catalog CA.1111B

(Replaces CA.1111A)

Studio/Field Color Camera, Type TK-45A

- **Automatic color balance**
- **Automatic iris control**
- **Compact camera control unit**
- **Bias-light minimizes lag**
- **Scene contrast compression**

The TK-45A is a three-tube color camera featuring major advances in operational simplicity, stability and performance. It is a worthy successor to the famous TK-44 series camera.

The TK-45A uses 30mm lead-oxide tubes for uncompromised performance. Besides satisfying high picture quality requirements, the camera offers maximum flexibility for both studio and outside pickups.

Automatic features such as automatic color balance, automatic iris control and optional automatic centering, simplify operation and eliminate subjective evaluation in matching cameras.

The TK-45A is the first choice for those who demand the finest in picture quality.

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Business Benefits

The TK-45 is really two cameras in one; its sparkling pictures make it a superb studio camera while its light weight and extra portability make it an easy handler for taking to the ballfield, sports arena and other location assignments. The camera handles virtually any pickup assignment and turns out top-quality pictures that build enviable reputations, both personal and professional.

Camera sensitivity, in the studio or on-location, opens new fields of lighting creativity, of scene composition, of camera angles and of camera assignment. The TK-45 camera's five-footcandle (50-lux) sensitivity makes it useful almost anywhere a camera need go to pickup programming under ambient-light conditions, afternoon, evening or night. Increased sensitivity also saves studio lighting which, in turn, reduces air conditioning load and expense.

"Scene Contrast Compression", a special TK-45 feature, lets the camera capture picture detail in the shadow and other dark portions of the scene without highlight overexposure. In the studio, this camera ability gives the lighting man increased flexibility; outdoors, scene contrast compression lets the action in the deep, long shadows of late afternoon go on-air without overexposing picture highlights.

Pictures at Five Footcandles

Pick-up tube lag places a limitation on camera sensitivity. "Bias lighting" greatly reduces the characteristic lag at low light levels. The use of bias lighting permits operation at light levels as low as five footcandles.

Noise-Free Video Enhancement

A technique of aperture correction that enhances image edges without increasing background noise significantly, "contours-with-a-comb" combines a "comb" filter with an electronic corer to suppress edge beats and high-frequency noise. The result is crisp video without noise and other distractions.

Dependable Color Tracking

Color tracking in a camera is essential to dramatic lighting. The TK-45 tracks particularly well as the result of careful design and control. Studio lighting becomes less critical, easier to arrange and more dramatic. Outdoors, this tracking ability delivers quality pictures under less-than-adequate lighting.

Automatic Color Balance

The TK-45 includes a system that balances color at the push of a button. This puts a cursor on the viewfinder. The camera is then focused so that this cursor falls on a white object. White balance is achieved, automatically, in a matter of seconds. Once the balance is achieved, the system removes the cursor from the view-finder video as an indication of task completion.

Black balance is achieved automatically whenever the "lens cap" button is pushed on the control panel or at the camera.

In the event that balance error is beyond the range of the automatic system, it lights an indicator to warn of such a situation.

The automatic color balance feature assures objective uniformity and freedom from subjective color evaluation. The result is consistent colorimetry.

Automatic Iris Control

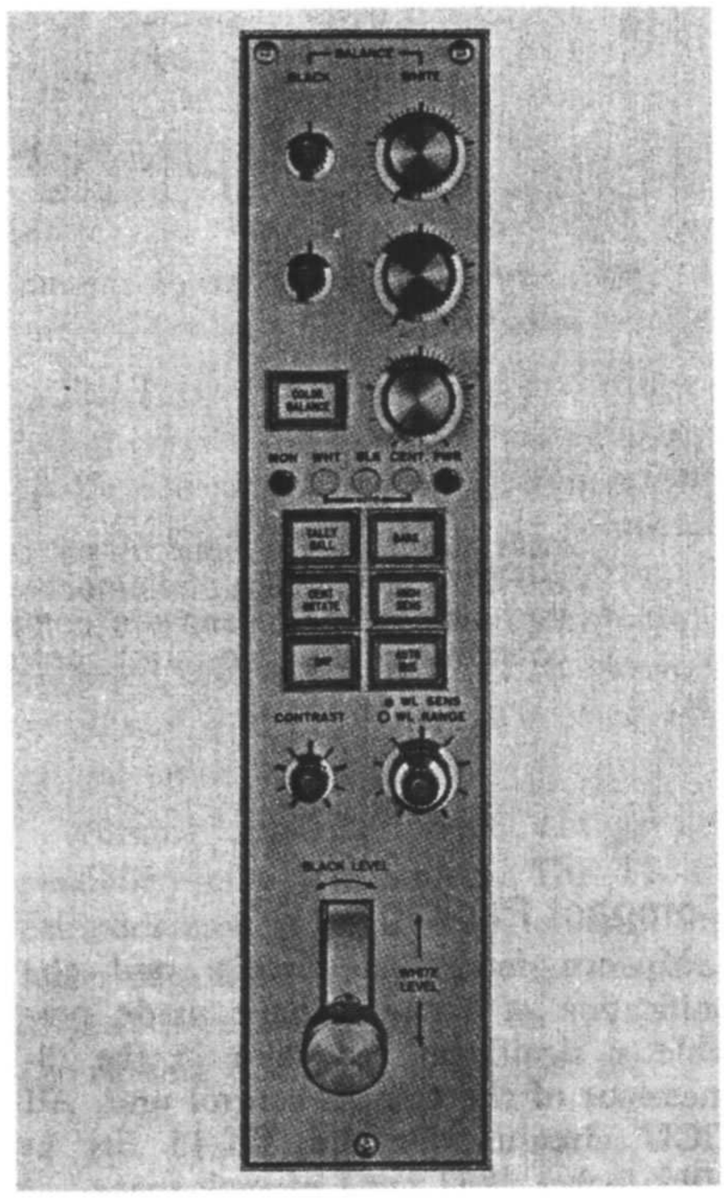
A peak-video detector in the system senses the video level and automatically controls the lens iris in accordance with the reflected light level. The automatic iris control simplifies camera operation for most situations and makes an unattended CCU practical.

Automatic Centering Control Option

The optional automatic centering system is intended as an operational aid. The camera is registered manually in the usual manner. Thereafter, the automatic centering circuits "mop-up" any tiny changes in centering which may occur as the tubes warm-up. While the device is designed to compensate for deviations of up to ±1%, the centering shifts normally encountered are far less.

