

# 4½-inch Image Orthicon TV Camera

TYPE TK-60A



## FEATURES

- 4½-inch image orthicon for sharper, crisper monochrome pictures
- Compact control panel with simplified operating controls
- Six camera chains easily controlled by one operator
- Rapid stabilization—produces picture within one minute of cold start
- Counter-balanced yoke assembly—maintains camera balance while focusing
- Built-in remote iris control with transistorized servo amplifier system
- 8-inch viewfinder kinescope for large, bright picture
- Built-in electronic lens cap
- Performance unaffected by line voltage variation from 95 to 130 volts or 190 to 260 volts
- Uses standard television camera cable



The complete TK-60A Studio Camera Chain including camera, set of lenses, camera processor, power supply, master monitor, control panel and console housing.

## DESCRIPTION

The RCA TK-60A Studio and Field Cameras are all new live monochrome camera chains featuring major advances in operational simplicity, stability and performance. The basic camera, which is identical in both the studio and field equipments, utilizes a 4½-inch image orthicon tube which provides a substantial improvement in resolution, signal-to-noise ratio and gray scale reproduction. These qualities result in pictures having the faithfulness of detail and general high quality normally associated with fine photography.

Extensive use is made of stabilized circuitry in every part of the camera chain, beginning with the voltages applied to the image orthicon and extend through all of the video amplifiers, deflection circuits and processing circuits. As a result, a great improvement has been achieved in stability of operation, which has permitted in turn a major reduction in the number of operating controls and the amount

of effort required for operation. In addition, the frequency with which readjustments of setup controls must be made and the amount of servicing required are minimized.

All of the basic setup controls are found in the camera. Once these setup controls and voltages are adjusted they need no further attention in normal day-to-day operation. Cameras may be interchanged freely between camera controls without change of setup adjustments. The simplicity of the operating controls together with the inherent stability of the camera chain makes it possible for one video operator to handle several camera chains simultaneously.

The major units of the TK-60A Camera Chain consists of a combined camera-viewfinder, a processor, a type WP-16B Power Supply, a TM-6C master monitor, and a remote control panel. The camera chain is supplied complete with tubes including image orthicon, a set of three lenses, a 50-foot camera cable with connectors, a camera wedge

mount and a 13-inch console housing for the master monitor and remote control panel. The processor and power supply are designed for mounting in a standard cabinet rack. A Cradle Head and one of the available tripods or pedestals should be ordered to support the camera.

### Camera-Viewfinder

The camera and viewfinder in the TK-60A are combined in a single unit. The streamlined styling of the new housing with its keystone motif and new sage-gray coloring give it distinctive, pleasing and extremely functional appearance. All circuit functions within the camera have been segregated into three subchassis units and a setup control panel. The sub-chassis units consist of a video preamplifier, a deflection chassis and an auxiliary chassis.

Access to the inside of the camera is provided by two hinged side doors which open downward, forming convenient horizontal working surfaces during maintenance periods or are easily removed if desired. The video preamplifier is located in the lower lefthand side of the camera. The deflection and auxiliary chassis are mounted in opposite sides of the camera by means of swing-out hinges which permit them to be raised for access to other parts of the camera assembly and for servicing. A control panel containing the camera setup controls is mounted toward the rear of the camera in the lower left side. The image orthicon and coil assembly are located on a movable focus carriage at the bottom of the camera.

Cool air is drawn in through ventilating holes in the bottom of the camera, circulated throughout the case and exhausted by a very quiet "whisper" type fan mounted in the top of the camera case. A separate blower is used to maintain proper image orthicon operating temperature. In addition, a small blower is mounted in the high voltage compartment to cool the associated components.

### Large, Bright Viewfinder

The viewfinder of the TK-60A features an 8½-inch rectangular kinescope which produces a large, bright picture display. Maximum usable highlight brightness is at least 150 foot-lamberts with a resolution capability of 600 lines. The viewfinder is normally fed by a signal from the output of the processor, permitting the cameraman to see a picture identical to that delivered to the studio output. This signal is sent over the camera cable and is equalized for flat response to the same degree as the output signal delivered by the camera. Provision is made to select remotely from the camera position an alternative signal feed through the camera cable. This feed may be used to show the cameraman a composite picture from an effects system when the camera is being used as an input source for special effects. In addition, the input of the viewfinder may

be connected locally to the output of the camera preamplifier to provide a quality check on the video signal as it leaves the camera.

### Ease of Focusing

A unique arrangement has been provided to counterbalance the weight of the image orthicon focus and deflection coil assembly as it is moved backward and forward during optical focusing of the camera. As the camera is focused, this assembly is counterbalanced by the camera auxiliary subchassis which moves in a direction opposite to that of the coil assembly. In this way, the work required to move the focus mechanism is always minimum regardless of the angle-of-tilt of the camera. Furthermore, there is no tendency for the coil assembly to "slide down hill" when the camera is tilted.

Camera and viewfinder are combined in a single unit, styled for pleasing appearance and simplicity. Large 8½-inch viewfinder produces unusually bright picture with high definition.





Quick change lens mount permits insertion or removal of lens by merely turning two captive thumbscrews.

### Transistor Amplifier Intercom System

Each TK-60A Camera Chain includes a self-contained intercom system with its own power supply. Two separate intercom circuits are provided. One circuit is for production use and has an outlet at the camera that is terminated in the processor from which connections may be made to existing station production intercom circuits. The second circuit is utilized by engineering. This circuit has outlets in the camera, processor and remote control panel and may be operated independently from a built-in d-c power source in the camera or connected to the existing station engineering intercom system. An outstanding feature is the provision of a built-in transistor amplifier and volume control at each point where a headset is plugged into the system. This provides a liberal reserve of intercom level at all times and permits each user to adjust the level to suit his own needs. Each station on the intercom system has back-loading to permit the bridging of a large number of stations without affecting sound level.

