

# BROADCAST ENGINEERING

MAY 1962



THE TECHNICAL JOURNAL OF THE BROADCAST INDUSTRY

**NAB**

**Convention Number**





S-5018—replaces 5AU4, 5AW4, 5AZ4, 5T4, 5U4, 5V4, 5W4, 5Y3, 5Z4, 5931, 6087, 6106



S-5207  
replaces 6X4



S-5130—replaces 866, 866A, 3B28



S-5367—replaces 8020



S-5343—replaces 816, 836, or 3B28  
and 866 at reduced voltage



S-5033—replaces 6AU4, 6AX4, 6BL4,  
6W4, 12AX4, 17AX4, 25W4, 6U4  
S-5019—replaces 5R4



S-5011A—replaces 80, 82, 83, 83V, 5Z3  
S-5017—replaces 0Z4, 5X4, 5Y4, 6AX5, 6X5



S-5251—replaces 5U4, 5AU4,  
5AW4, 5AZ4, 5T4, 5V4,  
5W4, 5Y3, 5Z4

*Illustrations  
approximately 1/2 size*



S-5347  
replaces  
12BW4, 6BW4

New low prices  
Now \$75.55  
in 1 to 9  
quantity

New low prices  
Now \$75.55  
in 1 to 9  
quantity



S-5344  
replaces 872A



S-5373  
replaces 8008

Send for  
revised price list

## Sarkes Tarzian Tube Replacement Silicon Rectifiers improve circuit performance

These standard Tarzian tube replacement rectifiers are directly interchangeable with over 95% of all popular vacuum tube rectifiers. Although they are generally smaller and more compact than the tubes they replace, their dc current ratings are as much as three times as high.

In addition, they offer the inherent advantages of solid state rectification:

1. Greater electrical stability
2. Compact, rugged construction
3. Instant operation; no warmup; no filament supply

#### 4. Cooler operation

For applications requiring high efficiency, wide temperature range, and long-period, maintenance-free operation, these compact units are unmatched. They are available in production quantities, at realistic prices. Special designs and modifications engineered on request. Special tube replacement units designed by Tarzian engineers include rectifiers with peak inverse voltages to 19,000.

Write for specifications and prices of tube replacement silicon rectifiers. Application engineering service is available on request.

*Quality in volume*



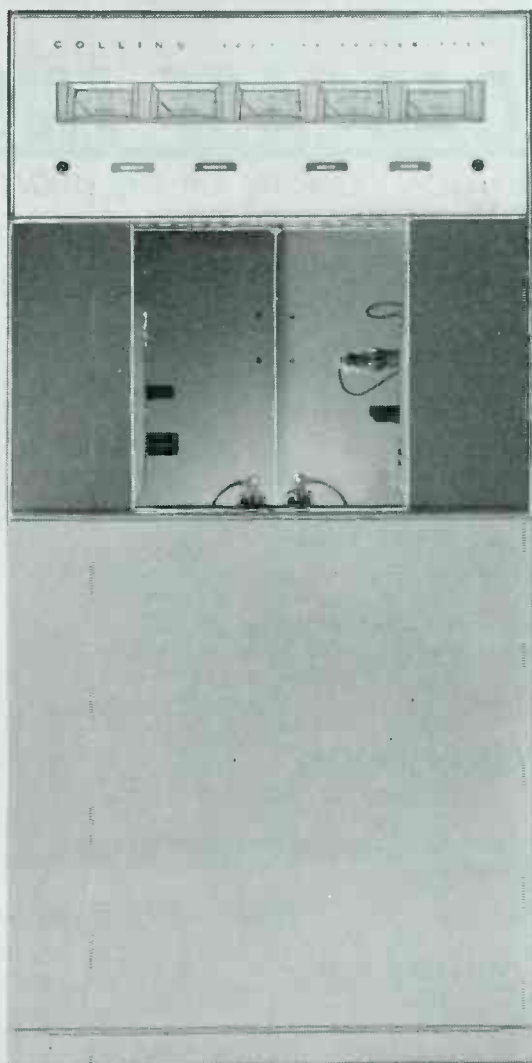
### SARKES TARZIAN, INC.

World's Leading Manufacturers of TV and FM Tuners • Closed Circuit TV Systems • Broadcast Equipment • Air Trimmers • FM Radios • Magnetic Recording Tape • Semiconductor Devices

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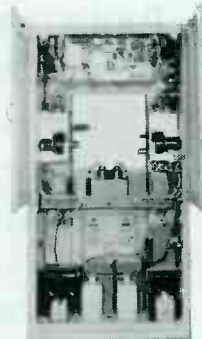


## Why is the handsomest,\* best-built transmitter in town also the loneliest ?

Because transmitters get fussed over only when they break down, and Collins transmitters have a proven record of less down time than any others. ■ The Collins 20V-3 1,000/500/250-watt AM Transmitter incorporates the time-proven circuitry of the 20V-2, with which you may be better acquainted. And, like all Collins transmitters, it's completely tested on your frequency *before* delivery. ■ Write us today for complete information.

COLLINS RADIO COMPANY • CEDAR RAPIDS • DALLAS • BURBANK • NEW YORK

\* Collins' transmitter design won the Award of Excellence at the 1961 Western Electronic Show & Convention.





# BROADCAST ENGINEERING

THE TECHNICAL JOURNAL OF THE BROADCAST INDUSTRY <sup>®</sup>

VOLUME 4

MAY, 1962

NUMBER 5

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BROADCAST ENGINEERING



# UN-SECRET INGREDIENT

## Yet no other tapes have it!

You can look it up! Half a century ago, the precision coating technology that forms the basis for today's recording tapes was being developed by 3M. Then, to this head-start in coating experience was added pioneering research in magnetic recording. Result—the first SCOTCH® BRAND Sound Recording Tapes won practically immediate acceptance as the performance standard of the broadcast industry . . . laid the groundwork for today's video tape recording.

In 1948, "SCOTCH" Recording Tape was first to offer red gamma ferric oxide, precision-coated to acetate backings (now a tape industry standard). And from 3M research came other notable firsts—acicular oxide particles longitudinally oriented, Silicone lubrication, polyester backings, high-output tape, to name a few. Meanwhile, 3M manufacturing set the pace for tape-coating uniformity, made possible identical magnetic properties throughout every reel, and from one reel to the next. These advances, too, proved a head-start for further developments.

In 1956, the advent of commercial video tape recording equipment made dramatic new demands on tape quality, required tapes to withstand heats and pressures unheard of in audible range recording. 3M not only provided the first practicable reels of video tape—it fulfilled pressing demands for this tape in commercial quantity for the April, 1957, change-over to daylight saving time. In this way, "SCOTCH" Video Tape helped revolutionize TV programming with delayed telecasts across time zones.

What does this un-secret ingredient—*leadership in tape technology*—mean to broadcast engineers? While others are striving to catch up with standards of excellence already achieved for the industry by "SCOTCH" BRAND products, 3M looks ahead to further improvements and advances years beyond the best that today's tape science can offer. Meanwhile, 3M offers "the tapes the professionals use": "SCOTCH" Recording Tapes, audible range and video, in the widest of choices for all requirements.

"SCOTCH" AND THE PLAID DESIGN ARE REGISTERED TRADE-MARKS OF MINNESOTA MINING & MANUFACTURING CO., ST. PAUL 1, MINN. EXPORT: 99 PARK AVE., NEW YORK CANADA; LONDON, ONTARIO. © 1962, 3M CO.

Magnetic Products Division **3M** COMPANY





# AUTOMATION, TAPE CONTROL, STEREO

Claim Limelight at '62 **NAB** Show

AS USUAL the annual National Association of Broadcasters Convention was a great success. At the time of writing the actual attendance count was not finalized; however, everything pointed to a record attendance. The 16th Annual Engineering Conference had a particularly good selection of papers, and BROADCAST ENGINEERING plans to publish some in the forthcoming months. Owing to the expanded exhibit space at the Hilton Hotel the technical equipment display was the best this reporter has seen in years and judging by all the comments heard this view was shared by all. The management section of the Convention will be covered by the

many non-technical journals so it will suffice to say that this section was as strong as the technical efforts.

In the following pages will be found a listing of all the exhibitors at the Convention together with a brief description of their major exhibits. Among the visitors automation and tape control seemed to claim the major attention and all those stands showing this type equipment were very well patronized. New transmitters attracted a great deal of attention, and the developments in color TV were well received. So here for the benefit of the "stay-at-homes" is a review of the Convention in alphabetical order.

## AITKEN COMMUNICATIONS, INC.

305 Harrison Street  
Taft, California

### Products:

The Auto Jockey is a complete system of audio control using conventional and or endless loop tape machines and the automatic back-up cueing Seeburg Changer. Silence in operation is with the advance head sensing and cueing system. New this year was the two tone, reduced level, control to eliminate false action of the equipment. Systems are custom made to meet individual station requirements.

## ALFORD MANUFACTURING COMPANY

299 Atlantic Avenue  
Boston 10, Massachusetts

### Products:

Television Broadcast Antennas  
FM Broadcast Antennas  
Diplexers  
Coaxial Switches  
Vestigial Sideband Filters  
RF Measuring Instruments

## AMERICAN MICROWAVE & TELEVISION CORP.

1367 Industrial Road  
San Carlos, California

### Products:

Television Studio Equipment, including Vidicon Cameras, Special High Resolution Film Systems, Transistorized Switches, Video Amplifiers, Electronic Pan-Tilt-Zoom System. Microwave Transmitters and Receivers, 6 & 13 KMC.

High Power Microwave Amplifiers for use with existing systems. Low Cost Differential Phase and Gain Equalizer.

American Microwave & Television Corp. featured a film camera chain and an ingenious new electronic pan-tilt-zoom device.

Other equipment displayed and demonstrated:

10 watt microwave amplifier using a traveling wave tube which can be driven to full output by a .10 watt (1/10 watt) transmitter.

Differential phase and gain equalizer for use in the video circuit of a microwave system or TV studio system.

Employed in conjunction with 35 mm. slide projectors, the new electronic pan-tilt-zoom device eliminates manually operated studio cameras and rear screen slide projection when either exterior or interior live-action scenes are simulated in TV program production.

The high resolution AMTEL vidicon camera will pan-tilt-zoom electronically as slides are illuminated in the projector. A television engineer seated at the unit's switching console controls all camera action by means of a "joy stick" (for panning and tilting) and a 4 to 1 zoom control.

Among several advantages cited for the new unit is the impossibility of panning or tilting the camera beyond the slide picture field, as can happen with studio cameras and rear screen projection.

## AMPEX CORPORATION

934 Charter Street  
Redwood City, California

### Products:

Ampex VR-1000C Videotape Recorder with color conversion accessory.

Ampex VR-1002 Videotape Recorder for black and white recording.

Ampex/Marconi Mark IV Image Orthicon Television Camera Channel and associated equipment.

Professional Broadcast Audio Recorders, Model Numbers 351/354 Series, 300 Series, 601 Series and 1200 Series.

Ampex Corporation introduced a greatly simplified and improved model of its television tape recorder picture synchronizer, known as "Intersync."

# NAB CONVENTION HIGHLIGHTS

The new version has 50 per cent fewer controls than previous models, thereby greatly simplifying maintenance setup, and operating procedure. In addition, the unit incorporates numerous-built-in test features cutting down the need for external test equipment in setup and also reducing setup time.

The new design also incorporates improved electronic resolver circuitry which results in greater horizontal phase stability and greater tolerance for instabilities caused by mechanical splices. New circuitry also makes possible the locking of the recorder to so-called line lock sync generators operating within FCC specifications; previous models required crystal controlled sync stability.

The new Intersync is available for all Ampex Videotape recorders currently in use as well as current production models. It is completely compatible with all other Videotape recorder accessories such as Amtec, Colortec and Electronic Editor.

## ANDREW CORPORATION

P.O. Box 807  
Chicago 42, Illinois

**Products:**  
Multi-V, FM Broadcast Antennas  
HELIAX, Flexible Air Dielectric cables  
Rigid transmission lines  
Coaxial switches  
Telescoping masts

## AUTOMATED ELECTRONICS, INC.

3022 Southland Center  
Dallas 1, Texas

**Products:**  
Completely automated tape programmer and/or spot recorder.

## AUTOMATIC TAPE CONTROL, INC.

Bloomington, Illinois

**Products:**  
Automatic Tape Control cartridge playback units and recording amplifiers.

ATC 55 cartridge player  
ATC Sound Salesman, Portable audition cartridge player

Automatic Program Logging printed tape log verification  
Automatic Tape Control cartridge equipment accessories

The following ATC equipment was in operation demonstrating how a completely automated broadcast station operates:

ATC Dual-Tone Tape Cartridge Units—The dual-tone system allows for an auxiliary control tone to be inserted in the recorded message which, in playing back, will automatically actuate other ATC equipment or additional equipment such as television slide projectors, record changer, etc.

ATC 55—a device which plays 55 tape cartridges in sequence without reloading or manual operation of any kind.

ATC Automatic Program Logging—a brand new ATC development that automatically prints FCC logging information directly from magnetic tape as it is broadcast.

## BAUER ELECTRONICS CORPORATION

1663 Industrial Road  
San Carlos, California

**Products:**  
1000/250 watt, 5000/1000 watt, 10,000 watt AM transmitters  
Remote control equipment  
"Peak Master" limiting amplifier  
"Level Master" automatic level control amplifier  
Automatic logging equipment  
"Spot-0-Matic" cartridge tape system

## BOGEN-PRESTO DIVISION OF THE SIEGLER CORPORATION

P.O. Box 500  
Paramus, New Jersey

## BROADCAST ELECTRONICS, INC.

8800 Brookeville Rd.  
Silver Spring, Md.

## CBS LABORATORIES

High Ridge Road  
Stamford, Connecticut

## CENTURY LIGHTING, INC.

521 West 43rd Street  
New York 36, New York

**Products:**  
The most complete selection of TV & Photographic Lighting Equipment, controls and systems to meet every staging need.  
Fresnelites, Lekolites, Scoops, Pattern Lekos and accessories.  
C-Core (Silicone Controlled rectifiers) remote control and manual lighting control equipment.

## CHRONO-LOG CORPORATION

Box 4587  
Philadelphia 31, Pennsylvania

**Products:**  
STEP (Sequential Television Equipment Programmer)  
STEP, the low-cost automation system for TV switching, was in operation at the Chrono-log Booth at the NAB Show. STEP is designed to switch video and audio, start and stop film projectors and tape units and operate slide projectors during the station break panic period. STEP offers practical automation for all TV stations, small and large.

The unique pinboard memory of STEP provides versatility of operation at low cost. STEP permits programming an entire day's switching sequences in advance. The operator can check out the sequence prior to running it on STEP by operating the system in the Preview mode.

The STEP control panel mounts directly in the operator's console and provides a clear display of the functions to be performed on the next switching event and the time remaining until that event. Provision for last minute changes and operator override of the predetermined switching sequence is provided in STEP.

A STEP System has been in operation for over four months at WTVR, Richmond, Virginia. The photograph shows the STEP control panel installed in the console at WTVR.

**Chrono-log Digital Clocks** have been widely used during the past five years to provide digital outputs of time for large scale digital computers, industrial control systems and telemetering systems. Now, Chrono-log Digital Clocks are being offered for use in the broadcasting field in various applications.

Chrono-log Digital Clocks can also be used for TV coverage of sporting events and other features where the element of time plays an important part and contributes to viewer understanding and interest.

**Q System**—A new product introduced at the NAB Show was the Q System, designed by Chrono-log to permit cueing performers and crew at the start and end of live shows and tape sessions.

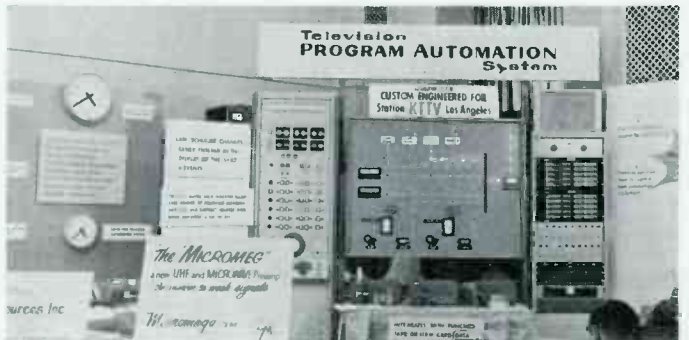
Q provides for remote displays of the time-to-go at various locations such as the control console, the director's desk, at the camera, etc. The displays are operated from a central location. A 5 minute warning and a 2 minute warning are given. The final 30 seconds are counted down by Q to insure that all personnel are ready at the proper time. Q is useful not only at the start of the show but also at the end, to permit the performer and crew to make a smooth closing.

Q is also useful during taping sessions and any other session where personnel must synchronize their activities.



A fortuitous juxtaposition of two key words highlights the main points of interest at the 1962 NAB Engineering Conference. Stereo and Automation were on everybody's lips, even small station operators.

Automatic Tape Control provided material for intensive study by many visitors to the Conference, and its equipment received thorough engineering scrutiny.



The Program Automation System specially supplied by Visual Electronics for KTTV shown here between demonstrations was the subject of a great deal of interest.



Electronic Optical Effects for slides are shown in these two photographs of the pan-tilt-zoom which was demonstrated by American Microwave.



**CLARK-ROOT, INC.**

211 Lambert Street  
Palo Alto, California

**Products:**  
Automatic Tape Programming Systems  
Long Playing Automatic Tape Transports

**COLLINS RADIO COMPANY**

5200 C Ave., N.E.  
Cedar Rapids, Iowa

**Products:**  
830D-1A 1 kw FM Transmitter  
830E-1A 5 kw FM Transmitter  
20V-3 AM Transmitter  
A830-2 Exciter  
212H-1 Remote Amplifier  
356H-1 Phono Equalizer Preamp  
808A-1 Remote Console  
212E-1 Console, modified for stereo  
212G-1 Console  
212F-2 Console  
642A-1 and 216C-1 Automatic Programming Equipment

**CONRAC DIVISION**

Giannini Controls Corporation  
19217 East Foothill Boulevard  
Glendora, Calif.

**Products:**  
Monochrome Video Monitors and Audio Video Receivers

**CONTINENTAL ELECTRONICS MANUFACTURING COMPANY**

4212 So. Buckner Blvd.  
Dallas 27, Texas

**Products:**  
AM Broadcast Transmitters and Transmitter Remote Control

**DYNAIR ELECTRONICS, INC.**

7564 Broadway  
Lemon Grove, California

**Products:**  
Several new models of solid state video amplifiers  
New, improved closed circuit TV transmitter  
New wideband modulator and demodulator  
Video switcher-fader and video switchers  
Ultra compact 100 watt TV transmitter  
Compact waveform monitor

**ELECTRONIC APPLICATIONS, INC.**

80 Danbury Road  
Wilton, Connecticut

**Products:**  
AKG Studio and Field microphones, AKG dynamic headsets, shock-proof microphone stands, Nagra III B Portable Tape Recorder.

**ELECTRONICS, MISSILES & COMMUNICATIONS, INC.**

262 East Third Street  
Mount Vernon, New York

**Products:**  
VHF Translators  
UHF Translators for all television rebroadcast applications

**EMI/US**

1750 N. Vine Street  
Los Angeles 28, California

**Products:**  
Monochrome and color television camera chains (4 1/2" I.O., vidicon, remote control, etc.)  
Broadcast Control Room Equipment (Solid-state vertical interval switching and distribution systems, transistorized audio mixing, tape deck and intercommunication equipment, audio and video recording tape)

**FEDERAL MANUFACTURING & ENGINEERING CORPORATION TELEVISION SPECIALTY CO., DIVISION**

1055 Stewart Avenue  
Garden City, L.I., New York

**Products:**  
Kinescope Recorders, Wireless Microphones, Rear Screen Projectors & Screens, Transistorized 16mm S-O-F Newsreel Cameras with portable power pack, Transistorized Mixer-Amplifiers, Lenses.

