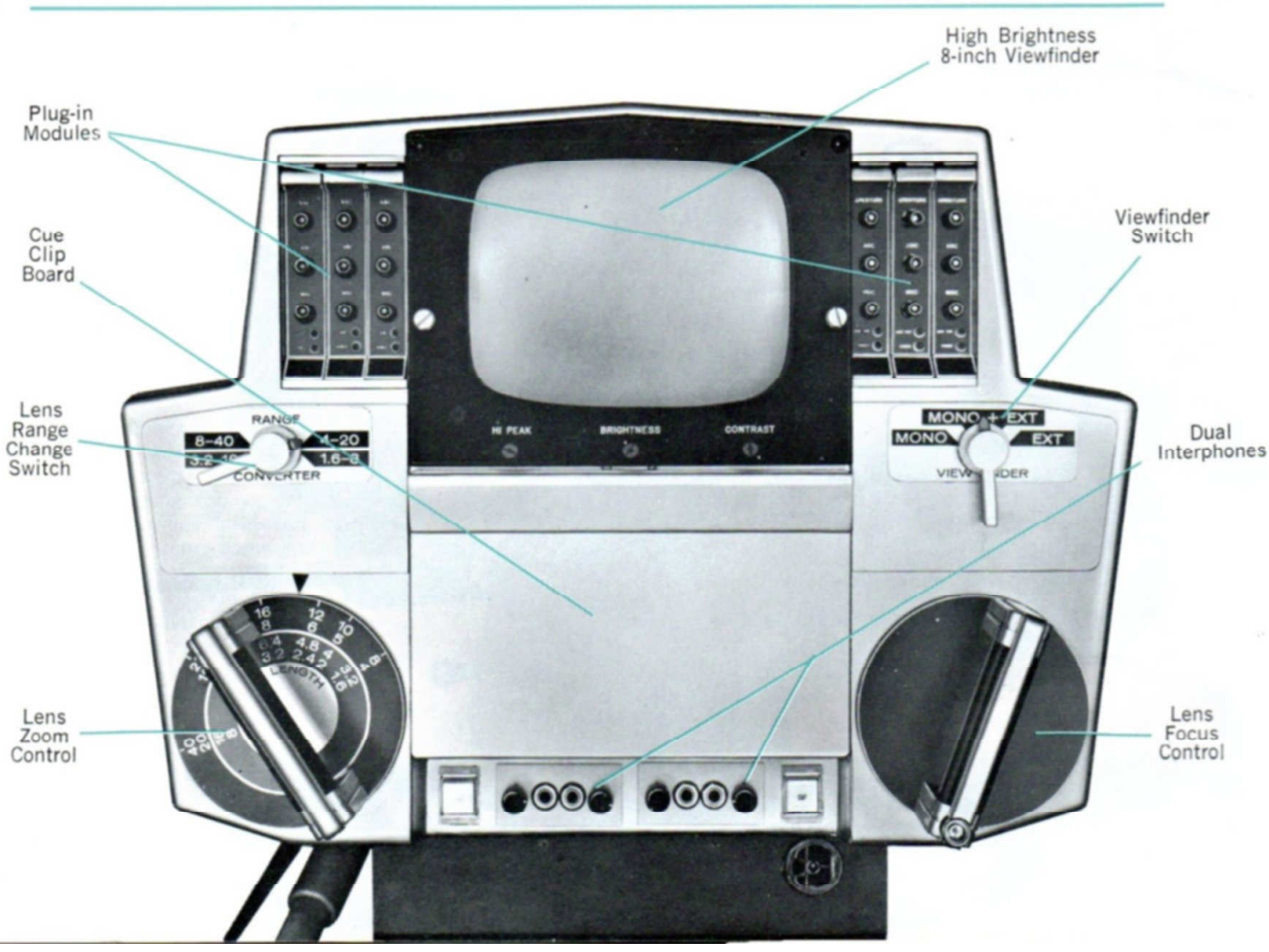
catalog B.2000

Transistorized Live Color Camera, Type TK-42

- Separate Monochrome (luminance) Channel
- Built-In Zoom Lens
- Stabilized Circuitry
- Standard Transistorized Modules
- Low Profile Styling


Easily Viewed
Tally Lights
Built-in
Zoom Lens
Low
Profile
Styling
RCA
TK42


High Brightness
8-inch Viewfinder
Plug-in
Modules
Cue
Clip
Board
Viewfinder
Switch
Lens
Range
Change
Switch
Dual
Interphones
Lens
Zoom
Control
Lens
Focus
Control
RANGE
8–40
4–20
1.6–8
CONVERTER
HI PEAK
BRIGHTNESS
CONTRAST
MONO
EXT
LENGTH

Transistorized Live Color Camera, Type TK-42

The RCA transistorized color camera, Type TK-42, represents an entirely new concept in color camera design and establishes a new high standard in color picture quality. A 4½-inch Image Orthicon Tube in a separate luminance channel lends "snap" to the color picture and results in monochrome picture quality comparative to that of the finest black-and-white cameras. Three 1-inch vidicon tubes provide chrominance information for color pictures of the highest fidelity.

The TK-42 Camera features a new, low profile design which places the viewfinder near the center line of the taking lens. This keeps the camera operating height at minimum at all times and places the viewfinder at or near eye level for the operator. The entire rack mounted portion of the camera chain including the power supply occupies less than 25 inches of rack space.