### Large, Sturdy Lens Turret

The rugged, large diameter lens turret of the TK-60A camera provides mounting facilities for four lenses with remote iris control. The 11 $\frac{3}{4}$ -inch diameter turret provides liberal spacing between adjacent lenses, thus reducing optical interference. Rigid mechanical support and accurate optical alignment of the lenses are assured by rim support bearings at the edge of the turret, providing a solid mount-

ing for heavy telephoto and zoom lenses. The turret shaft projects through the length of the camera and terminates in a handle at the rear, permitting change of turret position by a simple, direct rotating motion of the handle. Accurate, quiet-operating turret indexing is assured by four rollers which simultaneously engage notches in the rear of the turret itself.

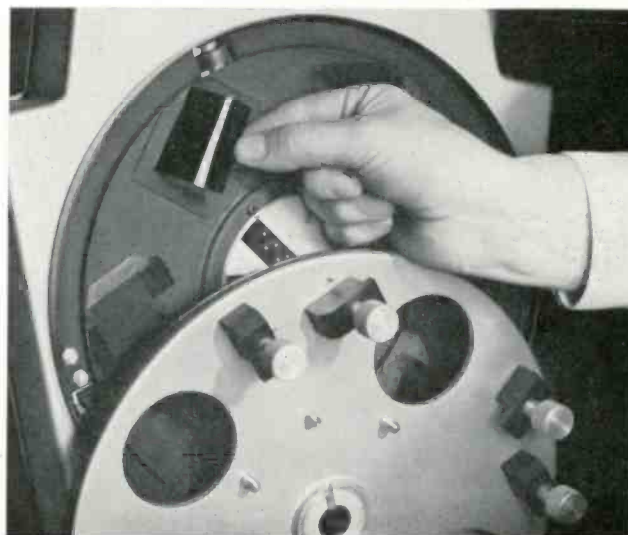
A new precision quick-change lens mount allows replacement of individual lenses by means of two captive mounting screws requiring only one-half turn to secure or to free the lens. The lens mount is designed to accommodate the MI-26882 series lenses which include mechanical provisions for linear, remote controlled iris adjustment.

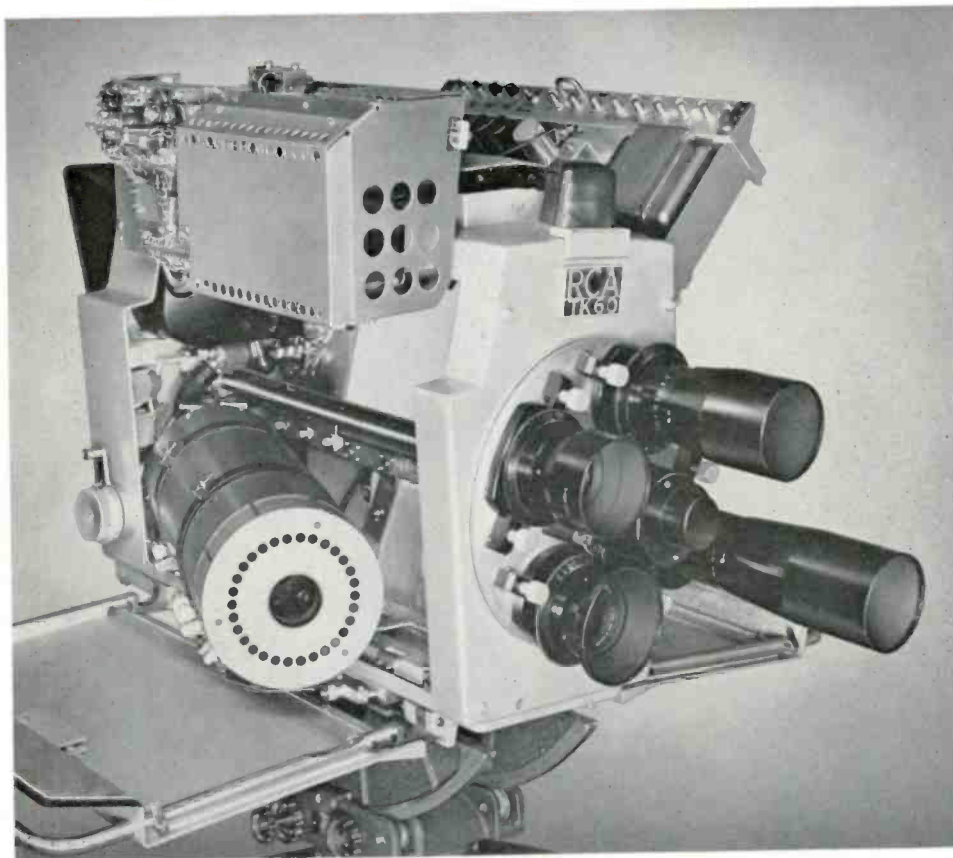
Mechanical drive for remote control of iris adjustment is provided by an enclosed precision servo mechanism located at the center of the turret. A single gear engages the iris drive rings of the four lenses permitting simultaneous iris adjustment of all lenses mounted in the turret. The servo motor may be controlled either locally from the rear of the camera or remotely from the camera remote control panel. A slip-clutch guards against the possibility of damage to the lenses or drive mechanism due to jamming, and permits hand operation of iris adjustment at the front of the camera when desired. The iris drive mechanism is easily removable from the turret by loosening two thumbscrews, permitting detachment of the turret by simply removing a center nut.

