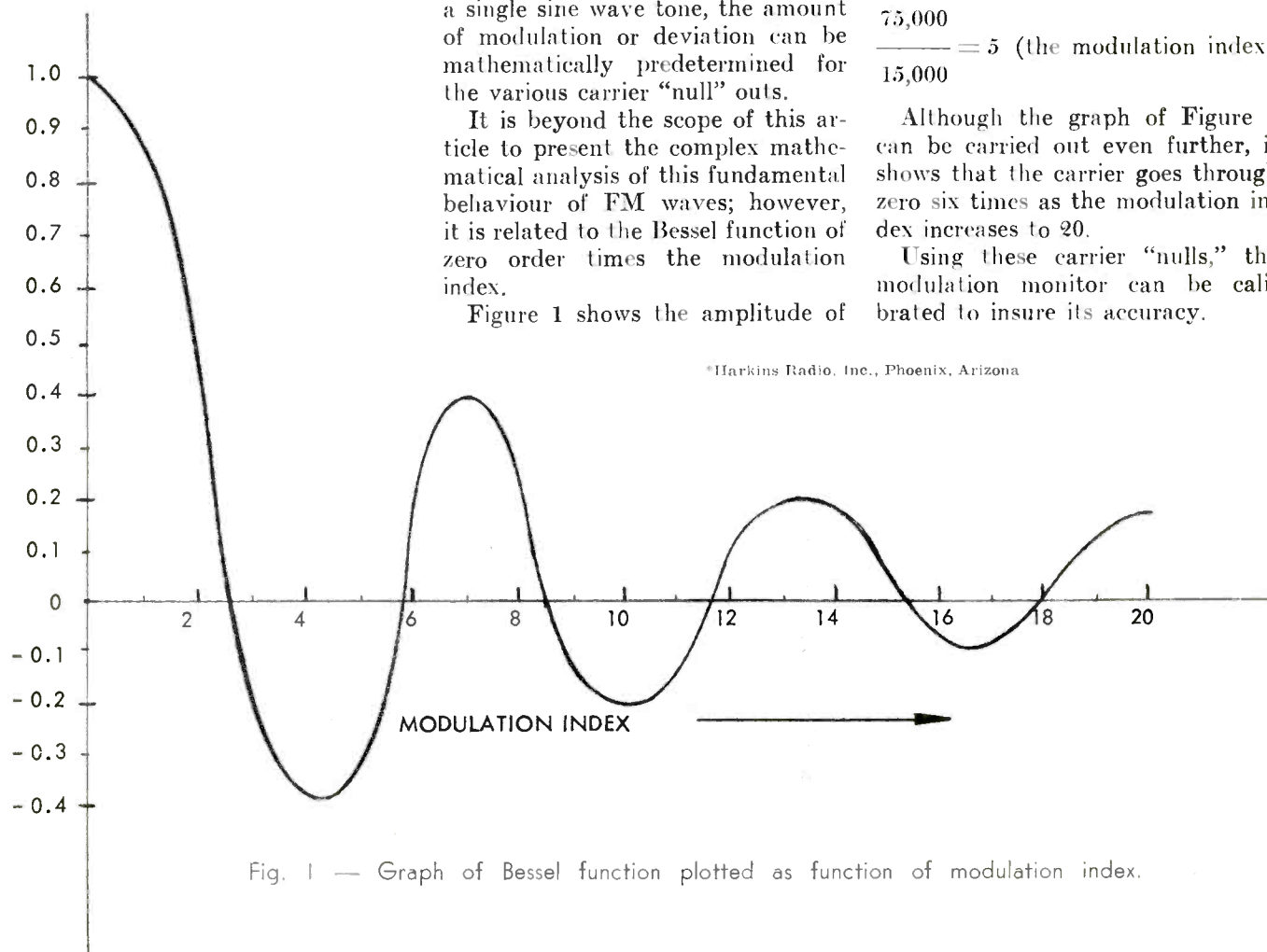
Figure 1 shows the amplitude of

the carrier as related to the modulation index. It will be remembered the modulation index is determined by dividing the amount of deviation (to either side of the carrier) by the modulating tone. For example, a 15,000 cps tone deviating the carrier plus or minus 75 Kc. or 100 per cent would be:

$$\frac{75,000}{15,000} = 5 \text{ (the modulation index)}$$

Although the graph of Figure 1 can be carried out even further, it shows that the carrier goes through zero six times as the modulation index increases to 20.

Using these carrier "nulls," the modulation monitor can be calibrated to insure its accuracy.



\*Harkins Radio, Inc., Phoenix, Arizona

Fig. 1 — Graph of Bessel function plotted as function of modulation index.



# STRAIGHT TALK

to

## BROADCAST ENGINEERS

### QUALITY RADIO TRANSMISSION BEGINS AT THE TRANSMITTER

By **DON JENKINS**  
*Final Test Foreman*  
Collins Radio Company

When you install a Collins Broadcast Transmitter, you get double proof of performance, assuring you of the most thoroughly tested transmitter available. In addition to the *audio* proof of performance, Collins transmitters are accompanied by a *written* proof of performance, too.

Every Collins transmitter is completely checked at the individual customer's frequency and with his particular antenna impedance requirements. A copy of the data recorded during these tests is shipped with each transmitter. These are not typical data but actual measurements that can be duplicated by the customer and thus may be used for operation checks and field servicing of the equipment.

Collins transmitters are operated at power outputs ten per cent above their ratings to allow for losses in lines and matching networks. Efficiencies are computed with the transmitter meters which have been checked against secondary standards to assure an accuracy of two per cent or better. Audio frequency response and distortion measurements are taken for both high and low power levels. Voltage and current readings for all tubes are recorded as indicated by the transmitter meters, or otherwise they are measured at the tube pins. Other information recorded includes input levels required for 100 per cent modulation for

both low and high power and ac power input requirements for various operating conditions. Tuning data which specify coil turns and dial readings are also part of the performance data. Each transmitter is programmed into a dummy load for eight hours at a high level of modulation as a means of eliminating early failure components and further assuring reliability in the field.

After successful completion of the testing, the heavy components such as plate and modulation transformers and filter reactors are removed, and the wires and associated terminals are coded. The transmitter is routed to the paint shop for a touch-up if necessary, and it is then sent for a final, check-off inspection to guarantee delivery of a complete, reliable unit.

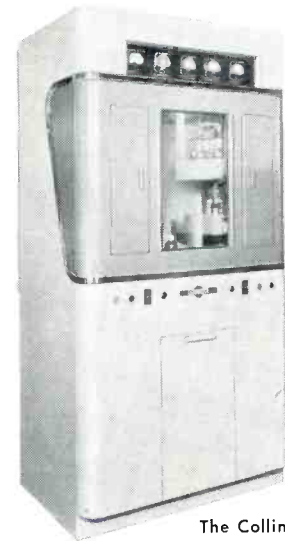
Interest in the transmitter does not end with its shipment. A competent staff of Collins field engineers and twenty-four hour availability of service parts stand behind delivery to insure continued performance.

Station managers, engineers and operating personnel are always welcome to visit the Collins test facilities. Here, you may witness the actual tests being made on your equipment and obtain firsthand operating instructions.

When you buy a Collins transmitter you are assured of a quality transmitter — *completely* tested and ready for installation.

Quality radio transmission begins at the transmitter — a Collins 300J-2 250/100 watt; 550A-1 500/250 watt; 20V-2 1,000/500 watt; and 21E/M 5,000/10,000 watt.

Write Collins Radio Company, Broadcast Sales, Cedar Rapids, Iowa, for information and specifications on a Collins quality transmitter in your radio station.



