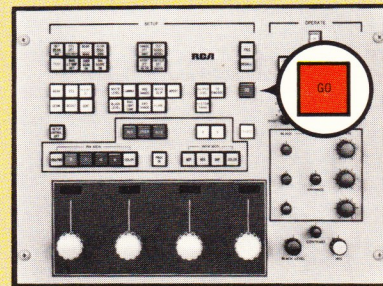


RCA

TK-290



HIGH PERFORMANCE AUTOMATIC TELECINE CAMERA



Automatic Set-Up
At The Touch of a Button

Features

- Microprocessor-controlled, software-based system
- Full feature dynamic automatics
- Digital, solid state memories
- "Autocam" option uses single pushbutton for automatic camera set-up
- Superior picture quality, consistently
- Latest pickup tube technology; choice of tubes
- Linear aperture and contour system
- Non-telecentric optical system
- Stable design for unattended operation
- Compatible with existing multiplex telecine systems

RCA'S NEW GENERATION AUTOMATIC TELECINE CAMERA



The new generation TK-290 extends RCA's long-established leadership position in telecine cameras and systems. This new camera brings to telecine the same advanced technology employed in the acclaimed, Emmy-award winning TK-47 automatic studio camera.

The TK-290 utilizes latest technology in pickup tube design; in solid state memories; in microprocessor-controlled functions, and in computer-assisted component matching and assembly techniques.

The result is a camera system that achieves superior performance and new levels of stability, reliability and operational simplicity. With its "Autocam" option, the 290 sets up at the touch of a button.

Additional TK-290 Features

- Centralized set-up—uses same Set-Up Terminal as TK-47
- Memory File and Recall capability
- Camera check without misadjusting controls
- Extensive use of LSI circuits
- Alpha-numeric function display
- Centralized set-up controls for multiple camera systems
- Automatic Monitor Mode Switching
- Video bus for Waveform and Picture Monitors
- Data bus for control signals

TK-290

Preliminary Specifications

Scan Standards

EIA525/60 field/s
CCIR625/50 field/s

Color StandardsNTSC, PAL-B or PAL-M

Power Requirements

Input Voltage100-130 or 200-260V
Frequency47 to 63 Hz
Power Consumption400 watts max.

Inputs (Loop-through, Bridging)

Reference Video1.0V composite across 75 Ohms
External Video (Grating)0.7V non-composite
across 75 Ohms

Outputs

Encoded Program Video
(2 outputs)1.0V composite across 75 Ohms
OR0.7V non-composite across 75 Ohms
R G B Program/Chroma Key
Video0.7V non-composite across 75 Ohms

Monitor Outputs

Picture3 outputs:
OPERATE at remote control location displays monochrome;
2 SET-UP OUTPUTS; 1 at head displays R, G, B, -G and EXT
separately or superimposed, M or Color; output at Set-Up
Terminal (SUT) displays R, G, B, -G and EXT separately or
superimposed, or color.

Waveform3 outputs:
1 at SUT displays R, G, B, separate, superimposed or se-
quential or color; output at head displays R, G, B superim-
posed or sequential or color; output at Remote Control loca-
tion displays R, G, B superimposed or sequential or color
equalized for a maximum of 200 feet of 8281 coax.

Viewfinder (swivel)displays: R, G, or B from preamps,
M, EXT or signal selected by Pix monitor controls at camera
head.

Gamma Correction

Switchable preset values of 0.45, 0.55, 0.65, 0.75 or alterna-
tively 0.25, 0.35, 0.45, 0.55. Also variable gamma trim for
R, G, B channels.

Shading Correction

White Shading CorrectionParabolic and sawtooth H & V
Black Shading CorrectionParabolic and sawtooth H & V

Resolution

With aperture correction "on", flat response at output to 400 TV
lines ± 1 dB with any recommended pickup tube complement.
Limiting resolution 700 lines dependent on pickup tube.

Horizontal Blanking

Adjustable to 10.4 microsec minimum.