### Neutral Density Filter Holder

Immediately behind the lens turret is a disc containing six openings for the insertion of neutral density filters, any one of which may be introduced into the light path to compensate for major variations in light level. Selection

Easily removable lens turret provides access to filter holder wheel with space for six neutral density filters. Holder wheel is rotated by knob from operator's end of camera. Detent stops between filters provide convenient optical lens cap.





The TK-60A Camera literally turns "inside-out" for complete access to all parts.

of filters is provided by a control knob at the rear of the camera which rotates the disc to the desired position. Detent stops located between filter positions permit use of the disc as an optical lens cap.

### Easy-To-Service Features

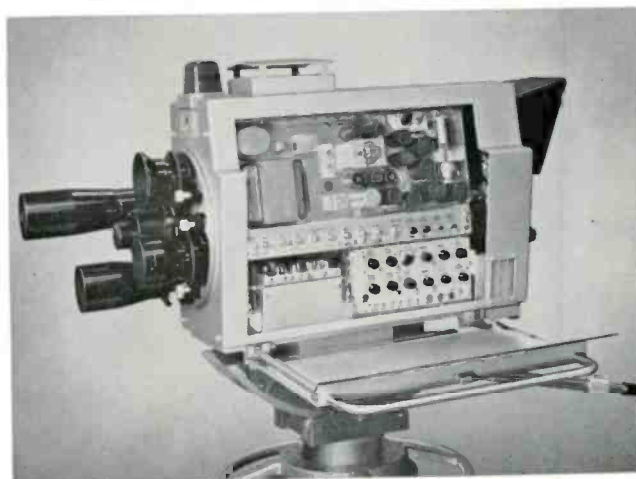
Many electrical and mechanical features are found in the TK-60A to facilitate servicing. The inherent stability and reliability of the circuits minimize the servicing required. When routine checking and repair are needed, a number of self-testing circuits make the job easy. All significant circuits are wired to pin jacks for making either meter or oscilloscope measurements of signal and power supply voltages.

In stabilized circuits employing feedback and current stabilization, many of the normal tests for tubes and circuit performance do not give significant indications. However, an effective test of such circuits can be made by an arbitrary reduction of filament voltage. In the TK-60 camera, means are provided for applying this reduced voltage test to one segment of the system at a time. Thus it is possible to obtain an indication of potential trouble and to isolate it to a particular area. Test switches are included in both the camera and processor for applying this type of test in a routine manner.

### Accessibility to Image Orthicon Tube

The focus-deflection coil assembly swings out to one side for easy replacement of the image orthicon tube. This simple approach avoids the need for removal of the turret or of any subassembly within the camera in order to change the pickup tube, and reduces tube replacement time to a period of two or three minutes. The hinged

Compact pre-set control panel combines camera set-up controls and numerous test probe points for easy servicing. Sturdy side doors provide convenient work space for test instruments.



mounting of the two largest chassis subassemblies in the camera provides accessibility to other areas in the camera. These subassemblies are operable in either normal or swing-out positions.

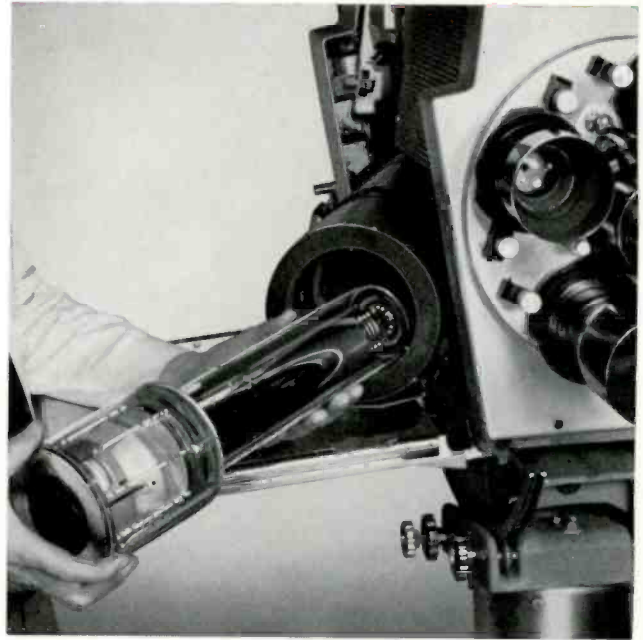
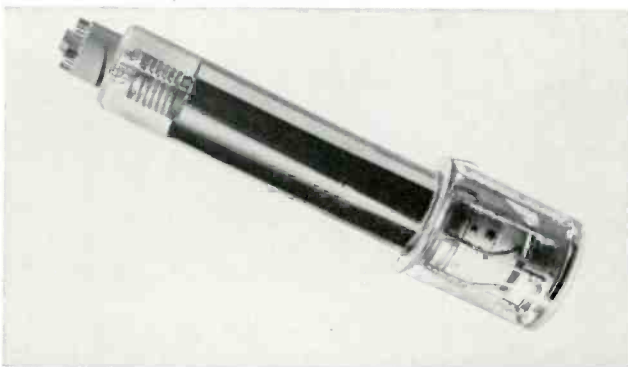
Solid type terminal strips with solder connections are used throughout the camera chain except on sub-assemblies which may occasionally require removal. Connections to removable sub-assemblies are made by captive plugs and receptacles to permit easy removal for servicing or replacement.

### 4½-Inch Image Orthicon Tube

The heart of the TK-60A Camera is the RCA 4½-inch Image Orthicon, a newly designed tube made to the same high precision standards as color pickup tubes. It features the use of a wall-mesh and high quality dynode construction which assure uniform beam landing and freedom from shading and background non-uniformities of all kinds. Close tolerances held on electrical characteristics of the 4½-inch tube are a feature of special importance which permits the use of setup controls with restricted ranges in the TK-60A.