**FISHER RADIO CORPORATION**

21-21 44th Drive  
Long Island City, New York

**Products:**  
Monitor and relay FM tuners, audio reverberation systems, audio ampli-

fiers and preamplifiers, audio control and loudspeakers, tape recorders, FM Stereo MPX Generator.

**GATES RADIO COMPANY**

123 Hampshire Street  
Quincy, Illinois

**Products:**  
AM-FM-TV broadcast transmitters, audio systems, transistorized amplifiers, transcription turntables, spot tape recorders, cartridge tape systems, remote amplifiers, remote control systems, frequency and modulation monitors, limiting and leveling amplifiers, plus other representative broadcast equipment.  
A new line of transistor audio control consoles was introduced at the NAB Convention by the Gates Radio Company, subsidiary of Harris-Intertype Corporation.  
For stereo programming, Gates featured the new M-6158 Dual Stereo Audio Control Console, designed for full 10-channel stereo operation. This system can also be used for AM, FM and TV dual channel broadcasting and recording of monophonic programming.  
Two additional audio systems were offered for dual and single channel monophonic operation. The new M-6209 Dual Channel Solid Statesman Console features a totally new switching concept for audio control. Two multiple station, illuminated push-button switches provide 12-positions and "off" as a control center for all medium level inputs. One switch bank feeds into channel four, the other into channel five. When the input positions are not switched into either channel, they are automatically connected to the cue bus for previewing or cueing. Two illuminated VU meters are designed to be placed either on the console housing or on the desk top.  
The new M-5764 Single Channel Solid Statesman Console also includes the 12-position push-button control center and detachable VU meter. All consoles are completely transistorized.

Also on display for the first time was the new Gates Dual Stereo Peak Limiter, the SMX stereo generating system and stereo turntables. The stereo limiter is a self-contained dual amplifier that is equally adaptable to stereo operation or to completely separate AM and FM operation. The unit consists of two identical peak limiting amplifiers with a common power supply. In the stereo position, the amplifier allows the highest signal in either channel to determine the amount of limiting of both channels.

Four new FM transmitters were exhibited, ranging in power from one to twenty kilowatts. Each model has been designed for stereo and includes silicon rectifiers, built-in remote control facilities, low-noise cooling system and the new Cascade exciter providing 30 to 15,000 cycle response.  
Other equipment displayed included 1 kw and 5 kw AM transmitters, new 100 watt TV transmitter, 10 audio control consoles, Spot Tape Recorders, Digital Tape System, Cartridge Tape Systems, 12 and 16-inch turntables, transistor amplifiers, remote amplifiers, modulation and frequency monitors, remote control systems, microphones and other control room accessories. Custom-designed stereo and monaural control rooms will be highlighted in special displays featuring new modular desks.

**GENERAL ELECTRIC CO. Defense Electronics Division Technical Products Operation**  
Electronics Park  
Syracuse, New York  
**Products:**  
35 KW, VHF, High Channel TV Amplifier  
5-1 KW, VHF, High Channel TV Transmitter  
Full Sized section of VHF and Microwave helical antennas  
Portable and Rack Mounted 2000 MC relay  
New Microwave Repeater  
(3) I-O Color Camera  
New 3" I-O, B&W Camera  
New 4 1/2" I-O B&W Camera

Special Live Vidicon Camera  
Film Vidicon Camera  
B&W Continuous Motion Film Projector

Film Center Multiplexer  
B&W calibration monitor  
Complete Line TV Utility Monitors  
Relay Switching System  
Transistorized sync generator  
Audio Console—Transistorized Remote Audio Amplifier—  
Transistorized  
Complete line of Audio equipment  
New Educational TV Studio Package

**GENERAL ELECTRONIC LABORATORIES, INC.**

18 Ames Street  
Cambridge 42, Massachusetts

**Products:**  
FM transmitters: 1 Kw, 5 Kw, 15 Kw, 30 Kw; stereo generators, SCA generators, FM SCA Relay Receiver, Rust remote control equipment.

**GPL DIVISION—GENERAL PRECISION, INC.**

National Headquarters  
63 Bedford Road  
Pleasantville, New York

**Products:**  
Model PA-550 High Resolution Vidicon Film Chain  
Model PA-200 35mm Telecast Projectors  
Studio & Remote Vidicon Camera Chains  
Video Recorders  
Sync Generators  
Video Switches  
Video & Pulse Distribution Amplifiers  
Wideband STL Microwave Systems

**INTERNATIONAL BUSINESS MACHINES CORPORATION**

590 Madison Avenue  
New York 22, New York

**Products:**  
DATA PROCESSING Equipment  
Demonstrating automatic program logging, billing, availabilities and analysis

**INTERNATIONAL GOOD MUSIC**

1410 Home Road  
P.O. Box 943  
Bellingham, Washington

**Products:**  
IGM Simplimation (Automation Equipment) Programming  
Heritage Representatives

**ITA ELECTRONICS CORPORATION**

130 E. Baltimore Ave.  
Lansdowne, Pa.

**Products:**  
FM Broadcast Transmitters  
FM Multiplex Equipment  
AM Broadcast Transmitters  
Consoles; Audio Equipment; Automation Equipment  
Remote Control Equipment  
Cartridge Equipment  
UHF-TV Transmitters  
Accessories

**ITEK ELECTRO-PRODUCTS COMPANY**

75 Cambridge Parkway  
Cambridge 42, Massachusetts

**Products:**  
Itek Wireless Microphone System, a new high-quality unit expressly designed for TV broadcasting, in studio and out. Features high power, exceptional fidelity, diversity reception and a complete line of accessories.

**JAMPRO ANTENNA COMPANY**

7500—14th Ave.  
Sacramento 20, California

**Products:**  
FOR TV:  
Omni-directional transmitting antennas for channels 2-13, with power ratings of 12 and 50 KW. TV diplexers, single line notch diplexers and harmonic filters, 2 KMC microwave parabolic antennas. Coaxial transmission line and fittings. VHF translator antennas. High power UHF TV standby antennas.

**FOR FM:**

High gain, wide band FM antennas, designed for FM stereo broadcasting. Complete line, up to 20 bays. Vertically polarized as well as conventional types. Directional FM antennas. FM diplexers and multiplexers. High attenuation, high power FM harmonic filters. Coaxial transmission line and fittings.

**JOHNSON ELECTRONICS, INC.**

62 South Highway 17-92  
Box 17  
Casselberry, Florida

**Products:**  
Transistorized, Amplifiers, Tuners, Receivers, Combinations and PA Podium.

**KLIEGL BROS.**

321 West 50th St.  
New York 19, New York

**Products:**  
Kliegl Bros. manufactures a complete line of TV lighting fixtures, accessories, wiring devices and lighting selection and control equipment for monochrome and color telecasting. The new and revolutionary SCR semi-conductor dimmer using the silicon controlled rectifier will be featured. Assistance in the planning of lighting and associated facilities is available.  
In addition to the new SCR (Silicon Controlled Rectifier) Dimmer, Kliegl this year featured a new batch of light sources for TV use. These include (1) The Quartz-Iodine lamp for cyclorama curtain lighting and (2) The Lilliput Twin which uses the very new sealed beam quartz-iodine lamps by G.E. and which do the job of high level lighting without using transformers, as well as (3) the latest in PAR-64 introductions.

**MaCarTa, INC.**

4021 Fleur Drive  
Des Moines 15, Iowa

**Products:**  
Automatic Magnetic Tape Cartridge Recording and Playback Equipment  
Automatic Tape Magazine Reconditioning and Reloading

**MAGNE-TRONICS, INC.**

49 West 45th Street  
New York 36, New York

**Products:**  
Magne-Tronics Automated Taped Radio-Music Program Service  
Magne-Tronics Automated Equipment  
Magne-Tronics Motivational Background Music Service for FM  
Multiplexing and/or Wired Line Transmission

**McMARTIN INDUSTRIES, INC.**

(formerly Continental Mfg., Inc.)  
1412 California Street  
Omaha, Nebraska

**Products:**  
Frequency Monitors  
Modulation Monitors  
SCA-Multiplex Monitors  
Stereo Monitors  
RF Amplifiers  
FM Multiplex Receivers (tubed and/or transistorized)  
FM Stereo Adapters  
STL Receivers  
UHF-VHF Communication Receivers  
Fixed Frequency Receivers  
Audio PA Amplifiers—transistorized

**MINNESOTA MINING & MANUFACTURING CO.**

Magnetic Products Division  
900 Bush Avenue  
St. Paul 6, Minnesota

**Products:**  
"Scotch" Brand Video Tape, Audible Range Tapes and Related Items.

**MIRATEL ELECTRONICS, INC.**

1st St., S.E. & Richardson  
New Brighton, Minnesota

**Products:**  
Television Video Monitors  
Conelrad Equipment  
Audio Operated Relays  
Program Failure Alarm  
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Broadcast Translators



**MOSELEY ASSOCIATES, INC.**  
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**Products:**  
Radio Remote Control Systems  
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SCA Subcarrier Generator  
FM Stereo Generator  
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**OZALID PRODUCTS,  
GENERAL ANILINE & FILM  
CORPORATION**  
Johnson City, New York

**Products:**  
Ozalid Duplicating Equipment and Materials for Copy Systems. Especially Useful for Special Broadcasting Requirements Such As Availabilities-Control, Order-Invoicing, and Traffic-Control.  
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**PROGRAMATIC BROADCASTING SERVICE**  
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**Products:**  
Automated Radio Equipment and Taped O-Vation Music, A Division of Muzak Corporation.

**RADIO CORPORATION OF AMERICA**

**Broadcast & Communications  
Products Division**  
Front & Cooper Streets  
Camden, New Jersey

**Products:**  
Monochrome and color television equipment, UHF and VHF television transmitters, AM/FM transmitters, Television Tape equipment, Audio equipment, Monitoring equipment and test equipment for AM, FM and TV Stations.

Television mobile equipment, TV cameras, control room equipment, AM, FM and TV antenna systems, transmission line, tower lighting and accessories.

Radio and TV station automation equipment.

Microwave relay equipment.  
A new generation of broadcasting equipment, including advanced products for radio and television stations and fresh concepts for tomorrow, was unveiled by the Radio Corporation of America at the National Association of Broadcasters convention.

RCA exhibit visitors saw an experimental color TV camera which for the first time produces four signals, three in color and one in black-and-white, resulting in color pictures of unprecedented richness and detail, according to C. H. Colledge, Division Vice President and General Manager, RCA Broadcast and Communications Products Division.

The addition of an M-channel (for monochrome) to the three primary color signals generated by current color cameras produces an effect much like that of four-color printing in which black imparts fidelity and depth of tone, Mr Colledge explained.

Use of the new camera will not necessitate any change in present color television receivers, he added. The experimental camera shared the RCA exhibit spotlight with other advanced equipment in the tape and film recording, automatic switching and control systems and FM stereo areas, much of it ready for early use by broadcasters.

Other members of RCA's new generation of radio-television broadcasting equipment included:

1. A television film recorder, capable of a 50 per cent improvement in picture resolution: 900 lines as compared with the 600-line pictures produced in conventional kinescope recording. To reduce halation and achieve a finer focused beam, the recorder uses a new thin-window, flat-faced presentation tube with an inner face-plate on which the image appears. A new double frame pull-down camera eliminates the shutter bar inherent in current systems. These features, plus simplified instrumentation, provide a system that RCA design engineers predict will transform TV film recording from an art to a science, with

predictable and consistently high quality results.

2. A television switching system, the TS-100, featuring a new type of simplified manual control (SIMCON) as the "mother" element for a family of add-ons capable of extending the systems ultimate capability to computer control of all station functions.

The basic SIMCON console is applicable to medium-sized and larger TV switching systems and simplifies manual control of video, audio and operations equipment. For more comprehensive systems, time and memory control can be added, using relay or punched paper tape, or a combination of both, for storage of information.

3. Production models of three types of RCA television tape recorders: the TR-22, the industry's first all-transistorized model, displayed as a prototype machine at the 1961 NAB convention; the TRT-1B, the standard broadcast unit, which will be operating in color, and the TR-11 compact unit, equipped with RCA's new accessory for operation at normal and half speed.

4. A mobile TV tape recording unit which uses a Metro Van, a light-weight local delivery type truck, as transport for the TR-11 compact recorder. The mobile unit will bear a complete price of under \$50,000. The four-rack recorder is installed with two racks on each side of the truck, with the units mounted on tracks to facilitate servicing and removal for in-studio use, if desired.

5. A production model of the TK-12 monochrome camera, now in commercial broadcast use. Its 4 1/2-inch image orthicon tube provides substantial improvement in resolution, signal-to-noise ratio and gray scale rendition.

6. A full range of matched studio and transmitting equipment to meet the exacting requirements of FM stereo broadcasting. The line includes a new universal tape cartridge for either stereo or monophonic operation, a solid-state stereo console, the RT-21 stereo tape recorder for stereo-mono in the smallest cabinet available, and a "new-look" sub-carrier generator for use with FM transmitters.

**RAYTHEON COMPANY**  
Equipment Division, Communication and Data Processing Operation  
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**Products:**  
KTR Microwave Television Relay Systems for Intercity relay remote pick-up or STL applications, 7,000 and 13,000 Mc. Portable and rack-mounted for NTSC color and simultaneous audio.  
TMA Program audio channel units for application to existing systems.  
Microwave Waveguide accessories, including antennas, waveguide, diplexers, etc.

**SARKES TARZIAN, INC.**  
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**Products:**  
Super Studio Vidicon Camera  
Super Film Vidicon Camera System  
Solid State Vertical Interval Switching System  
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**SCHAFFER ELECTRONICS**  
235 South Third Street  
Burbank, California

**Products:**  
Automatic Programming Systems  
Automatic Spotter  
Automatic Program Preparation System  
Remote Control Equipment

**SCULLY RECORDING INSTRUMENTS CORPORATION**  
62 Walter Street  
Bridgeport 8, Connecticut

**THE SOUNDSCRIBER CORPORATION**  
6 Middletown Avenue  
North Haven, Connecticut

**Products:**  
Reference recorders magnetic tape  
24 hours continuous time identified

**STANDARD ELECTRONICS**  
Route 524—Lakewood Road  
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**Products:**  
Exhibiting—All New Space Saving Equipment  
250 Watt FM Transmitter for Stereo or Multiplex  
5 Kw FM Transmitter for Stereo or Multiplex  
1 Kw FM Transmitter  
FM Serrasoid (R) Replacement Modulator for FM/FM Stereo and Multiplex use—for modernizing Western Electric and other older FM transmitters  
Stereo Generator  
25 Kw TV Amplifier  
These equipments contain features well accepted by the Broadcasting Industry, made famous by the Standard Electronics line of TV equipment such as  
Add-A-Unit  
Patchover  
Space Saving  
Economical Operation  
Low Tube Cost—Long Tube Life  
Additional New Features:  
Semi-Conductor Rectifiers in FM Transmitters—NO RECTIFIER TUBES!  
Simplex, Stereo FM/FM and Multiplex Modulator built in.  
Also see TV Broadcast Industry accepted TV Transmitting Equipment.  
25 Kw—FHF Amplifier incorporating now well accepted features, such as:  
Space Saving  
Add-A-Unit  
Patchover  
Economical Operation  
Low Tube Cost—Long Tube Life  
Glass Doors—All Tubes Visible  
Self Contained—No external Transformers, Blowers or other cooling equipment.  
Air Cooled—Even 50 Kw

Available for Channels 2-6 and 7-13 in power output ratings of:  
500 Watts 25 Kw  
10 Kw 50 Kw

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**TEKTRONIX, INC.**  
P.O. Box 500  
Beaverton, Oregon

**Products:**  
Video-Waveform Monitors.  
Vectorscope for Color TV Phase Measurement.  
Video Plug-In Unit for Tektronix Oscilloscopes.  
Oscilloscope Trace-Recording Camera.  
TV and BC Test Equipment—Generators, Amplifiers, Etc.  
Scope-Mobiles (Oscilloscope Carts).  
Auxiliary Test Equipment.

**TELEMET CORPORATION**  
185 Dixon Avenue  
Amityville, L.I., New York

**Products:**  
The electronic demonstrated a number of its latest equipment developments which have extensive applications in the field of color TV and broadcasting equipment, video transmission facilities and testing. The most prominent of these are as follows:

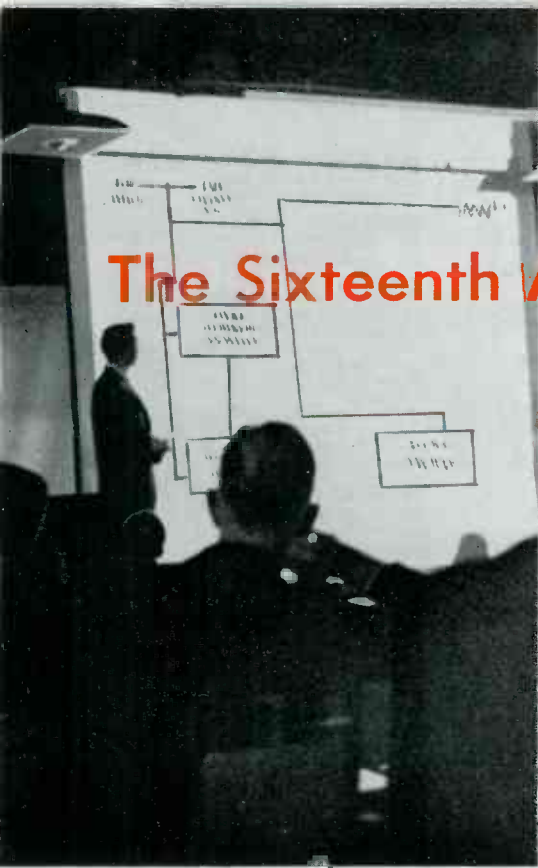
1. TRANSISTORIZED VIDEO TEST SIGNAL GENERATOR, Model 3502A: An entirely new, completely solid state test set featuring individual plug-in modules to generate multiburst, stairstep, and window signals. Each module has self-contained power supply, sync and blanking adder and vertical-interval keying facility.

2. TRANSISTORIZED VIDEO DISTRIBUTION AMPLIFIER, Model

(Continued on page 28)



Edward R. Murrow, long-time radio newsman, network executive and now head of U. S. Information Agency and its Voice of America program, received special NAB plaque for his contributions to broadcasting.



## The Sixteenth Annual

NAB

# ENGINEERING CONFERENCE

George Bartlett and his committee did a fine job of selection in their choice of papers — always a difficult job and open to criticism. It is obviously impossible to report completely the subject and discussion of each paper. So, following are brief summaries of a variety of the papers presented that were available to us at our press deadline.

### SPECIALIZED EQUIPMENT FOR RADIO BROADCASTS

Delegates to the Broadcast Engineering Conference were told that equipment now in use will virtually let a station run all by itself.

Ralph L. Haberstock, Senior Audio Engineer with the Gates Radio Co., Quincy, Ill., said use of cartridge tape equipment for radio programming is most helpful in taking the jam out of the control room. "Tape cartridges could be recorded with spots and themes," he said, "would cue ready for re-use and would reduce the chance for error that might result in lost revenue."

Mr. Haberstock said the system works through tones which are inaudible to the human ear. The tones, he said, trip switches and cause other machines to start or stop operations. Various tones can be used to perform a variety of control room functions, leaving the operator free to concern himself with other production chores.

The use of inaudible control tones also was the basis for a presentation by John A. Moseley, President of Moseley Associates, Inc., Santa Barbara, Calif.

Mr. Moseley told the assembly about a new microwave remote control unit which can perform functions heretofore possible only by telephone lines and linear control equipment. The new unit, a studio-transmitter link operating in the 950 megacycle range, uses a series of tones to turn on transmitters, raise or lower power, turn on associated equipment, and of course, turn equipment off.

The equipment is most valuable for locations where telephone lines ordi-

narily are impractical, such as mountain tops, he said.

The radio-controlled remote system also would relieve stations of concern over line failure, icing and breaking of wires. In addition, the cost of a radio remote control link is a one-time affair, while a line set up is on rental from a telephone company.