The Collins 300J-2,  
550A-1, 20V-2 Transmitter



COLLINS RADIO COMPANY • CEDAR RAPIDS, IOWA • DALLAS, TEXAS • BURBANK, CALIFORNIA

Six ounces of beauty  
in styling and musical quality.  
AKG's D 19 B wide-range dynamic  
microphone gets the best out of the  
better grade of tape recorders.  
Excellent sensitivity and cardioid  
discrimination; bass-cut switch;  
200 Ohms and high impedance.  
A product of Vienna, where they  
know the true sound of music!  
Imported and serviced in USA by  
Electronic Applications, Inc.  
Stamford, Connecticut.



# AMENDMENTS AND PROPOSED CHANGES OF F.C.C. REGULATIONS

## PART 17 — CONSTRUCTION, MARKING, AND LIGHTING OF ANTENNA STRUC- TURES

### Miscellaneous Amendments

The Commission having under consid-  
eration the amendment of Part 17—  
Construction, Marking and Lighting of  
Antenna Structures, of its rules to effect  
editorial changes arising from the trans-  
fer of the functions of the Civil Aero-  
nautics Administration to the Federal  
Aviation Agency; and to clarify sections  
concerning painting and lighting speci-  
fications; and

It appearing that for the above-men-  
tioned reasons, the public interest would  
be served by amending Part 17 of the  
Commission's rules in the manner herein  
ordered; and

It further appearing that the amend-  
ments adopted herein are editorial in  
nature; therefore, prior publication of  
notice of proposed rule making under  
the provisions of section 4 (a) of the Ad-  
ministrative Procedure Act is unneces-  
sary; and

It further appearing that since the  
amendments herein ordered adopted in-  
volve no substantive change in the Com-  
missions' rules such amendments may be  
made effective less than 30 days after  
publication, as provided in section 4 (c)  
of the Administrative Procedure Act; and

It further appearing that the amend-  
ments herein are issued pursuant to the  
authority contained in sections 4 (i),  
5 (d) (1) and 303 (r) of the Communi-  
cations Act of 1934, as amended, and  
section 0.341 (a) of the Commission's  
Statement of Organization, Delegation  
of Authority and other information.

It is ordered, This 24th day of Febru-  
ary 1960 that effective February 24,  
1960, Part 17—Construction, Marking  
and Lighting of Antenna Structures, is  
amended, as set forth below.

Part 17 is amended as follows:

1. Section 17.1 (b) is amended to read  
as follows:

### § 17.1 Basis and purpose.

(b) The purpose of the rules in this  
part is to prescribe certain procedures  
and standards with respect to the Com-  
mission's consideration of proposed an-  
tenna structures which will serve as a  
guide to persons intending to apply for  
radio station licenses. The standards  
were worked out in conjunction with the  
Civil Aeronautics Administration (now  
the Federal Aviation Agency), the De-

partment of Defense and other Govern-  
ment agencies.

2. In § 17.2, paragraphs (e), (h), (j),  
and (m) are amended, footnote 1 to  
paragraph (1) is deleted and a note to  
the paragraph is substituted therefore,  
as follows:

### § 17.2 Definitions.

(e) *Designated air traffic control  
areas.* Areas established and designated  
by the Administrator of the Federal  
Aviation Agency for air traffic control  
purposes. Information concerning the  
location of these areas can be obtained  
from Federal Aviation Agency publica-  
tions and by contacting the FAA re-  
gional offices.

(h) *Civil airways.* A system of aerial  
routes designated by the Administrator  
of the Federal Aviation Agency for Air  
Navigation and Traffic Control pur-  
poses. Information concerning the loca-  
tion of civil airways can be obtained  
from aeronautical charts, FAA publica-  
tions, and by contacting the FAA re-  
gional offices.

(j) *Horizontal surface.* The horizontal  
surface is an imaginary plane through  
the airspace, circular in shape, with its  
height 150 feet above the established  
airport elevation and having a radius  
from the airport reference point as indi-  
cated in the following table:

	<i>Feet</i>
Intercontinental express airports and Department of Defense air bases .....	13,000
Intercontinental airport .....	11,500
Continental airports .....	10,000
Express airports .....	8,500
Trunk line airports.....	7,000
Feeder airports .....	6,000
All smaller airports.....	5,000

The category of every airport in ac-  
cordance with the above classification is  
designated by the Administrator of the  
Federal Aviation Agency.

(1) \* \* \*

NOTE: Consideration to aeronautical  
facilities not in existence at the time of  
the filing of the application for radio  
facilities will be given only when pro-  
posed airport construction or improve-  
ment plans are on file with the Federal  
Aviation Agency as of the filing date of  
the application for such radio facilities.

(m) *Minimum flight altitude.* Mini-

imum altitudes designated by the Administrator of the Federal Aviation Agency to provide aircraft a safe clearance of all obstructions within the area designated. The necessary information concerning the locations of these areas and the established minimum flight altitude can be obtained from the FAA publications and by contacting the FAA regional offices.

3. Delete footnote and footnote designator 2, § 17.12 (c) and add a note to the text immediately following Section 17.12 (c) to read as follows:

**§ 17.12 Antenna structures over 170 feet up to and including 500 feet in height.**

(c) \* \* \*

NOTE: See note to § 17.2 (1).

4. Section 17.23 is amended to read as follows:

**§ 17.23 Specifications for the painting of antenna structures in accordance with § 17.21.**

Antenna structures shall be painted throughout their height with alternate bands of aviation surface orange and white, terminating with aviation surface orange bands at both top and bottom. The width of the bands should be equal and approximately one-seventh the height of the structure, provided however, that the bands shall not be more than 40 feet nor less than 1½ feet in width.

**§§ 17.27-17.33 [Amendment]**

5. That portion of §§ 17.27 (a) (3), 17.28 (a) (3), 17.29 (a) (3), 17.30 (a) (3), 17.31 (a) (3), 17.32 (a) (3), 17.33 (a) (3) which reads "100- or 111-watt lamp (#100 A21/TS or #111 A21/TS, respectively)" is amended to read as follows: "100-, 107-, 111-, or 116-watt lamp (#100 A21/TS, #107 A21/TS, #111 A21/TS or #116 A21/TS, respectively)."

**§§ 17.24-17.26, 17.36 [Amendment]**

6. That portion of §§ 17.24 (a) (1), 17.25 (a) (2), 17.26 (a) (2), 17.36 which reads "100-, or 111-watt lamps (#100 A21/TS or #111 A21/TS, respectively)" is amended to read as follows: "100-, 107-, 111-, or 116-watt lamps (#100 A21/TS, #107 A21/TS, #111 A21/TS or #116 A21/TS, respectively)."

7. Section 17.37 (b) is amended to read as follows:

\* \* \* \* \*

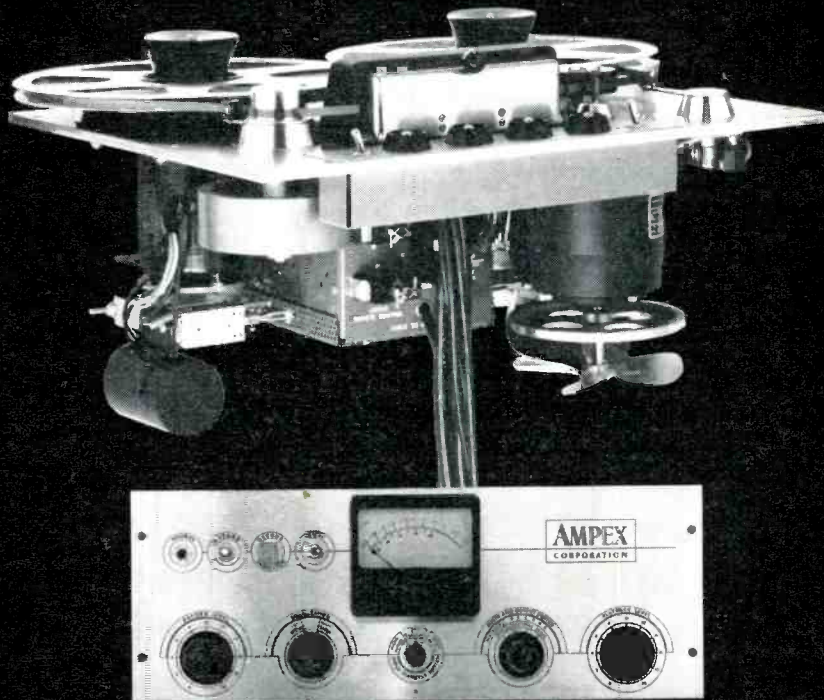
**§ 17.37 Inspection of tower lights and associated control equipment.**

(b) Shall report immediately by telephone or telegraph to the nearest Air Traffic Communication Station or office of the Federal Aviation Agency any observed or otherwise known failure of a code or rotating beacon light or top light not corrected within thirty minutes, regardless of the cause of such failure. Further notification by telephone or telegraph shall be given immediately upon resumption of the required illumination.

