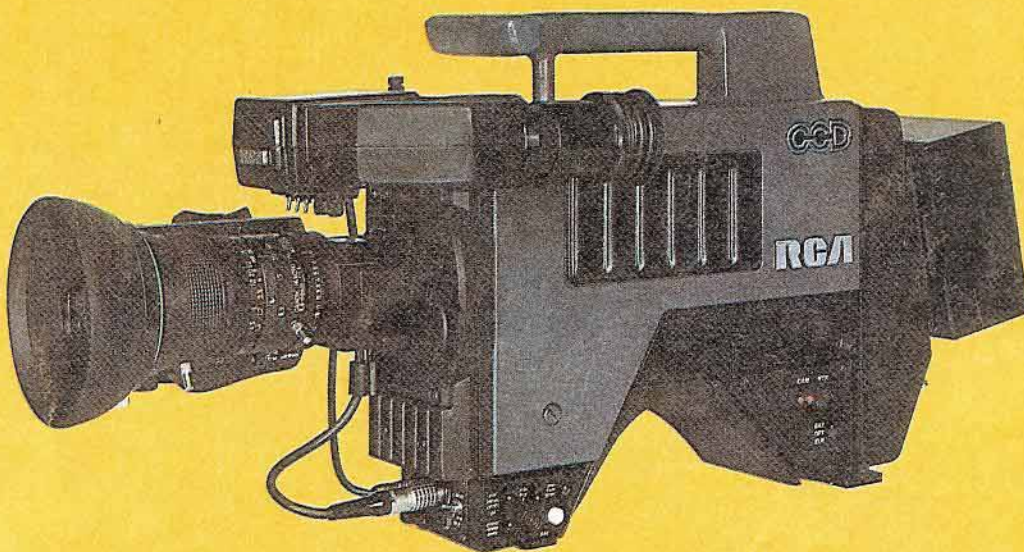


**RCA**

catalog CA.1480A  
(Replaces CA.1480)

# CCD-1

**THE "ONE-FOR-ALL" CAMERA  
FOR ENG, EFP, STUDIO**



- All solid state image sensing
- No lag, burn, or comet-tailing
- No registration adjustments—ever
- Exceptional long-term reliability
- Outstanding sensitivity and signal-to-noise ratio
- Unequalled dynamic range and dynamic resolution
- Light weight, low power consumption
- Multicore and Triax remote control available



A wide range of power sources, ENG accessories and mounting equipment are available, and a selection of lenses is offered to cover all applications.

For extended versatility, full triax remote, or a simple control system may be specified.

## CCD-1 IDENTIFICATION LISTING

### Description

CCD-1 ENG/EFP Camera  
CCD-1S Sports/EFP Camera

### MI Number

571000A1  
571030A1

### Lenses

Angenieux 15X7	599700A1
Angenieux Tripod Controls	599821A1
Angenieux Pistol Grip Adaptor	571008A1
Angenieux Pistol Grip	A15X7PG
Angenieux 25X8	A25X8
Canon 13X6.6	599704A1
Canon Tripod Controls	599824A1
Canon Pistol Grip Adaptor	571010A1
Canon Pistol Grip	BG2-0648-000
Canon 18X6.6	PH18X6
Fujinon 12X7	599701A1
Fujinon 14X6.6	599702A1
Fujinon Tripod Controls	599823A1
Fujinon Pistol Grip Adaptor	571009A1
Fujinon Pistol Grip	SRD45A
Fujinon 17X6.6	S17X6
Fujinon 30X11	S30X11
Schneider 14X6.5	599703A1
Schneider Tripod Controls	599822A1
Schneider Pistol Grip Adaptor	571011A1
Schneider Pistol Grip	SE05-0035

### Batteries/Chargers

Anton Bauer 4AH Nicad	4NC76
Fast Charger for 4NC76	LSFC
Overnight Charger for 4NC76	AC76
Cine60 4AH Belt	S1404TK
Cine60 8AH Belt	S1408TK
Cine60 14AH Belt	S1414TK
Cine60 Fast Charger	557117B1
AC Power Supply	599540A1

