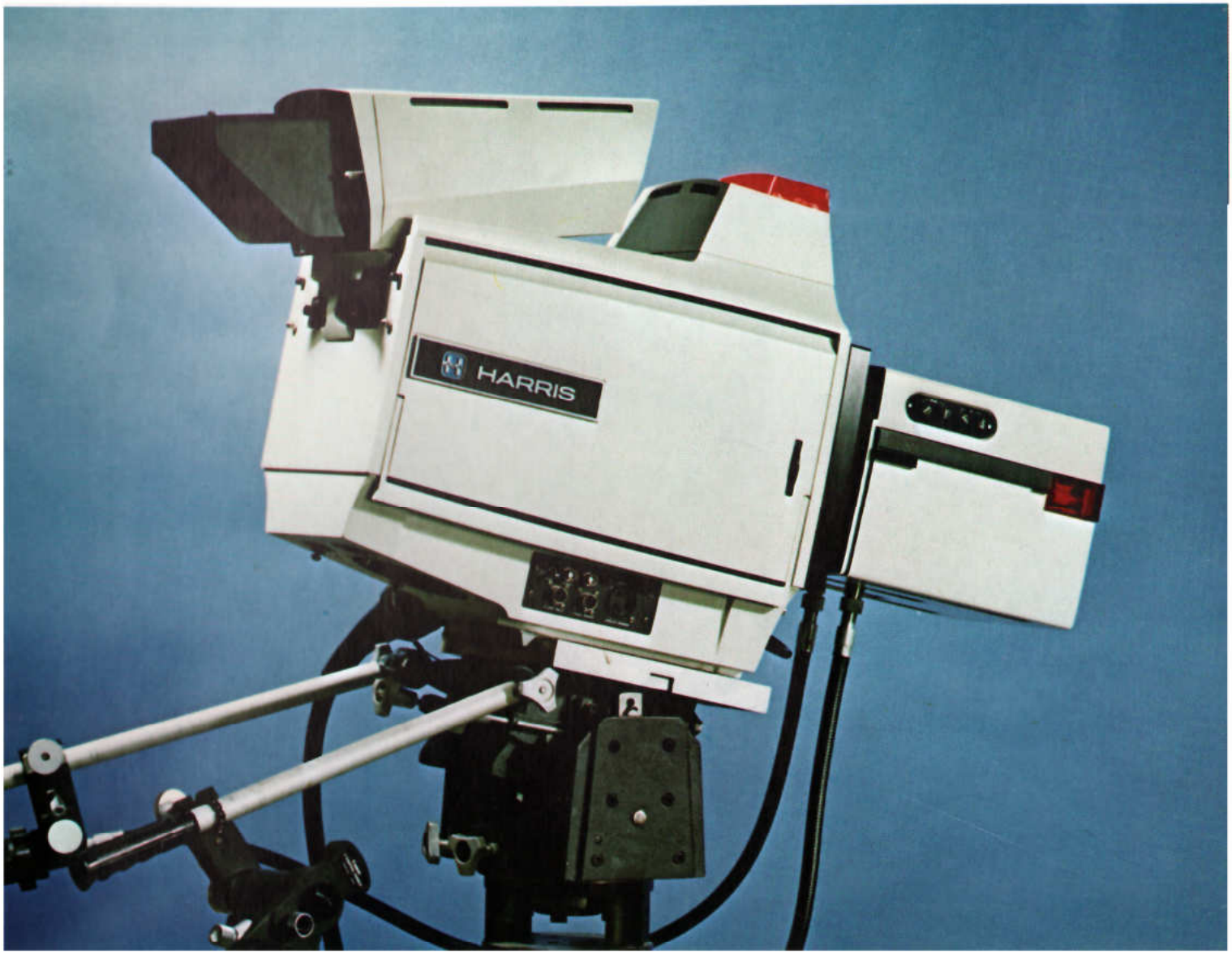
HARRIS
COMMUNICATIONS AND
INFORMATION HANDLING

TC-80

Automatic Live Color TV Camera with Add-On Triax

- The best performing, most advanced camera available today
- Triax accessory offers greatest remote flexibility
- Automatic color balance, automatic centering and automatic iris are all standard
- Total remote setup saves time and money
- Master gamma provides complete picture contrast control
- Accepts anti-comet tail or standard tubes without modification
- The most precise, most rugged construction ever used in a TV camera



Harris' deluxe TC-80... a new standard of excellence in live color cameras

Over three years were spent in the research and development of the TC-80 to bring you the ultimate automatic studio/field color camera. Color fidelity and picture integrity are of the highest quality, which translates into very positive response from viewers and clients, while many superior electronic and mechanical features mean easiest setup and operation, for your convenience.