The compact, simplified camera control panel may be either rack mounted or console mounted in a single 20-inch console housing.

Advanced, solid state circuitry provides excellent performance and reliability with extremely low heat dissipation. The total power requirement of the camera chain excluding monitors is less than 750 watts. The camera and rack mounted auxiliary equipment employ modular design throughout. Standard modules are plug-in, rugged, and easy to maintain.

The TK-42 line color camera is new in entirety, thoroughly engineered to produce the best obtainable monochrome and color pictures with the least effort. This camera brings for the first time to color television a degree of simplicity and convenience of operating previously associated only with monochrome cameras.

Description

Separate, High Resolution Luminance Channel

The new TK-42 Color Camera utilizes four pickup tubes; one 4½-inch image orthicon to develop a separate wideband luminance signal and three electrostatically focused 1-inch vidicons to develop the chrominance signals. This is a new concept to produce both color and monochrome video signals of highest quality. The separate luminance channel provides two very important advantages over earlier three-tube cameras. First, the output signal of the TK-42 Color Camera when viewed on a monochrome receiver or monitor is equivalent in resolution, grayscale and overall quality to that obtained from the finest black and white cameras. Second, the high resolution luminance component of the colorplexed video signal enhances the grayscale and resolution of the color picture.

Fully Transistorized

Transistors and other solid state components are utilized throughout the TK-42 Camera system to perform all circuit functions. The only exceptions are the four pickup tubes, viewfinder kinescope, high voltage rectifier, and the tubes used in the picture and waveform monitors. Solid state circuitry provides long term reliability, reduced maintenance and a consistently high level of performance. Transistorization has made possible a major reduction in power consumption, rack space requirements, weight, and physical size of the auxiliary equipment and of the overall TK-42 Camera chain.

Built-in Zoom Lens System

Built into the camera is an extremely versatile, high quality zoom lens system. The basic lens and an accessory wide angle adaptor cover the entire range of focal length from 1.6 inches (40mm) to 40 inches. The superior optical quality and wide range of focal length of the system do away with the need for a conventional lens turret and assortment of lenses. In addition, the single lens system eliminates the problem of color matching between lenses of various focal lengths on a single turret.

SEPARATE LUMINANCE CHANNEL lends "snap" to the color pictures derived from RCA's TK-42 Transistorized Live Color Camera. Shown above is a 4½-inch Image Orthicon Tube that provides monochrome picture quality equivalent to that of the finest black-and-white cameras.

The built-in lens and wide angle adaptor will handle virtually any requirement for either studio or field operation—with the added advantage of an infinitely variable range of focal length to "frame" any scene precisely within the desired field of view.

Convenient Zoom and Focus Control

Camera Zoom and focus are controlled by two "D" handles located at the lower left and lower right corners at the rear of the camera respectively. These handles may be used to pan, tilt and dolly the camera. A wide angle adaptor is used on the camera for operation at focal lengths from 1.6 inches to 16 inches (40 to 400 mm) in two ranges; 1.6 to 8 inches and 3.2 to 16 inches. Selection between the two zoom ranges is made smoothly by means of a lever at the rear of the camera. The zoom range may be changed while the camera is on-air without need to re-focus optically. The wide angle adaptor is easily demounted from the front of the camera for operation at focal lengths from 4 to 40 inches in two zoom ranges; 4 to 20 inches and 8 to 40 inches. The 1.6 to 16 inch range is normally ample for all in-studio operations. However, the full range of 1.6 to 40 inches is readily available for either studio or field applications.

Low Profile Camera

The TK-42 Camera has been carefully engineered to present an attractive, low profile for ease of handling and operation. The center of the viewfinder kinescope is less than 7 inches above the optical axis of the taking lens. As a result, the camera operating height is kept at a minimum at all times and the viewfinder is normally at or near eye level for the camera operator. A low center of gravity increases the mechanical stability when dollying or maneuvering the camera. Over-all size and weight have been minimized through the use of solid state circuitry and efficient mechanical packaging.

Plug-in Modular Construction

The circuits of the TK-42 Camera and rack mounted auxiliary equipment have been packaged in the form of plug-in modules for compactness, easy access for service and quick interchange of spares. The viewfinder is a separate unit and is mounted on a sliding track arrangement which may be pulled out for inspection and maintenance. The plug-in modules are serviced by removal and insertion in a module extender which plugs into the module space and permits servicing under operating conditions with normal voltages applied. Two full length side doors permit access to the modules within the camera and to all other components for alignment or service. Many of the module types used in the TK-42 Camera are the same as or similar to those of the RCA TK-33 Monochrome Live Camera, TK-22 Monochrome Film Camera and the TK-27 Color Film Camera. This minimizes the variety of circuitry with which technical personnel need be familiar.

Stabilized, Self-Compensating Circuitry

Stabilizing techniques have been used extensively throughout the camera chain to assure uniformly high performance over long periods of time. A unique cooling and heating system maintains optimum temperature of the chrominance pickup tubes at all times. Feedback stabilization circuitry is used to compensate for aging of components and for ambient temperature changes. Precise reference devices are used to maintain critical control voltages and currents at optimum value.

One Man Setup

Built-in calibration and alignment pulses are provided for ease and speed of normal alignment and setup procedures. In addition, the TK-42 has automatic black level control and self-adjusting cable timing. The colorplexing circuitry may be adjusted by utilizing the normal waveform and picture monitors, no special test equipment is required. The camera alignment and setup may be made by one man at the camera location using the camera viewfinder and special built-in test facilities.