April, 1960

# AMPEX 351

## STEREOPHONIC / MONOPHONIC



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Consistently high performance and virtually trouble-free operation of the Ampex 351 have established it as the first choice of not only broadcasters, but educators, professional recording studios, research laboratories, religious and business organizations.

Actual case histories document the fact that Ampex, on a cost-per-operating-hour basis, is the most economical recorder made. Write for new comprehensive catalog 2033.



*Ampex will be at NAB, Chicago, April 3 to 6, 1960, Exhibit No. 32*



AUDIO PRODUCTS DIVISION  
AMPEX PROFESSIONAL PRODUCTS COMPANY

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8. Section 17.38(c) (4) and (5) is amended to read as follows:

**§ 17.38 Recording of tower light inspections in the station record.**

\* \* \* \* \*

(c) \* \* \*

(4) Identification of Air Traffic Communication Station (Federal Aviation Agency) notified of the failure of any code or rotating beacon light or top light

not corrected within thirty minutes, and the date and time such notice was given.

(5) Date and time notice was given to the Air Traffic Communication Station (Federal Aviation Agency) that the required illumination was resumed.

9. The table in § 17.42 is amended to read as follows:

**§ 17.42 Lighting equipment.**

\* \* \* \* \*

Outside white.....	Federal Specifications.....	TF-P-102 <sup>1</sup>
Aviation surface orange.....	do.....	TF-P-591 <sup>3</sup> (Color #12197 of Federal Standard 595)
Aviation surface orange, enamel.....	do.....	TF-P-489 <sup>1</sup> (Color #12197 of Federal Standard 595)
Code beacon.....	FAA Specifications.....	446 (Sec. II-d-Style 4) <sup>1</sup>
Obstruction light globe, prismatic.....	Army-Navy Drawing.....	} AN-L-10A <sup>2</sup> or FAA Specification L-310 <sup>5</sup>
Obstruction light globe, fresnel.....	do.....	
Single multiple obstruction light fitting assembly.....	do.....	
Obstruction light fitting assembly.....	do.....	
100-watt lamp.....	.....	No. 100 A21/TS <sup>6</sup>
107-watt lamp.....	.....	No. 107 A21/TS (3,000 hours)
111-watt lamp.....	.....	No. 111 A21/TS ((3,000 hours)
116-watt lamp.....	.....	No. 116 A21/TS (6,000 hours)
500-watt lamp.....	.....	No. 500 PS 40/45 <sup>6</sup>
620-watt lamp.....	.....	No. 620 PS 40/45 (3,000 hours)

<sup>1</sup>Copies of this specification can be obtained from the Business Service Center, General Services Administration, 7th and D Streets, S.W., Washington 25, D. C. (Outside white, 10 cents; Aviation surface orange, paint 5 cents, enamel 15 cents).

<sup>2</sup>Copies of Army-Navy Specifications or drawings can be obtained by contacting Commanding General, Air Materiel Command, Wright Field, Dayton, Ohio, or the Bureau of Aeronautics, Navy Department, Washington 25, D. C. Information concerning Army-Navy Specifications or drawings can also be obtained from the Bureau of Facilities of Materiel, Airports Division, Federal Aviation Agency, Washington 25, D. C.

<sup>3</sup>At the Air Routes and Ground Aids Division Meeting of the International Civil Aviation Organization during November 1949, the designation "Aviation Surface Orange" was adopted to replace "International Orange."

<sup>4</sup>Copies of this specification can be obtained from the Airspace Utilization Division, Federal Aviation Agency, Washington 25, D. C.

<sup>5</sup>Copies of this specification can be obtained from the Bureau of Facilities of Materiel, Airports Division, Federal Aviation Agency, Washington 25, D. C.

<sup>6</sup>It is strongly recommended that the 116-watt, 6,000 hour lamp and 620-watt, 3,000 hour lamp be used instead of the 100-watt and the 500-watt lamps whenever possible in view of the extended life, lower maintenance cost, and greater safety which they provide.

**RADIO BROADCAST SERVICES**

**Extension of Time for Filing Comments**

In the matter of amendment of §§ 3.119, 3.289, 3.654 and 3.789 of the Commission's rules.

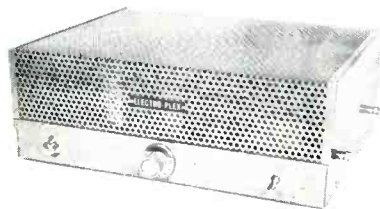
At a session of the Federal Communications Commission held at its offices in Washington, D. C., on the 29th day of February, 1960;

The Commission having before it for consideration (1) its Notice of Proposed Rule Making in the above-captioned matter released on February 8, 1960, providing for the filing of comments with respect to its proposals on or before March 1, 1960; and (2) a "Request for Extension of Time Within Which to File Comments" filed on February 26, 1960, by the National Association of Broadcasters; and

It appearing that the National Association of Broadcasters requests an extension of time for the filing of said comments to March 22, 1960, and for filing of reply comments to March 31, 1960; and that it is alleged, among other things, that such extension will enable petitioner and "other interested parties to devote further time to an evaluation of the possible wide ramifications present in the proposed language" of the above-captioned amendment; and

It further appearing that the grant of the requested extension will serve

# BACKGROUND MUSIC RECEIVERS . . . FOR THOSE IN MULTIPLEXING



The Q-75 multiplex receiver employs 17 tubes, de luxe features. High sensitivity, 10 watts output. May also be used in Simplex operations with selective muting.

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### ELECTRO-PLEX HAS THE THREE IMPORTANT INGREDIENTS TO MAKE YOUR BACKGROUND MUSIC BUSINESS A SUCCESS:

**EXPERIENCE . . .** Electro-Plex personnel has over 10 years experience in background music work—were in on the initial designs of simplex receivers when FM radio was first used for this application back in 1948.

**EQUIPMENT . . . .** Currently available Electro-Plex equipment represents the latest in multiplex circuitry — the most modern approach — designed by engineering personnel with over 20 years experience in F.M.

**POLICY . . . . .** An important element at Electro-Plex. Our policy embodies a deep, personal interest in our customers and a desire to help them with their engineering and operational problem wherever possible.

**ELECTRO-PLEX Division  
NUCLEAR ELECTRONICS CORPORATION**

2925 N. Broad St.

Philadelphia 32, Pa.



the public interest, convenience and necessity;

*It is ordered,* That time within which comments may be filed in the above-captioned proceeding is extended to March 22, 1960, and that the time for filing reply comments is extended to March 31, 1960.

**LICENSE PERIODS FOR CERTAIN BROADCAST STATIONS**

**Notice of Proposed Rule Making**

1. Notice is hereby given of proposed rule making in the above-entitled matter.

2. The Commission has under consideration the above-enumerated provisions of its rules. Although relating to different broadcast services, these rules are identical in substance. The Standard Broadcast Rule provides, in pertinent part, as follows:

All standard broadcast licenses will be issued for a normal license period of three years. Licenses will be issued to expire at the hour of 3:00 a.m., e.s.t., in accordance with the following schedule and at three years thereafter.