The 4½-inch tube operates on the same basic principles as the well known 3-inch types. In appearance it has the same general shape, but is simply larger in size. The significant difference from the 3-inch tubes lies in the larger area of the glass target scanned by the electron beam. It is this larger area which accounts for the ability to give increased resolution, or more significantly, the signal to noise ratio is increased by a factor of almost 2 to 1. Though the target of the 4½-inch image orthicon is larger, the photo-cathode (used diameter) is the same as that of the 3-inch tube. Hence camera lenses having the same size image diagonal may be used with either 4½- or 3-inch tubes. Magnification of the electron image in the

Key to superior picture quality in the TK-60A Camera is the 4½-inch image orthicon tube. While target area is twice as large for higher resolution, image magnification permits use of same size lenses as are used with 3-inch tubes.



Swing-out yoke mounting arrangement permits change of I.O. tube within two or three minutes.

4½-inch tube is brought about by suitable strengthening and shaping of the magnetic focusing field in the image section of the tube.

Another important feature built into the 4½-inch tube is relatively close spacing between the glass target and the mesh. As a result, signal-to-noise ratio is increased and the linear portion of the transfer characteristic is lengthened, permitting more accurate reproduction of the gray scale. Also, broad redistribution of secondary electrons is reduced, thus minimizing the possibility of overshoots and halos in the picture.

### High Voltage and Focus Current Regulation

Close regulation of the voltages applied to the image orthicon and viewfinder is of prime importance in achieving stable performance. This is accomplished by using corona-discharge tubes to maintain highly accurate voltages. In circuits where desirable to eliminate the possibility of even small variations of the voltages, the corona-discharge tubes are enclosed in a temperature-controlled oven.

In addition to precise voltage regulation for the image orthicon, the magnetic focusing field must be equally stable. Current regulating circuits are employed in the processing amplifier to maintain the focus current within a maximum variation of 0.12 percent. Current reference is obtained from the drop in a resistor having a low temperature coefficient, and voltage reference is obtained from a highly stable zener diode.

## Stabilization Techniques

With normally-used fixed bias controls, the beam current in the image orthicon drifts through a rather large range during the first half hour or so of operation. To eliminate the need for constant resetting of this bias during warm-up, beam current stabilization is provided in the TK-60A by the use of feedback between G2 and G1 of the image orthicon tube. This arrangement keeps the beam at the proper value for discharge of picture-whites and for minimum noise at all times.

A separate blower system is provided for temperature stabilization of the image orthicon, consisting of a blower and a plenum chamber with two exhaust ducts. One duct maintains adequate cooling to the heater and cathode section, the other directs air to the image section of the image orthicon tube. The duct to the image section contains two heater elements, which are controlled by a thermostat mounted in the yoke assembly and in contact with the glass envelope near the target. The thermostat and heaters provide rapid warmup and maintain proper operating temperature of the image section of the image orthicon tube. Two flexible hoses are utilized as air passages from plenum chamber to the yoke assembly.

Current stabilization is used in amplifier tube circuits essentially throughout the TK-60A chain. Both temperature and aging effects which tend to cause a slump in cathode current are effectively counteracted where desirable by using a cathode resistor of high value with the grid returned to a positive voltage. Any change in emission characteristics of the tube will therefore result in only a small effective change in cathode current. Maximum use is made of feedback techniques in video output stages, deflection systems, and clamp circuits. Precision resistors with very low temperature coefficients are used in all critical circuits to minimize drift in voltage and current and to reduce camera warmup time. These are further aids in maintaining stable signal levels, linearity, and low differential gain.

## Magnetic Shielding

Special care has been employed in the design of the TK-60A deflection assembly to provide complete magnetic shielding around the tube and its associated coils. This makes it possible to operate the camera in stray fields of intensities as high as 10 gauss without significant deterioration in picture quality.

Premium tubes with high performance and long life are used wherever possible. Every effort has been made to minimize the number of tube types and to operate them conservatively. Use of these tubes along with feedback and current stabilization yields a great increase in life



All operating controls required by cameraman are located at the rear of the camera for ease of operation.

expectancy and general reliability. Extensive use is also made of the new, very small, Nuvistor triode tube. It is used exclusively in the video preamplifier, and in a number of other functions associated with blanking and deflection. One of the most significant characteristics of the Nuvistor (especially important to the video preamplifier) is freedom from microphonics. Other desirable characteristics include very small size, very low heat dissipation, high gain, and long life.

## Built-in Calibration Pulse

A control for adjusting gain of the signal multiplier in the image orthicon is included among the setup controls in the camera. A built-in calibration signal is provided for making proper preset adjustment of this control. The calibration signal consisting of a symmetrical square wave at scanning line frequency, is added by a switch to the picture signal at the input of the video preamplifier. The calibration signal is factory-adjusted to provide the normal level of 0.7 volts peak-to-peak at the output of the preamplifier. It presents a half-black, half-white picture on the viewfinder. By using the filter holder disc as a half mask and focusing the camera on an all-white scene it is seen that the white portion of the image orthicon signal fills in the black area left by the calibration signal.

When the gain of the signal multiplier is correct, both halves of the scene will appear to have equal white values

on the viewfinder. If they are not equal, the multiplier gain control should be adjusted to make them equal. As a result of the stabilized circuitry in both the preamplifier and the high voltage supply, this adjustment of correct signal level remains accurate for a considerable period of time.

### TK-60A Camera Control

Essentially all of the setup controls in the TK-60A equipment are located in the camera where the viewfinder and a built-in calibration signal provide the measuring facilities required for setup adjustment, while only operating controls are placed at the camera control position. A previously adjusted camera may therefore be placed into service without need for adjusting setup controls at the camera or at the control position.