Use of this radio control system for stereo also is under investigation.

### QUALITY CONTROL OF FM STEREO DISCUSSED BY BROADCAST ENGINEERS

Representatives from two companies that manufacture transmitter and receiver equipment stressed the need for more quality control in FM Stereophonic broadcasting.

Frank D. McLin, Project Engineer of Collins Radio Co., Cedar Rapids, Iowa, told the engineers of a new transistor-powered FM broadcast system for both monophonic and stereophonic transmissions. He said it also could be used in the so-called 'background music' service.

Frank McIntosh, Washington, D. C., consulting engineer for McIntosh Laboratory, Inc., of Binghamton, N. Y., reviewed the present quality in FM broadcasting and improvements that can be made in the future.

Mr. McLin said the transistor-powered FM system is superior to regular tube systems because "it has high reliability due to the extensive use of transistors, low distortion, and excellent channel separation."

He said home listeners will enjoy benefits of greater stereophonic clarity through this new system, and the

advantages to both monaural and background listening will be superior to existing systems.

### LENS AND PICKUP TUBE MANUFACTURERS SEEKING TO IMPROVE HOME PICTURES

Constant research and development of television components which ultimately will give home viewers a better quality picture were outlined in two papers presented by research engineers. Dr. Frank G. Back, Research Director of Zoomar, Inc., discussed "New Concepts in the Evaluation of Television Lenses," while R. G. Neuhauer, an Engineering leader of the Radio Corporation of America, reported on "Characteristics and Mode of Operation of Image Orthicons."

Lenses that give an accurate picture of a test board do not always present an accurate rendition of a live subject, according to Dr. Back. He said, "A lens can have extremely high target resolution, but the picture may appear washed out and lacking in crispness."

Because of the low sensitivity to blue of standard camera pickup tubes, he said, the in-focus changes of zoom lenses do not affect picture quality, and the color may be used as a filter by coating the lens.

He said this will give a sharper picture on color transmission. A black and white camera must use a wider lens opening because of the reduced input of reds and green with the blue filter.

One of the most effective, inexpensive, and readily available methods of testing and evaluating the finished pickup lenses, Dr. Back said,



# NEW TELECHROME TRANSISTORIZED VIDEO AND PULSE DAs & VIDEO TEST EQUIPMENT

Telemet's new line of transistorized video broadcast and test equipment features the same Telechrome standards of performance in compact units which occupy the smallest rack space possible. Space and heat dissipation problems are dramatically reduced. The five units shown below represent the beginning of a complete new line of fully transistorized equipment by Telemet.

#### TRANSISTORIZED VIDEO AND PULSE DAs FEATURING:

- Plug-in modules
- Individual internal power supplies
- Compensated input capacity
- 1 in-4 out per module, 32 outputs for 3½" rack space



**MODEL 3200 VIDEO DISTRIBUTION AMPLIFIER.** Gain up to 6 db; frequency response  $\pm 0.5$  db 10cps-10mc; differential phase less than 0.2 degrees; differential gain less than 0.3 percent



**MODEL 3202 PULSE DISTRIBUTION AMPLIFIER.** Output level adjustable between 3.5 and 4.5 volts; output pulse within EIA specs and constant over an input voltage range 1.5 and 5 volts; failure alarm indicates loss of output pulse

#### TRANSISTORIZED TEST EQUIPMENT FEATURING:

- Standard EIA output
- Simultaneous VIT output
- Internal power supply
- Portable or rack mounted models



**MODEL 3501 MULTIBURST GENERATOR**



**MODEL 3502 STAIRSTEP GENERATOR**



**MODEL 3503 SINE SQUARED PULSE AND WINDOW GENERATOR**

Send for complete catalog data.

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AMITYVILLE, NEW YORK: 185 Dixon Avenue • Phone (516) 541-3600  
SANTA ANA, CALIFORNIA: 38-41 S. Main Street • Phone (714) 546-2281

A Giannini Scientific Company



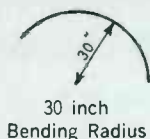


# H8

new  
large size  
HELIAX

## Flexible Coaxial Cable

**3 inch**  
Nominal Size



**315 kw**

In Excess of  
**2500 ft.**  
Continuous  
Lengths

H8, HELIAX is available, both jacketed and unjacketed in standard and high average power designs. High power designs use high temperature polyethylene insulation.

H8, HELIAX features corrugated copper inner and outer conductor construction. The corrugations impart unusual strength and flexibility, while maintaining excellent electrical characteristics.

H8, HELIAX peak power rating is 315 kw. Average power ratings at 100 mc are:

H8-50	Unjacketed, 50 ohm	23 kw
HJ8-50	Jacketed, 50 ohm	26.5 kw
H8-50A	Unjacketed high power, 50 ohm	34.5 kw
HJ8-50A	Jacketed high power, 50 ohm	40 kw

Attenuation is 0.14 db/100 feet at 100 mc

H8, HELIAX is available in continuous specific lengths as limited only by receiving and handling facilities.

WRITE FOR BULLETIN 8486

HELIAX is available in sizes 3/8 to 3 inches.

*Andrew*

P. O. Box 807, Chicago 42, Illinois

BOSTON  
NEW YORK

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TORONTO

WASHINGTON, D.C.

is to use the lens on a projector, and view the screen as the lens proceeds through the various stages of the zoom. Such tests, he said, "reveals shortcomings or deficiencies within minutes, where bench tests would take hours to conduct."

The same uniformity and depth of true blacks and whites were discussed by Mr. Neuhauser of RCA's Electron Tube Division. He said a more accurate picture ultimately will make home viewing more enjoyable.

He said "high voltage operation of the image orthicon pickup tubes produces the best signal and most accurate photographic reproduction of a scene."

### STUDIO LIGHTING ADVANCES DESCRIBED AT CONFERENCE

A more accurate camera pickup of colors in a television studio can be obtained under a new TV studio lighting concept described by Rollo G. Williams, director of color research for Century Lighting, Inc.

He said lighting of a television studio "should be approached in a manner that will allow the spectral distribution of the light sources to be varied as required, so that advantages can be taken of higher output, spectral distribution changes, or long lamp life as required."

Mr. Williams said the power of a lamp is not the key factor in illuminating a set. Of more importance, he said, is the reflected light from the subject that the camera sees.

Mr. Williams said lighting technicians, by using a lamp that can be varied through control equipment to cover the entire visible range of colors, can "overcome a major battle in clarity." "Intelligent control of such factors," he said, "can result in important economies in equipment and operating costs."

### SIGNALS OF TELEVISION STATIONS MEASURED IN TWO UHF-VHF PROJECTS

Television stations and antenna manufacturers conduct extensive research of existing or planned antennas to assure home viewers the best picture possible.

Such an experiment now is in progress in New York City and another was conducted in St. Louis, Mo.

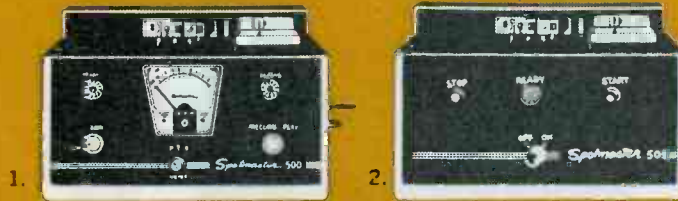
E. W. Allen, Chief Engineer of the Federal Communications Commission, told delegates to the Broadcast Engineering Conference that preliminary results from WUHF, the ultra-high frequency television station on channel 31, in New York City, showed good quality reception up to 25 miles from the transmitter.

Two separate antennas are being used in the project, and transmissions in both black and white and color are tested with each system. Some 5000 residences in the metropolitan New York City Area are covered in the test, and pictures are checked with an eye to clarity and quality with both indoor and outdoor receiving antennas.

A comparative check between New York VHF stations and the experimental WUHF has shown no outstanding weakness in the UHF signal. But, Mr. Allen pointed out that, "it is believed to be too early to draw



# INDUSTRY'S MOST COMPLETE LINE OF CARTRIDGE TAPE EQUIPMENT



1. 500—Compact combination cartridge tape recorder/playback unit; 2. 505—Compact cartridge tape playback unit;

monophonic units



3. 500S—Compact combination stereo cartridge tape recorder/playback unit; 4. 505S—Compact stereo cartridge tape playback unit (also available in rack mount);

stereophonic units



8. RS200—Lazy susan revolving cartridge rack;

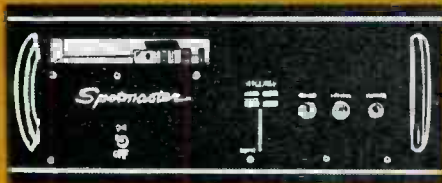
lazy susan



10. 300, 600, 1200—Tape cartridges



5. 500R—7" rack mount combination cartridge tape recorder/playback unit;



6. 505R—7" rack mount cartridge tape playback unit;

rack mounted units



9. RM100—wall mount cartridge rack;

wall mount cartridge rack



7. TP1—Tape cartridge winder

tape cartridge winder

This is Spotmaster—the most complete line of quality cartridge tape equipment in the World. Pioneered by Broadcast Electronics, Inc.—Spotmaster equipment is now being used in over 500 radio and television stations in the U.S.A. and in over 100 stations in Canada, Mexico, Europe and Australia.

1. 500—Compact combination cartridge tape recorder/playback unit; 2. 505—Compact cartridge tape playback unit; 3. 500S—Compact combination stereo cartridge tape recorder/playback unit; 4. 505S—Compact stereo cartridge tape playback unit (also available in rack mount); 5. 500R—7" rack mount combination cartridge tape recorder/playback unit; 6. 505R—7" rack mount cartridge tape playback unit; 7. TP1—Tape cartridge winder; 8. RS200—Lazy susan revolving cartridge rack; 9. RM100—wall mount cartridge rack; 10. 300, 600, 1200—Tape cartridges

SOLD NATIONALLY BY: Visual Electronics Corp., 356 W. 46th St., N.Y., N.Y. Richard H. Ullman Inc., 1271 Ave. of the Americas, N.Y., N.Y. CANADA—Northern Electric Co., Ltd., 250 Sidney St., Belleville, Ontario. AUSTRALIA—Simon Gray Pty., Ltd., 28 Elizabeth St., Melbourne, C.I.

*Spotmaster*

BROADCAST ELECTRONICS, INC. 8800 BROOKVILLE RD., SILVER SPRING, MD.

# NEMS-CLARKE®

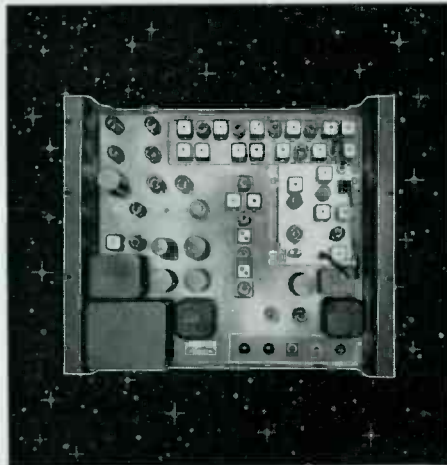
## BROADCAST EQUIPMENT

### TV COLOR REBROADCAST RECEIVER NEMS-CLARKE TRC-1

meets requirements for a high-quality receiver for use in direct pickup and rebroadcast or monitoring of black and white and color signals. Its features give reliability necessary for full-time commercial use with signals of exceptional quality.

Video freq. response  
± 2db, 50cps-4.2mc  
Audio distortion less than 1%.  
Local oscillator stability ± .005%  
Noise figure, channels 2-6, 10db max.  
channels 7-12, 12db max.

Data Sheet No. B-006 **Price: \$1150.00**



### FIELD INTENSITY METER NEMS-CLARKE 120-E

is a compact lightweight portable instrument for measurement of a wide range of radio signal intensities in the broadcast band of 540-1600kc. Its range of sensitivity from 10 microvolts per meter to 10 volts per meter, makes it ideal for the interference studies at low signal strength in close-in measurements and high power directional arrays. The accuracy of the attenuators is 2%.

Data Sheet No. B-001 **Price: \$850.00**

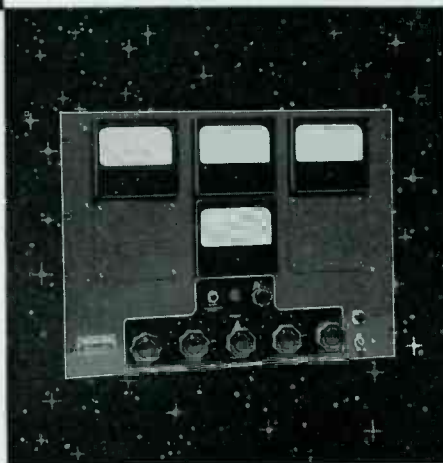


### PHASE METER NEMS-CLARKE 108-E

indicates phase relationships in directional antenna systems. Each instrument is adapted for the particular installation and usually incorporates provision for indicating the relative amplitudes of the currents in the various antennas.

Frequency range—100kc-2mc  
Phase angle range—0°-360°  
Monitoring accuracy 1°  
Resolution 1/2°  
RF input impedance—  
50 or 70 ohms nominal  
RF voltage range—1 to 7 volts.

Data Sheet No. B-003 **Price: \$700.00**



definite conclusions on the basis of the trends exhibited by the very small quantity of data analyzed so far."

In another antenna measurement survey—the power gain of KMOX-TV, St. Louis—a helicopter was used to take readings around the perimeter of the coverage area.

A report on the installation and measurement procedures was made to the Engineering Conference by Ogden L. Prestholdt, Director of Engineering for the CBS Radio Network. Co-authors of the research report were Andrew Alford, president of the Alford Manufacturing Company, Boston, Mass., and R. E. Fisk, specialist with the antenna engineering division of the General Electric Company, Syracuse, New York.

To simulate the existing KMOX-TV antenna, a scale model laboratory antenna was built. To simulate the comparison antenna, a scale of that also was built. The full-size comparison antenna was hoisted through the center of the existing KMOX-TV tower and fastened to its tallest height, just below the regular antenna.

Measurements were made by a mobile unit with the antenna set at about the height of an average home. Because reflection from ground obstructions prevented a complete and accurate survey, a helicopter was used to take readings in various stages of elevation and various distances from the tower.

With the comparison antenna strength noted, it was mathematically possible to measure the difference between the regular antenna and the reference antenna, and compute the power strength.

### TRANSMITTER-KICKING AND TUBE-TAPPING SOMETIMES RETURNS STATIONS TO THE AIR

Two engineers for the Collins Radio Co., Cedar Rapids, Iowa, agreed that tapping of tubes and a "judicious" kick of the transmitter is a good first step toward putting a faulty transmitter back on the air.

A paper presented to the Broadcast Engineering Conference here by Richard L. Uhrik and Everett J. Gilbert, outlined steps taken in a search for a rapid system whereby a station could be returned to service after a breakdown of transmitter equipment.

Mr. Uhrik told the conferees that "the sources of potential failure in a transmitter number from 5000 to 10,000 individual possibilities."

The best thing to do immediately, he said, is to attempt "stab-in-the-dark" repairs, using judgment based on years of actual operating experience.

In the event this "Immediate Action Plan" fails, there are "32,786 sets of 15 decisions" the engineer can make. By isolating each section of the transmitter and blocking the possibilities of failure in each section, the fault can be found systematically and fairly rapidly.

Mr. Uhrik said, pre-planning a fault isolation system by stages is a time-consuming job. He recommended that stations under-graduate engineering students on a part-time basis to work out a system for general station use.

**Vitro ELECTRONICS**

919 Jesup-Blair Dr. Silver Spring, Md.  
A Division of Vitro Corp. of America

Manufacturers of Telesync, Test Sets, Field Intensity Meters and Accessory Units, Audio, Video and RF Jack Panels and Patch Cords. Write for Catalog.



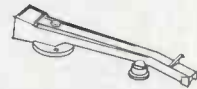


# ANNOUNCEMENT

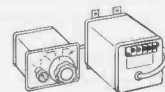
*GRAY RESEARCH AND  
DEVELOPMENT COMPANY*

*has been purchased by a group  
of former employees and  
Hartford businessmen . . .*

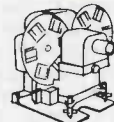
We intend to maintain — and improve — the high-quality standards associated with “GRAY RESEARCH” since 1948 . . . we will continue to meet delivery commitments without sacrificing quality or reliability . . . we will continue our responsibility to present users of *Gray* equipment.



Where feasible, we will stock spare parts for all equipment manufactured by *Gray Research* and to have these parts shipped within 24-hours from receipt of your order.



By the time you read this, our new plant under new management will be in full production. For more information on our policies, products, services and facilities, contact me directly.



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EXPORT: Rocke International Corp., 13 E 40th. St., N.Y. 16, N.Y. CANADA: Applied Electronics, 23 Canmotor Ave., Toronto 18, Canada

## LIGHTWEIGHT UNIT AIDS IN TELEVISION STRENGTH REPORTS

A new transistor-powered field strength meter for both Ultra High Frequency (UHF) and Very High Frequency (VHF) television stations was revealed today by Smith Electronics, Cleveland, Ohio.

Cecil S. Bidlack, broadcast consultant with the Ohio electronics manufacturer, told delegates to the Broadcast Engineering Conference that the size and weight of units heretofore used in measuring the signal strength of television stations were large, unwieldy and needed storage batteries or lines for electricity.

He said the new unit was designed for use by the Federal Communications Commission in its New York City test of the relative signal strengths and coverage areas of both UHF and VHF transmissions.

The new unit is lighter and smaller than conventional models and can operate on batteries rechargeable overnight from any regular power source. It uses a speaker for television station audio and a meter to check the strength of the video signal with no picture tube.

Mr. Bidlack said that "a completely portable instrument such as has developed has untold possibilities for the future."

## MAINTENANCE-FREE TRANSISTORIZED BROADCAST EQUIPMENT PHROPHESIZED

Television broadcast equipment will be maintenance-free and will give uninterrupted quality service when stations begin all-transistor operation in the near future, according to a noted television studio engineering consultant.

In a paper, prepared jointly by J. F. Wiggin, and by R. E. Putman, manager of General Electric's Studio & Industrial TV Engineering, Mr. Wiggin said that transistors have come a long way since they were first used in television broadcast equipment. Transistors draw less power than vacuum tubes and in comparison "a vidicon chain using transistors finds a power reduction of 24 to 1. In the mechanical area, the reduction in size of all components allows a great saving in volume and weight."

In tests of General Electric broadcast equipment using transistorized circuitry, over 900,000 hours of operation were logged to one transistor failure. "To put it in a better light," said Mr. Wiggin, "this means that there has been approximately one transistor fail per unit per year of continuous operation."

Discussing the disadvantages of transistors, Mr. Wiggin said that "transistors are quite critical to both heat and cold." He added "even though transistor prices have dropped drastically during the past year, they still cost more than tubes. Consequently, much of the transistorized equipment has a higher initial cost than tube equipment."

He told the engineers, "It appears that more and more equipment will be designed with transistors, and you, the broadcasters, will receive greater stability and reliability of equipment in the future."

## SPECIAL DESIGN APPLICATIONS PROVE TRANSISTOR LONG LIFE

John H. DeWitt, Jr., president of WSM, Inc., owners of WSM-TV, Nashville, told the Broadcast Engineering Conference that the life of a transistor in certain camera stages give "no noticeable deterioration of picture quality with time."

Furthermore, he said, it now is possible "to design equipment using only one or two types of transistors which greatly reduces the stockage problem."

"General use of well-designed transistorized equipment will greatly reduce maintenance cost in any given station," he said. "It will be the delight of management as well as a comfort to the chief engineer."

Mr. DeWitt spoke primarily about two specific units now in operation at WSM-TV, a video/pulse distribution amplifier, and a camera pre-amplifier.

Charles P. Ginsburg, a vice president of the Ampex Corp., told delegates about a newly-designed television tape recorder which operates on different principles than the contemporary model.

He discussed the design characteristics of a helical scan recorder, and compared them to those of the existing transverse model.