3. As here applicable, section 307 (d) of the Communications Act of 1934, as amended (47 U.S.C. sec. 307(d)), provides:

No license granted for the operation of a broadcasting station shall be for a longer term than three years. \* \* \* Upon the expiration of any license, upon application therefor, a renewal of such license may be granted from time to time for a term of not to exceed three years in the case of broadcasting licenses, \* \* \* if the Commission finds that public interest, convenience, and necessity would be served thereby.

4. The above provisions of the rules provide for a three-year term for initial licenses and subsequent renewals of three years each. In order to conform these implementing rules to the statute and to make clear that the Commission may, in appropriate circumstances, issue an initial license or a renewal of license for a lesser term, it is proposed to amend these rules in the manner set forth below.

5. Authority for the adoption of the proposed amendments is contained in sections 4 (i), 303 (r), 307 (d), 308 (a), and 309 (a) and (d) of the Communications Act of 1934, as amended.

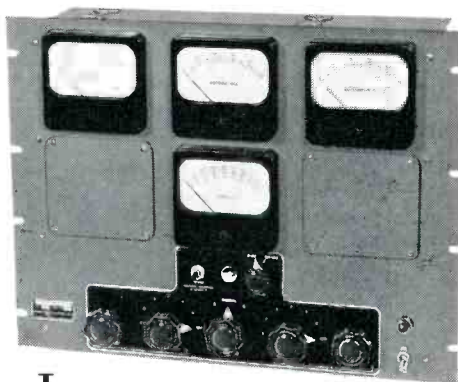
6. Any interested party who is of the view that the proposed amendment should not be adopted, or should not be adopted in the form set forth herein, may file with the Commission on or before April 1, 1960, a written statement setting forth his comments. Comments supporting the proposed amendment may also be filed on or before the same date. Comments in reply to original comments may be filed within 10 days from the last day for reply to original

\*  
**NEMS-CLARKE**

**Phase Meter**

**MODEL 108-E**

\*



THE Model 108 Phase Meter is an instrument designed to provide an indication of the phase relations in directional antenna systems. Each instrument is tailored for the particular installation and usually incorporates provision for indicating the relative amplitudes of the currents in the various antennas, as well as the phase relation. The Model 108 Phase Meter has found its principal use in broadcast stations employing directional antennas, but its wide frequency range makes it readily adaptable for other applications.

The popularity of the Model 108 Phase Meter is proven by the vast number now in use.

**NEMS-CLARKE COMPANY**

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and see why **E-V** microphones meet exacting professional standards

Radio and television networks, recording studios, and independent stations from coast to coast have increased performance and lowered operating costs with the Electro-Voice Model 666 Dynamic Microphone. Superior front to back ratio due to exclusive Variable "D" cardioid design coupled with matchless manufacturing precision. The 666 insures increased discrimination against unwanted sound, greater working distance from the microphone to the artist and its light 11-ounce weight makes boom work easy. The only moving element . . . the famous E-V exclusive Acoustalloy diaphragm . . . improves response, reduces maintenance and overhead . . . is always reliable even under the most strenuous program operations. The Model 665 is similar in function to the Model 666 but designed for less critical applications. List \$150.00.

For Complete Information Write Dept. 40V.

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comments. The Commission will consider all comments filed hereunder prior to taking final action in this matter provided that, notwithstanding the provisions of § 1.213 of the rules, the Commission will not be limited solely to the comments filed in this proceeding.

7. In accordance with the provisions of § 1.54 of the rules, an original and 14 copies of all written comments shall be furnished the Commission.

1. Paragraph (a) of § 3.34 is amended to read as follows:

**§ 3.34 Normal license period.**

(a) Licenses for standard broadcast stations ordinarily will be issued for a period of three years and, when regularly renewed, at three year intervals thereafter; *Provided, however,* That, if the Commission finds that the public interest, convenience, and necessity will be served thereby, it may issue either an initial license or a renewal thereof for a lesser term. When regularly issued or renewed, licenses will be issued to expire at the hour of 3:00 a.m., e.s.t., in accordance with the following schedule, and at three year intervals thereafter.

2. Corresponding changes are made in the language of § 3.218 (a) relating to the license period for FM Broadcast Stations.

3. Corresponding changes are made in the language of § 3.518 (a) relating to

the license period for Noncommercial Educational FM Broadcast Stations.

4. Corresponding changes are made in the language of § 3.630 (a) relating to the license period for Television Broadcast Stations.

[F.R. Doc. 60-2127; Filed, Mar. 7, 1960; 8:49 a.m.]

**CONELRAD Authorizations**

At a session of the Federal Communications Commission held at its offices in Washington, D. C., on the 2nd day of March, 1960;

The Commission, having under consideration amendment of its Rules of Practice and Procedure to provide for CONELRAD authorizations which are issued from time to time under delegated authority contained in the Statement of Delegations; and

It appearing that CONELRAD authorizations to other than standard broadcast stations may be issued as provided by Commission rules; and

It further appearing that Executive Order 10312 provides that non-government radio stations may be silenced or required to be operated in a manner consistent with the needs of national security and defense; and

It further appearing that in connection with the CONELRAD program, it is necessary for the Commission to issue CONELRAD authorizations pursuant to

§ 2.407 of the Commission's rules and section 4 of Executive Order 10312; and

It further appearing that authority to issue certain CONELRAD authorizations is delegated to the Chief, Broadcast Bureau, upon concurrence of the Chief Engineer under the provisions of Order FCC 51-776; and

It further appearing that provision for issuing CONELRAD authorizations, and a statement of the conditions attached thereto, should be set forth in the Commission's procedural rules; and

It further appearing that the amendment adopted herein pertains to matters of procedure and hence that compliance with the public notice and procedural requirements of the Administrative Procedure Act is unnecessary; and

It further appearing that the amendments adopted herein are issued pursuant to authority contained in sections 1, 4 (i), and 303 (r) of the Communications Act of 1934, as amended, and section 4 of Executive Order 10312;


It is ordered, That, effective March 21, 1960, Part 1 of the Commission's rules is amended by the addition of a new § 1.68 as set forth below.

**§ 1.68 CONELRAD authorizations.**

(a) In connection with the program for the Control of Electromagnetic Radiation (CONELRAD), as provided for in Executive Order 10312, the Commis-

# FIRST TRULY VERTICAL SLIDE ATTENUATOR!


...only 2" deep



Daven's Series 825 and 835 are the first truly vertical slide attenuators... with finger-fitting knob that moves in a straight line with finger-tip pressure. The wiper arm rides on silver alloy contacts, not on the resistor element, providing noise-free operation and extremely long life.

<ul style="list-style-type: none"> <li>■ Silver alloy contacts, wiper arms</li> <li>■ Balanced and unbalanced ladders and T-type attenuators</li> <li>■ In 20 and 30 steps</li> <li>■ With or without "Cue" position</li> </ul>	<ul style="list-style-type: none"> <li>■ Complete protection against dirt and foreign objects</li> <li>■ Connector-type terminals on rear</li> <li>■ 1½" wide, 6" long, 2" deep</li> <li>■ Available singly, or with 2, 3, or 4 units side by side</li> </ul>
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

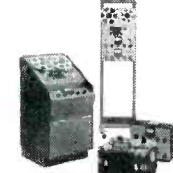
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1014 Wyandotte St. Kansas City 5, Mo.

sion issues CONELRAD authorizations which require stations to operate in a manner consistent with the needs of national security and defense.

(b) Standard broadcast CONELRAD authorizations shall permit, in addition to operation during a CONELRAD Radio Alert or a CONELRAD Drill, operation during the experimental period of the stations concerned as provided by § 3.10 of this chapter, and shall permit operation only on a CONELRAD frequency, with an effective radiated power not in excess of 10 kilowatts: *Provided*, That no interference shall be caused to other stations maintaining a regular operating schedule within the experimental period unless the licensees of such other stations have previously consented thereto: *And provided further*, That none of the transmissions made shall be identified.