Setup functions at the camera include the usual adjustments for the image orthicon such as beam, beam alignment, target voltage, target calibration, orthicon focus, multiplier focus, and G6. A separate control for the wall-mesh electrode in the image orthicon tube is also located in the camera. Size and centering control (dual centering controls to accommodate reversal of scanning) and linearity adjustments are located on the deflection subchassis, while preset shading controls appear on the auxiliary subchassis.

Operating controls which are located on the camera include turret handle, optical focusing control, and manual control for rotating the neutral density filter holder, and two switches for reversing directions of horizontal and vertical scanning, respectively. The turret handle and focusing control retain the general locations and modes of operation to which cameramen have become accustomed in earlier RCA cameras. All of the operating controls listed in this group are conveniently located at or near the rear of the camera.

### Remote Control Panel

The remote control panel contains the three operating controls of the TK-60A camera chain, consisting of the remote iris control, brightness and a contrast control. The remote iris control is the principal operating control in the camera chain. An open-loop servo system drives all four lenses on the turret simultaneously. In the MI-26882 series of lenses, the iris scales are linear and identical in all focal lengths. Thus the calibrated scale at the control (either at the rear of the camera or on the remote control panel as determined by a selector switch) shows the actual iris setting for any lens in the turret.

The remote control panels may be used for either of two modes of operation. The desired mode of operation is selected by a simple jumper arrangement in the camera and processor. In the clamp-on-black mode of operation the functions of the remote control knobs are as follows. The iris control is adjusted to maintain the correct light exposure to the photo cathode of the image orthicon. The contrast control functions as a video gain control. The brightness control is utilized to maintain the desired black level.

In the clamp-on-white mode of operation the iris control operates as above. The adjustment of the contrast control alters the level of the black information of the video signal with reference to the fixed peak white level as established by preset adjustment of the white clamp reference in the camera. The brightness control is adjusted to establish the desired black level to which the black video information is adjusted by the contrast control.

Two alternate versions of the remote control panel are available, identical in electrical function but designed to accommodate different mounting requirements. The MI-26008 Remote Control Panel is 11 $\frac{1}{8}$  by 2-21/32 inches in size and is designed for mounting beneath the master monitor in the space provided in the MI-26786 thirteen-inch console housing. The MI-26007 Remote Control Panel is 7 $\frac{3}{4}$  by 2 $\frac{1}{8}$  inches in size and is designed to mount in the space provided in the front of a TM-35 Portable Master Monitor.

### Electronic Lens Cap

A special new feature, of considerable convenience when the camera is left unattended, is an "electronic lens cap." It may be applied at any time by either the cameraman

Small and simplified camera remote control panel contains only two actual operating controls. Two versions of panel are available, MI-26007 (illustrated) for use with TK-60 Field Camera Chains, and MI-26008 for use with TK-60 Studio Chains.





or the video operator. Tallies at both locations show when the camera has been capped. A switch cuts off the accelerating voltage in the image section of the pickup tube and applies a bias of about 4 volts to the target; thus the picture is effectively removed from the tube.

### Built-in Image Orbiter

Electromagnetic image orbiting and immobilization, completely self-contained in the camera, are provided at a speed of 1 rpm. A switch at the back of the camera permits orbiting with or without image immobilization or turning the orbiting system off. In the "off" position, a red tally warns operator that the orbiter is not operating.

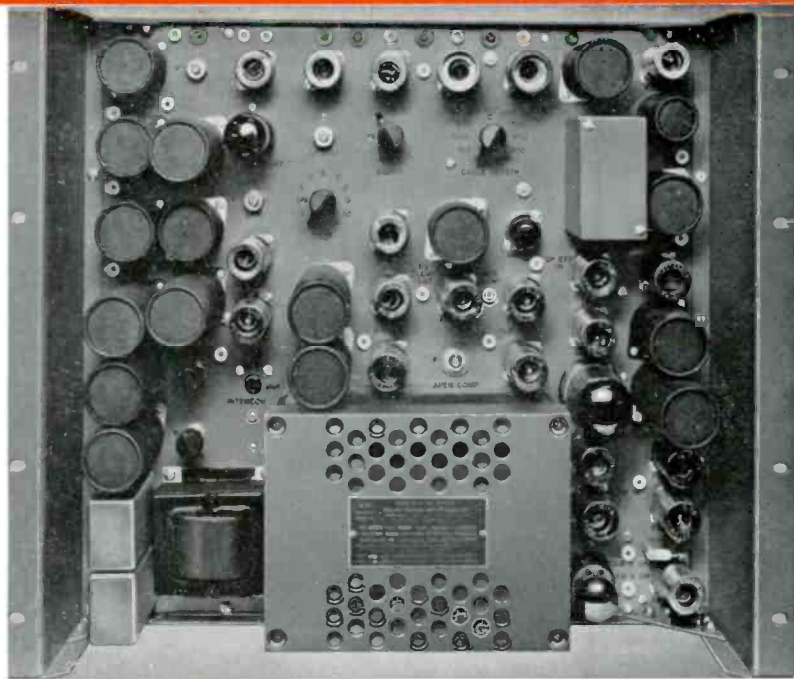
### Processor

The processor is a rack-mounted unit built on a standard bath-tub chassis occupying 15 $\frac{3}{4}$  inches of rack space. It contains all of the circuits for processing the signal delivered by the camera preamplifier and for providing three separate outputs to the signal switching and distribution system. It contains receptacles for the camera cable, power input to the camera chain, and intercom and remote control circuits. Also included are a 24-volt power supply and other components required for a self-contained intercom system.