A complete remote philosophy has guided the development of the TC-80, from the add-on Triax feature, to the location of all setup and operational controls at the CCU. Now you can have network quality pictures in the field as well as the studio, with high camera sensitivity and a master gamma contrast control feature that provide sharply defined pictures under all types of lighting conditions.

The camera head, with lens and viewfinder detached, weighs only 73 pounds (85 pounds with viewfinder), and is easily portable with full-length, swing-out carrying handles. With Triax added, your remote range is extended to *one mile* for the greatest possible field flexibility.

A full complement of automatics is *standard* in the Harris TC-80, including digital black and white balance, full time horizontal and vertical centering, and a unique three-speed automatic iris. These automatic features, combined with the TC-80's inherent stability, allow camera operation by non-technical personnel, freeing your engineers for other station duties.

The adjustment-free sealed prism optical system incorporates an integral bias light for minimum lag at low light levels. Complete optical and mechanical alignment stability are ensured through the use of a unitized optical bed-plate assembly, with self-aligning precision yoke mounts.

The TC-80 uses the one-inch tube format to allow rapid, easy exchange between standard and anti-comet tail Plumbicon* tubes—all you need do is push a switch, and set a few simple controls to get the desired ACT action.

All lenses designed for the one-inch image format may be used with the TC-80, from the largest 42-to-1 zoom to the more conventional 10-to-1 lenses, or smaller. All standard lenses use a hanging, self-positioning mount and positive lock, and may be connected or disconnected quickly.

The TC-80, with its top quality performance and unique flexibility, is truly designed for today's discriminating telecaster. This camera reflects Harris' many years of broadcast engineering experience, and is another industry leader in the Harris video product line.

AUTOMATIC COLOR BALANCE. Color balance is simply and easily achieved at the touch of a button, with modern digital circuitry providing error-free white and black alignment in a matter of seconds. During white balance, the TC-80 viewfinder provides a window area for aiming the camera at a white reference target. Upon completion of white balance, the TC-80 signals the operator by extinguishing the balance light. The balance process may be stopped at any time by releasing the button.

Similarly, black balance is achieved by pushbutton control. Capping the lens provides the camera with its reference black, and again, the camera automatically indicates balance completion.

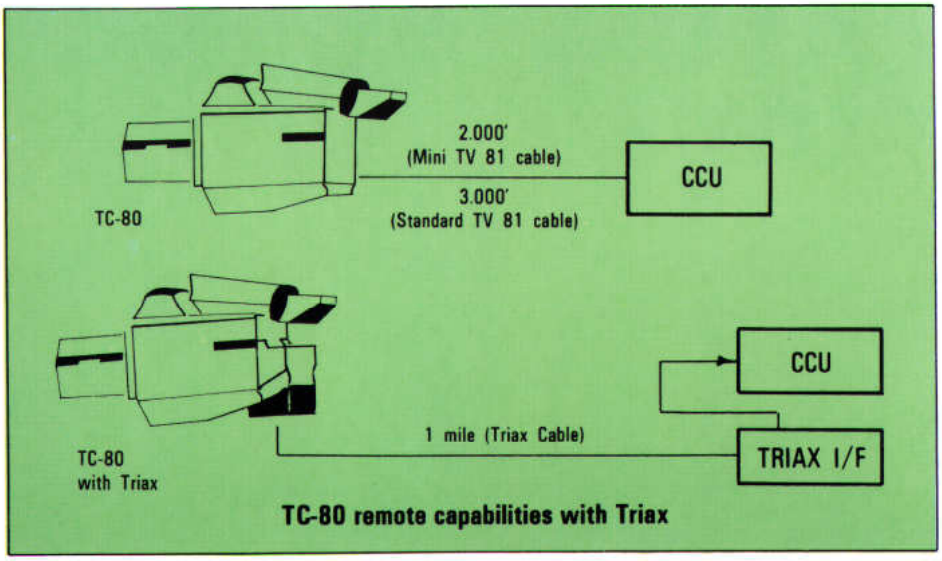
While balancing, the camera's paint controls are disabled. This means that artistic effects can be preserved even though color balance is retouched.

AUTOMATIC CENTERING. Independent digital electronic circuitry in the TC-80 provides constant sensing of scene content for registration errors and automatically compensates horizontal and vertical centering. These circuits operate continuously on picture information and do not require special charts, scenes or operator intervention.

AUTOMATIC IRIS CONTROL. Special weighting and frequency discriminating digital circuitry prevents specular reflections or momentary errors from upsetting an otherwise properly exposed picture. High iris speeds are used to correct big errors fast—then, as the proper exposure is approached, slower speeds are used to reach, and never overshoot, the proper setting. Several front panel response controls permit tailoring automatic performance to specific requirements.