(c) FM broadcast station CONELRAD authorizations shall permit such stations to operate with their licensed power and on their licensed frequency in the State Emergency Defense Network (FM) of the state in which the FM station is located, to provide a CONELRAD alerting capability, and to aid in the restoration of normal communication facilities after an emergency.

(d) Remote Pickup broadcast station CONELRAD authorizations shall permit

such stations to operate in a prescribed manner on their licensed frequency and with normal power in the State Remote Pickup Broadcast Intercommunication Network for intercommunication, cue and control, and program purposes during or after an emergency.

(e) Other CONELRAD authorizations which may be issued shall be on such terms as may be designated therein.

(f) All CONELRAD authorizations shall be for such periods of time as covered by the station license of the stations concerned, subject, however, to being changed or cancelled at an earlier date in the discretion of the Commission without the necessity of a hearing.

(g) Unless cancelled, CONELRAD renewal authorizations will be issued together with the station's renewal license. (Sec. 4, 48 Stat. 1066, as amended: 47 U.S.C. 154. Interprets or applies sec. 303, 48 Stat. 1082, as amended: 47 U.S.C. 303) [F.R. Doc. 60-2128; Filed, Mar. 7, 1960; 8:49 a.m.]

**INTERIM POLICY ON VHF TELEVISION CHANNEL ASSIGNMENTS  
Order Extending Time for Filing Comments**

In the matter of interim policy on VHF television channel assignments and amendment of Part 3 of the rules concerning television engineering standards, Docket No. 13340.

At a session of the Federal Communications Commission held at its offices in Washington, D. C., on the 30th day of March, 1960;

The Commission has before it for consideration a petition filed March 30, 1960, in this proceeding by the Association of Federal Communications Consulting Engineers requesting that the time for filing comments herein be extended for 60 days. That request has been supported in a statement filed by the Association of Maximum Service Telecasters, Inc.

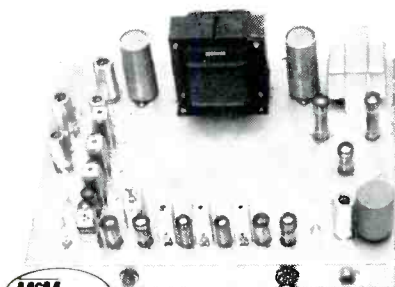
The petition states that additional time will be needed to study any new propagation curves which may be proposed. The Commission has reviewed the engineering curves proposed in this docket. It appears desirable to revise those curves and we expect to announce revised proposed curves not later than May 1, 1960. The petition therefore sets forth good cause for the requested extension of time and such extension would be in the public interest.

Accordingly, it is ordered, This 30th day of March, 1960, that the time for filing comments herein is extended to and including June 20, 1960, and the time for filing reply comments is extended to and including July 5, 1960.

Released: April 4, 1960.

Beautiful Signals

HANDLED with CARE



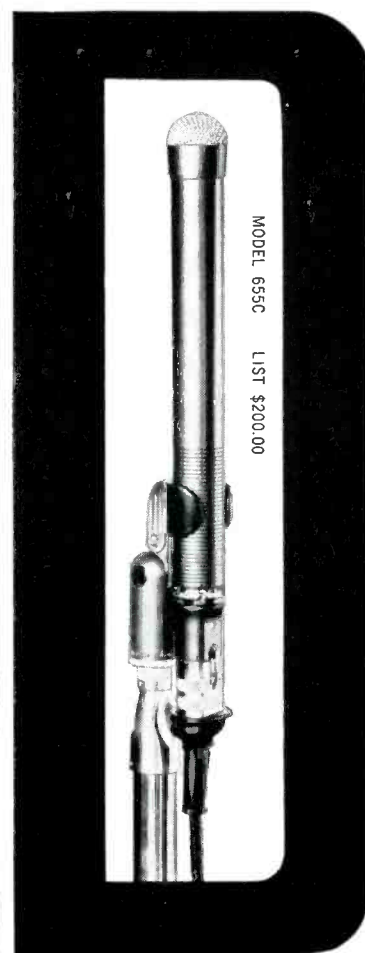
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Better sound sells FM on main carrier and subs. Better sales result with carefully engineered and reliable receiving equipment. At Continental rigid quality control and extreme manufacturing care guarantees you and your listeners the finest reception . . . whatever your requirements.

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MODEL 655C LIST \$200.00

the dependability only  microphones give you

Not long ago a 655C microphone fell from an eight story building and for two weeks lay snow-covered in a light-well. On recovery it was still operative, and required only factory cleaning. Such abuse, abnormal as it is, reflects E-V dependability, instills confidence in performers, and helps reduce station operating costs. The 655C has the capacity for natural, life-like reproduction with its exceptionally wide range (40 to 20,000 cps flat). It is lightweight with slim, trim styling, making it ideal for TV staging, radio remotes, or critical recording sessions. The 655C features an indestructible E-V Acoustalloy diaphragm, in a microphone design.

The Model 654, noted for its ruggedness and precision, is similar in design and intended for applications only slightly less exacting than those requiring the Model 655C. Costs only \$100.00 list.

For Complete Information Write Dept. 40V.

**Electro-Voice®**

BUCHANAN, MICHIGAN

**EMAND**

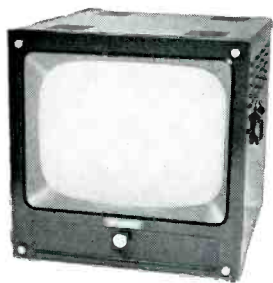
# ED BENHAM, Chief Engineer KTTV-L.A., reports on:



"Here at KTTV, Conrac's consistent high quality has proven time and time again that Conrac's complete range of professional monitors and receivers are the best possible viewing investment for us."

At KTTV, as in hundreds of other television stations, this dependable, uniform Conrac quality means consistently excellent video response — plus, sharply reduced maintenance costs.

Every Conrac monitor  
from 8" through 27"  
**BROADCAST**  
or **UTILITY**



*includes these important features:*

- ★ Video response flat to 8 megacycles
- ★ DC restorer — with "In-Out" switch
- ★ Provision for operation from external sync — with selector switch
- ★ Video line terminating resistor and switch

*Conrac Monitors Are Distributed by  
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Dept. K, Glendora, California

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VISIT CONRAC,  
BOOTH 23  
NAB SHOW,  
CHICAGO

## Professor Snikrah

Starts on page 24

and occasionally a real whiff of the familiar odor surrounding an over-heated resistor.

Be sure to follow the prescribed wattage rating given in the chart of Figure 3.

If you have an electric razor that everyone borrows around the station, you may open the case and install a type Mark II "Little Professor" which will easily discourage people from borrowing the razor since the effect appears to be an impending burn out of the little motor. Do not use a higher model for applications of this nature since damage may result when the unit is placed close to other components.

For the higher types, the procedure illustrated in Figure 2 should always be followed so that the unit can be mounted inside the case near some louvres but well away from the regular components. The Mark IVa is especially attractive when used this way.

Users in the field have reported unanimously that the "Little Professor" really lives up to its specifications which in itself is something new and refreshing. Testimonials on file (unsolicited) state that "it's more fun for the money" than any device yet invented.

The experimenter should also realize that various combinations can be used for individual problems. A Mark IVa installed along with a Mark II, for example, gives a dual effect. In all cases we have observed from many case histories that the coincidence of perception is inversely proportional to the I.Q. of the individual victim.

As a final remark, our lab invites suggestions regarding the application of various compounds such as fingernail polish, speaker cone cement, insulating varnish or ordinary house paint. Each of these refinements produces an effect displaying a strong individual character. They also change the tint of the smoke produced which is an interesting variation.

Wish I could be there to watch the fun!