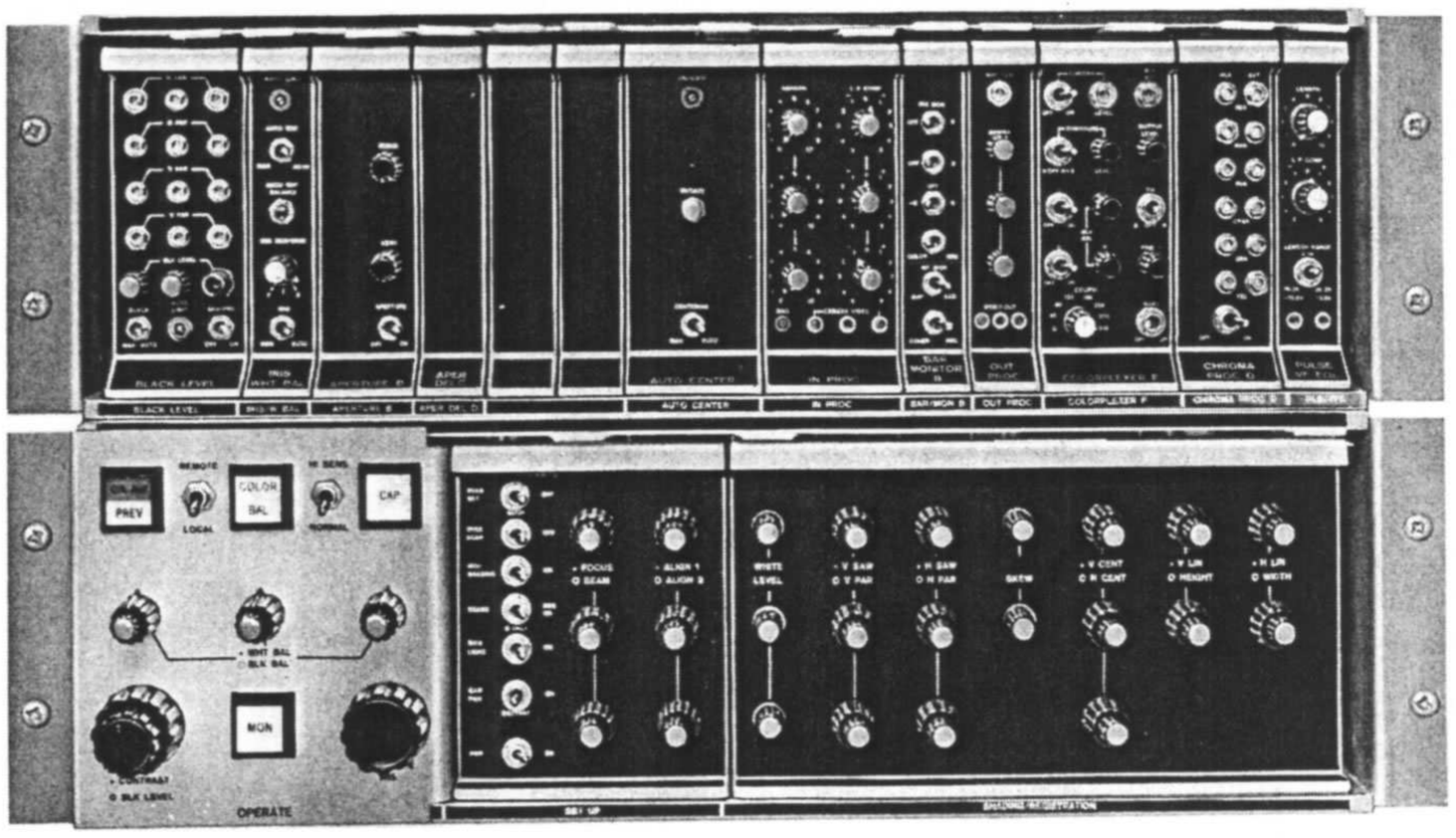
The Automatic Centering System makes corrections upon command. Continuous correction is not desirable since certain scene content may trigger maladjustment. A simple centering-test chart is recommended.

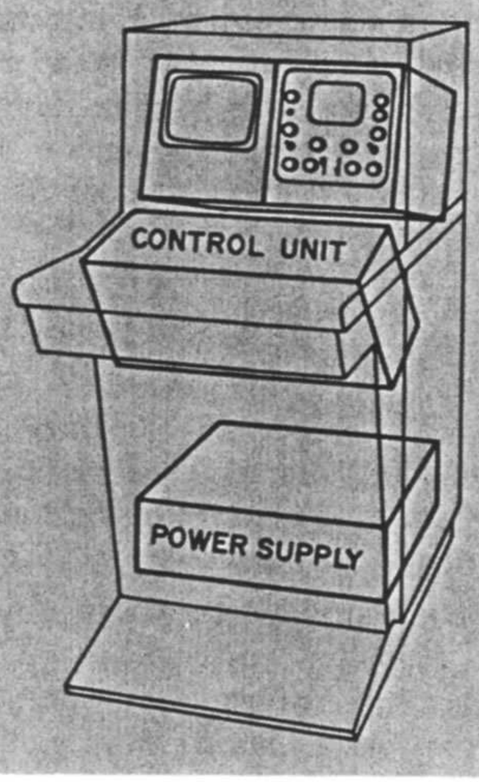
The procedure for automatic centering: After checking color balance, the camera is pointed at the centering-test chart and the "initiate" button is depressed. A light on the module indicates when corrections are being made. When the light goes out, centering is optimized.



"Joystick" remote control panel. Combines black level and iris control in one handle. See "Accessories".

CCU is complete in a single unit. Included in the lower section are the control panel, set-up panel and the shading/registration controls.





With the power-supply frame mounted in the base, all camera equipment—other than the camera head itself—is completely self contained in a single-turret control console.

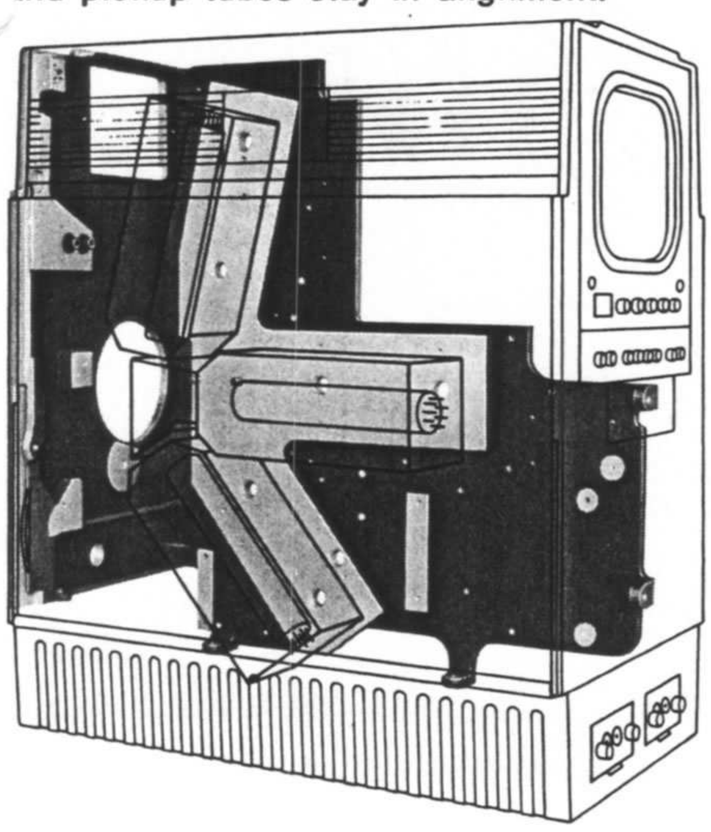
Compact Packaging

Modern integrated circuits and the unification of circuitry have made possible a significant reduction in the dimensions of the camera control unit. All CCU circuitry for the TK-45 fits in 10½ inches (267 mm) of rack space.

The CCU incorporates all circuitry for equalization, processing, encoding, the automatic functions, set-up controls and operational controls. This extra compactness allows even greater installation flexibility. The entire CCU, including the picture and waveform monitors, mounts in one single-turret console (see drawing). With power-supply frame mounted in the base, all camera equipment, other than the head itself, is completely self-contained in the housing.

In most situations, the CCU and the power supply will be mounted in an equipment rack in an equipment room. Camera control, in such a situation, is via an optional remote control panel (see photo and *Accessories*). The extra stability of the TK-45 makes such an arrangement entirely practical.

Rigid "bedplate" optical system integrates camera optics with camera structure for maximum adjustment stability. Lens, prism and pickup tubes stay in alignment.