The bandwidth of the video preamplifier and processor amplifier (including cable equalizing networks) is 8 mc within  $\pm\frac{1}{2}$  db. The improved signal-to-noise ratio obtainable with the new 4 $\frac{1}{2}$ -inch I.O. tube is sufficient to permit the use of considerable aperture correction to enhance the already improved detail response of the larger tube. Circuits are included in the processor for providing up to 13 db of aperture correction peaked at 6.0 mc, with continuously variable amplitude adjustment. The same image orthicon characteristics which permit the use of aperture correction also permit the use of gamma correction. Three preset values (0.7, 0.8 and 1.0) may be selected by a switch without affecting output video level.

### Accurate Cable Compensation

The processor also includes a tap switch for introducing video equalization to compensate for different lengths of camera cable. This switch provides increments in compensation corresponding to 100-foot increments in length up to a maximum of 1000 feet. The same switch assembly includes equalizing circuits for the coax used for viewfinder feed.



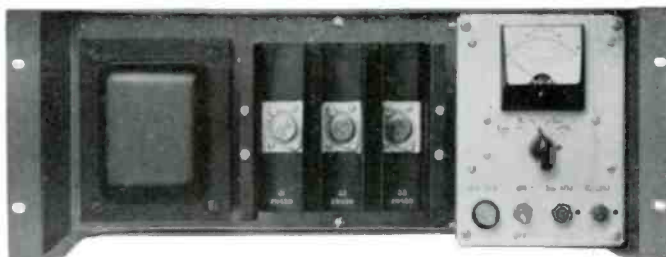
Rack-mounted Camera Processor, MI-26003.

### Semiconductor Power Supply

A Type WP-16B power supply, completely tubeless and with a current rating of 1.6 amperes at 280 volts, provides the necessary regulated power for the camera, processor and TM-6C master monitor. It also includes the necessary subchassis units which supply unregulated voltage and centering current required in the camera. Designed for minimum heat radiation and space consumption, it occupies only seven inches of rack space.

All power transformers in the camera, processor and the transistorized WP-16B regulated power supply are of the self-regulating type. They permit variation in line voltage between 95 and 130 volts or 190 and 260 volts without any need for changing transformer voltage taps. This feature also provides automatic compensation for the drop in a-c supply voltage to the camera over the camera cable up to a length of 1,000 feet. In addition, it gives

A single WP-16B Semi-Conductor Power Supply powers entire TK-60A Camera Chain.





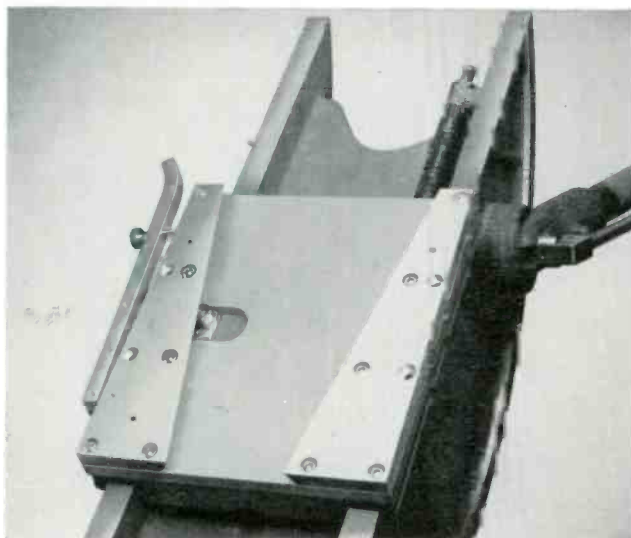
TK-60A uses standard camera cable and connectors for complete interchangeability with existing equipment.

assurance of stabilized heater voltages on all tubes and increases the stability and performance of the regulated d-c power supply.

### Wedge Mount for Camera Head

A new type of positive mount for the camera on the cradle head is provided in the form of a metal wedge and a mating wedge mount adaptor. This type of fastening

Camera Wedge Mount permits easy mounting of camera with accurate positioning and positive lock mechanism.



permits easy and rapid mounting of the camera. The wedge mount adaptor may be easily attached to an existing cradle head by 8 screws.

### Standard Camera Cable

Because of the very extensive use of RCA MI-94 type of camera cable in nearly all television stations. The TK-60A camera chain has been designed to use the same cable. Installation of the new camera, therefore, does not require replacement of existing cables. This is an important consideration in those cases where cables are routed through conduits in studio walls and where large quantities of MI-94 cables are already on hand. The camera cable receptacle is located on the base of the camera at the rear in the position which has become familiar in earlier RCA cameras.

### TK-60A FIELD CAMERA CHAIN

The TK-60A Field Camera Chain is similar to the TK-60A Studio Camera equipment with the exception that the TK-60A is packaged for portable field applications. The major units of the TK-60A Field equipment consists of a combined camera-viewfinder, a field processor, a Type WP-16B power supply, a power supply field case, a TM-35 portable master monitor, and a remote control panel. The camera chain is supplied complete with tubes including image orthicon. A cradle head, Type TD-11A folding metal tripod, set of interconnecting cables, set of camera cables with connectors (50, 100 and 200 foot lengths), and a set of three lenses complete the camera chain.

The camera-viewfinder unit of the TK-60A Field Camera Chain is identical with that of the TK-60A Studio Camera equipment. The field processor is similar to the rack mounting processor with the exception that the field unit is housed in an attractive, portable field case and utilizes field type connectors mounted on a sub-panel at one end of the case. A similarly styled field case is supplied for the WP-16B power supply. The camera remote control panel fits into a space provided in the front of the TM-35 portable master monitor.