*Ed. Note: The publisher assumes no responsibility for the functioning or effects produced by the Professor's circuitry.*

## Olympic Games

Starts on page 16

cently introduced M-60, a self-contained, 12-oz. remote amplifier-microphone, was used most often where one channel was adequate and during the live transmission of events taking place simultaneously. Collins supplied 125 of their dynamic, 3½-oz. lavalier-type M-20 and desk-type M-40 microphones. A Collins Announcer, a three-channel amplifier console with two turntables, was used in the foreign broadcast studios in producing programs recorded for later transmission.

With athletes participating from 34 countries and nearly 150 other countries closely following their activities, the organizing committee of the VIII Olympic Winter Games faced a staggering assignment of communicating the games' results from Squaw Valley, Calif., to the rest of the world. The solution: tape. Tape would permit the broadcasters (1) to edit the commentary for delayed transmission abroad (condensing the program material for a 15, 30, or 60 minute broadcast, and/or (2) to ship the original complete tape program via jet airliner for playback in their respective countries. So the committee selected Ampex Professional Products Co. to supply the magnetic tape recorders for the huge radio-recording studios to be used by the global reporting teams.

Over 50 professional tape recorders and 40 portable amplifier-speakers were installed in the 34 sound proof radio booths of the studio located in the press building several weeks before the opening ceremonies.

For reports where power and telephone lines were not available, the broadcasters used M-8 "Minitape" transistorized recorders by Stancil-Hoffman Corp. of Hollywood. Remote reports made on these battery-powered units were played back on the Ampex recorders without need for re-recording.

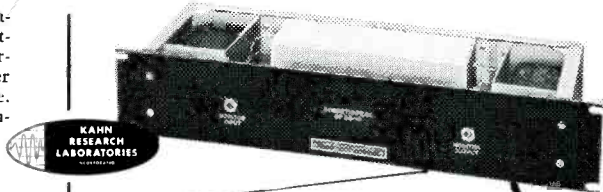
Opening day the equipment was ready and the announcers were briefed on its use at a special breakfast for broadcasters.

Each country was assigned a booth or booths for their use in recording, editing, dubbing and trans-

THESE STATIONS INCREASED COVERAGE

WITH **Symmetra-peak**

A.M., F.M. and T.V. stations everywhere are getting greater voice coverage and improved limiter and AGC performance. Here's what some enthusiastic users say . . .



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"after seeing and hearing this unit at WERE, Cleveland, we would like one as soon as possible" - WADC, Akron.

"We have recommended its (Symmetra-peak) use at all Westinghouse stations" - WIND, Chicago.

"With the use of Symmetra-peak, we find constant modulation regardless whether it is speech or music. We are very pleased" - WCLS, Columbus, Ga.

"We have completed our series of tests on your Model SP58-1A Symmetra-peak. . . we wish to thank you for making available a device of merit to AM broadcasting stations" - KVOO, Tulsa.

Others using Symmetra-peak include:

WCBS, WOR, WINS, WMGM, Press Wireless, CFPA, KWJJ and RCA Communications (a list of approximately 300 Symmetra-peak equipped stations is available for your inspection).

Write for User Comments and Illustrated Brochure

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the choice  
of the artists  
 Lavalier  
microphone



MODEL 649A

LIST \$105.00

These small, inconspicuous dynamic non-directional lavalier microphones were originally created for demanding TV applications. Remarkably versatile, they can be hung on a neck cord and the hands of the performer or announcer left free for demonstrations or they may be held in the hand, used on a desk stand or suspended from a boom. The Model 649A and companion Model 646 are ideal for audience participation shows, man-in-the-street interviews, panel programs—wherever microphone concealment, individual mobility or free movement of the hands is desired.

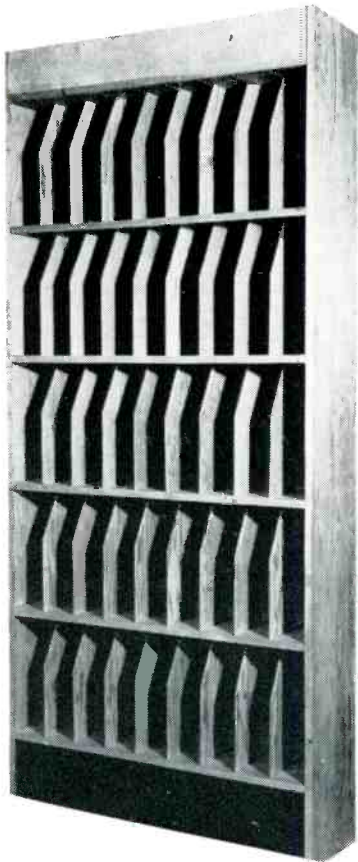
The unique, exclusive Acoustalloy diaphragm permits smooth response over a wide range and is almost indestructible with normal use.

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For 12" Records or 12" Diameter Tapes

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48" wide x 12" deep x 84" high  
Capacity 1500 12" Records  
or 420 12" Tape Reels  
Price \$94.50

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36" wide x 12" deep x 84" high  
Capacity 1125 12" Records  
or 315 12" Tape Reels  
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## Model GS 2412

24" wide x 12" deep x 84" high  
Capacity 750 12" Records  
or 210 12" Tape Reels  
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All prices include crating and freight prepaid anywhere in the continental U.S.A.

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FIXTURE COMPANY**  
MINERVA, OHIO

Phone: Paris, Ohio - UN 2-3951

lating. One Ampex 351 recorder was used constantly to duplicate tapes for distribution to the foreign broadcasters for their translation. The broadcasts were then sent via telephone lines at the proper time. U. S. broadcasters used direct phone lines for on-the-spot coverage, combining taped interviews with live commentary. A Model 351 recorder was also set up in the Blythe Arena press room to provide background music for the arena and skating rink activities.

Due to the various time differences around the globe, the recorders were used around the clock from early in the morning for recording purposes to the last delayed broadcast at night.

Magnetic tape not only simplified the reporters' jobs in making it possible for the world to receive immediate coverage of the events, but this unusually great job of editing and dubbing went off smoothly. Franklin Mieuli Associates (San Francisco) provided special coverage of the games using the recording facilities to a network of nearly 200 independent radio stations throughout the 12 western states and Hawaii.

Venue lines, laid by the Pacific Telephone Co. in August, 1959, were buried two feet underground. These lines fed into the press building via a central military receiving depot which relayed the broadcasts back to the press building where anyone could tap into the line from their individual booth. Microphones were placed at the start and finish points of the ski events, in the press building of the jump hill and in the KT-22 warming hut as well as in Blythe Arena. Two telco lines were set up to handle the foreign broadcasts . . . one to Denver for Asia broadcasts and one to New York for European tapecasts.

Voice of America produced broadcast segments in 20 languages, covering interviews with the athletes, descriptions of the games site and general games reports. These spots were sent by transcontinental feed to Washington, D. C.

NBC taped spots to be fed to network affiliated stations three times daily. Between the radio men and CBS Television, which recorded all events for delayed telecasts in its exclusive coverage arrangement, nearly a million feet (197 miles) of magnetic recording tape was consumed during the 10-day sports extravaganza.

CBS Television, with three Ampex TV tape recorders housed in mobile vans near the arena, recorded some three hours of TV coverage every day. The television pickup was sent to the mobile recording center from television cameras set up at vantage points throughout the area. The tapes were then edited quickly into compact presentations, and the network broadcast the programs at hours most convenient for the largest viewing audience around the nation.

All Blythe Arena events (including hockey games three times a day) were shot from a camera located on a scaffold on the open side of the arena. A Zoomar lens was used from this location to pick up both the ice arena and the skating rink. Camera equipment and camera man both received a workout when shooting the ski races held on KT-22 for all equipment had to be carried by chair lift to the top of the hill where it was set up in the warming hut. A 50-kilowatt generator provided the electricity from the warming hut and it was necessary to bring up a 50-gallon drum of gas each morning for the generator.

Most of the 13 nations broadcast at least one hour each day during the 11-day event. Many of these broadcasts were live transmission and in several languages to accommodate their neighboring countries and different language groups.