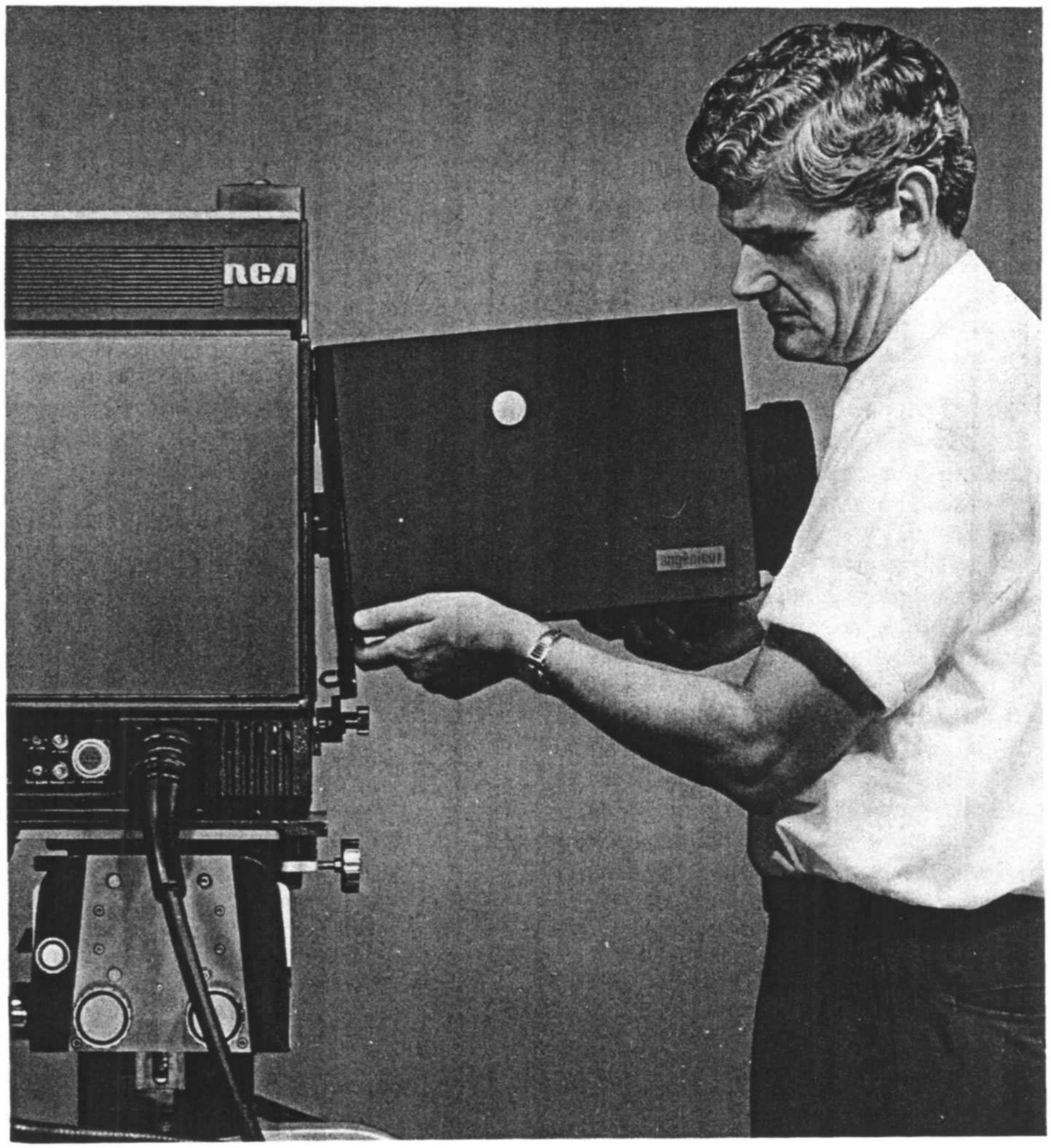
Scene Contrast Compression

This facility brings out picture detail hidden in the dark areas of a scene. The system stretches the video without a shift in color balance and without effect on the picture quality in the highlights. In the studio, this camera ability gives the lighting man increased flexibility; outdoors, scene contrast compression lets the action in the deep long shadows of late afternoon go on-air without overexposing picture highlights.

Color Match or Colorimetry Through Chromacomp

Chromacomp is a system of camera color balance that provides a wide range of color control without affecting the luminance portion of the picture. For example, the camera's response to any one of the three primary colors or their complements can be removed in the color picture without affecting the gray-scale balance. Used practically, Chromacomp lets the camera match other broadcast-

Lens mount and dismount is a one-man task as the result of a special wedge mounting.



quality cameras. The extra flexibility can be used to satisfy personal preferences in saturation, skin tones and other color qualities your organization may desire.

Rigid, Rugged Optics

Optical stability in a color camera demands structural integrity in the optical elements: lens, prism and pickup tubes. In the TK-45, all of these mount to a unique, one-piece optical bedplate of cast aluminum. Such design precludes the inevitable shifts between lens, prism and tubes that other structural forms allow.

Easier Remotes

The TK-45 is particularly well-suited to remote pickup assignments as the result of several mechanical and electrical design features.

The lens mount lets one man mount and dismount the lens in less than a minute. The mounting arrangement is so precise that lens interchange requires no optical realignment. The eight-place filter wheel carries all the filters one might need on remote right in the camera instead of some often misplaced tote box.

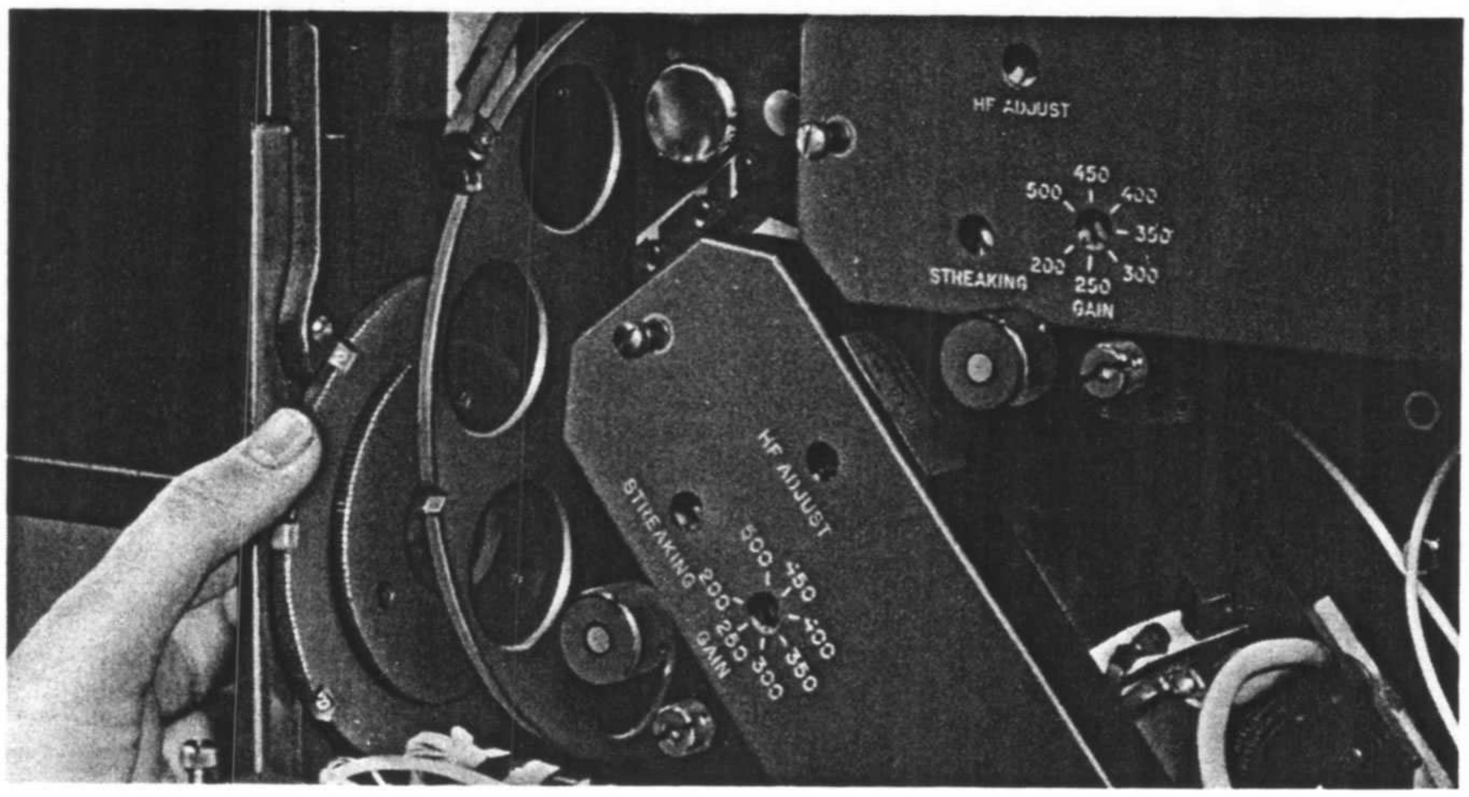
With the lens dismounted, the camera head weights only 103 lbs. (47 kg) for easy handling. (It's even lighter with the viewfinder removed.) Two full-length, foldaway handles make carrying very easy. The handles, because they're located low on the camera head, make lifting onto the tripod mount an easy task. And, the foldaway design keeps them out of sight when they're not needed.