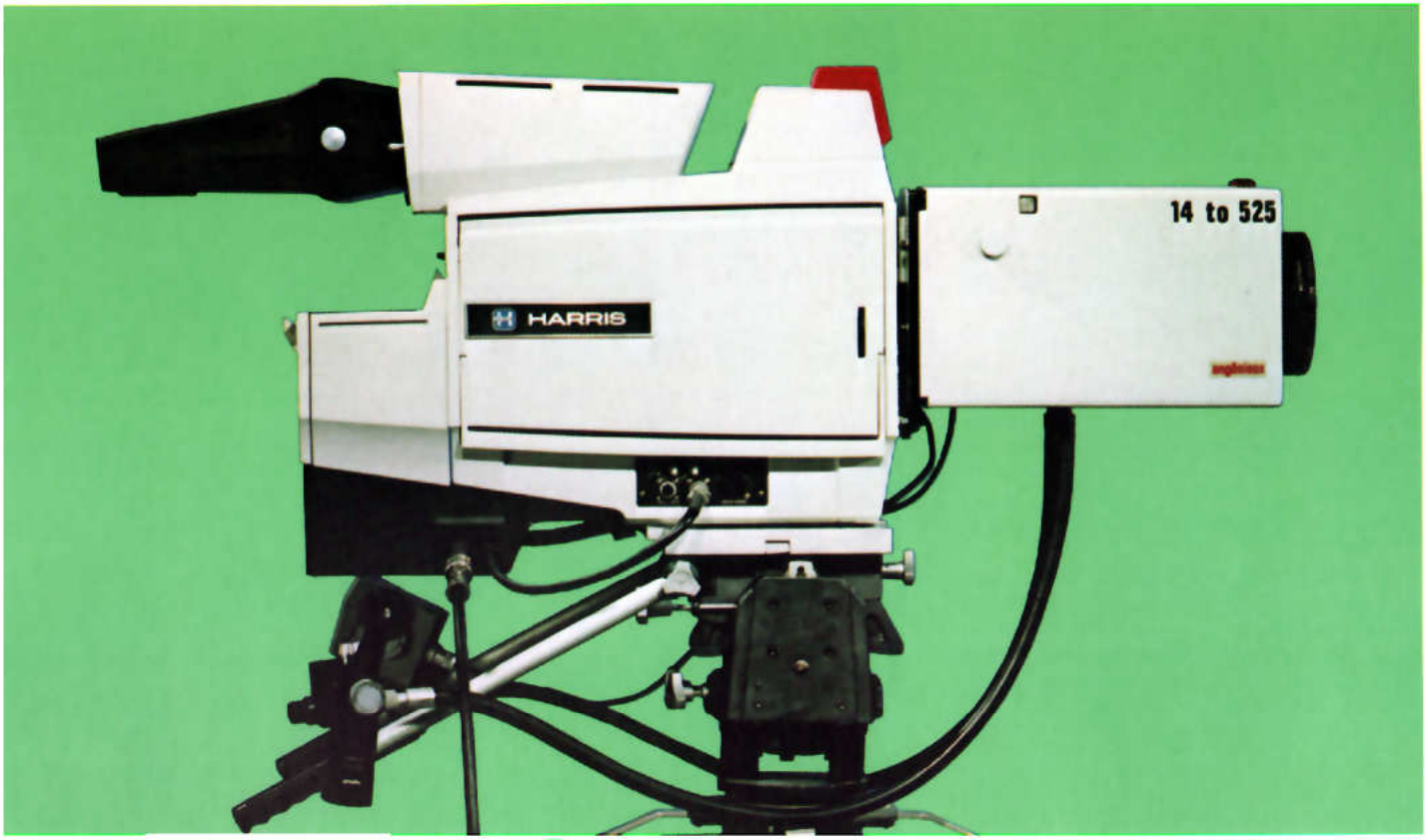
ANTI-COMET TAIL OR STANDARD TUBES. The Harris TC-80 employs XQ-1070 separate mesh or XQ-1090 anti-comet tail Plumbicon® tubes with no camera modification or realignment. Changeover from standard to ACT tubes is almost as quickly accomplished as standard tube replacement.