Signal/Noise

	PAL	NTSC
Vidicon tubes @ 300 na signal current	49 dB	52 dB
Lead Oxide tubes @ 425 na signal current	49 dB	52 dB
Standard Saticon® tubes @ 500 na signal current	53 dB	56 dB
LO-CAP Saticon® tubes @ 600 na signal current	57 dB	60 dB

(Measured at mid-gray, 100 IRE white, unweighted bandwidth
10 kHz to 4.2 MHz (NTSC) or 5.5 MHz (PAL), Chroma, Con-
tour, Aperture and Gamma off)

Geometry

Zone 1< 0.5%
Zone 2< 1.0%
Zone 3< 1.5%

Frequency Response (No aperture correction)

Low Frequency Response (60 Hz Square Wave) ... < 2% Tilt
Amplitude/Frequency Response
(0.5 MHz to 5 MHz)Flat within 0.5 dB

Registration

Zone 1 (Circle = 0.8V)< 0.05%
Zone 2 (Circle = 1.0H)< 0.05%
Zone 3 (All other)< 0.1%
(Typical figures with Saticon® tubes)

Contour EnhancementAdjustable 2 line vertical
correction added to luminance. Adjustable horizontal correc-
tion combed at subcarrier frequency added to luminance.

Out-of-Band Aperture CorrectionAdjustable vertical
aperture correction added to Red, Green and Blue. Adjust-
able horizontal aperture correction added to Red, Green and
Blue.

Camera Tube Types

Lead Oxide TubesAmperex XQ1410 G/B, XQ1413R,
EEV P8400 G/B, P8401AR
Vidicon TubesRCA BC4809, EEV8038
Standard Saticon TubesRCA BC4909
Lo/Cap SaticonsRCA BC4386, BC4396

Environmental

Operating Temperature Range0 to 45°C
Operating Humidity Range (non-condensing)0 to 90%
Operating Altitudeup to 10,000 ft. (3050 m) ASL

Radio Frequency Interference

Camera meets all specifications in RF fields up to 150 milli-
volts/meter, any frequency.