Simplified Pulse System

Horizontal and vertical drive pulses are derived from sync and are generated internally within the camera. In addition, the timing of the camera chain output signal is compared with sync timing to produce a control signal which advances the drive signals at the camera and compensates automatically for delay in the camera cable. This technique also compensates for delay in the colorplexing circuits and does away with the need for delay of drive pulses to monochrome cameras operating synchronously in the same system. A substantial saving may thus be realized by eliminating pulse distribution amplifiers and delay lines from the station pulse system.

Also built into the camera auxiliary equipment is a color bar test signal generator, that provides standard full raster color bar signals of 0.7 or 1.0 volt level for adjustment of colorplexer circuitry. Space and circuitry is provided for installation of an I and Q module to provide an EIA standard color test signal. The only input signals required for the camera chain are sync, blanking, color subcarrier and burst flag signals.

GENERAL DESCRIPTION

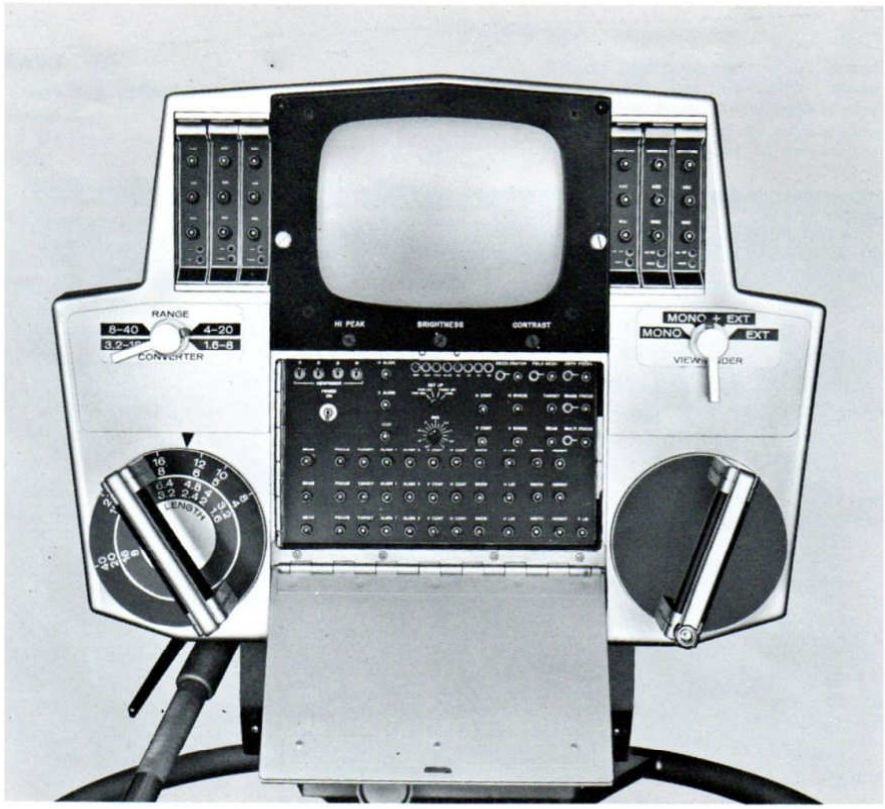
The TK-42 Camera Head contains the optical system including zoom lens, four pickup tubes with associated deflection circuitry, video preamplifiers, an 8-inch transistorized viewfinder and DC regulator circuits. The rack mounted auxiliary equipment contains the power supply, colorplexing and signal processing circuits, cable equalizers and termination points for the camera and remote control cables.

The camera control panel is in two sections consisting of a remote control panel and a color control panel. Both panels may be mounted in a 20-inch camera control console or in a rack, occupying 7 inches of mounting height. The remote control panel contains all of the controls normally required by the operator including the sensitivity, black level, test, monitor, and automatic manual mode of black level and gain switches, gain controls and the lens cap switch. The color control panel contains controls for vernier registration, chrominance balance and chroma gain and includes switches for test functions and for waveform and picture monitor display selection.

The camera chain output signals include picture and waveform monitor feeds, two color video outputs and two monochrome video outputs. All outputs are available as either composite or non-composite signals and are sending-end terminated.

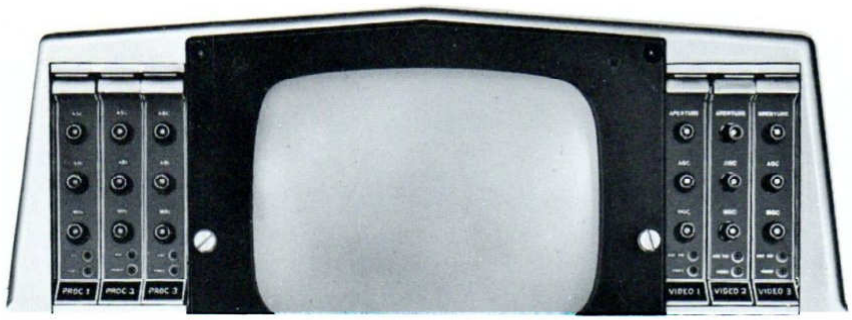
The camera is designed to operate on either 115 or 230 volts AC at 47 to 63 cycles. It will operate on either 60 field, 525 line scanning standards or 50 field, 625 line standards. The camera colorplexing circuit is supplied with appropriate filters for either the U. S. domestic color burst frequency standard (3.579545 mc) or for 4.4296875 mc, whichever is specified. If desired, the camera may be equipped with both filters for operation on either frequency standard on a switchable basis.