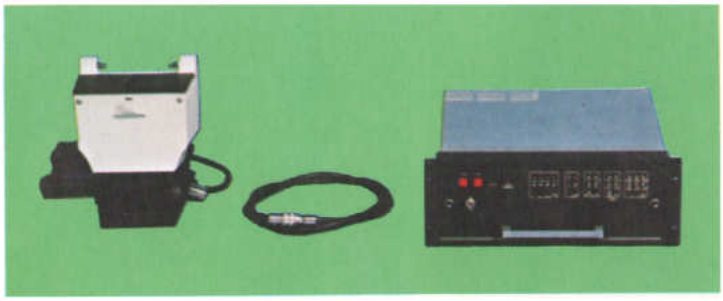
OPTIONAL TRIAX. The Harris Triax accessory provides a new dimension in versatility and flexibility for field operation of the TC-80 camera. Easily added, with



TC-80 remote capabilities with Triax

* Reg. T.M. of N.V. Philips of the Netherlands





TC-80 (above), shown in a typical field configuration, with Triax and extended range zoom lens. Complete Triax system is made up of components at right: camera head unit, Triaxial cable, and CCU interface drawer.

no special tools or camera modifications. Triax eliminates bulky, multi-conductor cable, and greatly extends your range of operation on location.

Careful development of the Triax system has allowed Harris to offer you this modern camera convenience with no picture degradation, or elimination of any of the camera's fine automatic features.

Additional Triax advantages include cost reduction in long cable runs, and in permanent cable installations. And, since it operates with smaller cable, not only will there be less weight to carry, but the cable will take up less space. Another unique advantage of the Triax system is that it makes microwave linkage of camera and control unit technically feasible.

The TC-80 is the first American-built TV camera to offer you Triaxial operation as an option—a significant advancement in camera design.

FOUR-POSITION ELECTRONIC COLOR TEMPERATURE CORRECTOR. An exclusive with Harris' TC-80, this feature provides lighting temperature equalization in four calibrated increments, without reduction of pickup tube face plate illumination. This means that the camera's excellent signal-to-noise ratio is maintained even when a long zoom lens is employed. The corrector may be used in conjunction with, or separate from, a standard five-position filter wheel placed in the optical light path.

CONTRAST CONTROL. Whether you are shooting scenes of deep contrast or very flat scenes, a master gamma control on the CCU operate panel allows you to reproduce every image in minute detail. Dark objects with similar shading characteristics no longer lose their identity, and lighter subject groups may be expanded to provide sharper definition.

SUPERIOR LOW-LIGHT LEVEL PERFORMANCE. Bias light, FET preamplifiers, efficient prism optics and an electronic color temperature corrector are a few of the outstanding features that allow the TC-80 to produce excellent detail even in low-light level conditions. Pictures are surprisingly noise free at five foot-candles—and less! Also, the camera's automatic white balance control maintains excellent colorimetry in situations where the low light level may be accompanied by a shift in the light temperature.

LINEAR COLOR MATRIX. True color masking allows accurate compensation for optical deficiencies, and for phosphor inadequacies in receiver tubes. Positive and negative addition of the three primary colors is accomplished prior to encoding of the color signal to optimize the camera taking characteristics. Flesh tones, deeply saturated reds and pale yellows—the truest test of a camera's accuracy—are faithfully reproduced by the TC-80.

CAMERA CONTROL UNIT. The TC-80 CCU has four components: the processor frame, the setup & operate panel, the intercom panel and the main power supply. These units may be rack mounted in a standard 19-inch rack, or in a modern console-type cabinet available from Harris.

COMPLETE REMOTE SETUP. With the TC-80, all setup controls have been centralized at the camera control unit, including 3-channel remote picture rotation. Even after tube replacement, complete system alignment is still accomplished conveniently from the one location. This remote design criteria complements the Triax accessory, where camera head and CCU may be a mile apart at times, making camera head adjustments impractical.

APERTURE CORRECTION. A horizontal and 2-line vertical aperture corrector, employing both comb filter and noise coring techniques, provides a new dimension in picture quality. Some unique features of this system include: fully gamma corrected detail enhancement to maintain resolution even in the low light areas; and adjustable horizontal boost frequency and single control horizontal/vertical ratio adjustment to allow tailoring the picture crispness to the scene material.

CALIBRATED BEAM SET. The TC-80 uses a calibrated electronic attenuator to reduce sensitivity in all three channels by 50% at the turn of a knob. Increased tube life and consistent registration are ensured with the calibrated -6 dB beam set feature.

Modern console-type cabinet available from Harris for housing TC-80 CCU components.

The processor frame features front-panel controls and built-in extractors.

The main pow

The setup and operate panel centralizes all controls used in aligning and operating the TC-80. Show

FLARE COMPENSATION. Individual front-panel controls are provided for flare compensation in all three color channels. This ensures accurate reproduction of blacks, even with scenes of extreme contrast.

MASTER GAIN CONTROL. A single calibrated stepped attenuator provides gain boost or cut in four 6 dB increments, from -6 to +12 dB, to increase or decrease the camera's sensitivity. To allow continuous coverage up to +18 dB, a vernier +6 dB gain control is also employed.