For easy camera set-up, the TK-45 requires only three inputs from the sync generator. This eliminates carefully measured cable runs and speeds installation. The camera automatically adjusts the timing of its drive pulses to the length of camera cable. This saves even more set up time. Built-in adjustable video equalization compensates for as much as 3000 feet (914 m) of camera cable to save more set up time.

Of particular importance when operating from portable power, the camera's self-regulating power supply covers—automatically—for voltage and frequency variations. The voltage range extends from 90 to 130 (or 190 to 260) while the camera operates on any power line frequency between 47 and 63 hertz.

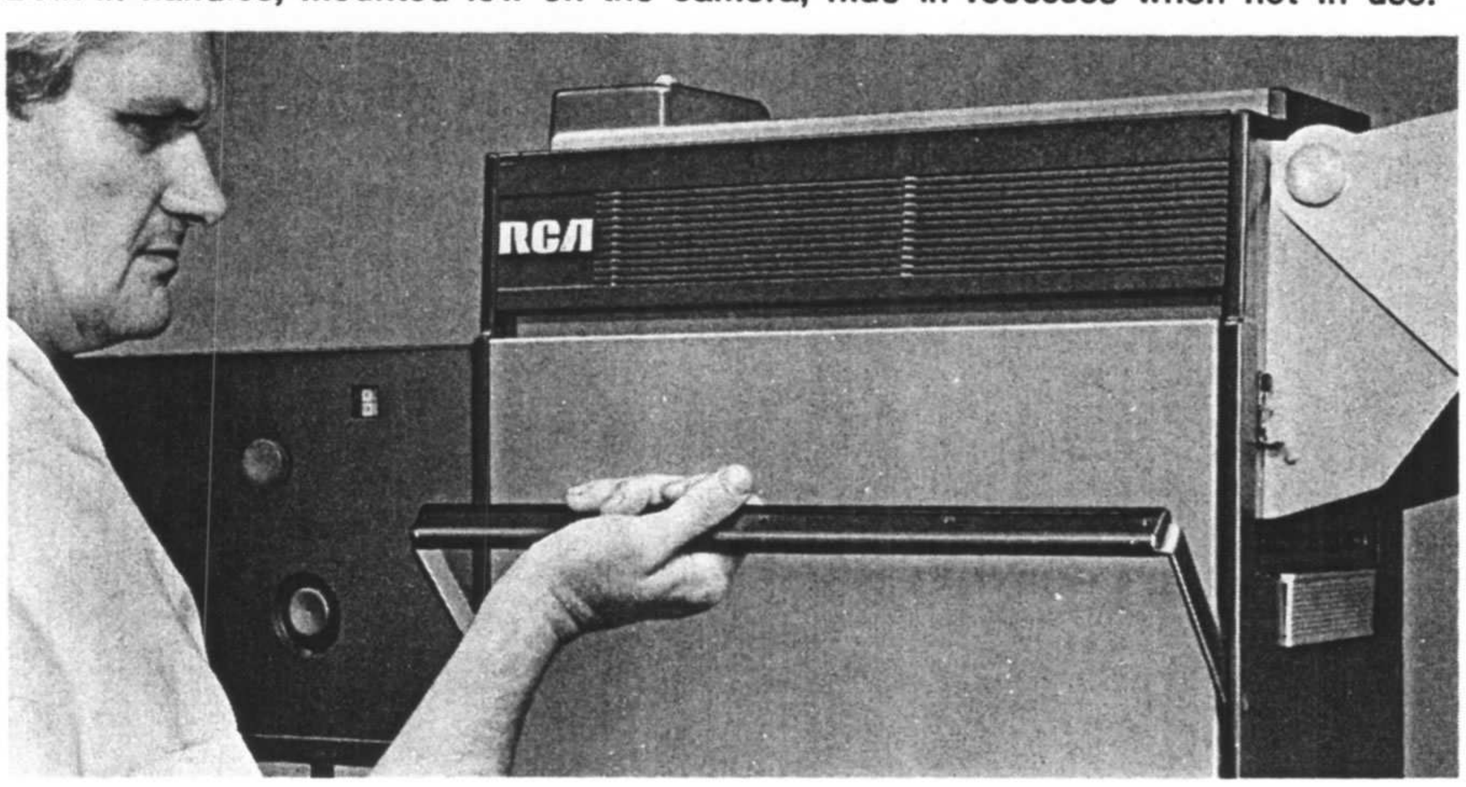
The TK-45 is engineered so that camera set-up takes but one man, working at the CCU. All camera set-up controls are on the panels of the modules that constitute the CCU along with an operating control panel (see photo). The pushbutton-operated, motor-driven lens cap provides an instant and highly reliable black reference for setup.

Working outdoors, there's always the possibility of a wet camera. The TK-45 camera's case is engineered to keep the water of a light rain outside the camera. There's even a built-in fan for use when the camera works out in the hot sun.