TK-42 Camera showing conveniently located set-up control panel.



Camera Unit Modules

CAMERA BACK



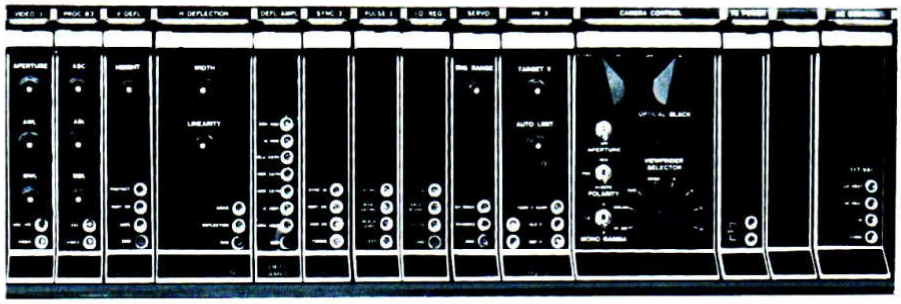
Proc

Processor clamps video and inserts gamma correction. Contains controls for manual and automatic black and automatic sensitivity. One used for each of four vidicon channels.

Video

Amplifies video from preamplifier and provides aperture compensation. One used for each of four vidicon channels.

CAMERA SIDE



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V Defl

Vertical deflection provides 4½-inch I.O. vertical deflection and drive signal to deflection amplifier. Provides pickup tube protection in case of scan-failure.

H Defl

Horizontal deflection provides 4½-inch I.O. horizontal deflection and drive signals to deflection amplifier. Provides pickup tube protection in case of scan-failure.

Defl Amp

Generates horizontal and vertical deflection for the three one-inch vidicons. Contains circuitry for blanking, high voltage and chroma "capping" for monochrome operational mode of the three vidicons.

Sync

Generates and distributes vertical gating, vertical drive, timing pulse and horizontal drive. Contains circuitry for automatic time delay compensation. Clips and amplifies sync for use in other modules.

Pulse

Generates white test pulse, black level pulse, horizontal drive stop pulse, gating pulses and test pulses for use in setup, testing and automatic circuits.

IO Reg

Supplies precision regulated image orthicon focus current, focus voltage, beam current and +1300 and −650 voltages. Image orthicon blanking is also generated in this module.

Servo

Contains servo amplifiers for controlling the iris of the lens from either the camera control panel or remote control panel. The G-4 rock signal for alignment of the image orthicon is generated in this unit.

HV

High Voltage—Generates high voltage, DC filiment voltage for the luminance channel vidicon and reference voltage to operate transistor de-couplers. Vidicon blanking and target voltage ranges are set in this module.

Camera Control

Is a common control position with switching facilities for video polarity, aperture on/off, monochrome gamma, color gamma, viewfinder input sources, and automatic optical black mode of operation.

TE Power

Provides power and control for the thermal electric cooling or heating at the face of the vidicon tubes. The vidicon d.c. filament voltage is supplied by this module.

AC Control

Is a relay controlled distribution point of a-c power to lens-cap, on-air and preview tally lights, yoke heaters, blowers, iris drive, orbiter, and lapsed-time meter.

VIEWFINDER MODULES (not shown)

VF Video

Strips sync from composite video and distributes sync as required. Also provides video feed to kinescope.

VF Vert Defl

Provides vertical deflection for viewfinder kinescope. Size and linearity adjustments are also incorporated.

VF Horz Drive

Generates advanced horizontal drive signal for the high voltage from sync separator. A free-running oscillator provides for protection of high voltage if sync signal is lost.

VF Utility Module

Rectifies and regulates kinescope focus and screen voltage and provides filter for G-1 voltage of kinescope.

VF High Voltage

Develops horizontal deflection and regulated anode high voltage for kinescope—also focus and screen voltages for utility module.

Camera Auxiliary Modules

FRAME #1

Regen

Regenerates sync and blanking and generates clamp pulses. Contains part of circuitry for horizontal drive advance to compensate for cable and encoder delays.

Blanker

Adds final blanking to video. Contains multiple video output line driver with sending-end termination and has switchable sync addition to output video. Contains single line driver with sending-end termination which can be remotely switched to line, an external signal coming from a loop-through input or combination of line and external test signal.

Monitor

Contains line driver amplifier for feeds to the CRO and picture monitor. Regenerates blanking and clamp pulses and inserts system blanking on the RGB&M signals. Test switch is included to allow set-up of encoder using only CRO signal.

Det

Converts monochrome and color difference signals into receiver Rr, Br, and Gr signals. Non-additively mixes signals and switches between NAM white and black to form single NAM signal. (Similar to monochrome camera signal.) Individual NAM white and black signals are used in automatic white and automatic black control systems.

SC

Subcarrier—Supplies quadrature subcarrier to modulator and generates sampling bursts required by automatic carrier balance detectors.

Modulator

Modulates the I and Q color difference signals to produce chroma signal with automatic carrier balance. Generates gating signal to ungate blanker module during burst time. Provides color difference signals to detector module.