## SPECIAL FUNDS AVAILABLE FOR EMERGENCY CONELRAD STATIONS

The chief engineer of an Alabama radio station suggested that every station assigned to Conelrad should have an emergency system to keep it on the air in event of a power failure.

James E. Gray, WYDE, Birmingham, Alabama, told delegates to the Broadcast Engineering Conference that Congress has allotted funds for such emergency facilities.

Mr. Gray outlined the minimum requirements for installing emergency facilities at the transmitter site, as well as recommended procedures for fast and efficient transition to the Conelrad frequency.

## REFRIGERATED TRANSMITTER KEEPS KOOL TELEVISION COOL

A television station in Phoenix, Ariz., has enclosed its entire transmitter area in a refrigeration chamber to combat temperature difficulties which could cause technical breakdowns.

Albin R. Hillstrom, chief engineer of KOOL (AM-FM-TV), told delegates to the Broadcast Engineering Conference that unusually high temperatures, fine dust conditions, and a low-ceiling building made conventional air coolers obsolete for the Phoenix installation.

KOOL's engineers and refrigeration technicians computed the mean temperatures at which the equipment should operate, and the unusually high temperatures present at the transmitter building. With a formula for the amount of cooling required, station engineers and refrigeration technicians installed an air tight chamber around the transmission equipment.

Mr. Hillstrom said the special chamber is relatively maintenance-free and completely automatic. The compressors start only when the blowers on the transmitters are in

## PROGRAM AUTOMATION CAN REDUCE COSTS, INCREASE EFFICIENCY

by Vernon A. Nolte, V. Pres.  
WJBC and Automatic Tape Control



Program automation does not mean pushing a button, walking out the door and locking the studio for the day. Automation is only a tool designed to provide specific efficiencies under certain program conditions.

Broadcasters today appear to be interested in two forms of program automation—the first, partial automation for brief periods—the second, full time automation for protracted program periods.

Both part-time and full-time automation can offer some interesting cost saving and efficiency factors. With rising costs in the industry, broadcasters must keep an eye on expenses and attempt to get more productive effort from employees. Many broadcasters believe it no longer makes sense to have a creative, skilled and well paid announcer spending most of his time in a control room doing mechanical operations when his efforts could be more productive elsewhere. This has encouraged some broadcasters to automate for periods of from two to three hours a day. They have found that they can relieve an announcer from mechanical functions in the control room long enough to prepare news broadcasts, write commercial copy, make sales calls, prepare public service programs, act in public relations capacities, and perform a multitude of other productive functions. Although this type of automation may not save a station much money, it does provide a method of getting more meaningful work from existing employees.

Full time automation is now used extensively, particularly by FM stations. Some AM stations also have found that it is possible to operate by automation and still maintain the spontaneity of the medium. At WJBC-FM, for example, which is now completely automated fifteen hours a day, we have been able to produce additional revenues to the extent of \$20,000 to \$25,000 per year at operating costs that are less than \$10,000 a year. One employee can operate the entire station, including the selling of time. News, bookkeeping, traffic and copy services are available from the regular AM staff without any additional cost.

Automatic Tape Control does not claim to have the complete answer to everyone's program automation problem. We do have certain tools that we believe offer the greatest flexibility in an automation system. The standard ATC units, the ATC 55, the new Automatic Program Logging—all have been designed to solve the automation problems of broadcasters. We recommend the personnel of Automatic Tape Control. They may be of assistance to you at your station.





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**THE NAB CONVENTION**  
*the latest developments in*  
**AUTOMATIC PROGRAMMING**  
*by Automatic Tape Control*



Just as no two sets of fingerprints are identical, no two broadcast stations have identical requirements for automated programming. Each installation must be considered from the standpoint of that station's own unique program policies and physical layout. That's why all our men are actually broadcast personnel. They do more than sell a piece of equipment. They can advise and counsel on your requirements—and how best to use our equipment to get the

most satisfactory and profitable results. Reading clockwise from the top: Bob Johnson, Tim Ives, Lee Sharp, Elmo Franklin and the three at left who are our engineers. These men were able to solve several automation problems for broadcasters at the recent NAB Convention. They are ready now to perform the same service for you. Why not get complete information on ATC equipment as it applies to *your* station. Write, wire, or phone us collect today.

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operation. Filters trap all dust before the cooled air enters the transmitter room, insuring clean operation of all equipment.

Mr. Hillstrom said the system has been in operation some 5,000 hours, and only one off-air problem has occurred—through no fault of the cooling system. Despite the high heat and low humidity of the desert area, he said, enough moisture is collected to provide all the water needed by the system.

**NEW TELEVISION SOUND SYSTEM PREVENTS AUDIO LINE FAILURE**

A newly-developed television system that puts sound in the picture promises to end that silent period during network audio failures was described by J. L. Hathaway of National Broadcasting Company's engineering department. An emergency sound system injects the aural portion of a television program directly into the picture portion. Ordinarily, sound and picture are carried on two different circuits. If a failure occurs between the network origination point and the television station either the sound or the picture is lost, depending on the circuit affected.

With the new system, now undergoing final testing by both NBC and the American Telephone and Telegraph Company, the sound is carried between the lines of the television picture in an unobtrusive state, invisible to the home viewer.

If the sound circuit from network to station is working normally, the emergency sound is not used. But if an interruption in the audio circuit occurs, the emergency sound is switched on with barely a break in reception. After repairs are made, sound is switched back to normal.

Because of the extreme width of a television picture circuit, it is not possible to inject a picture into the sound circuit.

**LOUISIANA TELEVISION REPAIRMEN LICENSED BY STATE-WIDE REGULATIONS**

A Louisiana law regulating the quality of service performed by television repairmen has driven out the "phony operators" and generally restoring public faith in TV repair shops, Broadcast Engineers were told by J. D. Bloom, Chief Engineer of WWL-TV, New Orleans, La.

He said the law was first enacted in 1958 to regulate home receiver technicians in cities of 20,000 or more persons, and was amended in 1960 to apply to all radio and television technicians in the state.

He said licensing is applied to an individual, rather than to a company, so that every workman who repairs any home receiver in Louisiana is responsible for the quality of his work and the costs of his service.

Mr. Bloom said the law has protected honest dealers from "cut-throat operations." All technicians seem to be satisfied with the law, and citizens of the state are getting quality service, he said.

He said a regulatory board, comprised of state appointed members and actual servicemen, not only receives complaints but offers classes to servicemen to aid them in better quality home repair service.



Television installation incorporating Tektronix Type RM527's in a Master Monitor console.

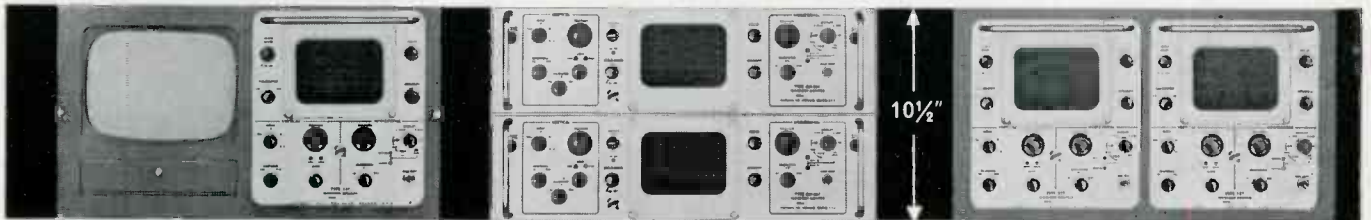


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You can use the dual inputs differentially. In addition to conventional two LINE and two FIELD displays, you can choose from three calibrated time-base rates, eliminating the need for time markers. And you can observe bright displays accurately and dependably over a full 7-cm by 10-cm viewing area.

Adaptable and versatile, this Tektronix Waveform Monitor features: amplitude linearity within 1% over full 7-cm of vertical deflection • sensitivity from 0.25 volt minimum to 1.6 volts maximum for 140 IRE units • response flat within 1% from 60 cycles to 5 mc or new IRE Rolloff • internal calibrator for 1.0 and 1.4 volt peak-to-peak signals • backporch dc restoration, *with no color-burst distortion.*



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Type RM527 . . . . . \$1075  
5 1/4" high, 16 3/4" wide, 16" deep

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Shortly after merger of I&T Publications, publishers of this magazine, with Howard W. Sams & Co., Inc., Howard W. Sams (right), Chairman and President of the merged firms, visited this publication's headquarters in Kansas City, Mo. He is shown with Robert E. Hertel (left) who remains president of I&T publications and William M. Kellner, superintendent of printing services.

## Broadcast Engineering Now Affiliated With Howard W. Sams & Co., Inc.

THIS magazine, published by Technical Publications, Inc., became affiliated with the Howard W. Sams & Co., Inc., March 1, when the Sams firm purchased Implement & Tractor Publications, Inc., the parent enterprise of which Technical Publications, Inc., is a subsidiary. The I&T properties which consist of nine publications and a complete printing plant will be operated by Howard W. Sams & Co. as a subsidiary. Robert E. Hertel remains as president of the Kansas City based firms and will serve on the board of directors of the Sams organization. Howard W. Sams and three other Sams executives will join the I&T board with Mr. Sams as chairman.

The Sams organization is a large, diversified publishing business with

a long-established subsidiary, the Bobbs-Merrill Co. publishers of law books, text books and educational materials. The nucleus of Howard W. Sams & Co. is its authoritative PHOTOFAC, a publication which is issued in special folder set format, containing service data obtained from engineering analysis and testing through laboratory study of radio receivers, audio equipment, record changers, recorders and similar consumer-type equipment. The 564 consecutive sets, as of March 1962, composing the current PHOTOFAC library provide essential how-to-do-it service information covering 53,000 models and are the exclusive source of such information in the industry.

(Continued on page 31)

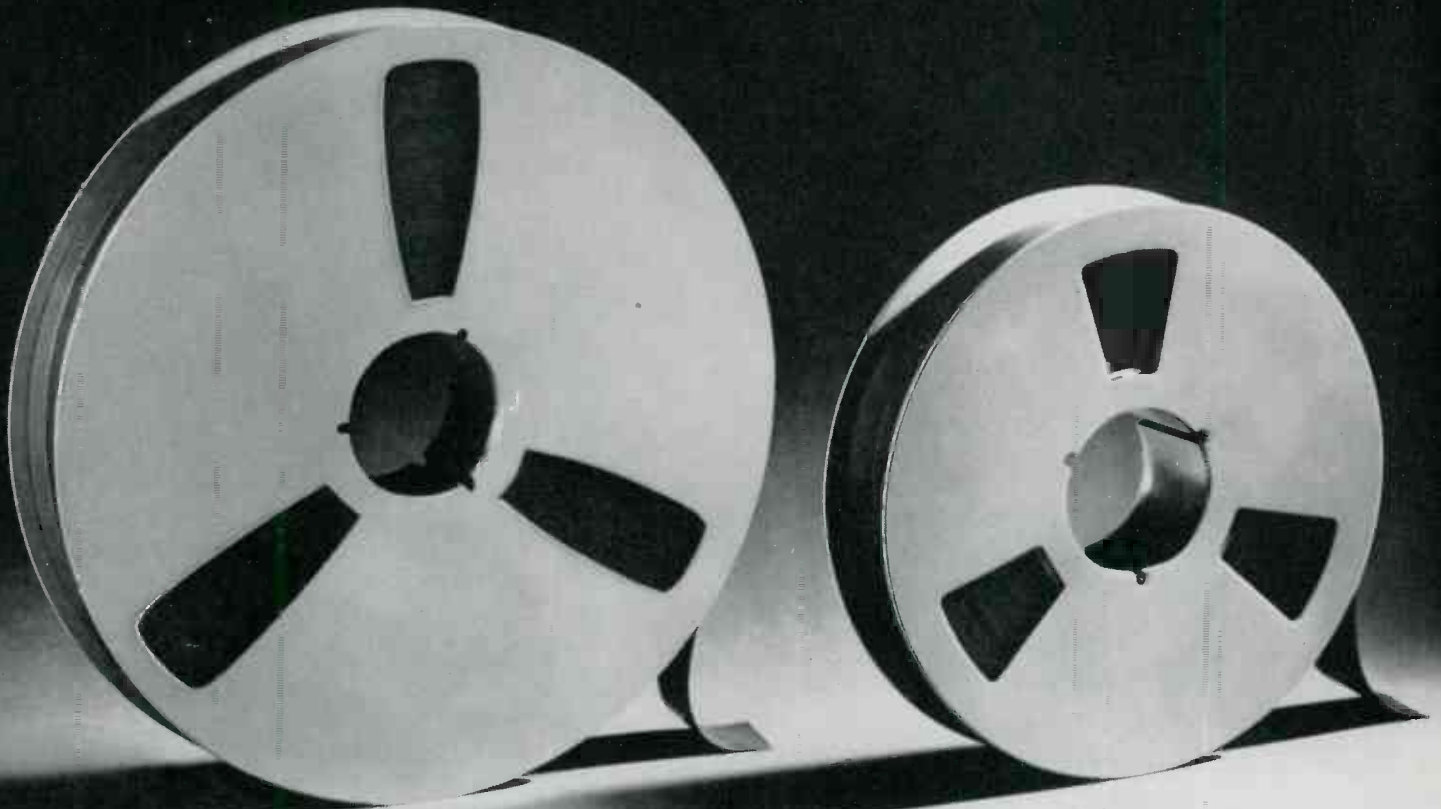


Howard W. Sams (right), founder of the publishing enterprises bearing his name, chats with Ed Carey, press foreman, in the firm's Kansas City affiliate.



# NOW...CUT YOUR TV TAPE COSTS IN HALF!

*pack twice as much programming on a reel!*



*all this...*

*on this!*

Photography Courtesy Reeves Sound Studios, Inc.

New RCA development enables you to operate any RCA recorder at 7½ or 15 ips – *without sacrificing compatibility*



- Permits 50% Cost Reduction in Tape Inventory
- Reduces Tape Storage Space
- Cuts Tape Distribution Expense

This new engineering advance, available only for RCA TV Tape Recorders, combines all the benefits of standard quadruplex recording with the savings of half-track recording. It provides for tape speed to be switchable from conventional 15 inches per second to half speed at 7½ ips.

Since this new approach uses quadruplex recording, tapes are interchangeable with other standard machines. Regular 2-inch tape is used. Standard editing techniques are employed. There are no picture discontinuities. And there is no discernible difference in resolution. *You get the same high quality that you are now getting from RCA recorders.*

**HOW IT WORKS:** A new RCA headwheel assembly and capstan motor make it possible to use half-track recording and to cut tape operating speed in half. The new recorded track is only 5 mils wide as compared with 10 mils for conventional recording. As a result, twice as many tracks can be recorded on the same length of tape—permitting twice as much programming to be packed on a standard reel.

See your RCA Broadcast Representative for complete details. Write RCA, Broadcast and Television Equipment, Dept. H-367, Building 15-5, Camden, N.J.



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# If this video recording equipment didn't



**1. AMPEX VR-1000C. CONSOLE VIDEOTAPE\* RECORDER.** Provides sparkling-clear picture plus accuracy and control of both black/white and color. It's easy to maintain. And console format provides unequalled operating convenience. A processing amplifier gives you superior playback of all tapes, including rf-to-rf copies. Unquestionably the finest in performance, convenience, reliability: The VR-1000C console. No wonder it's preferred by all U.S. and foreign networks! And only Ampex has it.

**2. AMPEX VR-1002. UPRIGHT VIDEOTAPE\* RECORDER.** The practical answer for the console-equipped station needing a companion recorder or a mobile recording unit. Or for the station with space

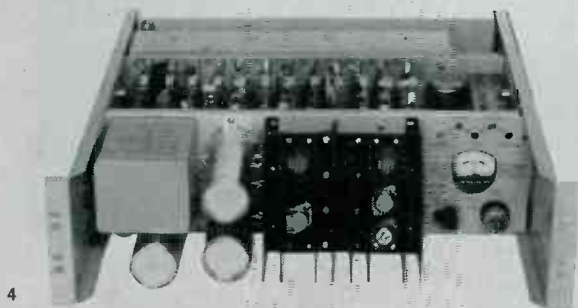
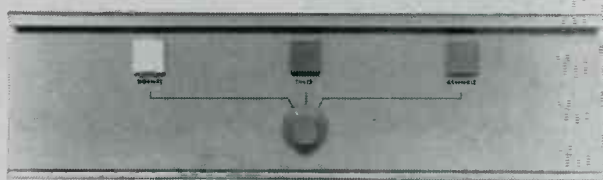
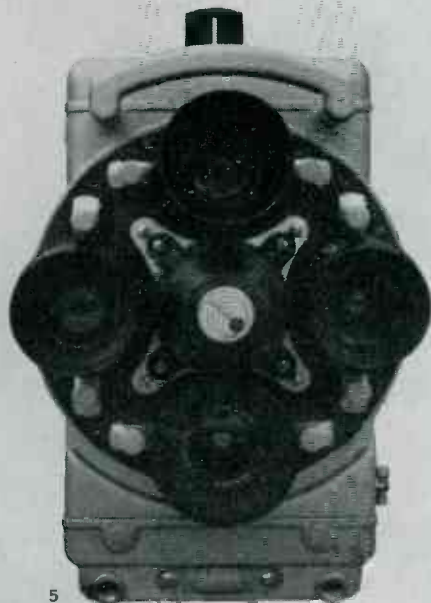


limitations. It gives you the quality features you want most—in a compact design that stresses ease of operation. AFC Modulator automatically locks carrier frequency to standard. Control panel adds convenience with all meters required for normal operation placed adjacent to their respective control knobs. And a Mark III recording head has individual transducers pre-selected and precisely matched for the highest picture quality. (Monitoring equipment optional.)

**3. AMPEX ELECTRONIC EDITOR.** Makes editing as easy as pushing a button. No physical cutting or splicing. You electronically insert changes, assemble new material or make corrections while the tape is in motion. And watch the entire new tape on the monitor—during



# give you the finest performance attainable...



production. The result: important new savings in time and tape. And only Ampex has it.

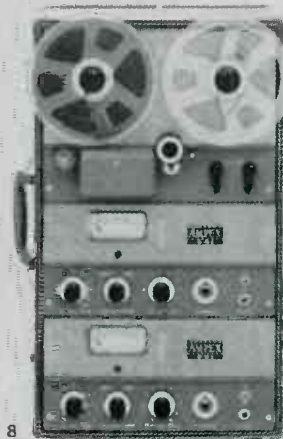
**4. AMPEX COLORTEC®. DIRECT COLOR RECOVERY EQUIPMENT.** Color adaptation — without complex conventional signal processing of decode-encode or heterodyning systems. Colortec produces signal guaranteed to meet N.T.S.C. color standards. Offers simplified operation — only two controls. Single solid-state chassis fits into only 5 1/4" of panel space in present VTR electronic racks. And only Ampex has it.

**5. AMPEX/MARCONI MARK IV. 4 1/2" IMAGE ORTHICON TV CAMERA.** The world's most advanced monochromatic TV camera. Provides

outstanding picture quality superior gray scale, noise-free picture — elimination of halos. It's stable, easy to operate — complete remote control relieves camera man of all electronic adjustments. It's the most imitated camera today and the perfect teammate to the VR-1000C or VR-1002 for producing, recording and reproducing the finest picture in television. And only Ampex has it.

**6. NEW AMPEX VIDEOTAPE®.** This is the year that videotape reaches a new standard of performance. The year you can get videotape made by Ampex. Into this tape has gone the superior engineering and manufacturing skill that has made Ampex the leader in the videotape recorder field. And it's coming your way soon.

or if this audio equipment didn't, either....



**7. AMPEX 351 AND 354. PROFESSIONAL RECORDER/REPRODUCERS.**

The Ampex 351 is dependable. Flexible. Easy to operate. And provides lasting economy. (Some models have logged over 36,000 hours. No wonder the 351 has become the standard of the broadcast industry!) Available unmounted, in a console or portable and a two-channel version: the 351-2. The recorder above: the 354 — a two-channel recorder designed specifically for stereophonic sound. It provides two new channels of electronics — in one compact panel. Both record and play at  $3\frac{3}{4}$  and  $7\frac{1}{2}$  ips or  $7\frac{1}{2}$  and 15 ips.