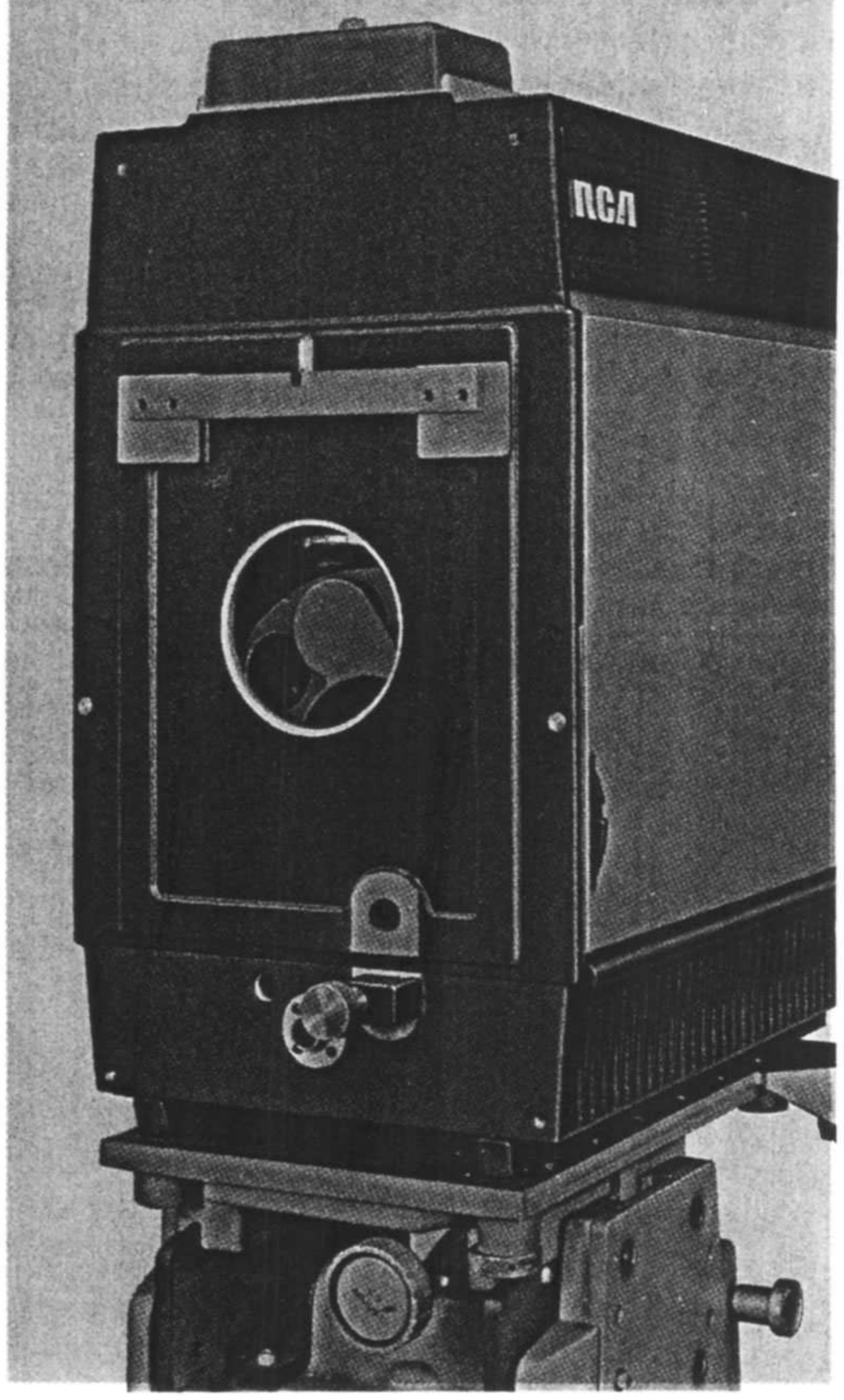


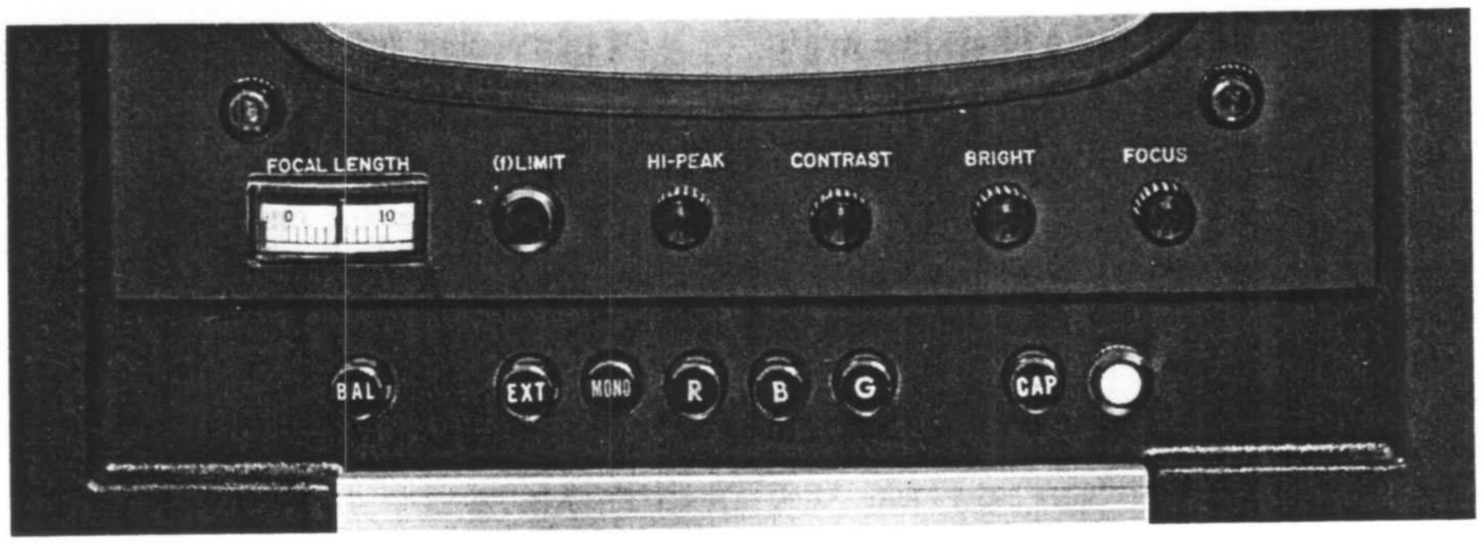
Built-in, eight-place filter wheel lets the camera store essentially every filter it might use. Operable without opening camera cover.

Built-in handles, mounted low on the camera, hide in recesses when not in use.



Camera front with lens removed. Note lens-mount wedge and automatic "lens-cap" shutter. Carrying handles fit in recesses just below side panels. Curved object in side panel is filter wheel control knob.





Cameraman conveniences help make good camera work the rule.

Cameraman Conveniences

Good camera work is a natural for the TK-45. Several conveniences designed especially to make it easy for the cameraman are included.

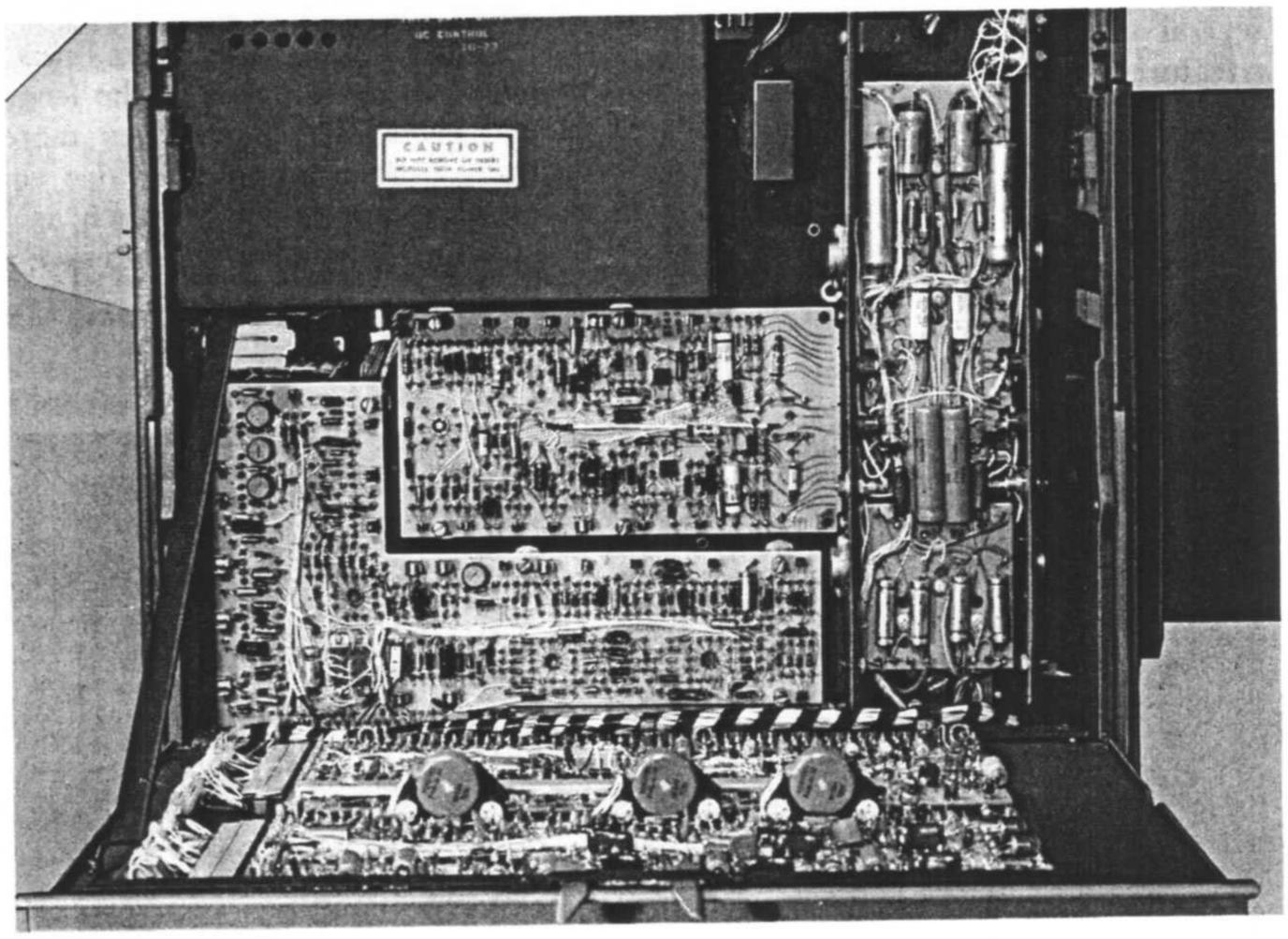
First, a focal-length readout device shows him the position of the zoom control. Another convenience is the indicator lamp —under the viewfinder hood—that warns him of under- or over-exposure with zoom. This device is most useful when the camera shoots through a long-throw lens.