Driver

Band limits I and Q signals, inserts burst flag into I and Q signals for burst generation and feeds these signals to modulator. Amplifies M signal and drives M delay module. Inserts delay into I signal to match Q filter delay.

Matrix

Matrixes R, B and G signals into I and Q. Contains relays and amplifiers used in monitoring individual M, R, B and G signals and has provisions for tying chrominance signals together for white balance adjustment of encoder.

Bar Gen

Generates R, B and G pulses used to form standard non-split modulated color bar patterns of either 75% or 100% level as selected by switch on front panel.

Blank Module

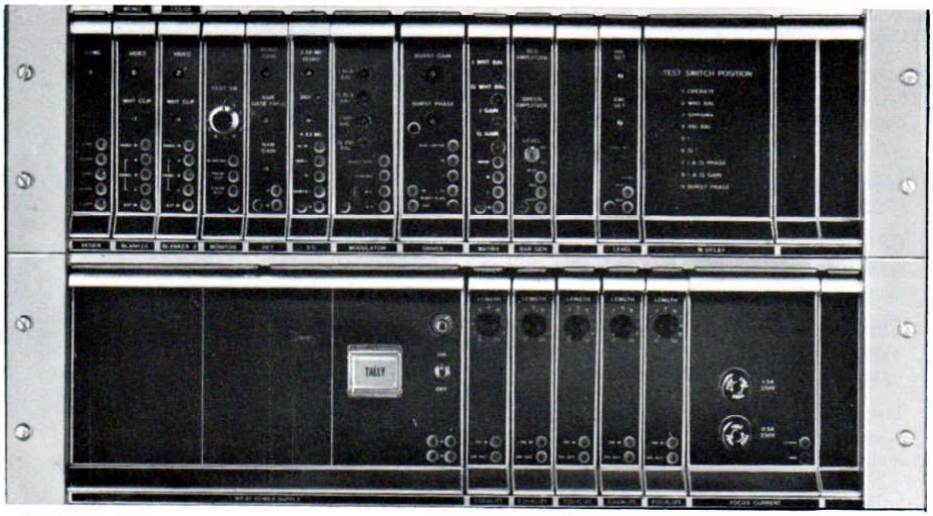
Level

Detects NAM white and NAM black signals and forms DC voltages used in feedback loops for automatic white and automatic black level control. Provides gating required for automatic black operation of camera.

M Delay

Delays M signal to match Q filter delay.

Blank Modules



FRAME #2

WP-81

Develops regulated positive and negative low voltage DC for use in Camera Auxiliary.

(23456) Equalizers

Equalization networks and circuitry required to compensate for amplitude attenuation versus frequency characteristics of coaxial video cable is contained in this module. Correction is provided in increments of 100 feet for a maximum of 1000 feet of cable.

Focus Current

Develops a voltage which is supplied to the I.O. regulator and viewfinder.

Blank

FRAME #3

Power Regulators

Receives control voltage from power control and regulates the output of the d-c voltage supply.

DC Voltage Supply

In conjunction with the power regulators and power control modules, this unit provides two separate sources of precisely regulated plus and minus d-c voltages for the camera head. Overload and overvoltage protection is included.

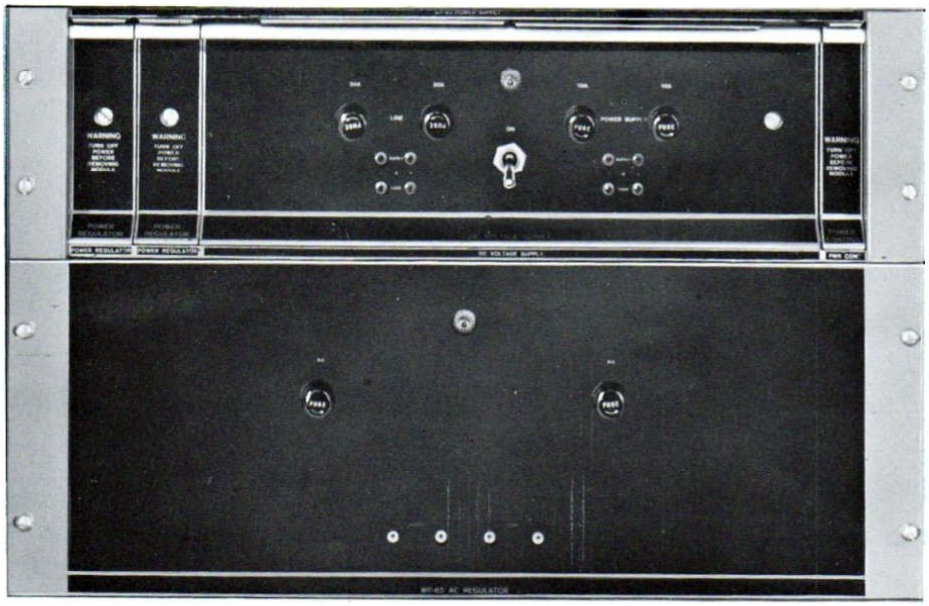
Power Control

Senses power supply voltages in the camera head and supplies control voltages to the power regulator for maintaining correct output voltages.

FRAME #4

AC Regulator WP-85 (Optional)

Maintains the proper AC voltage at the camera head by sensing circuitry which adjust automatically the AC voltage input to the camera cable.



Controls and Functions

COLOR CONTROL PANEL

Bars
Connects color bars to colorplexer.