Those countries sending from two to 15 announcers to cover the 1960 Olympic Winter Games were: Austria, Canada (English and French), Czechoslovakia, Finland (Finnish and Swedish), Germany (East and West), Holland, Italy, Japan, Norway, South Africa, Sweden, Turkey and the USSR.

**\$500** will be paid for "Technical Hints" published in **BROADCAST ENGINEERING**

# Industry News

## New NAB Engineering Handbook Completed

The fifth edition of the NAB Engineering Handbook has been completed and will be mailed to NAB members soon. A. Prose Walker (left) is shown displaying the first copy to George Bartlett who assist-



ed Mr. Walker in editing the handbook. Forty-seven authors contributed to the 1742-page book which has been in preparation for three years. The book, which is the only one of its kind, deals with all aspects of radio and television broadcasting from the engineer's viewpoint. The book is published by the McGraw-Hill Publishing Co. and will be available to non-NAB members in a few months from McGraw-Hill.

## Mectron Now Supplies C. P. C. Inc.'s Parts

The Mectron Co., 166 Ridge Ave., North Plainfield, N. J., has purchased the entire file of original man-

ufacturing drawings and data from Communication Products Co. These cover all items formerly used in the production of the company's rigid copper coaxial transmission lines. Mectron will now furnish replacement or substitute parts identified by C. P. C., Inc.'s catalog or drawing numbers.

## Elliott Named Distributor Sales Manager at Amprex



Frank Randall, president of Amprex Electronic Corp., has announced that George Elliott has been promoted to the position of manager, distributor sales. He previously was in charge of export sales, sales to other tube manufacturers and sales of replacement tubes for imported radios. Joseph Viviani has been promoted to the position of manager, export sales.

## FM Background Music Guide Available

An 8,000-word booklet based on ten years' experience in the field of FM background music is being offered by Musicast, Inc., of Los Angeles. The booklet is a guide for planning and operating FM background music systems and covers such subjects as storecasting, doctor-

casting, multiplexing, subcarrier leasing, program music licensing agreement structures, sales, equipment installation practice and service. Musicast is owner of KMLA in Los Angeles. The booklet, entitled "Musicasting," is priced at ten dollars and may be obtained from Musicasting, 2917 Temple St., Los Angeles 26, Calif.

## Carey Joins Orr Industries



J. Reynolds Carey has joined Orr Industries, a division of Ampex Corp., as marketing manager of consumer products. Carey will direct the marketing, advertising and sales activity of the Irish brand of magnetic recording tapes and related accessories. Prior to joining Orr he was sales manager of Refrigeration Products of Norge.

## One Million Watt FM Station Proposed

Melonas Broadcasting Co. has filed an application for a one megawatt FM station at Birmingham, Ala. The station will use two General Electric 35 kilowatt amplifiers fed by a REL quadriline 10 kilowatt amplifier. A 16-bay antenna will be supplied by Jampro Antenna Co. and will utilize a dual feed system from the amplifiers. Antenna height will be 924 feet above sea level. Jim Melonas, manager of the station, states that it will serve with proper programming a large audience which is not now served by radio.

## JAMPRO ANTENNA COMPANY

7500 14TH AVENUE • BUILDING 9  
SACRAMENTO • CALIFORNIA

ANTENNA EQUIPMENT FOR  
TELEVISION AND FM BROADCASTING

**FAST DELIVERY  
ON FM ANTENNAS**

**THE BEST SOLUTION TO ANTENNA  
PROBLEMS IS A CALL TO JAMPRO!**

## MUSICASTING ORDER

Please send us "MUSICASTING", the 8,000 word reference booklet of operational information on the FM Background Music business. Subject material includes multiplexing, simplexing, programming, storecasting, doctorcasting, subcarrier leasing, licensing agreements, rates, sales, equipment, installation practices and service. Cost \$10 per copy.

Enclosed is our check for \$10

Please send C.O.D.

NAME.....

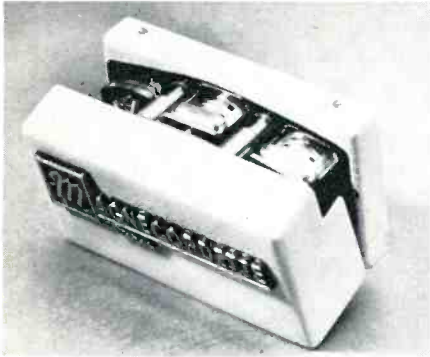
ADDRESS.....

CITY..... ZONE..... STATE.....

## MUSICASTING

2917 TEMPLE STREET • LOS ANGELES 25, CALIFORNIA

# Product News



## NEW STEREO HEAD

Midwestern Instruments, Box 7186, Tulsa, Okla., has announced a new 1/4-track head for the Series 100 Magnecordette stereo tape recorder. The new unit, a three-head assembly, records and reproduces 1/2-track monaural and 2-track stereo, and reproduces 1/4-track stereo. It incorporates a stacked, stereo erase head; stacked, inline 2-track record/reproduce head; and a stacked, inline 1/4-track reproduce head. A separate

head to accommodate the 1/4-track playback function is also provided. The head may be used as a direct replacement for existing heads on the Series 100 Magnecordette units.



## G. E. PORTABLE AMPLIFIER BA-26-A

A new lightweight, low-drain portable broadcast amplifier with 100 per cent transistorization has been introduced by Gen-

eral Electric Co., Lynchburg, Va. The amplifier has a high level input for tape or transcription in addition to the four microphone inputs. It has a laminated plastic front panel to preserve the permanent markings against wear and to allow space for operators to write in additional information and erase it without damaging the surface. It weighs 19.5 lb. and is 15 3/4 inches wide, 6 3/4 inches high and 13 1/4 inches deep. A regulated self-contained power supply with a range of 95 to 135 volts is built in and it may also be powered by batteries. It contains a built-in tone generator for setting up levels.

## NEW LITERATURE OFFERING

A brochure entitled "The Answer to Economy in Titling and Special Effects" is available from S. O. S. Cinema Supply Corp., 602 West 52nd St., New York 19, N. Y. The brochure lists and describes equipment for producing a wide range of titles, trick films, cartoons and animation.

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## TAPE RECORDING BOOK PUBLISHED BY ROBINS

A book entitled "How to Get the Most Out of Tape Recording" is now available from Robins Industries Corp., 36-27 Prince Street, Flushing 54, N. Y. The book contains 101 ideas for recording and hints concerning proper methods of caring for recording tape, equipment and accessories. The book lists for \$1.00.

# Classified

Advertising rates in the Classified Section are ten cents per word. Minimum charge is \$2.00. Blind box number is 50 cents extra. Check or money order must be enclosed with ad.

## EQUIPMENT FOR SALE

**TV VIDEO MONITORS**—8Mc. Metal cabinets starting at \$189.00. Never before so much monitor for so little cost. 30 different models, 8" thru 24". Miratel, Inc., 1083 Dionne St., St. Paul, Minn. 2-60 11t

**TEFLON COAXIAL TRANSMISSION LINE** 1 1/2", 51 ohm. Unused. Suitable for AM, FM, VHF-TV, Communication Systems, and some Microwave frequencies. RETMA flanges. Write: Sacramento Research Labs., 3421-58th Street, Sacramento 20, Calif. 2-60 6t

**Vidicon Tubes Type 6198 New**, at bargain rates. All types TV equipment bought and sold. Al Denson, Box 85, Rockville, Conn. 4-60 3t

## SERVICES

**Cambridge Crystals Precision Frequency Measuring Service.** Specialists for AM-FM-TV. 445 Concord Ave., Cambridge 38, Mass. Phone: TRowbridge 6-2810. 3-60 12t

**AM, FM, TV Applications, proofs, measurements.** Paul Dean Ford, Broadcast Engineering Consultant, 4341 South 8th St., Terre Haute, Ind., Crawford 4496. 4-60 6t

**Approved FCC operator's license course** offered by America's oldest broadcasting school. This proven ticket-getter given by FCC experts. Register now for day classes, 20 weeks, evening classes, 31 weeks. Academy of Broadcasting Arts, 316 West 57th St., New York 19, PL 7-3211. 4-60 3t



THE FINEST OF ITS KIND

## SINGLE FREQUENCY AND BROADBAND FM RECEIVING ANTENNAE

HIGH GAIN YAGI, CUT TO YOUR FREQUENCY FOR LONG DISTANCE PICKUP. HEAVY DUTY DESIGN FEATURING ALL STAINLESS STEEL HARDWARE.