**8. AMPEX 601. PORTABLE RECORDER/REPRODUCER.** Both the 601 (monophonic) and the 601-2 (stereophonic) offer full professional quality recording and reproducing. Plus the utmost in convenience and portability. The 601 gives you instantaneous starting, low impedance output, plug-in low impedance microphone transformer. So

does the 601-2 — along with new precision stereo heads, freedom from cross-talk and separate mixing controls for each channel. Both models record and play at  $3\frac{3}{4}$  or  $7\frac{1}{2}$  ips.

**9. NEW AMPEX 1200. PORTABLE 4-TRACK RECORDER/REPRODUCER.**

The newest precision portable 4-track recorder from Ampex. It makes possible the convenience and economy of 4-track recording/reproduction with full professional quality previously attainable only in 2-track. Plays and records at  $3\frac{3}{4}$  and  $7\frac{1}{2}$  ips.

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# TELEVISION TAPE FUNDAMENTALS

## Part 4— What the System Must Do

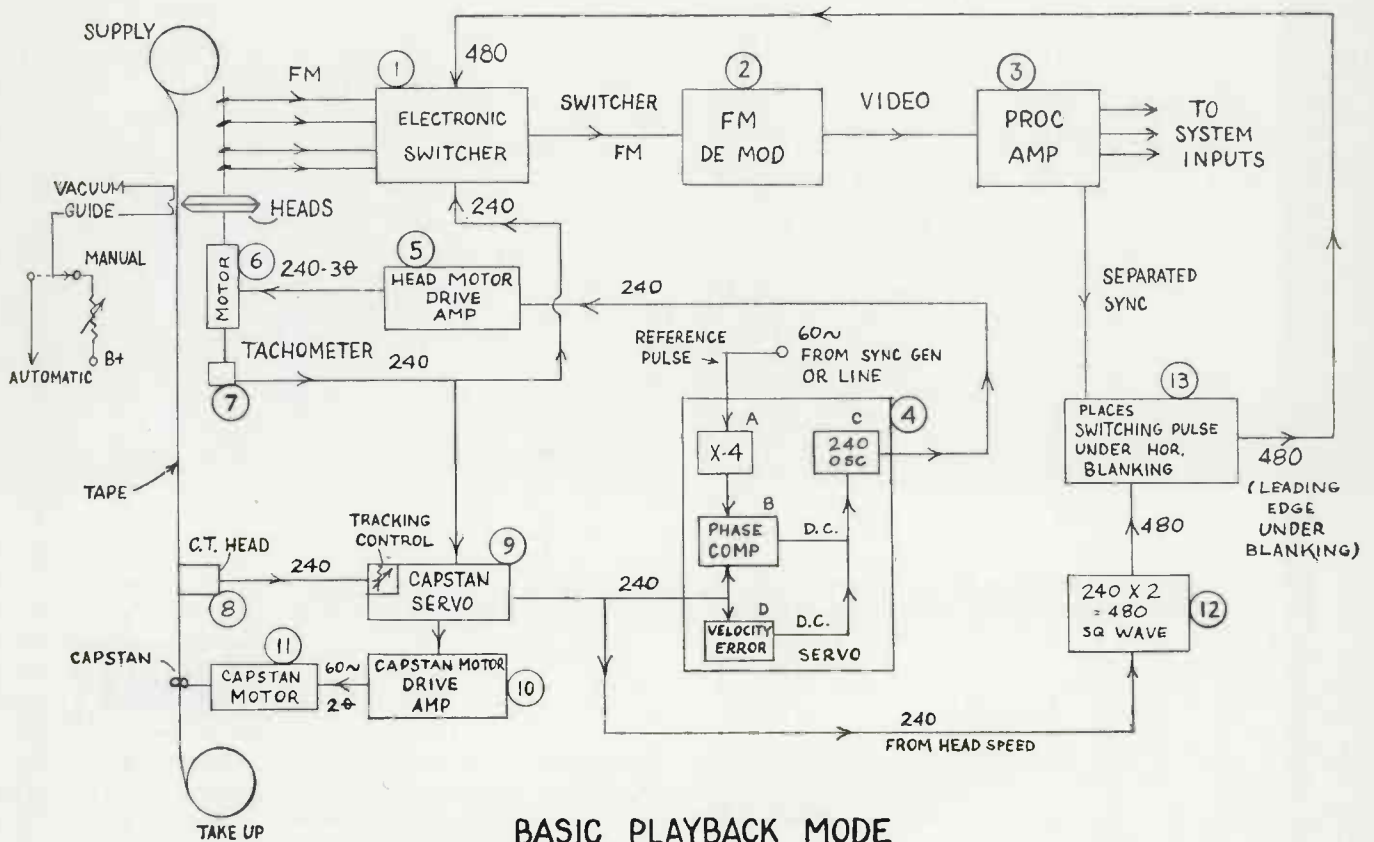
This series contains excerpts from selected sections of a forthcoming book to be published in 1962 by Broadcast Engineering Notebooks, P. O. Box 10682 (Penn Hills), Pittsburgh 35, Pa. Copyright 1962 by Harold E. Ennes. All rights reserved.

By Harold E. Ennes  
Maintenance Supervisor  
WTAE  
Pittsburgh, Pa.

### The Playback Mode

More circuitry is involved in the playback mode than in the record mode, which was discussed in Part III last month. This is because the playback function is more complex as will be seen from the following:

(A) Electronic switching is required in the video path to select only the head in contact with the tape. This prevents spurious signal and noise output being fed to the demodulator from the high speed heads not in direct tape contact.



BASIC PLAYBACK MODE

Figure 19



(B) An additional servo control is necessary for the capstan motor. The speed of the tape (capstan motor) must be controlled by a continuous comparison of the control track laid down during recording (240 cps nominal) with the nominal 240 cps signal derived from the head shaft tachometer. This is to assure that the video heads "track," or pass directly over the recording video tracks on the tape. Failure of such control results in drift of the relative positions of the heads along the length of the tape. Thus the heads could bridge two adjacent recorded tracks rather than remaining over single tracks.

Fig. 19 is a block diagram of the basic system function when in the PLAY mode of operation. The following notes are correlated with the numerical circles on the block diagram.

(1) The relatively low level (about 2 millivolts) outputs from the head slip ring-brush assembly is amplified in individual preamplifiers before being fed to the switcher unit. (For simplicity, the preamps are not shown on the block of Fig. 19.) The switcher combines the individual head inputs into a sequential and continuous single output channel. A 240 cps signal from the head tachometer pre-sets the gates. A 480 cps signal derived from the same source but with the leading edge placed under horizontal blanking is used to trigger the actual switch. The technique is expanded under notes (13) below.

Note that the tape vacuum guide may be placed under manual or automatic control. In the manual position, tip penetration (tape-to-head pressure) is adjusted by a knob on the control panel. In the automatic position, a "tape guide servo" is coupled to a sensor unit which senses 960 cps timing variations with a "standard" frequency of 32 TV lines (180-degree rotation of the head drum) and corrects the vacuum guide to eliminate "skew." This is described fully in the detailed Servo section of this series.

(2) The demodulator extracts the video signal from the frequency modulated carrier.

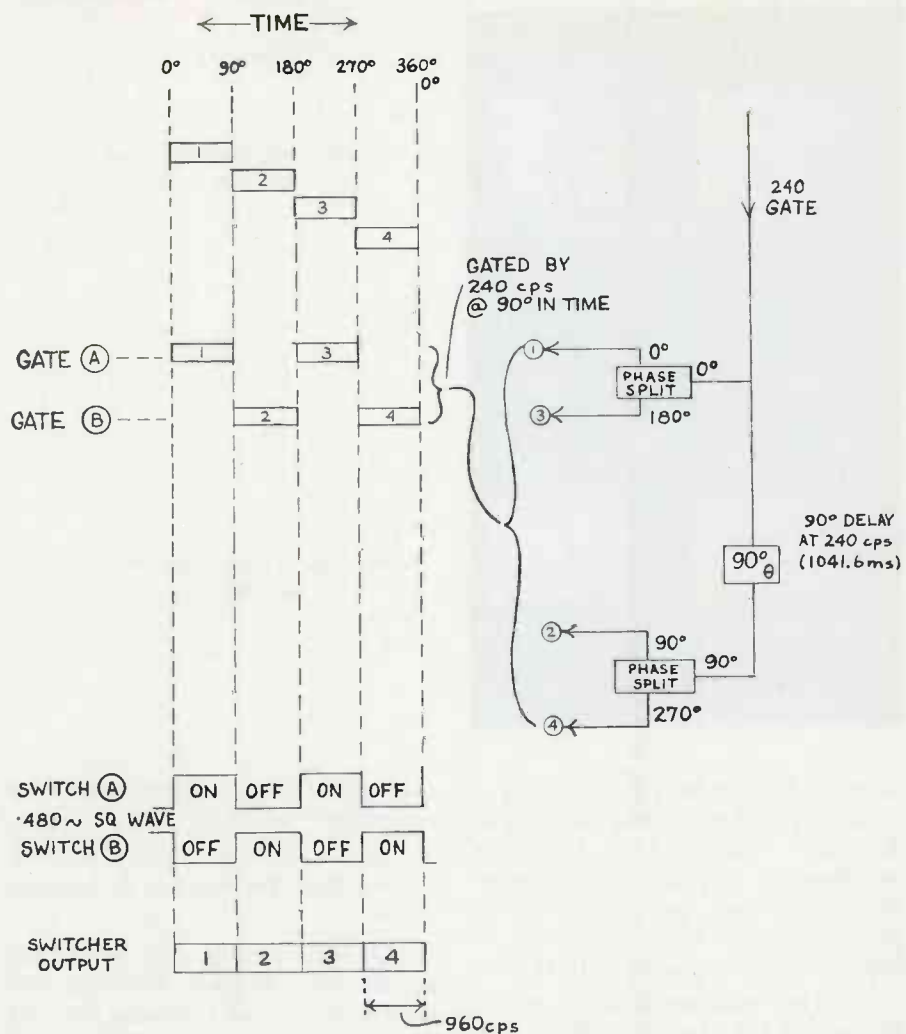


Figure 20

Switcher action chops the signal at a 960 cps rate to pass the head outputs sequentially in a single channel.

(3) The processing amplifier "cleans up" the blanking and sync intervals of the demodulated video, and delivers separated sync to other units in the system.

(4) Either the local sync generator or the 60-cycle power line is used to generate the playback reference pulse for the head motor power. CAUTION: This does not mean that the reproduced signal from the tape can be treated as a local signal for lap-dissolves or local superimposures when the sync generator is used for the reference pulse. Neither horizontal nor vertical sync pulses from the tape are necessarily coincident in time, cycle per cycle, with the external pulses from the sync generator. This reference is

used *only* for an initial "yardstick" to supply a stable comparison. Later developments such as the Ampex "Inter-Sync" (which permits local lap-dissolves and "supers") places the processed tape signal under direct control of the external sync generator and is covered in the Servo Section of this series.

Note that the head motor is controlled by the servo system used in the RECORD mode, except that the initial reference signal is the local sync generator or the 60-cycle power line. There are two servo "loops" in the head unit, the additional "velocity loop" indicated by block D of (4) and not shown in the RECORD block. Essentially, the "phase loop" has a narrow lock-

Editor's Note: Figure numbers follow in sequence throughout this series of articles.

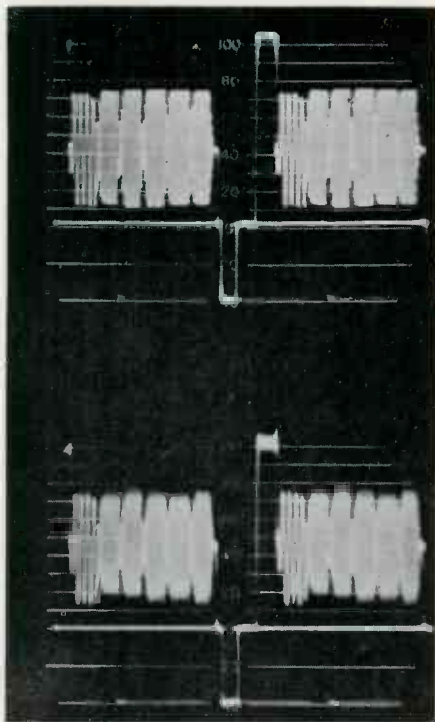


Figure 21

a  
Keyed burst signal at system input.

b  
Keyed burst signal at system output exhibiting overall flat response.

in range for precise phase control in normal operations, while the "velocity loop" (which is a frequency comparator) employs a wider range to reduce the time required for phase control when operation is started or momentarily interrupted.

(5) The head motor drive amplifier serves the same function as for recording.

(6) The head motor is the same as for recording.

(7) The signal from the head tachometer is routed as shown on the block diagram.

(8) The control track head reproduces the recorded control track.

(9) The capstan servo compares the control track signal (which is indicating the relative position of the heads during recording) with the head motor tachometer indicating the playback speed and phase. From this comparison an error signal is developed which slightly modifies the frequency of the 60 cps oscillator used in this case as the initial power source to drive the capstan motor. Note that a Tracking Control is provided to shift the phase of the control track signal. If, for example, head #1 is reproducing vertical sync, tracking can be shifted so that head 2, 3 or 4 reproduces vertical sync. This allows "matching" of heads to obtain optimum reproduction from a tape recorded by a different head.

(10 & 11) Same functions as for recording.

(12) A 480 cps square wave is formed from the 240 cps tachometer signal.

(13) The leading edge of the 480 cps square wave is made to occur during the horizontal blanking interval. This prevents switching of channels

during an active line interval with resulting transients (dots equivalent to switching time) in the picture.

Fig. 20 shows the basic principles of the switching function. NOTE: Ampex and RCA differ in technique, but not in principle.

#### Further System Notes

The video demodulator incorporates a de-emphasis circuit in direct ratio to the pre-emphasis used in the modulator. Further frequency compensation means are provided in the playback units to allow an overall "flat" response such as indicated by Fig. 21.

Fig. 22 illustrates the relationship of the control track sine wave current (and edit pulse) to the recorded video tracks. Current nodes (zero magnetization) and current peaks (maximum magnetization) occur at points physically located in the guard bands between video tracks. The edit pulse (see photo of Fig. 9) occurs at the current peak every 32 tracks (frame rate) between the second and third track following that which contains vertical track. Thus if head #1 contains vertical sync, the edit pulse will occur between tracks 3 and 4.

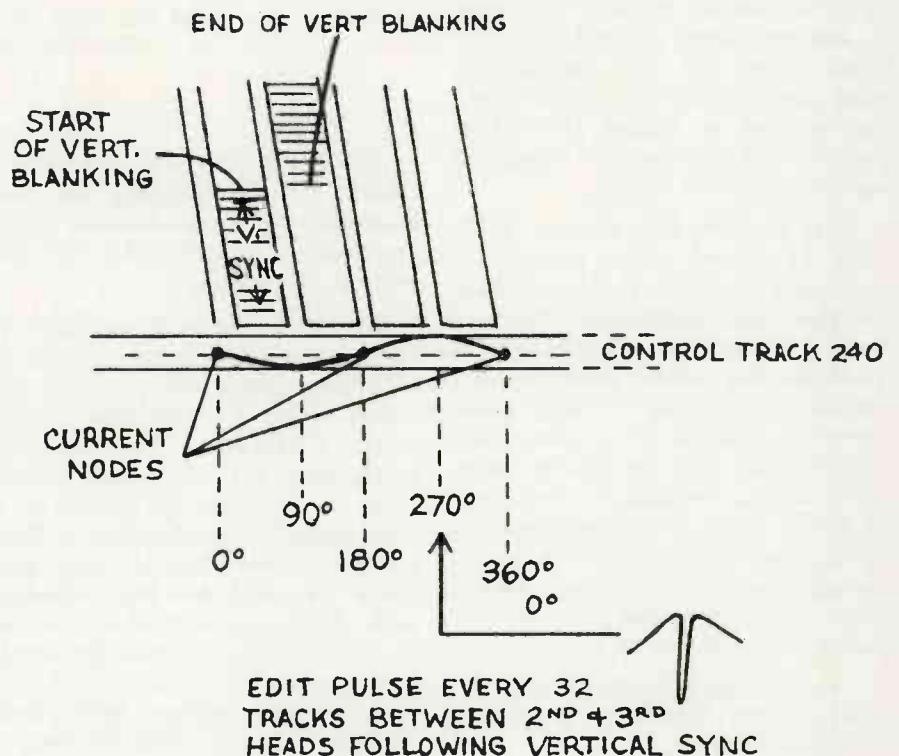


Figure 22  
Relationship of pulses in typical recording.



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WIRELESS MICROPHONE SYSTEM**



Designed especially for exacting broadcast industry use in or out of the studio . . . dead spots eliminated by simple, effective diversity reception and high power (400 milliwatts) . . . fidelity surpasses quality of today's finest miniature microphones . . . an Itek crystal filter and crystal control in each Receiver give you up to six channels simultaneously . . . from Itek, world's largest producer of crystal filters. Write today for brochure. You saw it at the NAB Show.

**Itek Electro-Products Company**  
75 CAMBRIDGE PARKWAY, CAMBRIDGE 42, MASS. A DIVISION OF



3204A: Completely transistorized with improved transfer characteristics, this unit represents a considerable size reduction over presently available vacuum tube models. Each plug-in module is self-contained with power supply and adjustable output.

3. TRANSISTORIZED PULSE DISTRIBUTION AMPLIFIER, Model 3202A: Entirely new to the product line, this completely transistorized unit is self-contained with power supply and alarm system. Absence of output pulse is displayed by front panel light and contact closure is available for remote locations.

4. TIME DOMAIN CORRECTOR, Model 20/20-A1. The Telechrome Time Domain Corrector is a new unit which corrects all major waveform defects in any monochrome or color television signal.

5. SPECIAL EFFECTS GENERATOR WITH FADER, Model 490B, in addition to providing 72 different effects also provides the capability to create lap dissolves and fades to Black with Color, monochrome, or mixed video signals.

6. VIDEO TRANSMISSION TEST SET, Model 1003-D—the only portable and standard rack mounting unit which produces multi frequency bursts, stair steps, modulated stair step, window signals, including composite sync.

7. VIDEO TRANSMISSION TEST SIGNAL RECEIVER, Model 1004-B, is designed to provide rapid and accurate measurements of differential phase and differential gain characteristics of video facilities.

8. EIA SYNC GENERATOR with VERTICAL INTERVAL KEYER, Model 1007-A, is a self-contained, multi-purpose unit which provides standard EIA Sync, Blanking and Drive Signals, a Vertical Interval keying signal keying signal, and a Grating (crosshatch) signal.

9. VERTICAL INTERVAL SIGNAL KEYER, Model 1008-A, generates a keying waveform, which when applied to the blanking input of a test signal generator as a special unblanking signal, will key the signal generator on during the desired horizontal lines in the vertical blanking period.

10. SINESQUARED WINDOW GENERATOR, Model 1073-D, produces new types of waveforms for testing any TV or other pulse unit or system for amplitude and phase characteristics.

**TelePrompTer CORPORATION**  
50 West 44th Street  
New York 36, New York

**Products:**  
TelePro 6000  
3½ x 4 Slide Projector with RA-60 random select changer  
TelePrompTer Mod V  
Amphicon 200 large screen television projector

**THE TELEQUIP COMPANY**  
336 East 50th Street  
New York 17, New York

**Products:**  
TELEQUIP displayed a completely new line of TV studio lighting and portable lighting for remote and newsfilm applications. Other new products displayed: 16mm TV intermittent projector, 8-inch desk-top "bullet" video monitor, and an upright Kinescope Recorder.