Ordering Information

TK-290:
NTSCMI-570025A1
PAL BMI-570025B1
PAL MOn Request

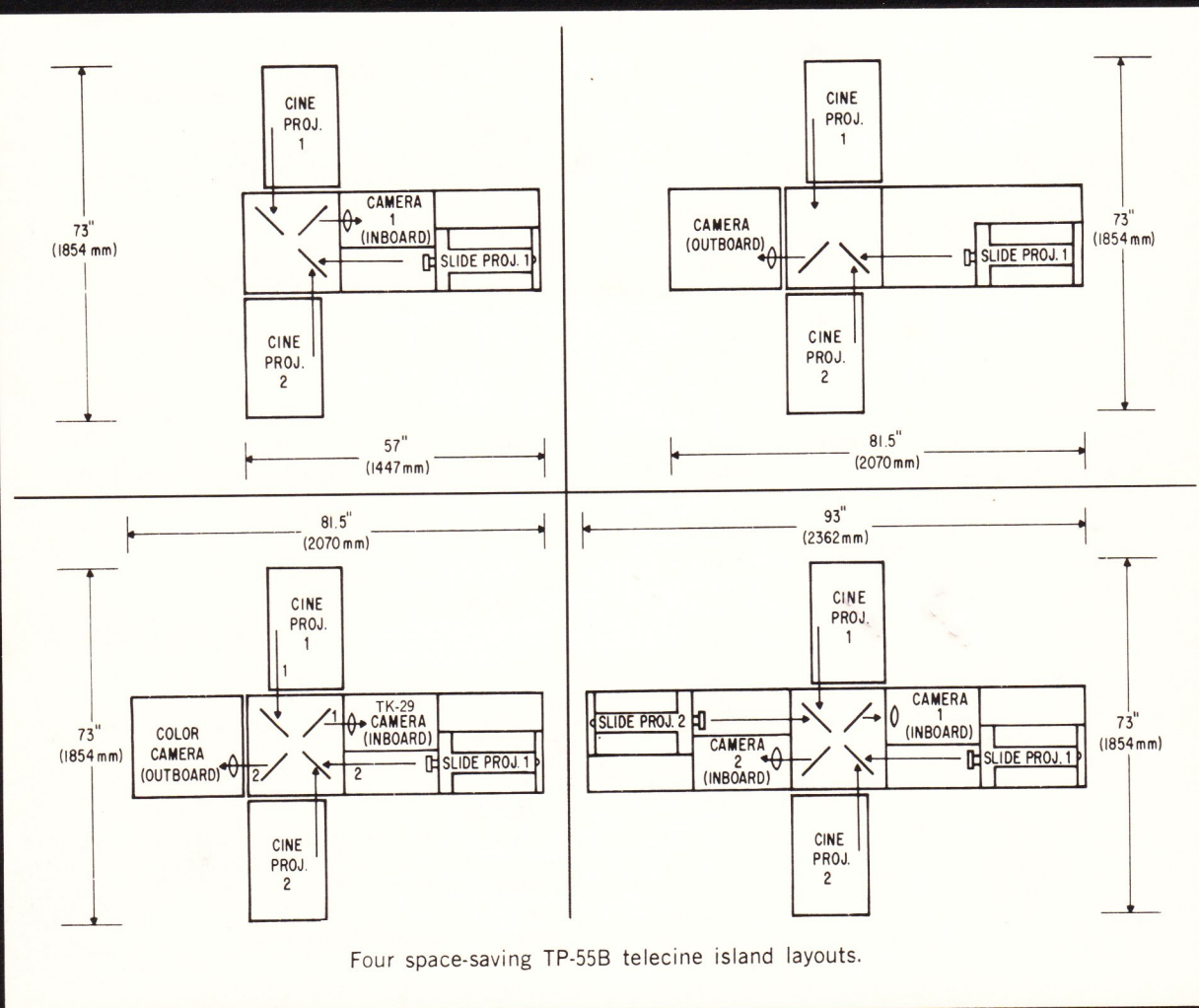
Accessories

Remote Operate PanelMI-557269C1
Remote Operate Cable:
50'MI-557833-550
75'MI-557833-575
100'MI-557833-600
Gamma Control PanelMI-557876B1
Gamma Control Cable (Bulk)MI-13346-15
Rotatable Monitor HousingMI-557209B3
Common Path ND Filters for use
with Saticon Tubes:
0.9 NDMI-570013-1
1.0 NDMI-570013-2
1.2 NDMI-570013-4
1.5 NDMI-570013-7
Lo Capacitance Saticon Kit (LCS)MI-570019-A1

Specifications subject to change without notice.

Mounting Flexibility

The TK-290 is mechanically compatible with TK-27, 28 and 29 telecine systems. Employed with the TP-55B Multiplexer, the TK-290 can be installed in a number of telecine configurations, as depicted in these typical layouts.



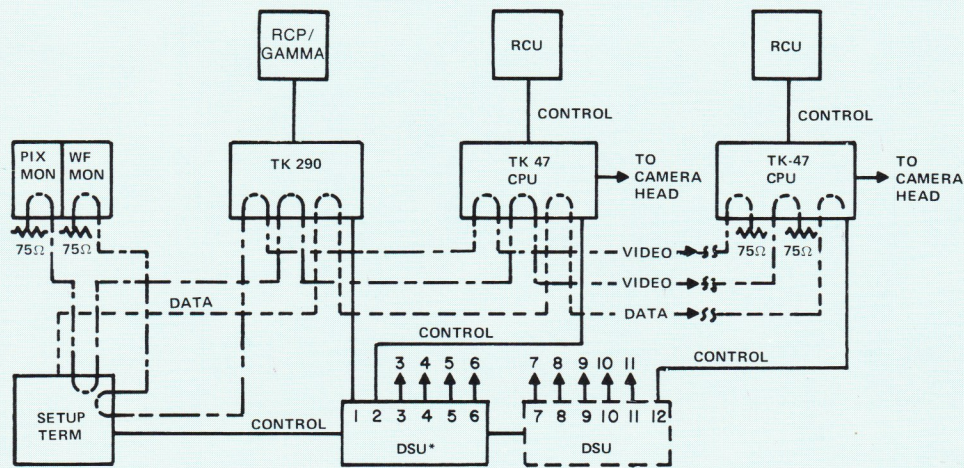
System Versatility

Among the advantages of the TK-290/TK-47 camera design concept is the flexibility it provides for varying operational needs. The key to this flexibility is the digital, microprocessor-controlled design of these cameras.