PAINT CONTROL. The TC-80 has individual black and white paint controls in all 3 channels to maximize color flexibility.

INTEGRAL ENCODER. This state-of-the-art encoder needs no alignment controls because of its stable, trouble-free circuitry. As a matter of fact, the only adjustments available are setup, output level, and subcarrier phase. Color bars are inserted ahead of the encoder for fast, accurate verification of system performance.

MASTER BLANKING. Blanking level is readily adjusted with a black level control, and a unique electronic null provides the operator with easy return to correct setup level. Master blanking is unaffected by the electronically independent contrast control.

TRIPLE REGULATION. An automatic self-tapping transformer provides line voltage tracking in the TC-80 power supply. This transformer combines with DC voltage regulation and individual isolator/regulators for each PC board to comprise a superior power conversion system for great stability of operation.

CABLE COMPENSATOR. Pulse timing and DC power are automatically compensated for, regardless of cable length to the camera head, for either conventional or Triax cable. Calibrated adjustment of video pre- or post-equalization is effected

supply is easily accessible in a slide-out drawer.

just below this panel is the intercom control unit.

SPECIAL EFFECTS. Various optical accessories such as star filters, close-up adapters, additional color and neutral density filters, etc. are available from Harris for use with the TC-80, to create special visual effects. Linear red, blue and green outputs are standard with the camera for use with Chroma Keyers or other special effects generators.

WAVEFORM AND PICTURE MONITORING. The TC-80 provides the following waveform outputs: sequential R,B,G; superimposed R,B,G; R-G; B-G and encoded output. These signals are routed to the waveform monitor by pushbutton control.

Video signals to the picture monitor, also selected by pushbutton, are: R,B,G, -G; and encoded output.

CAMERAMAN CONVENIENCES. Ease of camera operation was a basic consideration in the design of the TC-80, with numerous conveniences included for the cameraman. Careful attention to camera head details, such as center of gravity and weight, ensure smooth panning and tilting. There are no alignment controls for the cameraman to worry about, so his full attention can be devoted to "following the action". Cameraman controls, such as viewfinder brightness and contrast, signaling, etc., are logically located for ease of operation.

The TC-80 viewfinder tilts above and below the horizontal axis to give maximum flexibility at various camera angles. Accurate indication of zoom lens focal length is constantly displayed on the viewfinder raster, while displays of R,B, or G video, monochrome video or external sources, such as split screen or special effects, are easily switch selectable. Other viewfinder controls include subcarrier notch filter and a high peaker for ease of focus.

The viewfinder is readily detachable from the camera head with a quick release mechanism that requires no tools. And, snap-on indoor and outdoor viewing hoods are included with the TC-80.

In addition to the large tally located atop the camera, there are two tally lights mounted at the lens tip, and a fourth tally indication is just below the viewfinder screen.

The intercom system consists of two independent channels to allow engineering and production two-way communications simultaneously. Individual volume and side tone controls are provided for each channel. There is also a one-way channel for program audio. Switching at the CCU permits up to three incoming party lines to be selected for either or both of the two-way channels. Selectable party line impedance ensures matching to all existing systems. And, either carbon or dynamic mics can be used.

For signaling, a pushbutton control at the camera head sounds a beeper to alert the operator at the CCU. To alert the cameraman or talent, a CCU control flashes the camera's tally lights.

A final convenience feature is the springloaded script-clip located at the rear of the TC-80.

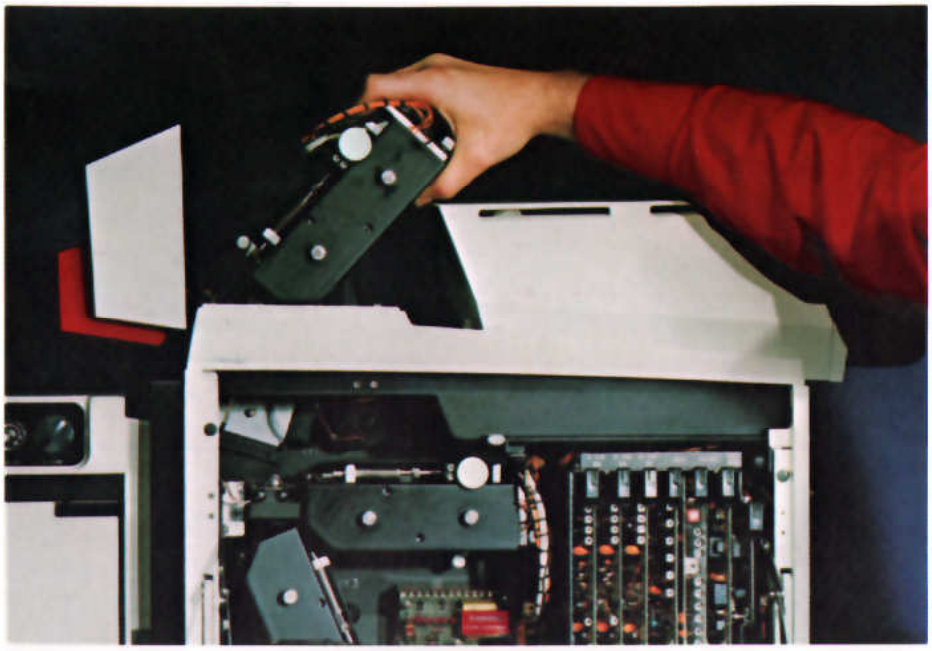
at the CCU, and provides significant signal-to-noise improvements.