**TELESCRIPT-CSP, INC.**

155 West 72nd Street  
New York 23, New York

**Products:**  
Dual Head Rear Screen Projector  
Single Head Rear Screen Projector  
TV Studio Prompting Equipment

**THOMPSON RAMO WOOLDRIDGE INC., DAGE DIVISION**  
455 Sheridan Avenue  
Michigan City, Indiana

**Products:**  
Self-Contained EIA Camera  
Switching Matrix  
STA-Vamp

**TOWER COMMUNICATIONS CO.**

2700 Hawkeye Drive  
Sioux City, Iowa

**Products:**  
Towers, Microwave, AM, FM, TV  
Microwave Passive Reflectors  
Portable Prebuilt Buildings  
Paradomes  
Erection & Installation Services

**UTILITY TOWER COMPANY**

3140 N.W. 38th Street  
Oklahoma City, Oklahoma

**Products:**  
Manufacture and installation of all types of Radio, TV, Microwave Towers.

**VISUAL ELECTRONICS CORPORATION**

356 West 40th Street  
New York 18, New York

**Products:**  
Program automation for video and audio systems. Key items of "superior equipment from specialist manufacturers" covering all requirements for TV, FM, and AM which Visual sells nationally.

TV Program Automation Systems, a complete line of Modular Transistorized TV Broadcast Master Control equipment including Video Switchers, Video and Pulse Distribution Amplifiers, Sync Generators with built-in gen lock, Mixing Amplifiers, etc.; GPL High Resolution Vidicon Film System, English Electric Valve 3" and 4½" Image Orthicon Tubes, Favag Master Studio Clock System, Conrac Picture Monitor line, Eastman 16mm TV Projectors, Smith-Florence Fault-Finder, Prodelin Transmission Line, Decca Weather Radar, Power Sources all transistorized Power Supply Systems, FM stereo equipment: Multiplex Receivers, Spot-master tape cartridge machines,

Altec Audio Consoles  
phones, Nems-Clarke Field Strength Meter, Audiomation Tape Players for background music, Comrex Wireless Microphones.

KRS Electronics featured a highly compact stacked tape cartridge unit for automatic radio programming in its exhibit at the 1962 National Association of Broadcasters convention.

The new KRS equipment was shown and demonstrated as a part of the Visual Electronics Corp. display. Featuring all-solid-state electronics, the new KRS unit provides a compact facility for injecting spot announcements between musical selections by push-button remote control.

Known as STACT (Stacked Tape Automatic Cartridge Transport), the new system offers complete flexibility and adaptability to specific requirements. It is of highest professional quality in design, construction and performance.

Heart of the instrument is the endless loop KRS tape cartridge. It feeds tape from the center of the cartridge and wraps it on the outside in one continuous motion. No rewinding is necessary. The tape container is plastic and approximately 6 inches square. It is placed in playing position by merely sliding it into the STACT unit. Three and six-cartridge models are available in rack mount or self-contained units.

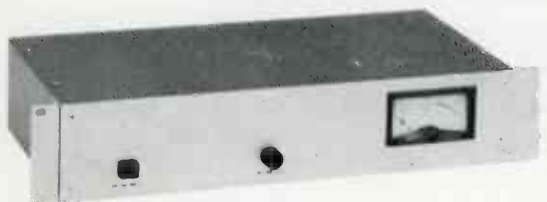
**VITRO ELECTRONICS**

919 Jesup-Blair Drive  
Silver Spring, Maryland

**Products:**  
TV and FM Rebroadcast Receivers  
Field Intensity Meters  
Phase Meters  
Patch Panels  
Special Consoles

Owing to the heavy floods in Iowa TOWER COMMUNICATIONS CO. had to abandon their plans to attend but their name was displayed with a note to blame their absence on the floods.

**SPARTA-MATIC**



**SETTING A NEW STANDARD FOR CARTRIDGE TAPE**

The new SPARTA-MATIC 300 series cartridge tape system, introduced at the Chicago NAB show, received acclaim from NAB members and exhibitors alike. Offering outstanding improvements in all areas, the SPARTA-MATIC 300 P playback unit and its companion 300R record amplifier, contain all the features you have been waiting for:

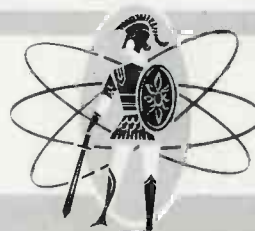
- Continuous Duty Rated
- Compact, Modern, Functional Design
- Laminated Tape Heads
- Proven Reliability
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- Improved Tone Burst Cueing
- Plug In Relays and Modules
- Solid State Design

All this and much more is yours with the new leader . . . SPARTA-MATIC. And you will be pleasantly surprised when you check the price. The sophisticate of cartridge tape: the SPARTA-MATIC 300 series.

Call, Write or Wire Today for Guaranteed Satisfaction Offer.

**SPARTA ELECTRONIC CORPORATION**

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# The only electronics home study program that guarantees\* . . . **A Commercial FCC License** **. . . Or Your Money Back!**

No other electronics home study program can equal that offered by Cleveland Institute. And that's why we make this exclusive guarantee:

\*Completion of our Master Course prepares you for a First-Class Commercial Radio Telephone License with a Radar Endorsement. If you fail the FCC examination for this license after successfully completing the Master Course, you will receive a full refund of all tuition payments. This guarantee is valid for the entire duration of your enrollment period.

**This Course Is Designed Specifically For Men With Previous Electronics Training or Experience and Provides...**

- Advanced electronic theory and math. (You will receive a special 10" Electronic Slide Rule and complete instructions).
- Special training in the practical application of electronics skill in such advanced fields as Computers . . . Servo-Mechanisms . . . Magnetic Amplifiers . . . AC Circuit Analysis . . . Pulse Circuitry . . . Color TV . . . Radar . . . Advanced Measuring Techniques . . . Industrial Electronics . . . Instrumentation . . . Automation . . . Radio Telemetry . . . Semiconductors.



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Conversion factors, formulas, tables and color codes at your fingertips. Yours without obligation, simply for responding NOW to this opportunity to improve your future.

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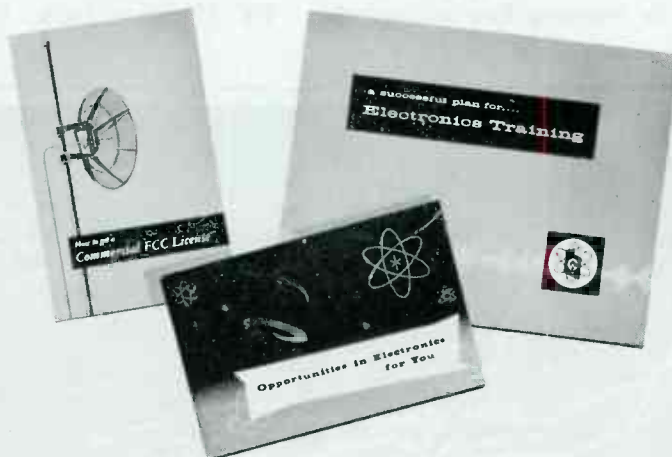
**Cleveland Institute of Electronics**

1776 E. 17 St., Desk BE-5, Cleveland 14, O.

Accredited by the Accrediting Commission of the National Home Study Council  
 (An Accrediting Commission Approved by the U. S. Office of Education).



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I want to know more about your electronics home study training program. Please send me your free booklets described above plus your handy pocket Electronics Data Guide. I understand there is no obligation. I have had training or experience in electronics as indicated.

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| <input type="checkbox"/> Radio-TV Servicing | <input type="checkbox"/> Broadcasting       |
| <input type="checkbox"/> Manufacturing      | <input type="checkbox"/> Home Experimenting |
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I'm now working in \_\_\_\_\_

I want to know about the following area of electronics \_\_\_\_\_

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City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

BE-5

# Book Reviews

## Troubleshooting with the Oscilloscope

Catalog No. TOS-1. Published by Howard W. Sams & Co., Inc., Indianapolis 6, Ind. 128 pages. Price: \$2.50

Troubleshooting modern electronic circuits literally demands the use of the oscilloscope, yet many service technicians experience difficulty in learning how to use this

versatile instrument. "Troubleshooting with the Oscilloscope" by Robert G. Middleton is designed to help overcome this difficulty.

Reading of this book will enable a technician to obtain maximum benefits from this instrument; it is an easily understandable explanation of how to operate a scope in isolating circuit troubles in practically any electronic circuit.

Ten chapters include: How to Operate a Scope; Application of Oscilloscope Probes; Signal-Tracing TV Circuits; Basic Visual Align-

ment; Square-Wave Signal Testing; Checking Horizontal Oscillator-AFC Circuits; Analyzing Horizontal Sweep Systems; Servicing Vertical Oscillator and Sweep Sections; Troubleshooting Radio Receiver Circuits; Troubleshooting Audio and Hi-Fi Circuits.

## RCA Power Tubes

Booklet PG-101E. Published by Electron Tube Div., Radio Corp. of America, Harrison, N. J., Oct. 1961. 46 pages.

This new booklet on RCA vacuum power tubes, rectifier tubes, thyatrons, and ignitrons features novel quick-selection charts for equipment designers. The three color 11" x 16" fold-out quick-selection chart for CW High-Vacuum Tubes can be employed as a useful and attractive wall chart. The booklet also covers informative descriptions of tube design features including important thermal considerations and the Cer-molox construction.

The data section provides information on over 200 different transmitting, industrial, and special-purpose power tubes. Tabulated data include ratings and operating values for various applications, type of cooling required, heater or filament requirements, and overall dimensions.

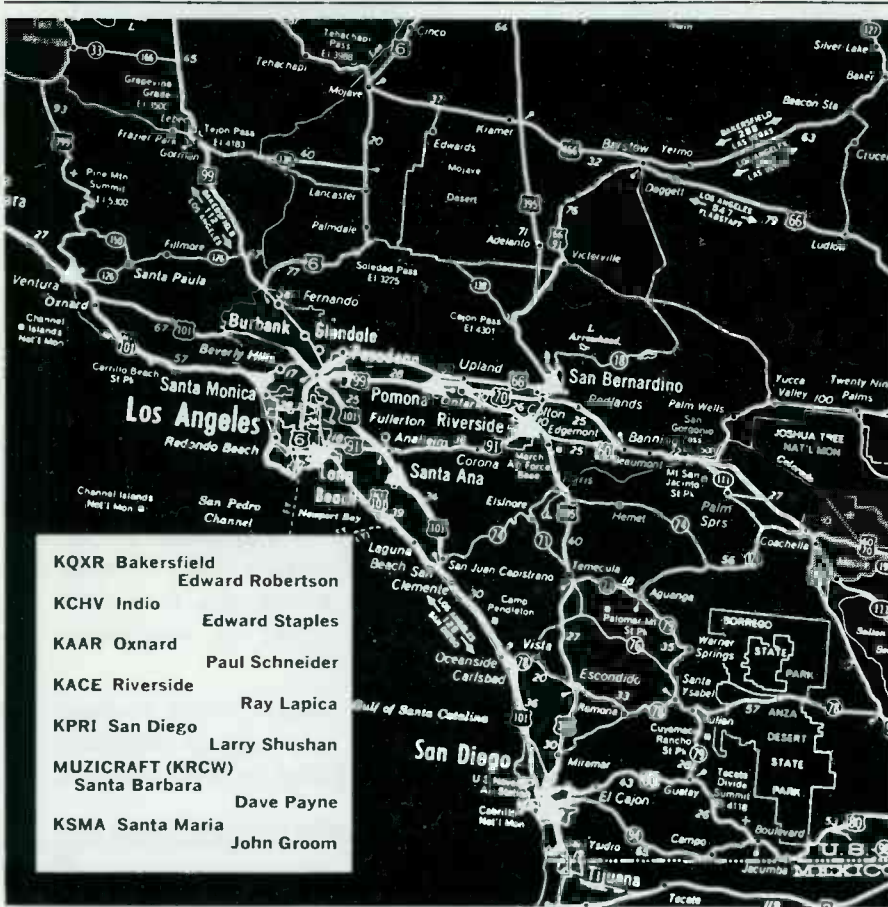
Copies of RCA Power Tubes—PG-101E, may be obtained from RCA Electron Tube Distributors, or by sending seventy-five cents to Commercial Engineering, Electron Tube Div., Harrison, N. J.

## Silicon Controlled Rectifier Manual

Published by Rectifier Components Dept., West Genesee St., Auburn, N. Y. Price \$1.50.

The General Electric Co. announces publication of the second edition of the SCR Manual. The new edition reflects the continued growth of knowledge in controlled rectifier ratings, theory and applications. It is expanded by 100 pages and five chapters over the previous book.

The entire text of the previous edition was translated into Japanese and various chapters have been translated for use in Europe. The first edition of the SCR Manual, published in 1960, has become a standard reference in the semiconductor industry.



## SOUTHERN CALIFORNIA MULTIPLEXING WITH McMARTIN

Multiplexing is a growing, dynamic industry in Southern California. These multiplex operators are helping to build this new industry. McMartin is proud to be a partner in this growth, by supplying McMartin multiplex receivers. These operators selected McMartin — the standard of the industry — for greater sensitivity and dependability.

**McMartin Industries, Inc.**  
(Formerly Continental Manufacturing Inc.)  
1612 California Street • Omaha, Nebraska

**McMartin**



## Affiliated with Sams

(Continued from page 18)

Howard W. Sams & Co. publishes a large number of titles in the technical books field, principally in electronics and communications. The books serve electronics technicians as manuals covering troubleshooting and repair service on all types of radio and television apparatus. The firm recently published a series of texts covering a basic course in servicing electronic computers and also introduced the first annual covering test equipment for radio and television servicing.

*PF Reporter*, a monthly magazine for the electronic servicing industry, provides a continuous flow of service data and procedural articles for all makes and models of home radio, television, record and tape equipment. This periodical and the firm's other products and services produced by three divisions and a subsidiary are in the expanding fields of electronics, technical information and training, and education.

Regarding the new relationship, Robert E. Hertel, president of I&T Publications, said: "This association permits expansion into areas that have been closed to us before. The consolidation with the Sams organization makes possible an even broader degree of diversification for both concerns. The continuity of our proved operating policies, methods and personnel gives assurance to our readers and advertisers that our publications will continue to present the same editorial vitality and leadership that have brought about the growth and continuing acceptance of our several products.

"We are particularly fortunate in affiliating ourselves with a firm which has such an admirable record of achievement in the technical aspects of radio and television equipment. The reputation for excellence and integrity earned by the Sams organization will lend added prestige to our efforts in developing BROADCAST ENGINEERING to its full editorial potential. We expect to benefit from the accumulated experience of the large technical staff in the Sams firm who can augment our group."

## A NEW STANDARD IN FILM AND SLIDE REPRODUCTION



PA-550



new  
high resolution vidicon film chain  
with automatic exposure control

Automatic operation by 1000 to 1 servo controlled light valve.

The finest in high resolution vidicon film chains, model PA-550... designed for network origination to provide the ultimate possible in television film reproduction, utilizing 80 gauss deflection system and stable circuits of the GPL military 1000 line system.

An order of magnitude better than other available film systems in:

**SIGNAL TO NOISE**  
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**RELIABILITY**

Over 15 systems a ready in network service providing a "seeable" difference in picture quality.

For the best and most modern broadcast systems and supplies, look to **VISUAL**—your **SOURCE** for Superior Equipment from Specialist Manufacturers.

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## AFTER HOURS..

relax  
with **REK-O-KUT**—  
the only  
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single-play turntables  
for studio and home

Engineers relax, but they don't relax their standards. At home, as at work—design and performance are their criteria. That's why so many engineers buy Rek-O-Kut single-play turntables for their home music systems. Send for full story about the *real* difference —“*Single-Play Turntables vs. Automatics*”.

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## Letters to the Editor

Dear Sir:

May I, a lifetime broadcaster with a technical background, offer some comments concerning the editorial titled “AM Freeze Coming?” in your January issue?

Regrettably, everything you say and fear about federal control is true, not just in the economic field. What you fail to emphasize, however, is that breakdown of engineering standards—which are the very *raison d'être* for federal licensing—has produced the now chaotic situation in the AM broadcasting band. The whittling away of stations' coverage by virtually unrestricted licensing of new co- and adjacent-channel operations cannot be disregarded in any serious analysis of AM broadcasting's economic woes. Recently, more rigid observance of the “10% Rule” has tended to slow the process of perimeter coverage erosion, but much damage has already been done. Meantime,

some 100 applications for new or “improved” facilities arrive at the Commission in an average month.

Some, but not enough, attention has been given by industry and government spokesmen to the indisputable fact that the proliferation of stations, especially in and around metropolitan areas, is the fundamental cause of radio's mounting financial troubles. The public interest has not been served, and never can be served, by adding another and still another voice to the babble of downgraded stations that crowd in on one another all across the dial. Yet, all one need do is find a frequency which will “work”—using if necessary a freakish directional pattern of doubtful stability—take his turn on the processing line, and when the grant comes through hire some juvenile-appeal disc jockeys, load up a stack of “top forty” records and enter the affray. Each new station of this ilk just puts added force behind the downward thrust on rates, with the attendant degradation of service in general.

**NEW**

**THE TRANSISTORIZED**

**TDA 2 VIDEO/PULSE**

**DISTRIBUTION AMPLIFIER**



This highly efficient and completely transistorized unit replaces all existing vacuum-tube types without alteration of cables. Complete with built-in regulated power supply, the TDA 2 weighs less than 4 pounds, occupies only 1 3/4 inches of panel space, and draws only 4 watts of power! Has 4 inde-

pendent outputs (internally terminated at 75 ohms).

PRICE: \$325.00 each, f.o.b. Nashville. This is less than competitive tube models requiring external power supplies creating better than 100 watts of heat.

Write or wire for descriptive technical data sheet on the TDA 2.

**INTERNATIONAL NUCLEAR CORPORATION**

P. O. BOX 6171 • NASHVILLE 12, TENNESSEE

\*Circuit designed at WSM-TV, Nashville, Tennessee



Quite obviously—I have been saying this for a long time—the AM broadcasting band is badly in need of a technical overhauling. A general reallocation has not taken place since 1940. In the meantime the number of stations has quadrupled. Prior to that time, stations on local and regional channels were afforded protection to their 0.1 mv/m contour; now it's the 0.5 mv/m, but rarely is full protection now provided to this “normally protected” contour where Class III and Class IV channels are involved.

So many diverse interests are involved, general agreement among them would surely be impossible to achieve. But Congress has given the Commission both the power and the duty in the Act. A new approach to the whole matter of allocation is needed. Certainly there can be no justification now for confining Class IV stations to just 6 of the 106 AM channels. More than one-fourth of the nation's stations—those which are having it tougher in every way, as a class—are jammed into 5% of the spectrum.

Right now, with the clear channel “haves” engaged in an all-out effort to revive their 750 kilowatt scheme, and with the Commission's proposal to duplicate certain of the clears in dispute in Congress, is the time to commence a thorough study of AM's difficulties. Meanwhile, a freeze on new applications and institution of a “no grant” policy for pending applications which propose interference greater than that permitted by the Standards should simultaneously be invoked.

The continued spoliation of AM broadcasting through disregard for sound engineering principles and the economic facts of life is no more in the public interest than the over-cutting of timberland or the destruction of shellfish life through overfishing aggravated by wanton pollution of coastal waters.

I hope your publication, which has begun to articulate the broadcast engineer's interests and problems in a very promising way, will not be unmindful of that one thing which is too often the technical man's blind spot: economics.

Cordially yours,  
Radio Station WTXL  
LAWRENCE A. REILLY,  
President

# NEW SCA REBROADCAST RECEIVER



High fidelity relay by off-the-air pick-up of SCA Multiplex and Main Channel signals . . . designed for use without SCA Generator . . . picks up broadcast signal and feeds directly to transmitter multiplex exciter . . . injects at sub-channel frequency (normally 67 KC) . . . low distortion . . . low noise . . . wide band multiplex output.