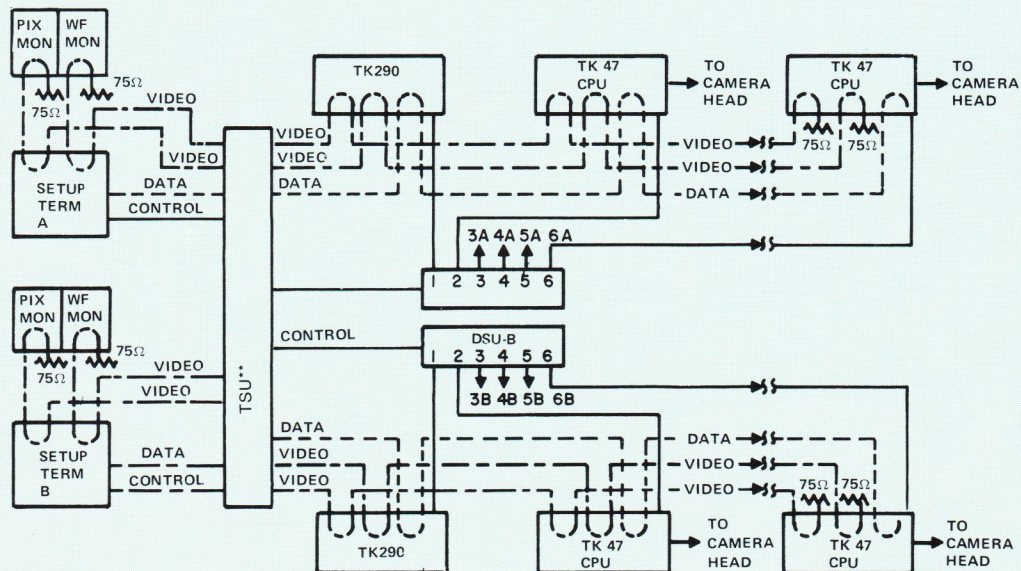
The Set-Up Terminal employs digital coding and multiplexing to permit operation of all controls over twisted pair cabling. A single data bus is used, looped through each of the TK-290 camera heads and the TK-47 CPU's, with a single cable feed to the SUT. Coaxial cables for the picture monitor and waveform

monitor are also looped through, simplifying the system and reducing cabling requirements. (See system diagrams.)

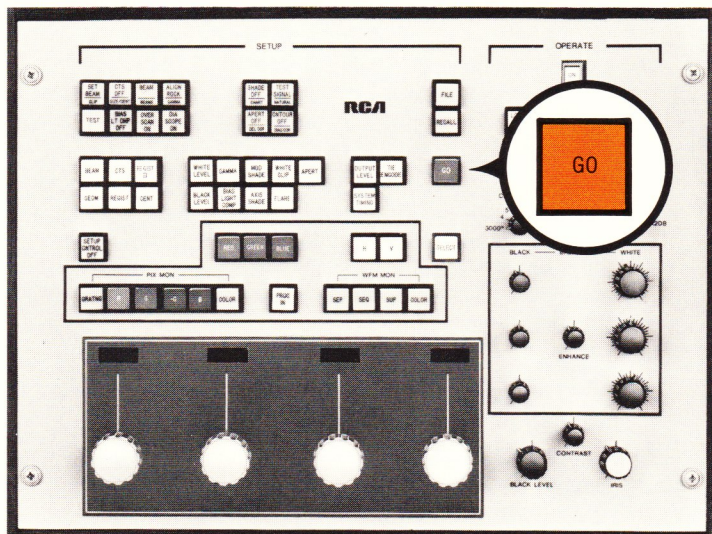
A single SUT can provide central control for an entire system of up to twelve TK-290 and TK-47 cameras. The Delegate Switching Unit (DSU) assigns any of six camera systems to a SUT at the touch of a button. The Transfer Switching Unit (TSU) is for larger camera systems. With the TSU and two Set-Up Terminals, up to 24 cameras can be handled, providing flexibility, redundancy and economy.