Under the viewfinder hood is an on-air tally; the viewfinder screen is big and bright; a special feed from the CCU lets the viewfinder display special effects from the video switcher when appropriate; a video-peak control adds extra crispness to the viewfinder picture when he wants it for finer focus; pushbuttons let him select R, G and B video from the camera circuitry or matrixed-video from the CCU over an equalized video line in the cable.

The TK-45 even includes a clip to hold the cameraman's cue sheet conveniently at the rear of the camera. The intercom system features adjustable level and a call button to the CCU.

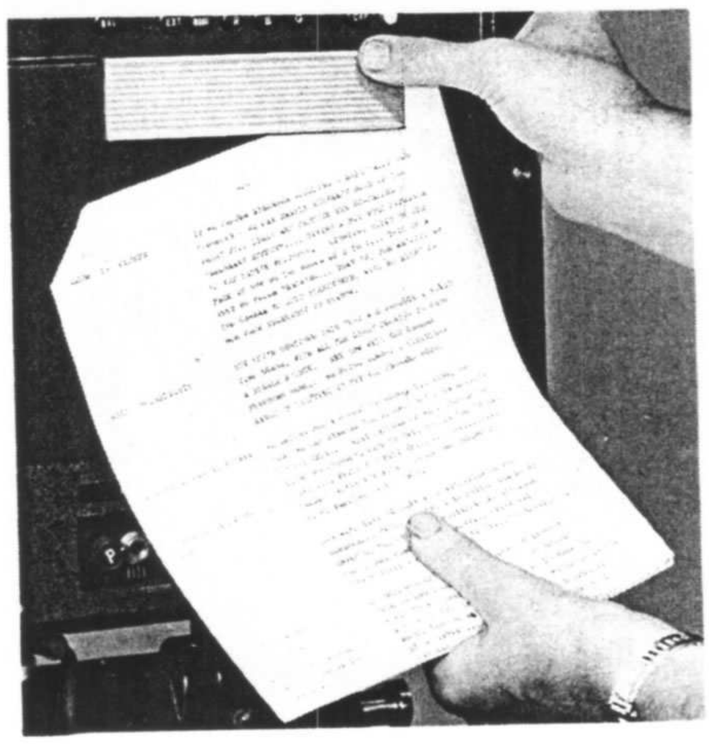
Indoor/Outdoor Switch

A switch, in the camera head, electrically compensates for the changes in differences in color temperature between tungsten and daylight illumination. This compensation is not only a convenience but more efficient than optical color correction filters used ordinarily.

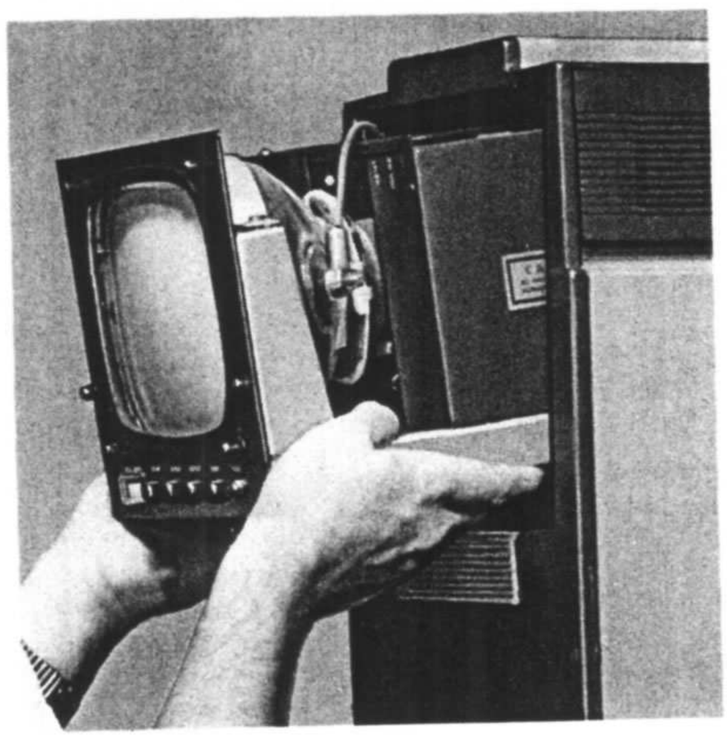


Inside the camera with wiring covers removed. Circuitry shown here performs deflection and power supply tasks.

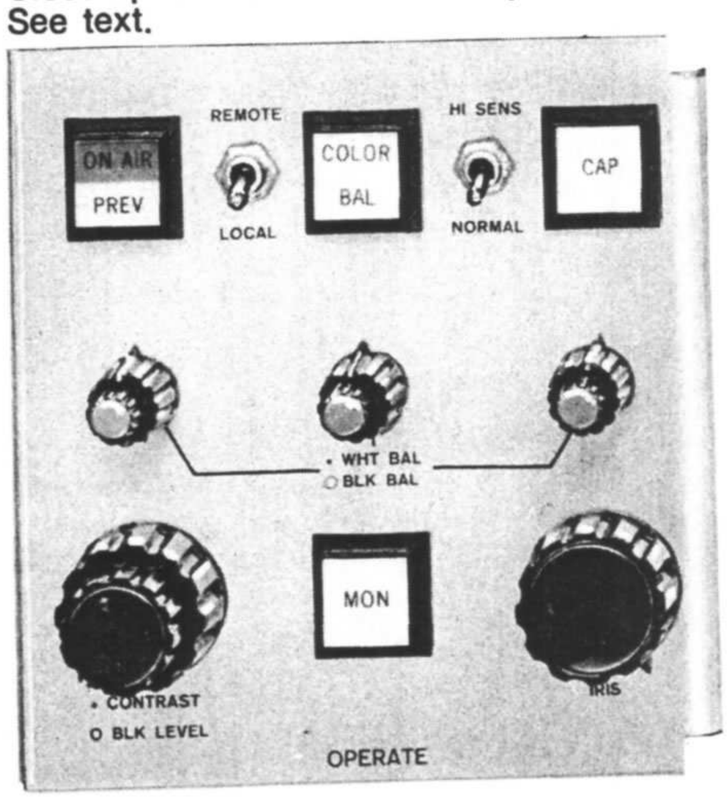
Another cameraman convenience: spring-loaded cue-sheet clip where he needs it most.



Viewfinder unplugs in a few seconds quickly and conveniently.



Close-up of the CCU control panel. See text.



"Super-Quiet" Operation

Convenient switches reduce video amplifier gain in all three channels by 3dB. This feature is useful for special taping applications where high light levels are available and the ultimate in signal/noise ratio is required.