The TM-35 portable master monitor with remote control in place may be mounted on any convenient operating table. The field processor and WP-16B power supply may be mounted beneath the desk since neither unit contains operating controls.



Complete TK-60A Field Camera Chain, including camera with cradle head and tripod, portable master monitor with camera remote control panel installed, field processor (at lower left) and WP-16B Power Supply in field case.

## SPECIFICATIONS

### General Specifications

Type of Reproduction.....	Monochrome
Number of Scanning Lines.....	525 or 625
Frame Repetition Rate.....	30 or 25 per sec.
Field Repetition Rate.....	60 or 50 per sec.
Line Repetition Rate.....	15,750 to 15,625 per sec.
Picture Signal.....	1.0 volts, peak-to-peak composite, nominal 1.4 volts, peak-to-peak composite, optional
Picture Polarity at Output.....	Black negative
Viewfinder Display Size.....	4 1/2 x 6 inches (8" kinescope)
Viewfinder Brightness.....	150 foot Lamberts Max.
Impedance of Coaxial Transmission Line.....	75 ohms
Maximum Length of Camera Cable.....	1000 feet

### Picture Quality

Limiting Horizontal Resolution.....	700 TV lines minimum in center, 500 TV lines minimum in corners
Signal-to-Noise Ratio.....	Nominal 36-38 db peak-to-peak signal/RMS noise for bandwidth of 4.5 mc
Square Wave Tilt.....	Adjustable to zero at vertical rate
Blanking Signal Overshoots.....	Not in excess of EIA specifications
Overall Frequency Response:	
With 100 ft. Camera Cable.....	±1/2 db to 8 mc; down not more than 3 db at 10 mc
With 1000 ft. Camera Cable.....	±1 db to 8 mc; down not more than 4 db at 10 mc

Scanning Aspect Ratio.....	4:3
Scanning Linearity.....	Within ±1% normal
Overcan Amplitude.....	Horizontal 10%; Vertical 10%
Retrace Intervals.....	Horizontal 7.6 μsec.; Vertical 635 μsec.
Range of Centering Adjustment.....	Horizontal ±10%; Vertical ±20%
Orbiting.....	Approximately circular path 7% dia. of picture height at 1 RPM. With immobilization, motion in received picture not over 1%

### Operational Specifications

Remote Iris Control.....	Elapsed time to cover entire range: 2.0 sec.; accuracy of setting: ±0.25 lens stop
Contrast Control.....	Range: 0% to 50% clipping of blacks
Electronic Lens Cap Control.....	Two-Way switch on remote control panel, operating in conjunction with similar switch on camera
Gamma Correction.....	Switchable to three preset values of 0.7, 0.8 and 1.0
Aperture Correction.....	Peaked at 6.0 mc; amplitude adjustable continuously from 0 to +13 db
Camera Cable Equalization <sup>1</sup> .....	Adjustable in steps of 100 ft. to a maximum of 1000 ft.

<sup>1</sup> Coaxial lines for preamplifier output and for viewfinder signal input are equalized simultaneously with identical compensating networks.

## SPECIFICATIONS (Continued)

## Electrical Specifications

## Input:

Horizontal Drive.....	4.0 ±0.5 volts, peak-to-peak negative <sup>2</sup>
Vertical Drive.....	4.0 ±0.5 volts, peak-to-peak negative <sup>2</sup>
EIA Blanking.....	4.0 ±0.5 volts, peak-to-peak negative <sup>2</sup>
Effects Signal to Viewfinder.....	Video at 0.7 volt nominal,

1.0 volt nominal, black negative  
Audio Cue Signal.....Balanced into 60 ohms at 2W level

## Output:

Video No. 1, No. 2 and No. 3.....	Non-composite level either
	0.7 or 1.0 volt, peak-to-peak black negative <sup>3</sup> (Sync may be added
	to any two outputs)

## Isolation Between Any two Non-composite

Outputs.....	At least 46 db from 1 kc to 100 kc;
	At least 30 db from 10 cps to 10 mc

## AC Power Input:

50 cycle	60 cycle
230 volt chain	115 volt chain

Line Frequency ..... 50 cycles ±1 cycle    60 cycles ±1 cycle

## Power Requirements (approx.

total including master mon-	
itor and power supply).....	1200 watts                    1200 watts

## DC Power Load (from WP-16B Power Supply)

	Including TM-6C	Excluding TM-6C
Regulated, +280 V.....	1350 ma	900 ma
Unregulated, ±400 V.....	190 ma	190 ma
Centering Current, -4 V.....	1450 ma	1000 ma

## Tube and Semiconductor Complement

## Camera Viewfinder:

1-6AU5	4-1N1734	2-2N2219
1-6EM5	1-1N3020B	1-2N2323
2-6DQ5	1-2N329A	2-2N2348
1-8HP4	2-2N369	2-GV3A-1300R
1-6688	3-2N404	1-M-42C-9.8
2-6922	2-2N585	3-PS1148
3-7308	1-2N706	2-SV4010A
21-7586	1-2N1132	1-SV4091A
1-7295B	1-2N1233	

## Processor:

2-6BC7	1-6080	12-7308
2-6BX7	7-6688	1-2N369
2-12AX7	1-7119	1-2N2219

## Mechanical Specifications

## Overall Dimensions:

Camera-Viewfinder	
Camera Case.....	15" wide, 19½" high, 26¼" long
Total with Viewfinder Hood, Turret,	
Iris Drive and Tally Light.....	15" wide, 22" high, 36" long
Processor (Rack Mounting).....	19" wide, 15½" high, 10" deep
Field Processor.....	8½" wide, 18½" high, 23" long
Remote Control Panel	
(TM-35 Mounting).....	7¾" wide, 2½" high, 3½" deep
Remote Control Panel,	
(Console Mounting).....	11⅞" wide, 2-21/32" high, 3½" deep
WP-16B Power Supply,	
Rack Mounting.....	19" wide, 7" high, 13½" deep
Field Case for WP-16B	
Power Supply.....	8½" wide, 18½" high, 27½" long
TM-6C Master Monitor.....	13⅞" wide, 18" high, 20" deep
TM-35 Portable Master Monitor.....	8½" wide, 15⅞" high, 20¾" deep
Console Housing.....	12¼" wide, 44¼" high max., 46" deep max.