*Delegate Switching Unit. Assigns any of six cameras in the system to a Set Up Terminal.



**Transfer Switching Unit. For large systems with two Set Up Terminals. Accommodates up to 24 cameras.



Automatic Set-Up

With the "Autocam" option, setting up the TK-290 is accomplished at the touch of a button on the Set-Up Terminal. This unique microprocessor-controlled system automatically adjusts camera control functions. A pre-programmed "brain" monitors, compares and corrects itself, automatically adjusting set-up variables such as: master geometry, registration, white shading, and black shading to maintain optimum performance at all times.

The automatic camera set-up is normally required only with a major change of component, such as yoke or tube, or if a complete check of camera set-up is desired. This check takes only minutes to complete, and all three channels (including green) are adjusted.

"Autocam" saves time, delivers consistent performance, and eliminates multiple operator judgment variables.

Open Gate "Check"—For Optimum Performance

TK-290 cameras equipped with "Autocam" also have another time-saving facility—Open Gate "Check". This pushbutton on the Set-up Terminal puts the camera through a cycle of routine pre-operational checks to be sure that it is set for optimum performance. This automatic system rapidly checks white level shading for each projector and stores the corresponding correction value in memory to be recalled on demand by signals from the multiplexer.

Dynamic Automatic Systems

Automatic subsystems in the TK-290 are completely independent of the automated set-up system. These automatics are designed so that the camera runs free of operator attention—functioning effectively as an unattended "black box" system. Five automatic inter-related subsystems work together to electronically control all color balance and level variables and to dynamically correct for changes and variations in film—combining to produce a television picture of superior quality. Dynamic automatics include:

Automatic White Level Control

Adjusts the position of the variable neutral density disk positioned in the optical light path for optimum output level. Correction is made continuously and typically a 2:1 over level condition is balanced in 80 milliseconds.

Automatic Black Level Control

Automatically adjusts black areas of the picture to a reference black level which is preset by the operator.

Automatic Color Balance

Automatically maintains color balance at predetermined levels of black and white by continually sampling and balancing. The circuitry compensates for color imbalance due to film aging or errors in processing. At the same time, it corrects for color temperature variations in projector light sources. Good logic and sensor design assure that no correction is applied to properly balanced film.

Automatic Gamma Balance

Gamma errors may be present in film as gradation differences in the dye colors. If camera R, G, B video sampling indicates a differential gamma error, individual channel gamma is automatically adjusted to achieve neutral balance.

Automatic Flare Correction

Flare is a phenomenon caused by light scatter in the telecine optical system and can change color balance in the dark areas of the picture as the scene content changes. Flare correction stabilizes the picture black levels at the selected value and maintains good balance among the three channels.

Non-Telecentric Optical System

The optical system for the TK-290 is RCA's proven non-telecentric design, employing a computed single prism light splitter for precise colorimetry and superior picture quality. With the beam splitter, both shading and dust problems are eliminated. The non-telecentric configuration assures flattest shading from projectors and is not sensitive to minor projector optical misalignment. The TK-290 does not require a matched multiplexer and projector system. Camera head optical system, bias light and deflection yoke assemblies are mounted on a rigid metal bedplate for maximum stability. The field lens is split into two sections with an air gap between. The image is in focus in the air gap,

not on the glass surfaces which may collect dust. A test slide holder permits the insertion of test slides between the split field lens for camera performance evaluation or maintenance.

Bias Light

An integral bias light system is incorporated in the TK-290. A separate bias light assembly is employed for each pick-up tube and the bias light illumination level is independently adjusted in each channel.