NEW REBROADCAST RECEIVER DATA SHEET AVAILABLE  
. . . FILL IN COUPON BELOW



**GENERAL ELECTRONIC  
LABORATORIES, INC.**

195 MASSACHUSETTS AVE., CAMBRIDGE 39, MASS.

Marketed in Canada by Canadian General Electric, Toronto 4, Ontario

TO: 10  
Mr. Sal Fulchino  
Broadcast Sales Manager  
General Electronic  
Laboratories, Inc.  
195 Massachusetts Ave.  
Cambridge 39, Mass.

Please send me your new Data Sheet describing  
the GEL/SCA Relay Receiver, Model FMR-1

Name \_\_\_\_\_ Title \_\_\_\_\_  
Station \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

# Industry News

## Ampex Equipment for Reconnaissance Lab

An important step in the development of future high performance recording systems was taken recently with the delivery of special test equipment, developed by Ampex Corp., to the Reconnaissance Laboratory, Aeronautical Systems Division, Wright-Patterson Air Force Base, Ohio. The specialized equipment will enable Air Force scientists to evaluate the performance of thermo-plastic and other recording materials proposed for electron beam recording.

Electron beam recording is an advanced technique for the electronic recording of information. It uses a microscopic beam of electrons to impose a pattern of electrostatic charges on the surface of a thermoplastic material. When heat is applied to the material, meaning-

ful micro-groove pictures are formed. (The recording process is comparable to the formation of a picture in a television picture tube.) Proposed systems would record up to ten times more information per second than present methods.

The new Ampex equipment delivered to the Air Force will permit establishment of standards on which continuing development of electron beam systems can be based, according to A. H. Hausman, Ampex vice-president of research and engineering.

## Announces Home Study Training Program

Cleveland Institute of Electronics, 1776 E. 17th St., Cleveland 14, Ohio, has announced a new home study training program entitled "Electronic Communications Technology" which has been developed especially

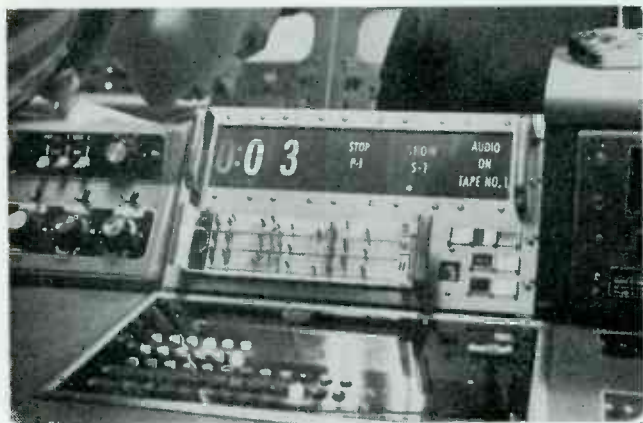
for employees of companies utilizing carrier communications.

Designed to upgrade communications personnel in electronics, the program is said to provide a complete understanding of electronic fundamentals, a thorough coverage of basic carrier communications and the guarantee of a Second Class FCC License. Should the student fail to pass the FCC examination for this license after successfully completing the CIE program, all tuition payments will be refunded.

A total of 56 subjects are covered, including microwave communication systems; transistors and other semiconductors; servicing mobile communication systems; and carrier system operation.

## Telemet Corp. Announces New Executive Appointments

Dr. Gabriel M. Giannini, president, Giannini Scientific Corp., Amityville, L. I., has announced executive appointments for Telemet Corp., a newly formed company which will manufacture, sell and service the former Telechrome line of commercial electronic equipment.



## STEP PREVENTS SWITCHING ERRORS AT WTVR, (Ch. 6), RICHMOND, VA.

STEP automates video and audio switching during station breaks.

The design of STEP is practical and reliable.

The price? Only \$5900.

If you are interested in TV automation, get further details on STEP.

**CHRONO-LOG CORPORATION**  
2583 W. Chester Pike, Broomall, Pa.

## HF MICRO RELAY TILT HEAD

FOR MOUNTING  
PARABOLIC REFLECTORS

Specially Priced at **195<sup>00</sup>**

Brand New! List Price \$425.00!

Head provides smooth easy panning a full 360° and spring balance tilting 45° forward or backward. Top plate is 6 7/8" wide by 8" long. Specially priced while limited quantity lasts.

Write for Free 100 Page Catalog!

**BEHREND CINE CORP.**

161 E. Grand Ave. • Chicago 11, Ill. • Michigan 2-2281

**NEW!**

## BATWING TV ANTENNAS CHANNELS 2-13

Write for Sales Catalog

## JAMPRO ANTENNA CO.

7500 - 14th Avenue  
Sacramento 20, California



G. Richard Tingley has been appointed vice-president and assistant to Dr. Giannini, and Jack Horowitz has been named vice-president, operations. Other appointments are: George R. Crofford, treasurer; Hans Schmid, chief engineer, video; S. S. Krinsky, western operations manager; and Harry V. Seaman, chief project engineer.

Plans call for updating the complete Telechrome line of video test equipment, special effects generators, wave form correctors, and other equipment. The telemetering line will also be re-designed as solid state equipment and will be offered under the new Telemet trade mark.

#### New Assistant Marketing Director for Altec

Altec Lansing Corp., Anaheim, Calif., has appointed W. H. Johnson as assistant marketing director with the responsibilities of coordinating the company's national marketing operations.

Johnson was formerly manager of engineering and technical information for Altec since 1960. Prior to his transfer to the Lansing plant in Anaheim, he was mid-western sales manager of the company, with headquarters in Chicago.

#### UHF TV Repeater Installed in New York

An oblong UHF antenna is the newest addition to Manhattan's west side skyline. Located on top of the southeast tower of the George Washington Bridge, the antenna is part of a translator system repeating the programs of WUHF, channel 31. The translator, developed by Adler Electronics, Inc., and the main station are being used by the FCC to test the effectiveness of UHF in New York City.

The new channel is relayed into areas deprived of good reception by barriers such as mountains or buildings. Object of the experiment is to discover whether UHF channels can provide good TV reception in a large city. It is known that UHF does not have the range or the capability of VHF channels to "bend" around obstructions. Since most VHF channels are already in operation, future growth of TV is dependent upon full use of UHF. If the operation is successful, FCC can be expected to step up its drive for more effective utilization of the UHF spectrum.

## 40 db COMPRESSION WITH ONLY .4% DISTORTION



## The FAIRCHILD 666 COMPRESSOR

The new Fairchild 666 Compressor employs a unique semi conductor gain reduction system. The 666 does not change bias conditions, thereby eliminating distortion usually associated with compressors. Now you can compress up to 40 db without any increase in harmonic distortion and without thumps or similar noises. Write today for complete technical details. Price: \$399.00

with "Third Hand" \$495.00

## FAIRCHILD

RECORDING EQUIPMENT CORPORATION  
10-40 45th Ave., Long Island City 1, N. Y.

# SMALLEST



649B shown actual size. List

Price \$105.00.

This tiny handful is E-V's answer to studio requests for a truly miniaturized dynamic microphone. The Model 649B is just 2 1/4" long, weighs but 31 grams, yet has the remarkably high output of -61 db! Although just half the weight and bulk of competitive lavaliers, the 649B response is smooth, peak-free and full-bodied so that you can mix its output with that of any standard microphone!

## DYNAMIC LAVALIER!

No fragile "toy", the E-V 649B uses the famous Acoustalloy<sup>®</sup> diaphragm and a sturdy dynamic mechanism that is guaranteed unconditionally for two years except for finish, guaranteed for life against defects in materials or workmanship. It is omni-directional, with response tailored for the slightly "off-mike" location of a lavalier.

A 649B in your studio will give your performers more freedom than they have ever had... while you get the fine sound and trouble-free operation that's traditional with all Electro-Voice microphones. Write for complete technical specifications today!



ELECTRO-VOICE, INC., Commercial Products Division, Dept. 521V, Buchanan, Michigan  
Subscribe today to "Microphone Facts", fact-filled, free series on modern microphone techniques. Request on studio letterhead.

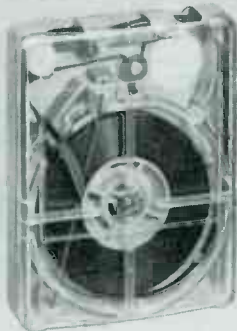
**Electro-Voice<sup>®</sup>**



# FIDELIPAC<sup>®</sup>

Automatic Tape  
Cartridges by  
**CONLEY**

**FIRST in**  
**Performance**



The cartridge that made station automation possible . . . the proved, dependable unit that is used by more broadcasters because it so consistently delivers first-rate performance on the job.

Fidelipac Tape Cartridges are deservedly First in Sales, First in Quality and First in Acceptance because of these better features:

- easy handling • easy storage • easy replacement • minimum tape breakage
- increases tape life • varying tape sizes permit programming from seconds to hours on single cartridge • automatically cued and ready for instant use • technically simple —technically perfect. • your present equipment was made to handle Fidelipac

Fidelipac Tape Cartridges work better, save money, are more profitable . . . put them to work for you! . . . for spot announcements, themes, station breaks, and delayed broadcasts.

Standard Lengths in Three Cartridge Sizes:

**Model 300** —with up to 300 feet of single coated tape

**Model 600** —with up to 600 feet of single coated tape

**Model 1200** —with up to 1200 feet of single coated tape

Ask for

FIDELIPAC "THE STANDARD OF THE INDUSTRY"  
from your regular source of supply



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**CONLEY ELECTRONICS  
CORPORATION**

1527 Lyons Street • Evanston, Illinois

## Industry News

### Telecommunications Network To Span 3,060 Miles

Fabled ancient lands of the Near East will soon be spanned by a 3,060-mile telecommunications network powered with engine-driven generators built by Onan division of Studebaker-Packard Corp. This company has signed a \$1,100,000 contract to provide Radio Corp. of America, prime contractor for the network, with 267 generator sets and switch gear for the project. RCA's contract is for approximately \$16,400,000.

The Central Treaty Organization (CENTO) host countries—Turkey, Iran and Pakistan—will provide buildings to house the line's equipment and build whatever access roads are necessary. The power capability of the CENTO system is such that it could supply the residential needs of a town of approximately 30,000 population. Because of the critical importance of the state-owned, government-operated civilian telephone system, special provisions are being made to guarantee uninterrupted power.

Actual construction on the project is scheduled to begin this summer, with operation of the network to get under way by July 1, 1963.

### RCA Employees Awarded David Sarnoff Fellowships

Fellowships for graduate study in the 1962-63 academic year for ten employees of the Radio Corp. of America have been announced by Dr. Irving Wolff, chairman of the RCA education committee.

"The Fellowships, established in honor of the RCA Board Chairman, range in value to as high as \$6,500 each," Dr. Wolff said. "The grants include full tuition and fees, plus an allowance for books, a stipend of \$2,500 to \$4,000 depending on the Fellow's marital status, and \$1,000 as an unrestricted gift to the university."

The David Sarnoff Fellows are selected on the basis of academic aptitude, promise of professional achievement and character. Dr. Wolff said. They will pursue graduate studies in physics, electrical engineering, applied mathematics,

chemistry, industrial management, business administration and journalism. Those receiving awards are currently employed by various RCA divisions and associated companies.

### Chrono-log STEP System in Operation at Richmond, Va.

WTVR, Richmond, Va., has automated its video and audio switching by installing the Chrono-log STEP system. Under the direction of Wilbur M. Havens, manager, and John V. Shand, program director, an analysis of station break switching requirements was made. It was found that the majority of the breaks could be handled by the use of 16 basic sequences, which are permanently pinned into five STEP pinboards and the proper sequence to be used is marked on the operator's log.

Station breaks which do not fit one of the 16 sequences are handled either by changing pins in a standard sequence or by pinning up a special sequence on a spare pinboard. Manual switching is available in parallel with STEP when required.

The installation was part of a modernization program at WTVR which included the installation of a new video switcher. The momentary control pulses required to operate the video switcher are produced by STEP. Audio switching requires maintained contact closures and these are provided by STEP operating in conjunction with a cross-bar switch.

### General Electric TPO Post To John W. Stonig

Appointment of John W. Stonig to the new position of manager, military and government sales for General Electric's Technical Product's Operation, Syracuse, N. Y., has been announced by H. E. Smith, TPO manager—marketing. The establishment of the new position is said to be part of a continuing TPO program to provide better service for military and government customers.

Stonig will work with and through the company's new Defense Programs Operation in Washington, D. C., and will be responsible for sales of all TPO products for military and government applications. His office will be at TPO headquarters in Syracuse.

BROADCAST ENGINEERING



**Allied Electronics Corp.  
Opens New Facilities**

Opening of new facilities for distribution of electronic components to industry in Detroit, Mich., and Cleveland, Ohio, has been announced by Allied Electronics Corp., industrial sales subsidiary of Allied Radio Corp., Chicago, Ill.

The new locations, at 10647 Mc-Nicholas Rd., Detroit, and 4824 Turney Rd., Garfield Heights, Cleveland, are part of a nationwide expansion program, the company said. The firm presently has industrial facilities at Los Angeles, Milwaukee, Minneapolis-St. Paul and Washington, D. C., in addition to its Chicago headquarters. District managers, recruited from the areas which they will serve, will report to Myron Bond, national sales manager of Allied Electronics.

**Vendeland Appointed as  
Conrac Product Manager**

Giannini Controls Corp., Duarte, Calif., has announced the appointment of Robert N. Vendeland as product manager of Conrac division. Vendeland will be responsible for product development and marketing, and his primary objective will be to further Conrac's penetration of the educational and instructional television fields.

Conrac produces video monitors for broadcast and closed circuit television applications. In addition to supplying monitors for educational, instructional and TV station facilities, the company manufactures slow scan display devices for data systems and TV monitors for military and NASA applications.

**Data Processing System  
At Vitro Laboratories**

Vitro Laboratories, a division of Vitro Corp. of America, New York, N. Y., has added an IBM 7090 data processing system to its digital computer facility at Silver Spring, Md. The expansion is said to give Vitro the largest commercial computer facility in Montgomery County, an area studded with engineering firms and laboratories engaged in defense work.

The new unit, a transistorized computer system, has been installed to handle a sharp increase in data processing and analyses connected with Vitro's work on missile systems.

AVAILABLE FROM BLONDER-TONGUE

The new  
**Benco T-6 VHF Translator**

Is Priced at \$845<sup>00</sup> (U. S. suggested list)



...It is  
**FCC Type Accepted, Rugged,  
Available for Prompt Delivery**

The Benco T-6 offers these advantages:

1. Meets all FCC specifications.
2. Provides constant output even in weak signal areas—preamp AGC activated by signals as low as 50 microvolts.
3. Automatic shutoff and identification.
4. Remote shutoff for any location up to 5 miles from the translator. (with RC-1).
5. Covers distances from 8 to 30 miles or more.
6. Prompt delivery to those who must have a low cost unit immediately to meet their 'on-the-air' time-schedule.

TECHNICAL SPECIFICATIONS	
Primary Power Source	117 v ± 10% 60 c/s
Power Consumption	120 W
Temperature Ambient	-30°C to + 50°C
Overall Noise Figure	
Low Band	4 db ± 1 db
High Band	6 db ± 1 db
Recommended Input	50—4000 microvolts
Max. Permissible Power	1 Watt (Peak Power)
Frequency Stability	.02%
Gain (maximum)	105 db
Band Width	6 Mc (3 db points)
Dimensions (metal base)	18"x22½"
Weight	27 lbs.

**BENCO VHF AND UHF TRANSLATORS FOR EVERY TYPE OF INSTALLATION**

**MODEL T-1 VHF TRANSLATOR FCC type-accepted.** 1 watt output for U. S. use • ideal for future expansion • meets all FCC specifications • noise-proof automatic shutoff • regulated power supply for stable operation • underrated output section for continuous service; weather-proof housing; quick easy coding of identification unit • built-in direct reading power meter.

**MODEL T-14 VHF-TO-UHF TRANSLATOR.** FCC type-accepted. 2.5 watts output. For U. S. use. Includes identification units with automatic "on/off," power indicator and voltage regulator. VHF input, channels 7-13.

**MODEL T-13 VHF-TO-UHF.** Same as T-14 except: VHF input, channels 2-6.

*If you're planning a translator installation, contact Blonder-Tongue. Free layout service and field engineering assistance are available at nominal cost.*

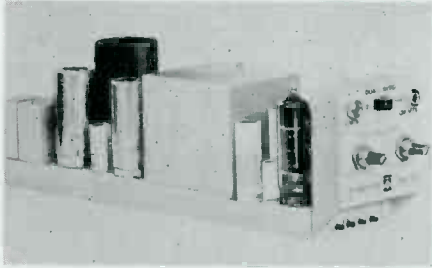
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**BLONDER-TONGUE**

9 Alling St., Newark, N. J.

Canadian Div.: Benco Television Assoc., Tor., Ont. Export: Rocke Int'l Corp., N.Y. 16—Cables: ARLAB home TV accessories • UHF converters • master TV systems • closed circuit TV systems

# Product News



## NEW LANGEVIN COMPRESSOR-LIMITER AMPLIFIER

Langevin, Div. Sonotec, Inc., Dept. 111, 503 S. Grand Ave., P. O. Box 687, Santa Ana, Calif., has announced the model AM-5301 Leveline amplifier, a new, miniature, plug-in, thump-free limiter designed to act as an automatic averaging, or as a peak level control amplifier in recording, TV broadcast, microwave and industrial sound applications.

Measuring 3½ inches high, 2¾ inches wide and 10¼ inches long, the compact unit is said to control level differences over a range of 30 db and give a compression ratio which is variable up to 5 to 1. It acts as an automatic master gain control, or it can control the level differences between turntables, network program or microphone preamplifier sources, the manufacturer states. Employing 100 microsecond attack time, it is designed to safeguard against transmitter overload while affording all the advantages of compression.

Frequency response is  $\pm 5$  db 20-20,000 cps, and has less than .5 per cent total harmonic distortion at 30 db of compression with ½-watt output. The unit can also be employed as a 6-watt monitor, or as a regular program amplifier with 57 db gain at less than -110 dbm equivalent signal-to-noise.

## ALTEC TRANSISTOR STEREO SYSTEM

Altec Lansing Corp., 1515 S. Manchester Ave., Anaheim, Calif., has announced a new solid-state stereo tuner-amplifier featuring both convenience and versatility.

The Astro is said to be a complete stereo source-amplification system packaged in a single chassis and employing transistor circuits to permit continuous operation free of heat problems. It is housed in a cabinet measuring 6 x 15 x 13½ inches.

Providing 55 watts of power, the unit has a response of 1 db from 20 to 20,000 cps. Distortion is less than 1 per cent THD at 20 watts, and the built-in multiplexer provides a wide channel separation of 30 db over the entire audio spectrum, the manufacturer states.

## NEW FOLDERS ON G-E INDUSTRIAL ELECTRON TUBES

General Electric Co., Electronic Components Div., Owensboro, Ky., is offering a new set of mailing pieces covering various aspects of industrial electron tubes.

Attractive and colorful, the six folders in the series may be used as data reference sources, as well as by distributors in industrial campaigns tailored to individual needs. The literature covers G-E lines of Five-Star receiving tubes, industrial control thyatrons, and communications, ceramic and television camera tubes.

## NEW LITERATURE DESCRIBES VHF TO VHF CONVERTER

A new data sheet describing the Intec model CV-1 VHF to VHF converter has been released by Intercontinental Electronics Corp., TV Distribution Equipment Dept., 300 Shames Dr., Westbury, Long Island, N. Y.

Featuring signal gain at all conversions and low noise, the new model is a crystal-controlled unit. Additional features include a built-in power supply, matched input and output, and low power consumption. A chart of recommended conversions for all authorized VHF hi-band, lo-band, and sub-channel conversions is included.

## AMPEX TELEVISION TAPE

Television tape, designed specifically for use with the VR-1000 series Videotape recorders, has been developed by Ampex Corp., 934 Charter St., Redwood City, Calif.

The tape is coated, using the Ferro-Sheen process, and features maximum tape life, and minimum head wear and head clogging.

The addition of television tape rounds out the company's line of tape products, which includes tapes for use with Ampex instrumentation, computer, professional and consumer audio recorders.