Literature on request.

Send 25¢ for booklet on FM Antennae and FM Reception.

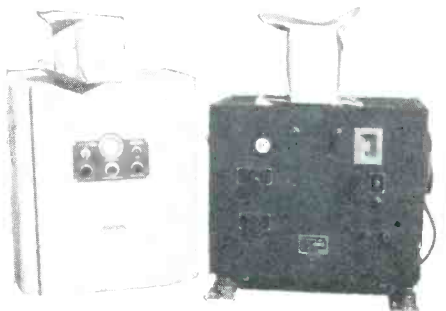


**APPARATUS DEVELOPMENT CO.**  
WETHERSFIELD 9, CONN

## SAVE on Brand New AUTOMATIC DEHYDRATORS

SENSATIONAL SAVINGS because of a recent quantity purchase! Your choice of ANDREW or DIE-ELECTRIC PRODUCTS Automatic Dehydrators. Brand new, in original packing crates, plus spare parts kit. 110V, 60 cps operation. Andrew Unit, Model 1911—Die-Electric Products Unit, Model 22.

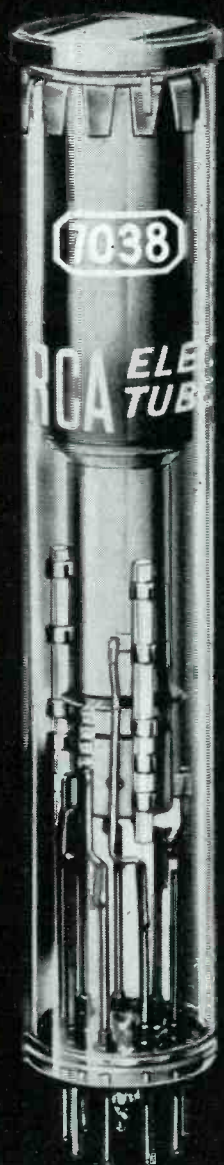
Price: \$300.00  
F.O.B. Sacramento



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SACRAMENTO, CALIFORNIA



ANOTHER WAY RCA  
SERVES THE BROADCAST  
INDUSTRY THROUGH  
ELECTRONICS



*Get Broadcast  
Quality Pictures  
with...*

**1**  
**FOOTCANDLE  
ILLUMINATION**

High effective sensitivity and a uniform photoconductive layer enable the **RCA-7038** to provide versatility for vidicon use in TV broadcasting.

RCA-7038 is capable of producing broadcast quality pictures with as little as one footcandle illumination on its faceplate and features a superior degree of uniformity of characteristics from tube to tube. A resolution capability of 600 lines, a spectral response covering the entire visible spectrum, the exceptional uniformity, and the high effective sensitivity make the RCA-7038 a versatile and superior tube for either color or black-and-white TV applications.

For further information on RCA-7038 and the complete line of RCA camera tubes, call your RCA Camera Tube Distributor today. He'll give you fast service and prompt delivery.

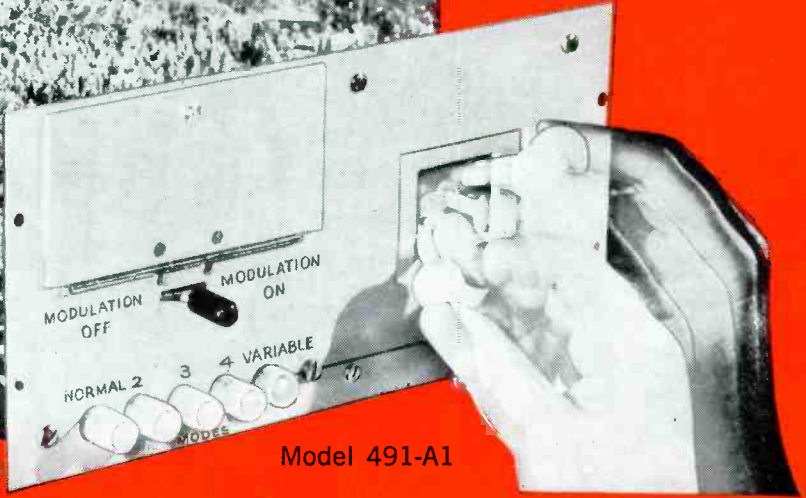


**RADIO CORPORATION OF AMERICA**  
*Electron Tube Division*  
**Harrison, N. J.**

VISIT THE RCA EXHIBIT AT THE NAB CONVENTION

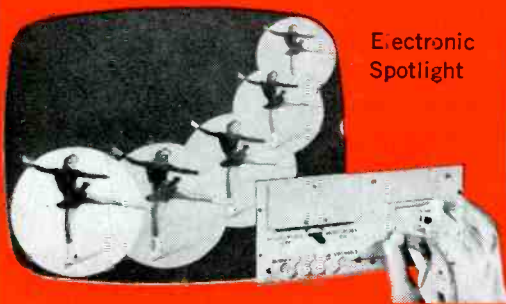


# NEW "Joy Stick" Positioner

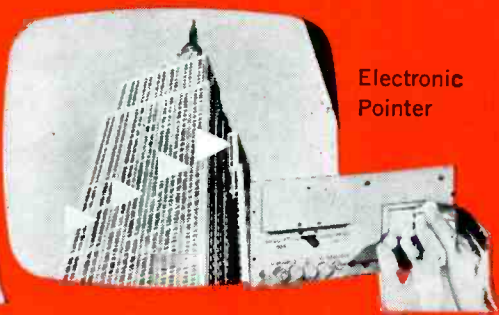


Inserts May Be Placed At Any Position on Raster.

Model 491-A1



Electronic  
Spotlight



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Pointer



Create  
Wipes  
With  
Motion

## TELECHROME SPECIAL EFFECTS GENERATOR with Exclusive "JOY STICK" POSITIONER

First, Telechrome provided broadcasters with a vastly improved system for producing a wider variety of dramatic wipes, inserts, keying and other special effects. Now, Telechrome engineering introduces the "Joy Stick" Positioner. This makes it possible to create many hundreds more effects and to move wipes, inserts, keying or other special effects to any place on the TV screen. The effects are startling! A new era in program creativity begins now! Ask to see the "Joy Stick" Positioner demonstrated, today!

Write, Wire, Phone for Literature

COLOR TV • INDUSTRIAL INSTRUMENTATION • TELEMETRY



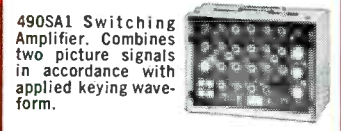
**TELECHROME MANUFACTURING CORP.**  
28 RANICK DRIVE • AMITYVILLE, N.Y.

Lincoln 1-3600

Cable Address: COLORTV  
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**490WA1** Waveform generator. Generates keying signals for the 72 different wipes.



**490SA1** Switching Amplifier. Combines two picture signals in accordance with applied keying waveform.



**490RA1** Remote Control Unit. Selects and controls desired effect. Designed for console or desk mounting. Easily modified for integration into existing studio facilities. Complete with power supply—512CR1

Available Portable or Rack Mounted

N.A.B. Show  
Booth No. 20

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MIDWESTERN ENGINEERING DIVISION • 106 W. St. Charles Rd., Lombard, Ill., MAYfair 7-6026  
SOUTHWESTERN ENGINEERING DIVISION • 4207 Gaston Ave., Dallas, Tex., TAYlor 3-3291