"Joystick" Remote Control Panel

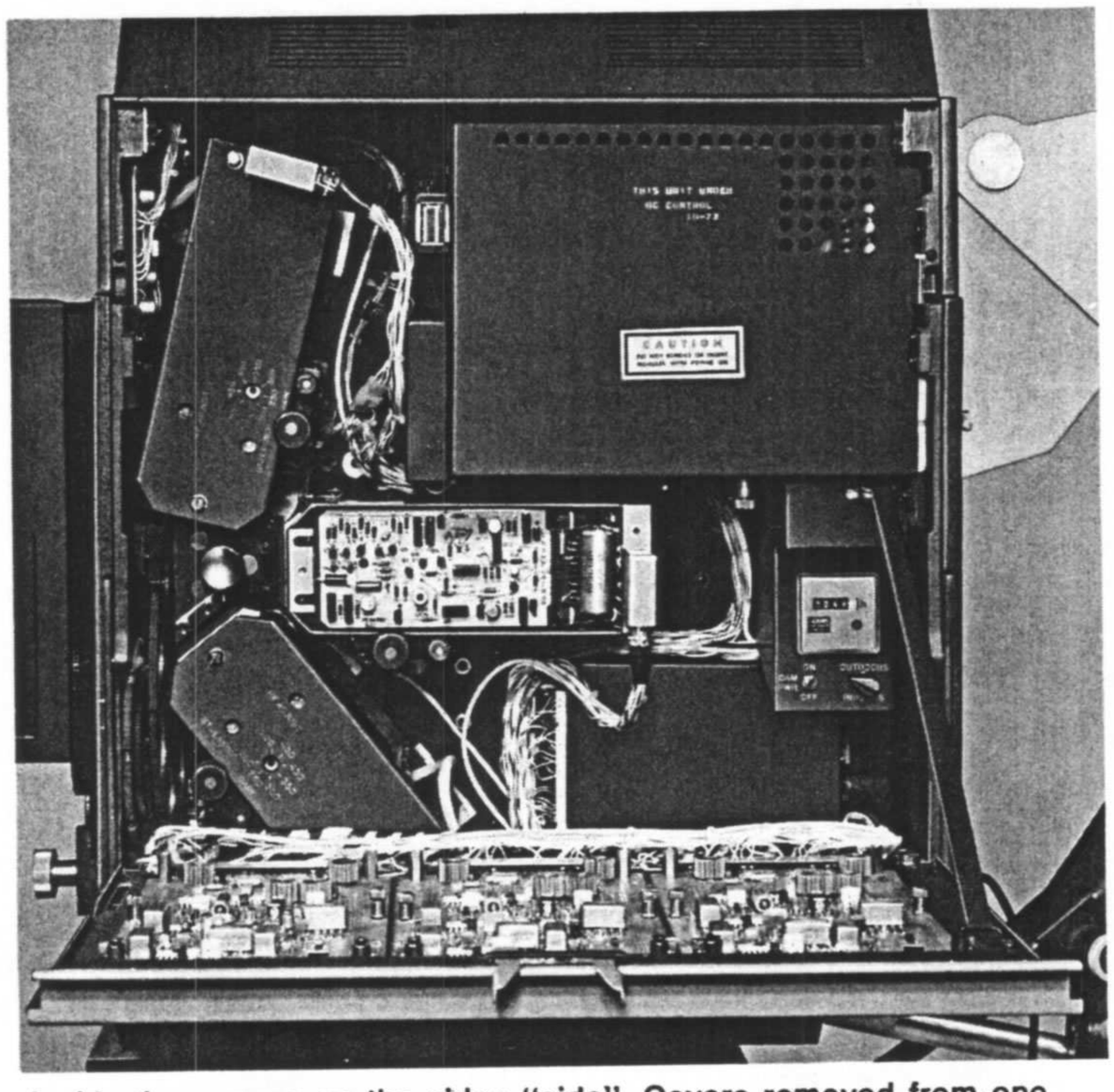
Available as an option, the "joystick" remote-control panel duplicates all of the controls on the CCU in a layout that is suitable for side-by-side mounting of control panels in a console housing. Up to six panels mount side-by-side in a rack-width console. For situations with less than six cameras, the unused spaces are covered with blank panels, also available optionally (see *Accessories*).

Quick-Change Viewfinder

In the TK-45, the viewfinder is mounted for quick change. In a camera that goes on the road, the easily demountable viewfinder can be removed to lighten the camera head whenever necessary. With the lens and viewfinder off, the camera head weighs less than 90 lbs. (42 kg).

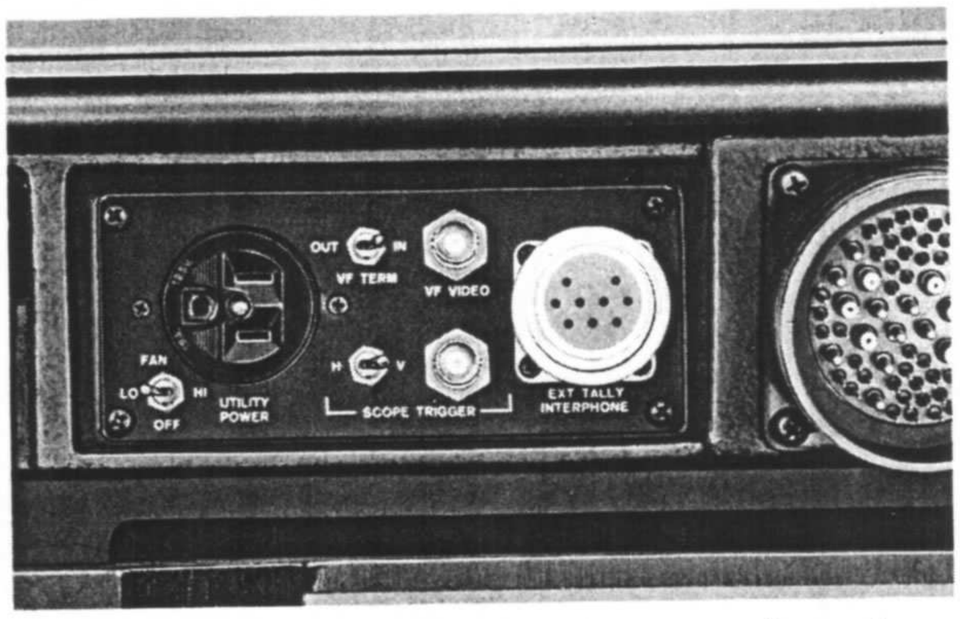
Easy Service-Ability

One of the reasons for the long life built into RCA cameras is the service-minded design that minimizes the task of component replacement.



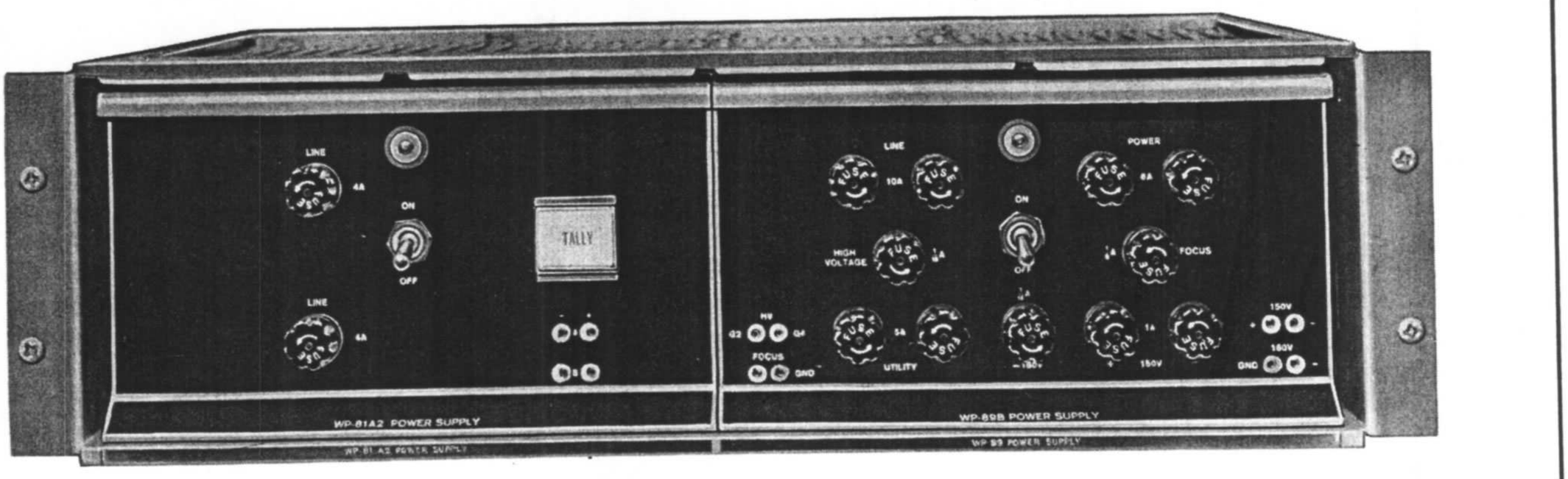
Inside the camera on the video "side". Covers removed from one video preamp (on yoke) and the three video amplifiers (at bottom).