## COLLINS THREE-CHANNEL REMOTE AMPLIFIER

The model 212H-1, a three-channel remote amplifier designed to provide adequate facilities for most remote applications, has been announced by Collins Radio Co., Cedar Rapids, Iowa. The unit is transistorized throughout and is built into a thermoplastic and vinyl-clad aluminum case. A handle is mounted on the rear chassis for easy portability, and a snap-on cover of

for your tower requirements check

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A complete tower erection service that has these special advantages:

- ✓ DEPENDABILITY
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Peoria, Illinois

## Are Your Station Turntables Ready for Stereo Broadcasting?



THE ANSWER IS YES if you're using the new Fairchild 750 16" belt-driven playback turntable. The only turntable designed for stereo broadcasting! Write today for complete technical specifications on this remarkable new turntable. Price: \$485.00  
Fairchild 752 Cabinet \$110.00

**FAIRCHILD**

RECORDING EQUIPMENT CORPORATION  
10-40 45th Ave., Long Island City 1, N. Y.

**Bauer Kit**

## 1 Kw TRANSMITTER

The "Bauer Kit" Model 707 is the only 1000/250 watt AM transmitter with Silicon Rectifiers in all power supplies, a Variable Vacuum Capacitor and a Constant Voltage Transformer. Your assurance of maximum reliability and optimum performance. All components are standard items available at local sources.

Assembly of the "Bauer Kit" is actually easier than many consumer audio kits - the wiring harness is furnished completely pre-fabricated and coded. And when you complete the transmitter it will be fully inspected, tested and guaranteed by the Bauer Electronics Corporation.

Bauer 1 Kw Transmitter  
(In Kit form) \$3695.00\*  
Bauer 1 KW Transmitter \$4695.00\*  
\*FOB San Carlos, California BE-116

**Bauer**  
ELECTRONICS CORPORATION  
1663 Industrial Road • San Carlos, Calif.

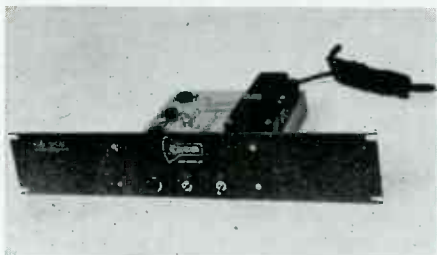
BROADCAST ENGINEERING



thermoplastic protects the panel, controls and VU meter.

The completely self-contained model weighs 11 lb., and operates from 14 1.5-volt flash-light batteries. The VU meter indicates remaining battery charge for the amplifier or meter. A built-in phono equalizer on two of three channels is designed to provide instantaneous switching between two phonos and a microphone, or between three microphones. As a precaution against unintentional power drain, the supply is interlocked with the headphone jack so that the unit requires headphones to be plugged in before it becomes operational.

Additional features include a built-in multiple tone generator to allow a quick response check of the remote line or to provide a standby tone; and 2¼-inch wide, roller-type controls which indicate volume input by a diagonally moving white stripe. The rollers are said to make possible a sure and fast control that can be operated with one finger. Volume input is indicated on the panel.



#### VIDEO LINE DRIVING AMPLIFIER

Community Engineering Corp., 234 E. College Ave., State College, Pa., has announced a new high-output video line driving amplifier.

The model 1019EQ is designed to equalize and drive up to 1½ miles of Foam 11 coax, or one mile of RG-11/U cable. The frequency response for the combined amplifier-cable combination is ± 0.5 db from 5 cycles to 8 megacycles. Square wave response with a square wave from 60 cycles to one megacycle is flat topped to within ± 2 per cent. The amplifier is completely solid state, using silicon mesa-type transistors. Power requirements are 117 volts, 50 to 60 cycles, 22 watts.

Internal attenuation and phase equalization can be tailored to the customer's application.

#### NEW SERIES SPARTA-MATIC TAPE CARTRIDGE UNITS

The new 300 series Sparta-Matic tape cartridge units has been introduced by Sparta Electronic Corp., 6430 Freeport Blvd., Sacramento, Calif., and features a more compact size and the use of a separate record amplifier unit that is interchangeable with any of the 300 series playback units.

The new playback unit measures 5½ inches high and the record amplifier is 3½ inches high, with illuminated push-button control switches and anodized aluminum front panels to make a table top unit. Both units may also be mounted in a standard 19-inch rack, or custom cabinet-mounted.

Features include use of plug-in modules for the record, playback and tone cueing system components; plug-in relays; front panels of both record and playback units can be removed while mounted for access without hindering operation of the machines; a cartridge insertion that automatically lifts and locks the drive puck to a ready position, then is activated by the push-button start control switch; and laminated tape heads.



**LEONARD BALLARD**  
Chief Engineer  
Radio Station KIOA  
Des Moines, Iowa

## OUR STATION SOUNDS BETTER SINCE WE CHANGED TO MaCarTa Equipment

KIOA radio



FIFTH AND PARK STREETS - DES MOINES, IOWA - ATISCIA  
SWANCO

Mr. G. D. Andrews, President  
MaCarTa, Inc.  
4021 Fleur Drive  
Des Moines, Iowa

Dear Andy:

We have had MaCarTa equipment for over six months now (in fact, I think we were one of your first customers) and I thought you would be interested in a report.

We are thoroughly satisfied with MaCarTa in every respect. The reliability of stopping and starting on cue is absolute. We have no overlap or gap problems - even with very tight programming - as we have had with other kinds of tape cartridge equipment.

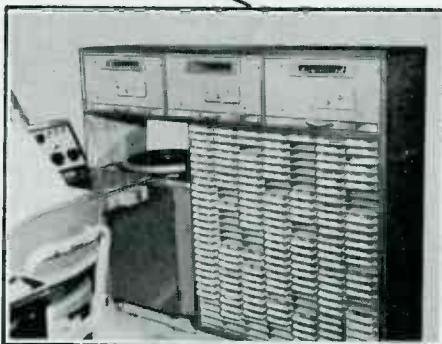
The recording process is very fast. We get more production done per hour than with cumbersome (and much more expensive) disc equipment. Now, anyone can operate the recorder because it's simple, straightforward, and it works! What's more, the quality of tapes produced on our MaCarTa equipment is much higher than discs so the technical standard of KIOA has been automatically raised.

We honestly believe KIOA sounds better than any other radio station in Des Moines today. MaCarTa equipment is the prime reason why.

Very truly yours,

*Leonard Ballard*  
Leonard Ballard

**BELOW - THE THREE MaCarTa  
108 PLAYBACKS AT KIOA.**



### HAVE YOU INVESTIGATED THE NEW MaCarTa CAROUSEL?

**It's the Answer to Complete Hands-off Tape Cartridge Programming**

**WHATEVER YOUR STATION SIZE, THERE IS A MaCarTa EQUIPMENT PACKAGE IDEALLY SUITED TO YOUR PARTICULAR REQUIREMENTS. WRITE FOR FACTS!**



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THE NATIONAL MARKETING ORGANIZATION FOR MAGNETIC SPECIALTIES, BLOOMINGTON, ILLINOIS - PIONEERS OF MAGNETIC CARTRIDGE TAPE DEVICES.

# 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.

The classified columns are not open to the advertising of any broadcast equipment or supplies regularly produced by manufacturers unless the equipment is used and no longer owned by the manufacturer. Display advertising must be purchased in such cases.

## EQUIPMENT FOR SALE

Transmission line, styroflex, heliax, rigid with hardware and fittings. New at surplus prices. Write for stock list. Sierra Western Electric Cable Co., 1401 Middle Harbor Road, Oakland 20, California. 6-61 1f

Commercial Crystals and new or replacement crystals for RCA, Gates, W. E., Bliley and J-K holders; regrounding, repair, etc. BC-604 crystals. Also A. M. monitor service. Nationwide unsolicited testimonials praise our products and fast service. Eidson Electronic Company, Box 31, Temple, Texas. 9-61 tf

One used model 518-DL, 10,000 watt FM broadcast transmitter including: 1,000 watt driver, interconnecting wiring; complete remote control system; frequency and modulation monitor. Immediate delivery. Capitol Broadcasting Company, Inc., Virgil D. Duncan, Chief Engineer, 2619 Western Blvd., Raleigh, North Carolina. Telephone 919 828-2511. 3-62 4t

Two used model 450 Ampex tape playback units 3 3/4 ips half track both direction at \$400 each. Two late model 450 Ampex tape units as above, \$600 each. One changeover panel silence sensing for item one, \$50. Five Magnecorder playback units 3 3/4 ips half track fast rewind, \$125 each. Twenty-five slightly used Browning multiplex tuner receivers \$75 each. Several used Harkins and Hershfield multiplex receivers, POR. Several used Seeburg Automatic record players 78 rpm and 45 rpm models with 100 record capacity, POR. Capitol Broadcasting Company, Inc., Woody Hayes Music Division, Woody Hayes Manager, 3207 Clark Avenue, Raleigh, North Carolina. Telephone 919, 834-8474. 3-62 4t

Surplus HF transmitter 2-20mc. Collins TCC Autotune. Clean. Complete. \$2,140 F.O.B. Tacoma area. Write KAYE, Puyallup, Washington. 5-62 1t

Ampex S-3200 Tape Duplicator System (Master and Two Slaves) Equipment repossessed from small tape duplicating service. Nearly new with less than 50 hours total time. 30-60 i.p.s. Full and half track (Mono or Stereo). To be sold f.o.b. San Francisco Bay area. Immediate delivery. Audio Center, 293 State Street, Los Altos, Calif. Tel. No. 948-9121. 5-62 1t

GOVERNMENT SURPLUS, NEW 10 CM. WEATHER RADAR SYSTEM—Raytheon, 275 KW peak output S band. Rotating yoke P.P.I. Weather Band 4, 20 and 80 mi. range. Price \$975 complete. Has picked up clouds at 50 mi. Wt. 488 lbs. Radio Research Inst. Co., 550 5th Ave., New York, New York. 5-62 8t

PHILCO MICROWAVE LINK. 7KMC System. Type CLR-6 also in stock: Repeaters, 12 and 24 channel multiplex. Large quantity. Exc. cond. Radio Research Inst. Co., 550 5th Ave., New York, N. Y. 5-62 8t

## HELP WANTED

Immediate opening for television technician experienced in studio maintenance and operation. Ampex VTR maintenance experience desirable. Must be ambitious, dependable, and have first phone license. Replies treated in confidence. Send qualifications, references, salary requirements, and recent photograph to Chief Engineer, WLAC-TV, Nashville, Tennessee. 5-62 1t

## BUY, SELL OR TRADE

Will buy or trade used tape and disc recording equipment — Ampex, Concertone, Magnecord, Presto, etc. Audio equipment for sale. Boynton Studio, 10 BE Pennsylvania, Tuckahoe, N. Y. 4-62 6t

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Established 1954

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Save 30% on 4-Track

Stereo Music on Tape!

Empty 3 in. Plastic Reels 7c ea.



BARGAIN PRICES! Send for our FREE Tape Recorder/Blank/Pre-recorded Tape Catalog #B-3

### SAXITONE RECORDING TAPE

\* Oxide guaranteed not to rub off or squeak—or money back. Compare ours with other "Bargain" tape. You'll find it's more than just "price" when you deal with us. We are original pioneers in the tape recorder business and our reputation means everything to us.

800' Acetate (plastic), 5"	.75
800' MYLAR 5" reel	.95
800' MYLAR (Polyester), 5"	.99
1200' MYLAR, 1/2 mil. 5" reel	1.18
1200' Acetate (plastic), 7"	1.19
1200' MYLAR, 1 1/2 mil. (Strong)	1.68
1800' Acetate (plastic), 7"	1.79
1800' MYLAR, 1 mil. thick, 7"	1.99
2400' MYLAR, untensitized, 7"	2.69
2400' MYLAR, tensitized, 7"	2.99

Studios, Large Users Even Lower. PLUS POSTAGE.

Also—Scotch, Irish, Audio, Reeves, Ampex and Sarkes-Tarzian magnetic tapes, mikes, audiocassettes, needles, etc. We'll surprise you with our quotations!

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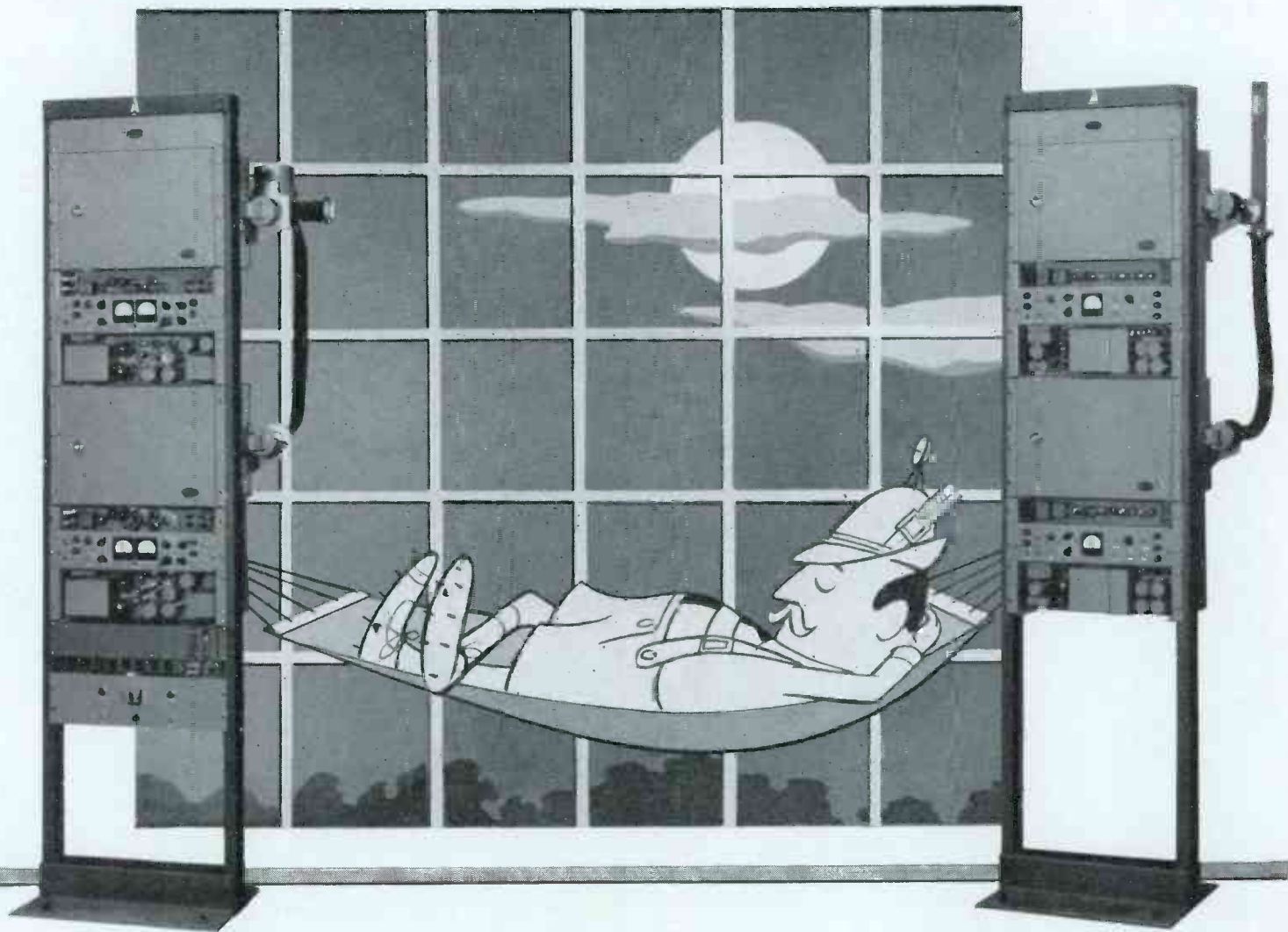
NORELCO SPEAKER Famous AD3800M, twin cone 8" (75-19,000 cycles) discontinued model, former list 18.00, usual net 9.90 going at 4.99 plus postage. (2 for 9.00). Other Norelco speaker sizes at bargain prices. Send for SPEAKER SPECIFICATION SHEET.

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## BROADCASTING ENGINEERING

actively solicits readers' written material. If you have ideas for equipment that you have built, or have designed but not yet built, or any installations you may have made, etc., sit down and write a story about it. Be sure to send plenty of photographs and drawings to illustrate it. We can use from one magazine page to three, or even four if the story is of sufficient interest. Our regular rates will be paid promptly on acceptance by the editor.





## RAYTHEON 1-WATT DUAL-LINK HOT STANDBY STL ELIMINATES AFTER-HOURS MAINTENANCE, OFF-AIR TIME

Providing the ultimate in STL economy and reliability, Raytheon 1-Watt Dual-Link Microwave prevents lost air time, requires no after-hours maintenance. Two Transmitters, two receivers, one sensor and waveguide switch form the completely automatic system, there are no extras to buy, total rack space is only 60 inches, and delivery is in less than 45 days.

As demonstrated at the recent NAB Convention, Raytheon Dual-Link STL connects directly to your present antenna and requires no test equipment for routine maintenance. Either transmitter or receiver can be repaired while the other is operating. Warranty is for a full year, and purchase can be made through two low-cost, long-term financing plans.

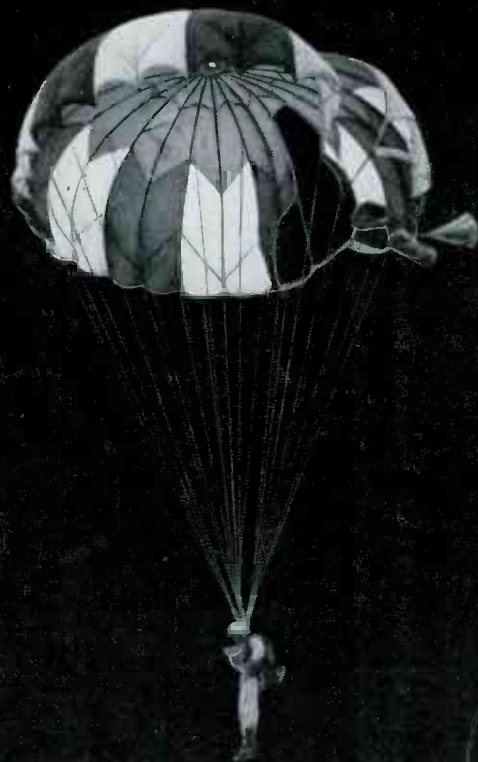
- Full 15 kc audio program channel
- 50 millisecond automatic switchover
- Better than  $\pm 0.02\%$  frequency stability
- Meets or exceeds NTSC color standards



### FOR FULL DETAILS WRITE TODAY TO:

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 Communications And Data Processing Operation BE-5  
 1415 Providence Highway  
 Norwood, Massachusetts  
 Atten. of: H. Bannon

NAME \_\_\_\_\_  
 COMPANY \_\_\_\_\_  
 ADDRESS \_\_\_\_\_  
 STATE \_\_\_\_\_



RCA-4401-V1 Image Orthicon

**PICKS UP  
ACTION-PACKED  
SCENE IN  
NEAR DARKNESS**



High-sensitivity RCA-4401-V1's recently televised "live" a record-breaking nighttime parachute jump in Phoenix, Arizona. Starlight and ground-based searchlights provided the only scene illumination.

TV cameras in a helicopter and on the ground picked up the jump team as they parachuted from the aircraft at 5,000 feet. The RCA-4401-V1's pierced the darkness...and a nation-wide TV audience watched the parachutists jump,

then land upon a designated target.

A specially processed photocathode and high multiplier gain give these Image Orthicons the high sensitivity to "see" objects in near darkness.

In addition to the RCA-4401-V1, your RCA Industrial Tube Distributor carries a complete line of Image Orthicons, as well as other tubes for virtually every station application—whether it's for video, audio, or RF service.

RCA ELECTRON TUBE DIVISION, HARRISON, N.J.



The Most Trusted Name in Television