SYNC GENERATOR. The TC-80 NTSC sync generator is a modular accessory that plugs into the processor frame of the CCU. Color genlock, with protection for loss of reference, is a standard feature. With this accessory, single cable synchronization of camera chains is simply and inexpensively accomplished. Sync, blanking and subcarrier outputs are available at the rear of the CCU for driving other cameras or ancillary equipment.

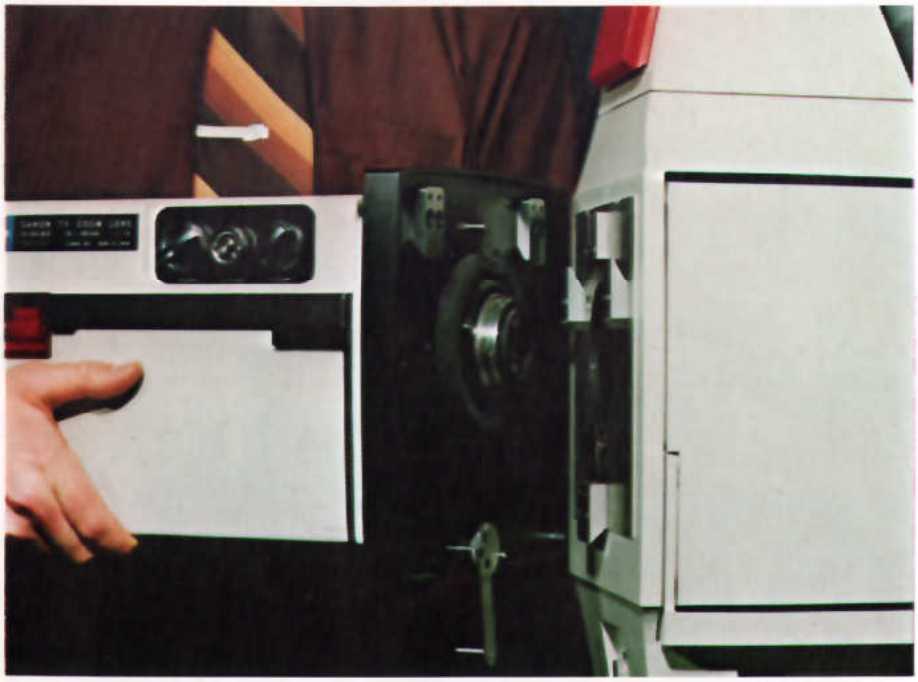
LENS CAP. The TC-80 lens cap is electrically operated from the camera control unit or the remote operate location. Capping the lens provides the camera's automatic black balance circuitry with its reference, and the spring-loaded cap will protect the camera optics automatically when power is removed.

CLIP CONTROL. Individual red, blue and green adjustments of the the white clipping level are controlled from the front panel for ease of setup and alignment.

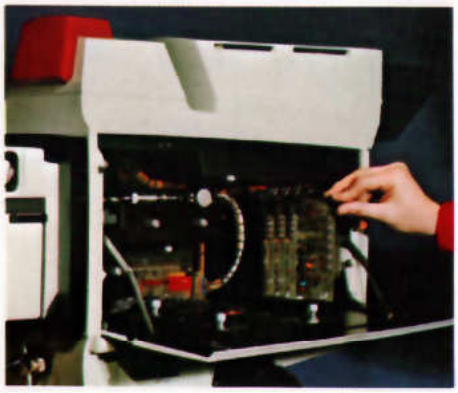
An adjustable viewfinder and convenient location of cameraman controls add to the TC-80's ease of operation.



Quick-disconnect, self-aligning assemblies allow easy yoke removal and replacement.



Lenses are easily installed, using a hanging, self-positioning mount and a positive lock.



Camera-head modules are readily accessible for servicing, and controls are front-edge mounted.

Utility panel provides connections for test equipment and external intercoms, tallys, monitors.