Light Control

An integral Neutral Density Light Control Wheel provides controlled light to the pickup tubes, maintaining constant black currents and signal-to-noise ratios under all operational conditions.

Choice of Photoconductive Pickup Tubes

The TK-290 is a three-tube camera which offers the user a choice of photoconductive pickup tubes, including vidicon, Saticon® and lead oxide (as well as a Lo Cap Saticon® which extends the S/N ratio to 60 dB for noise-free pictures).

Deflection System

The TK-290 employs an advanced design 25mm deflection yoke based on technology developed for RCA's top-of-the-line studio camera, the TK-47. TK-290 yoke sets are manufactured by RCA and are selected and matched for registration by computer. The yokes' construction assures maximum picture resolution, and front end layout is designed to present a low capacitance to the pickup tube target.

Preamplifier

The preamplifier is designed for maximum signal-to-noise ratio performance and dynamic range. A significant reduction of input capacity is achieved by locating the input semi-conductor and feedback resistor within the yoke assembly itself.

Advanced Registration System

Another new feature which contributes to the TK-290's picture performance is an advanced registration system: "APT"—an acronym for Asymmetrical Pincushion and Trapezoidal correction. This correction system provides new levels of Geometry and Registration precision for better on-air pictures.

Optical Path Correction

Along with complete control of shading, the TK-290 includes memory files which store corrections for up to six different projectors in the system. Optimum corrections for shading, registration and color balance are stored. Switching of files from projector to projector is accomplished automatically to follow the multiplexer.

Aperture Correction and Contour Enhancement

Aperture correction in the TK-290 is derived from the green channel and is inserted in the R, G, B channels after gamma. The system utilizes the out-of-band peaking technique and is adjustable to achieve flat response to 400 TV lines (5MHz) at the camera output with less than 1 dB of in-band ripple. Coring is employed to minimize noise, especially in the dark areas of the picture.

Horizontal and vertical contour enhancement employs

multiple delay lines to derive a four-sided correction signal from the green channel after gamma. This signal, which peaks at 3.5 MHz, is linearly added back to the luminance signal in the encoder. This arrangement produces good contour correction all the way down to black. Combing and coring are applied to the correction signal to minimize noise and cross-color effects.

Ordinary 35mm slides and 35mm and 16mm film prints need different levels of contour correction because of the differences in detail. The TK-290 connects the appropriate contour level system in synchronization with movement of the multiplexer mirror associated with each projector.

Consequently one value of edge enhancement is introduced when the picture source is a 16mm film and another when the input is a 35mm slide or film.

The TK-290 camera is equipped with an internal sync generator which permits it to operate as a stand-alone system, or genlocked to composite video.

Set-Up Terminal

The same Set-Up Terminal is used for TK-290 and TK-47 cameras, and the systems are completely compatible and cost-effective.

A single Set-Up Terminal can be used for setting up all TK-290 and TK-47 cameras from a central location.

The Set-Up Terminal (SUT) is a digital device which functions as the technical control center. It is connected to the TK-290 by a cable with twisted pairs. After set-up has been completed, the SUT may be disconnected from the camera chain.

Set-Up Control Functions

Control functions for setting up the TK-290 camera system are delegated to the four knobs (resolvers) at the bottom of the panel. An LED display above each control knob provides an alpha-numeric display of the function being controlled at any particular time.

Each of the knobs is a digital signal generator. Movement of the knob generates a digital signal which controls the circuit to which it is delegated.

Three set-up modes for the TK-290 are available from the Set-Up Terminal.

1. **Manual Function Select.** This mode involves using the individual pushbuttons on the left side of the SUT to check settings and make desired adjustments.
2. **Automatic (Optional).** Automated camera set-up at the touch of a single pushbutton on the SUT panel.
3. **Auto-Select.** Automatic set-up of selected functional groups.

Selecting the Mode

Mode selection for set-up is made by pressing the "Select" pushbutton. At each push of the button another mode is selected and displayed as an LED readout. Once the desired mode is displayed, the selected set-up procedure is activated by pressing the GO pushbutton on the panel.