Monitor
Selects monitor display: color output, mono output, NAM, BRGM.

B, R, G, M
Selects outputs seen on monitor or CRO in BRGM position of monitor and CRO switches.

CRO
Selects display for CRO (same choice as on monitor switch).

Chroma
Varies white level in all color channels simultaneously, but not monochrome white level.

Mono
Disables color channels, provides mono signal without burst on all video outputs.

Chroma
Switch turns chroma, but not burst, off.

H Cent
Vernier horizontal centering.

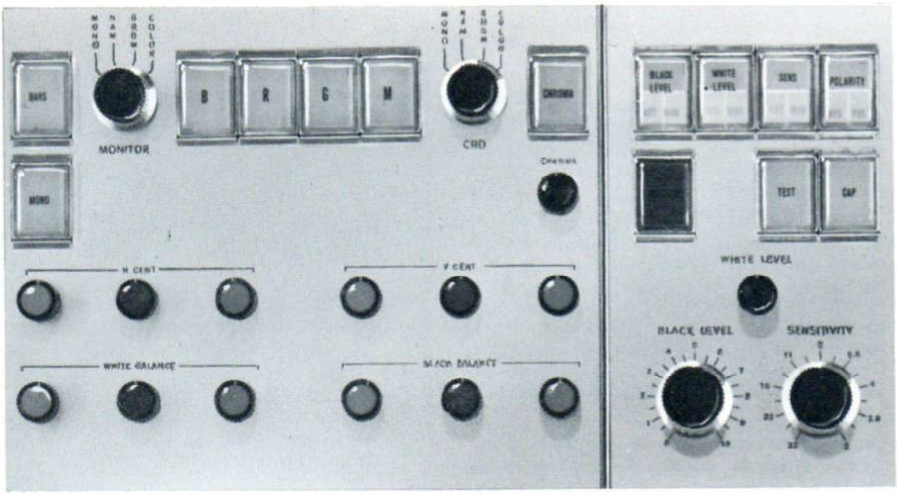
V Cent
Vernier vertical centering.

White Balance
Varies white level of color channels individually.

Black Balance
Varies black level of color channels individually.

REMOTE CONTROL PANEL

Black Level
Selects manual or automatic black level control.



Control position for TK-42 Color Camera. Left is color control panel; right, remote control panel.

White Level
Selects manual or automatic white level control.

Sensitivity
Selects manual or automatic sensitivity control.

Polarity
Selects operation for positive or negative film.

Monitor
Used with studio switcher to connect camera chain output to console monitor.

Test
Energizes test pulses.

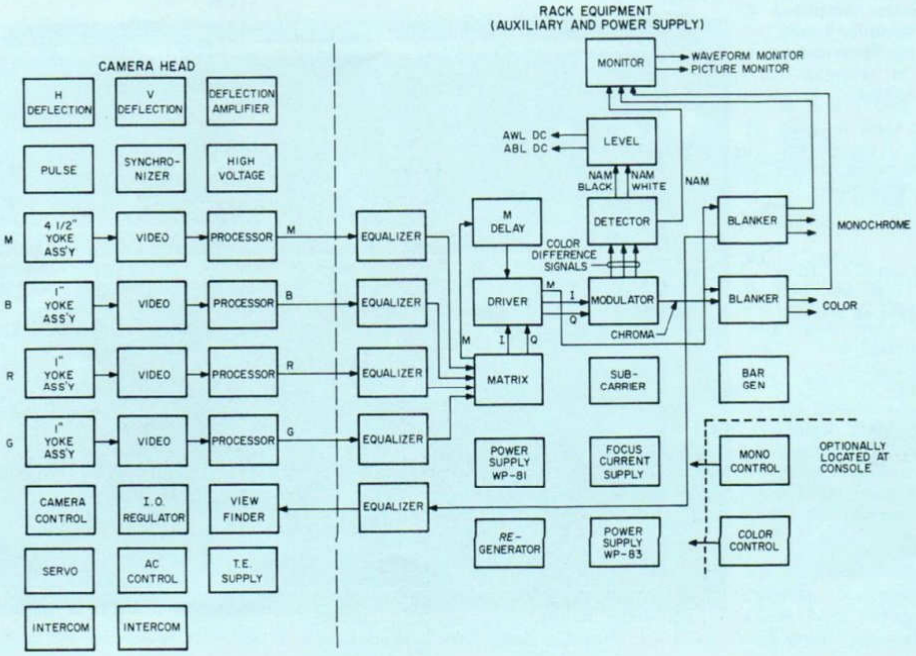
Cap
Electronically caps vidicon pickup tubes.

White Level
Controls white level reference pulse when switch is in manual, or sets level to which peak white is held when switch is in automatic.

Black Level
Controls black level reference pulse when switch is in manual, or sets level to which peak black is held when switch is in automatic.

Sensitivity
Controls vidicon sensitivity when switch is in manual, or sets level to which peak sensitivity is held when switch is in automatic.

FUNCTIONAL DIAGRAM



Specifications

General

Type of Reproduction.....Color and Monochrome

Scanning Standards.....Either 525 lines, 60 fields per sec. or 625 lines, 50 fields per sec.