## Weight:

Camera-Viewfinder .....	150 lbs.
Processor, Rack Mounted.....	60 lbs.
Field Processor.....	70 lbs.
Remote Control Panel, TM-35 Mounting.....	1½ lbs.
Remote Control Panel, Console Mounting.....	2 lbs.
WP-16B Power Supply, Rack Mounting.....	71 lbs.
WP-16B Power Supply in Field Case.....	80 lbs.
TM-6C Master Monitor.....	55 lbs.
TM-35 Portable Master Monitor.....	49 lbs.
Console Housing, 13-inch.....	75 lbs.

## Equipment Supplied

Type TK-60A Monochrome Studio Camera Chain including the following:

115 V., 60 Cycle Chain		230 V., 50 Cycle Chain	
Qty.	MI Number	Description	Qty. MI Number
1	26002-A	Camera Viewfinder .....	1 556002-A
1	26003-A	Processor, Rack Mounting .....	1 556003-A
1	26008	Remote Control Panel,	
		Console Mounting .....	1 26008
1	26084-B	Power Supply, WP-16B .....	1 26094-B
1	26083-A	Centering Current Subchassis .....	1 26083-A
1	26082-A	Unregulated High Voltage Subchassis	1 26082-A
1	26882-A3	Lens, 50mm, f/2.0 .....	1 26882-A3
1	26882-A4	Lens, 75mm, f/2.0 .....	1 26882-A4
1	26882-A5	Lens, 127mm, f/2.8 .....	1 26882-A5
1	26373	Viewfinder Hood .....	1 26373
1	26877-A	Image Orthicon, RCA 7295-B .....	1 26877-A
1	26725-E5	Camera Cable, 50 feet .....	1 26725-E5
1	26884-A	Wedge Mount .....	1 26884-A
1	26786	Console Housing, 13-inch .....	1 26786
1	26136-C	Master Monitor, TM-6C .....	1 N26136-C
1	26579-B	Blower for TM-6C .....	1 556579-B
1	26667	CRO, RCA Type 5ABP1 .....	1 26667
1	26655	Kinescope, RCA Type 10SP4 .....	1 26655

Type TK-60A Monochrome Field Camera Chain including the following:

115 V., 60 Cycle Chain		230 V., 50 Cycle Chain	
Qty.	MI Number	Description	Qty. MI Number
1	26702-A	Camera Viewfinder .....	1 556002-A
1	26009-A	Field Processor .....	1 556009-A
1	26007	Remote Control Panel,	
		TM-35 Mounting .....	1 26007
1	26084-B	Power Supply, WP-16B .....	1 26094-B
1	26083-A	Centering Current Subchassis .....	1 26083-A
1	26082-A	Unregulated High Voltage Subchassis	1 26082-A
1	26216	Field Case for WP-16B .....	1 N26216
1	26882-A3	Lens, 50mm, f/2.0 .....	1 26882-A3
1	26882-A4	Lens, 75mm, f/2.0 .....	1 26882-A4
1	26882-A5	Lens, 127mm, f/2.8 .....	1 26882-A5
1	26373	Viewfinder Hood .....	1 26373
1	26154	Portable Master Monitor, TM-35 .....	1 556154
1	26877-A	Image Orthicon, Type 7295-B .....	1 26877-A
1	26359	Set of Interconnecting Cables .....	1 26359
1	26725-E5	Camera Cable, 50 feet .....	1 26725-E5
1	26725-E6	Camera Cable, 107 feet .....	1 26725-E6
1	26725-E7	Camera Cable, 200 feet .....	1 26725-E7
1	26884-A	Wedge Mount .....	1 26884-A
1	26203-A	Cradle Head .....	1 26203-A
1	26046	Tripod, Type TD-11 .....	1 26046

## Optional and Accessory Equipment

Cradle Head .....	MI-26203-A
Television Pedestal, Type TD-3A.....	MI-26036
TD-3A Counterweights (25 lbs.) required for TK-60.....	MI-26391
Console Well Adaptor for MI-26008 Remote Control Panel	MI-26252
Rack Adaptor for MI-26008 Remote Control Panel.....	MI-26254
Rack Adaptor for MI-26007 Remote Control Panel.....	MI-26887-2
Left Panel Assembly and Side Cover for Console Housing	MI-26788-1
Right Panel Assembly and Side Cover for Console Housing	MI-26788-2
Upper Left Side Cover Only.....	MI-26789-1
Upper Right Side Cover Only.....	MI-26789-2
Shock Mount for Processor.....	MI-26511-A6
Shock Mount for WP-16B.....	MI-26511-A5
Shock Mount for TM-35.....	MI-26511-A3
Spare Video Pre-amplifier for TK-60A Camera.....	MI-26006
Spare Remote Iris Drive Assembly for TK-60A Camera.....	MI-26019
Spare I.O. Yoke Assembly for TK-60A Camera.....	MI-26004

<sup>2</sup> Pulse widths as specified by EIA in RS-170. Terminals for signals are arranged for loop-through connections with isolating filters.

<sup>3</sup> Circuits terminated at sending end and Z<sub>0</sub> = 75 ohms.