PLANNED FOR SERVICEABILITY. With its designed-in reliability, the TC-80 will provide long-term, trouble-free operation with minimal servicing. When service is required, however, many useful features such as easy tube change, interchangeable preamps, readily accessible components and voltage status lights and test points, have been included to cut maintenance time and costs.

PICKUP TUBES. Pickup tubes can be replaced quickly, without removal of other camera head components. Each precision yoke assembly is attached with a self-aligning quick-release mechanism. A single connector provides connections for the preamps, the tube and the yoke.

INTERCHANGEABLE PREAMPS. The preamps are identical in all three channels and may be interchanged easily for trouble-shooting. This interchangeability also reduces your spare parts inventory.

STATUS LIGHTS AND TEST POINTS. Five indicator lights inside the camera head show availability of necessary voltages from the camera power supply to assist in fault isolation. Test points are provided at critical locations to simplify maintenance. There are six status lights and test points at the CCU main power supply.

REMOVABLE VIEWFINDER. The viewfinder is easily detachable, and an extension cable is provided to facilitate servicing.

CAMERA HEAD POWER. For safety during setup or servicing, the camera head power can be shut down from either the head or CCU position. Also, power is shut down automatically when the camera cable is disconnected. A remote sensing circuit ensures proper voltage at the camera head, regardless of cable drop.

HOUR METER. As an aid to preventive maintenance, an elapsed time meter is included in the camera head.

UNMATCHED MECHANICAL CONSTRUCTION. The TC-80's all-aluminum case and optical mounting plate comprise the best mechanical structure ever used in a color television camera. The case and plate are combined in a solid, precision-machined, stress-relieved unit that ensures great operating stability, even with heavy use in demanding remote situations. The lens interface surface is machined after assembly to ensure adjustment-free optical alignment. The rigidity of construction permits the camera to accommodate long, heavy lenses, without additional support.

TC-80 ACCESSORIES. The TC-80 has been designed to accommodate all commonly used camera accessory items, including most standard broadcast lenses available for the one-inch format. These range from the largest 42-to-1 zoom lenses down to the more conventional 10-to-1's—from such leading suppliers as Angenieux, Canon, Fujinon, Rank and Schneider.

All popular cam heads and pedestals can be used with TC-80, and a variety of field tripods are also available.

The following two accessories are designed specifically for use with the TC-80, and may be ordered initially, or added later:

- Triax system—greatly extends your remote capabilities.
- NTSC Sync Generator—allows stand-alone or single-cable synchronization.

TC-80 Specifications

Electrical Scan Standards

EIA 525/60
CCIR 625/50

Power Requirements

Voltage ..... 90 to 130V or 180 to 260V
Frequency ..... 47 to 63Hz
Power Load ..... 500W (exclusive of monitoring)

Inputs (Loop-Through, Bridging)

Sync ..... 2 to 8 Vpp, negative
Blanking ..... 2 to 8 Vpp, negative
Sub Carrier ..... 1 to 4 Vpp
VF External Video ..... 1.0 Vpp Composite
External video or black burst with optional sync generator ..... 1.0 Vpp

Outputs

Program Video ..... 1 composite, 2 separately selectable for composite or non-composite
Chroma Key (R, B, G) ..... 0.7 Vpp across 75 ohms
Picture Monitor Video ..... 0.7 Vpp across 75 ohms
Waveform Monitor Video ... 0.7 Vpp across 75 ohms

Monitor Switching Facilities

Picture ..... R, B, & G or - G separately or combined; color output (program)
Waveform ..... R, B, G sequential or superimposed; R-G; B-G; color output (program)
Viewfinder ..... R, B or G; Y video; external video

Sensitivity (Typical tubes)

Minimum Incident Light for full output with f1.6 lens ..... 6 fc
Incident Light for rated Signal/Noise at f2.8 ..... 80 fc
Signal/Noise Ratio
NTSC ..... 50 dB
PAL ..... 47 dB
(300 na green signal current; 1.0 gamma; bandwidth NTSC - 10 kHz to 4.2 MHz, PAL - 10 kHz to 5.5 MHz; masking, aperture & chroma - off)
Resolution (no aperture correction) ..... 600 TV lines

Optical System

Color Separation ..... Single unit prism with Integral Bias Light
Correction Filters ..... 5 position filter wheel

Pick-Up Tubes

Red ..... XQ1073R or XQ1093R
Blue ..... XQ1070B or XQ1090B
Green ..... XQ1070G or XQ1090G

Registration Accuracy

Zone 1 (circle = .8V) 0.05%
Zone 2 (circle = 1.0V) 0.1%
Zone 3 (circle = 1.0H) 0.2%
Zone 4 (all other) 0.4%

Picture Geometry

Zone 2 ..... 1.0%
Zone 4 ..... 1.0%

Camera Cable Length

With 0.65 inch (17mm) diameter cable ..... 2000 ft. (610m)
With 1.1 inch (28mm) diameter cable ..... 3000 ft. (914m)
With 0.5 inch (13mm) diameter Triaxial Cable and optional Triax System ..... 5000 ft. (1524m)
Over 5000 feet with larger diameter Triax Cable.