Viewfinder Display Size.....4½" x 6" (8" kinescope)

Viewfinder Brightness.....150 ft. Lamberts maximum

Maximum Length of Camera Cable:

Field Use.....Up to 2000 ft. (with optional AC Regulator and In-Line Equalizer)

Studio Use.....Up to 1000 ft. (with optional AC Regulator)

Picture Quality

Limiting Horizontal Resolution,

Luminance Signal.....700 TV lines minimum in center 500 TV lines minimum in corners (image orthicon limiting)

Signal-to-noise Ratio,

Luminance Signal.....Nominal 36-38 db peak-to-peak signal/RMS noise for bandwidth of 4.5 mc

Square Wave Tilt.....Maximum 2% for 60 cycle square wave

Blanking Signal Overshoots.....Not in excess of EIA specifications

Overall Frequency Response:

With 100 ft. Camera Cable.....±0.5 db at 6 mc; down not more than 3.0 db at 8 mc

With 1000 ft. Camera Cable.....±0.5 db at 6 mc; down not more than 4.0 db at 8 mc

Total Geometric.....Any point within raster to be within 2% of its true position

Orbiting.....Approximately circular path, diameter 5.0% of picture height at 1 RPM

Operational

Remote Iris Control:

Elapsed Time to Cover Entire Range.....2 seconds max.

Accuracy of Setting.....Within ±0.25 lens stop

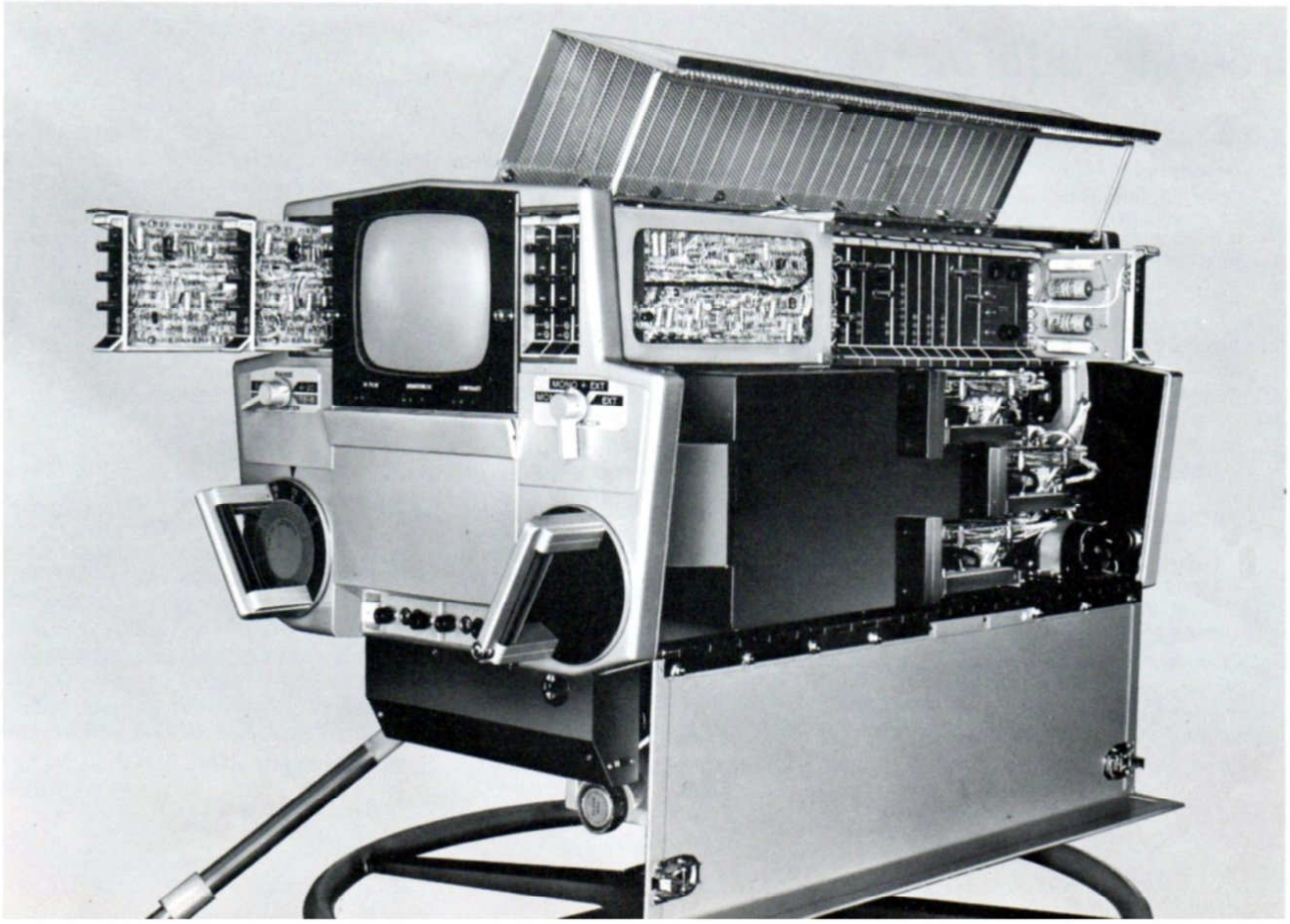
Gamma Correction,

Luminance Channel.....Switchable to three preset values: 0.5, 0.7 and 1.0

Aperture Correction.....Amplitude adjustable continously for 0 to +12.0 db

Camera Cable Equalization.....Adjustable in steps of 100 ft. to a maximum of 1000 ft.