Interphone modules unplug for access to components. Modules are interchangeable.



Utility outlets for scope and/or picture monitors at the camera (next to cable connector on right side).

These two power supplies, in only 5.25″ (133 mm) of rack space, power all camera circuits.



Specifications

Scan Standards
EIA ..... 525/60 fields
CCIR ..... 625/50 fields

Color Standards ..... Types available for NTSC, PAL-B or PAL-M

Power Requirements
Voltage ..... 90-130V or 190-260V
Frequency ..... 47-63 Hz
Power Load (exclusive of monitors) 650VA

Inputs (Loop-Through, Bridging)
Sync ..... 2 to 8V, p-p neg.
Blanking ..... 2 to 8V, p-p neg.
Color Subcarrier ..... 1 to 4V, p-p
Grating ..... 0.7V, non-composite
Burst Flag NTSC ..... Not required
Burst Flag PAL ..... 2 to 8V, p-p

Outputs
Program Video (both composite or both non-composite) ..... Two outputs
Composite Video ..... 1.0V across 75 ohms
Non-Composite Video ..... 0.7V across 75 ohms
Chroma Key (R, G, B) ..... 0.7V, p-p across 75 ohms
External Viewfinder Feed (at camera head) ..... 1.0V composite across 75 ohms

Monitor Switching Facilities
Waveform ..... R, G & B video after Processor, side-by-side or superimposed; color output
Picture ..... Processed R, G, and B video, separately or in any combination, color output and "contour" signal
Viewfinder ..... Camera R/G/B video individually and combined; mono video or external video

Contour Enhancement
Horizontal and vertical aperture equalization with comb filter to minimize noise and luminance-chrominance interference. Coring minimizes noise on base line.

Chromacomp
Individual control of hue and saturation of primary colors and their complements (red, green, blue, cyan, magenta and yellow) without affecting gray scale.

Scene Contrast Compression
Stretch continuously variable from 0 to 4:1 as measured on the first—or darkest— step on the EIA Reflectance Chart. Adjustment has no effect on peak white level.

Shading Correction
Horizontal and vertical sawtooth and parabolic modulation shading for each video channel.

Lens Servo Amplifiers ..... Integral with zoom lens

Interphone
"Production", "Engineering" and "Cue" at camera head. Requires interphone unit at CCU and 2.4Vdc.

Viewfinder
Screen Diagonal Dimension ..... 8" (203 mm)
Resolution (In center of screen) ..... 600 lines
Controls ..... "Contrast", "Brightness", "Beam Focus" and "Video Peaking"
Gamma ..... Continuously variable between 0.45 and 0.7

Pickup Tube Types
Blue Channel ..... Type XQ-1020B
Green Channel ..... Type XQ-1020G or XQ-1025G
Red Channel ..... Type XQ-1020R or XQ-1023R

Camera Cable Length
Using 0.65" (17 mm) dia. cable ..... 2100' (640 m) max.
Using 1.1" (28 mm) dia. cable ..... 3000' (914 m) max.
Picture Timing ..... Automatically compensated for any cable length to 3000 feet (914 m)

Sensitivity and Signal/Noise Ratio
NTSC ..... 125 footcandles at f/4, S/N ratio 48 dB (unweighted, 3200°K illumination, 0.7V white, 0.5 gamma, bandwidth 10 kHz to 4.2 MHz, zero aperture correction, using Type XQ-1023R tube in red channel.)
PAL ..... 1250 lux at f/4, S/N ratio 45 dB (unweighted, 3200°K illumination, 0.7V white, 0.5 gamma, bandwidth 10 kHz to 5.5 MHz, zero aperture correction, using Type XQ-1023R tube in red channel.)

Registration Accuracy
Zone 1 (circle in center = 0.8 picture height) 0.05%
Zone 2 (circle in center = 1.0 picture width) 0.1%
Zone 3 (area outside Zone 2) 0.2%

Picture Geometry
Zone 1 (see Registration Accuracy above) 0.5%
Zone 2 ..... 1.0%
Zone 3 ..... 2.0%
(Excludes geometry deviation in lens)

Environmental
Ambient Temperature Limits ..... –20 to +55 deg. C
Ambient Relative Humidity ..... 0 to 90% RH
Operational Altitude ..... to 10,000 ft. (3048 m) ASL

Mechanical
Camera Head (less lens):
Height ..... 18½" (470 mm)
Width ..... 11¾" (298 mm)
Depth ..... 20" (508 mm)
Weight (Approx.) ..... 103 lbs. (47 kg)
Camera Control Unit:
Height ..... 10½" (267 mm)
Width ..... 19" (483 mm)
Depth ..... 16" (405 mm)
Weight ..... 60 lbs. (27 kg)
Power Supply:
Height ..... 5¼" (133 mm)
Width ..... 19" (483 mm)
Depth ..... 18" (457 mm)
Weight ..... 71 lbs. (32 kg)
Remote Control Panel (optional):
Height ..... 14" (356 mm)
Width ..... 3" (76 mm)
Depth ..... 4" (102 mm)
Weight ..... 3¾ lbs. (2 kg)

Accessories

Module Extender MI-557301-A2
Extender Cable Assembly (for WP-81 Power Supply) MI-557425
Extender Cable Assembly for WP-89 ..... MI-557430-B1
Remote Control Panel (Joystick) MI-557270-A1
Remote Control Cable, 50-ft. (15 m) MI-557536-1
Aperture B Module (For out-of-band contour enhancement) MI-557726-B1
Automatic Centering Module MI-557562-A1
Angenieux 15-to-1 Zoom Lens, 18-270mm, f/2-3 ..... MI-557556
Angenieux 10-to-1 Zoom Lens, 18-180mm, f/2.2 ..... Angenieux 10x18J11
Angenieux 18-to-1 Zoom Lens, 27.5-500mm, f/2.-3. ..... MI-557507
Canon 10-to-1 Zoom Lens, 20-200mm, f/2.2 ..... MI-557548
RTH 10-to-1 Zoom Lens, 21-210mm, f/2 ..... MI-557509
RTH 10-to-1 Zoom Lens, 16-160mm, f/2.2 ..... Varotal 30
RTH 16-to-1 Zoom Lens, 32-508mm, f/2.-3.75 ..... MI-557511
Schneider 11-to-1 Zoom Lens, 18-200mm, f/2.1 ..... MI-557551
Schneider 30-to-1 Zoom Lens, 20-600mm, f/2.1-6.3 ..... Schneider 30X1

RCA reserves the right to modify the design or change specifications without notice.

Front and Cooper Streets, Camden, New Jersey 08102, U.S.A.

RCA Broadcast Systems

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