Operating Environment

Temperature
Camera Head .... -20 to +50 degrees C
Control Unit ..... 0 to +50 degrees C
Humidity ..... 0 to 95% RH
Altitude ..... 0 to 10,000 ft. (3048m)

Shading Provisions

H & V sawtooth and parabola modulation. H & V sawtooth and parabola additive, for Bias Light.

Aperture Correction

Combined horizontal and vertical aperture correction derived from green with Comb filtering and noise coring. Primary horizontal boost frequency 6 MHz, with adjustable 2.5 MHz secondary boost.

Gamma Correction

Each Channel ..... Continuously variable from linear to 0.35
Master Gamma ..... Continuously variable from linear to 0.35 independent of channel controls

Intercom

Camera Head & CCU ... Two headsets (carbon or dynamic mic); Production, Engineering & Cue circuits
Party Line ..... Accepts up to three party lines; selectable impedance matching
Program Audio ..... Unbalanced bridging for cue audio

Signaling System

CCU to Camera ... Pushbutton flashes camera tally lights
Camera to CCU ..... Pushbutton operates audible signal

Viewfinder

Screen Diagonal ..... 6.1 in. (155mm)
Picture Brightness ..... 0 to 150 ft. lamberts
Resolution ..... better than 600 TV lines
Picture Timing ..... AFC
Video Equalization ..... Full Cable length
Controls ..... Contrast, Brightness, Input Select and Response (flat, peak, notch)
Focal Length Indicator ..... White bar top of picture

Mechanical

Camera Head (Less lens)
Height ..... 19.5 in. (495 mm)
Width ..... 10.5 in. (267 mm)
Depth ..... 21 in. (533 mm)
Weight ..... 85 lbs. (38 kg)

Processor Frame
Height ..... 8.75 in. (222 mm)
Width ..... 19 in. (483 mm)
Depth ..... 15.5 in. (393 mm)
Weight ..... 30 lbs.(14 kg)

Operate & Set-Up Panel
Height ..... 7.0 in. (178 mm)
Width ..... 19 in. (483 mm)
Depth ..... 7.0 in. (178 mm)
Weight ..... 11 lbs. (5 kg)

Intercom Panel
Height ..... 1.75 in. (44 mm)
Width ..... 19 in. (483 mm)
Depth ..... 7.25 in. (184 mm)
Weight ..... 3 lbs. (1.4 kg)

Main Power Supply
Height ..... 8.75 in. (220 mm)
Width ..... 19 in. (483 mm)
Depth ..... 20 in. (508 mm)
Weight ..... 100 lbs. (45 kg)

Interconnect Panel
Height ..... 7 in. (178 mm)
Width ..... 19 in. (483 mm)
Depth ..... 6 in. (142 mm)
Weight ..... 8 lbs. (3.6 kg)

Accessories

Triax System
NTSC Sync Generator Module
Zoom Lenses
Angenieux 10X14E11, 14-140 mm, F1.6
Angenieux 15X14E61, 14-210 mm, F1.6
Angenieux 42X12.5E61, 12.5-525 mm, F1.5
Canon PV10X16B, 16-160 mm, F1.6
Canon PV18X12B, 12-216 mm, F1.6
Canon PV34X24B-DZ, 24-816 mm, F1.6
Fujinon R10X11RW-2, 11-110 mm, F2.1
Fujinon R14X16EWM-3, 16-225 mm, F1.8
Rank Varotal 30, 12-120 mm, F1.6
All other one-inch format lenses from Angenieux, Canon, Fujinon, Rank and Schneider.
Camera Cable, std. length 50 ft., 75 ft., 100 ft., 150 ft., 200 ft., 250 ft., 300 ft., 400 ft., 500 ft.
Triax Cable, std. length 100 ft., 250 ft., 500 ft., 1000 ft.
Headset, single or dual, dynamic or carbon mic
Conrac SNA9 9-in. Picture Monitor
Tektronix 528 or 1480 Waveform Monitor
ITE Cam Head H2 or H3; ITE-P4 or P5 Studio Pedestal
ITE-WA Wedge Adaptor; ITE-WP Wedge Plate
Quick-Set (Houston-Fearless) and Vinten Cam Heads, Pedestals, etc.
Vinyl Rain Cover

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