SIMPLICITY AND CONVENIENCE are cornerstones of new TK-42 Color Camera. Camera circuits are completely transistorized and take the form of standard plug-in modules, many of which can be interchanged with those of other cameras. Low-profile styling enhances maneuverability and ease of operation.



Specifications (Cont'd)

Electrical

Input Signals:

Sync, Blanking and Burst Flag

Signals ..... 4.0 ±0.5 volts, peak-to-peak negative[1]

Sub-Carrier ..... 2.0 ±0.5 volts, peak-to-peak
3.579545 mc or 4.4296875 mc[2]

Effects Signal to Viewfinder ..... 0.7 volt nominal

Input Impedance ..... Bridging

Output Signals:

Program ..... 2 Color, 2 monochrome, either 1.0 volt peak-to-peak composite or 0.7 volt peak-to-peak non-composite. One color output required for color monitor.

Monitoring ..... 1 color and 1 monochrome for internal picture and waveform monitoring through system monitor selector switchers.

AC Power Input:

(camera and auxiliary but excluding monitors):

Line Voltage

Field Use ..... 90-130 volts or 180-260 volts
(with optional AC Regulator)

Studio Use ..... 113-125 volts or 226-250 volts
(with 500 ft. max. camera cable)

Line Frequency ..... 47-63 cycles per second

Power Consumption ..... 750 watts approximately

[1] Pulse widths as specified by EIA RS-170. Terminals for signals are arranged for loop through connections.

[2] Choice of subcarrier frequency to be specified by customer.

Mechanical

Overall Dimensions:

	Wide	High	Long
Camera Case	22⅞" 57.94 cm.	16½" 41.93 cm.	32½" 83.66 cm.
Total with wide angle lens adaptor and viewfinder hood	22⅞" 57.94 cm.	23¼" 59.06 cm.	45⅜" 115.13cm.
			Deep
Auxiliary Assembly	19" 48.3 cm.	10½" 26.6 cm.	16½" 42 cm.
Fan Assembly	19" 48.3 cm.	1¾" 2.63 cm.	13" 33 cm.
Power Supply WP-83	19" 48.3 cm.	5¼" 13.35 cm.	16½" 41.93 cm.
AC Regulator WP-85	19" 48.3 cm.	7" 17.8 cm.	13" 33 cm.
Mounting Frame for Control Panels	19" 48.3 cm.	7" 17.7 cm.	
Remote Control Panel	4¼" 11.4 cm.	7" 17.7 cm.	8" 20.1 cm.
Color Control Panel	8½" 21.5 cm.	7" 17.7 cm.	8" 20.1 cm.

Weight:

Camera and Viewfinder ..... 280 lbs. (127 kg.)
Auxiliary Assembly ..... 50 lbs. (22.7 kg.)
Fan Assembly ..... 10 lbs. (4.53 kg.)
Power Supply, WP-83 ..... 40 lbs. (18.3 kg.)
AC Regulator, WP-85 ..... 35 lbs. (15.9 kg.)
Remote Control Panel ..... 3 lbs. (1.36 kg.)
Color Control Panel ..... 6 lbs. (2.72 kg.)

Ordering Information

TK-42 Color Studio Camera Chain as follows:

Qty.	Description	MI Number
1	Color Camera and Viewfinder including lens range converter, less vidicons and image orthicons	MI-557212-A1
1	Auxiliary Unit To provide Colorplexing, Signal Processing, Power, Monitor Feeds, Cable Equalization	MI-557227-A1
1	Auxiliary Fan Assembly	MI-556547
1	Auxiliary Power Supply, WP-83	MI-557229-A1
1	Remote Control Panel	MI-557203
1	Color Balance Control Panel	MI-557204
1	Blank Panel	MI-556530-1
1	Frame Assembly for Control Panels	MI-557306
1	Master Monitor Equipment including:	
	TO-4 Waveform Monitor	MI-556523
	Connector Plate Assembly for TO-4	MI-556525
	Front Panel for TO-4	MI-556524
	TM-19 8-Inch Professional Monitor	MI-556526
	Front Panel for TM-19	MI-556527
	Rack Mounting Shelf 10½" High	MI-556528
1	Color Monitor, Type TM-27, 17"	MI-40232-A

Qty.	Description	MI Number
1	Console Housing, 20" to include:	
	Base Section	MI-556531
	Single Turret	MI-556535
	Remote Control Section	MI-556534
	Base Front Edge Trim, 22"	MI-556544-1
	Horizontal Turret Trim, 22"	MI-556546-1
1	Camera Cable, 50-foot length	MI-557315-1
1	Color Cam Head	MI-557310
1	Pedestal, TD-9AC	MI-40861-A
1	Image Orthicon, 4½" (4492)	MI-557337
1	Vidicon, 1", 4493	MI-557334
1	Vidicon, 1", 4494	MI-557335
1	Vidicon, 1", 4495	MI-557336

Accessories

AC Regulator, WP-85	MI-557230-A1
In-Line Equalizer	MI-557245
100 ft. Camera Cable	MI-557315-2
200 ft. Camera Cable	MI-557315-3
Module Extender	MI-557301
Module Extender (for preamplifier)	MI-557319
Terminal Extracting Tool	MI-43226
Cable, (Bulk 52-conductor) for Control Panels	MI-13358
I and Q Color Bar Module	MI-556554
Adjustable Viewfinder Hood	MI-55720