### Remote Control

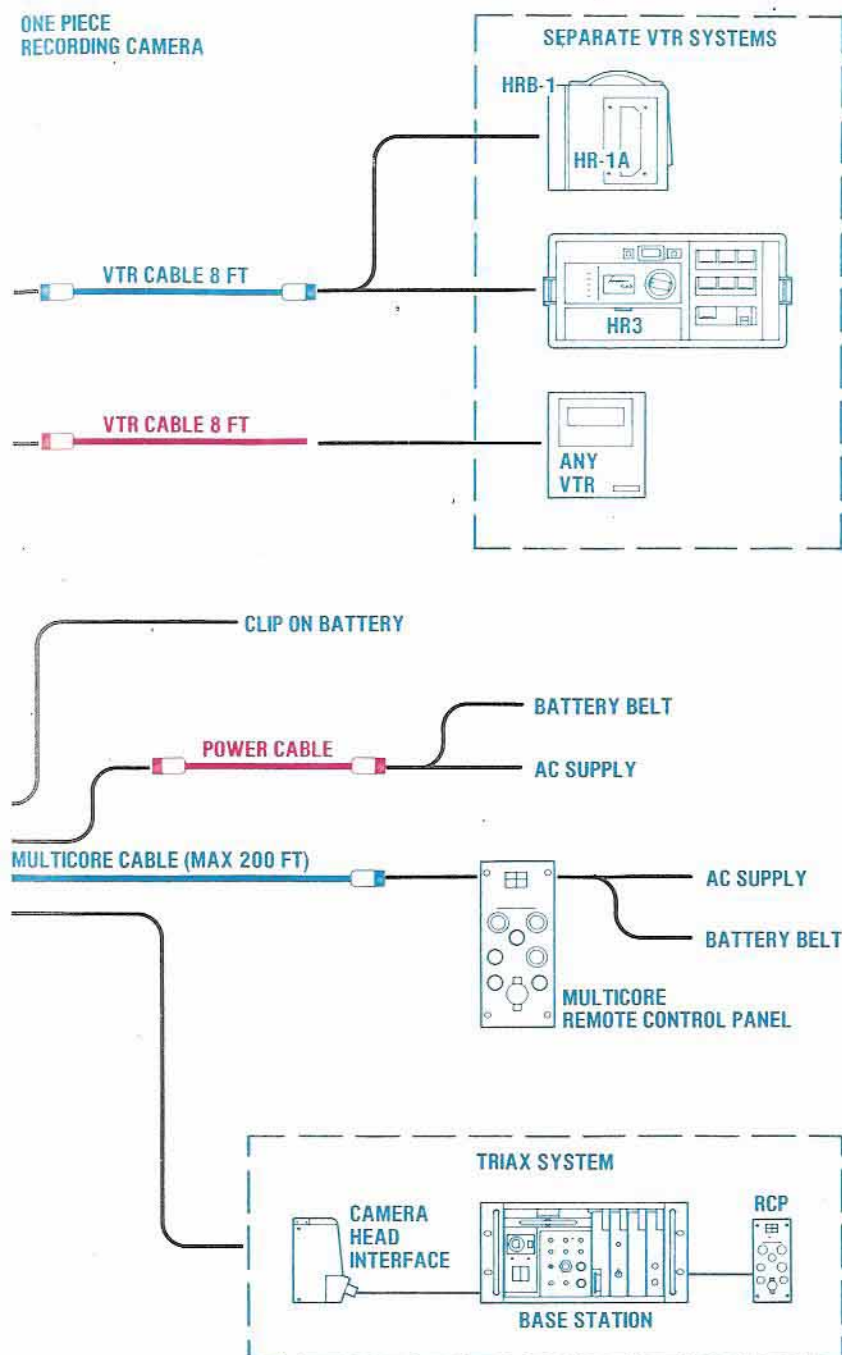
Triax System	571021A1
9267 Triax Cable	570599-CB
9232 Triax Cable	570598-CB
Base Station Shipping Case	599849A1
Rack Mount Kit (Single Unit)	599718A1
Rack Mount Kit (Dual Units)	TM8500
Remote Pan, Tilt, Zoom, Focus System	TM832
Simple Multicore Joystick Control	571023A1
Multicore Cable	571024-CB
Multicore Extension Cable	571039-CB

### Accessories

5-inch Viewfinder	571022A1
Viewfinder Mounting Assembly	571026A1
HR-1A Adaptor Plate	599603A1
Spare Module Extender	571001A1
Spare Module Extender/double length	571002A1
Sennheiser Shotgun Microphone	599542A1
Mobile Camera Support Brace	ACCD85

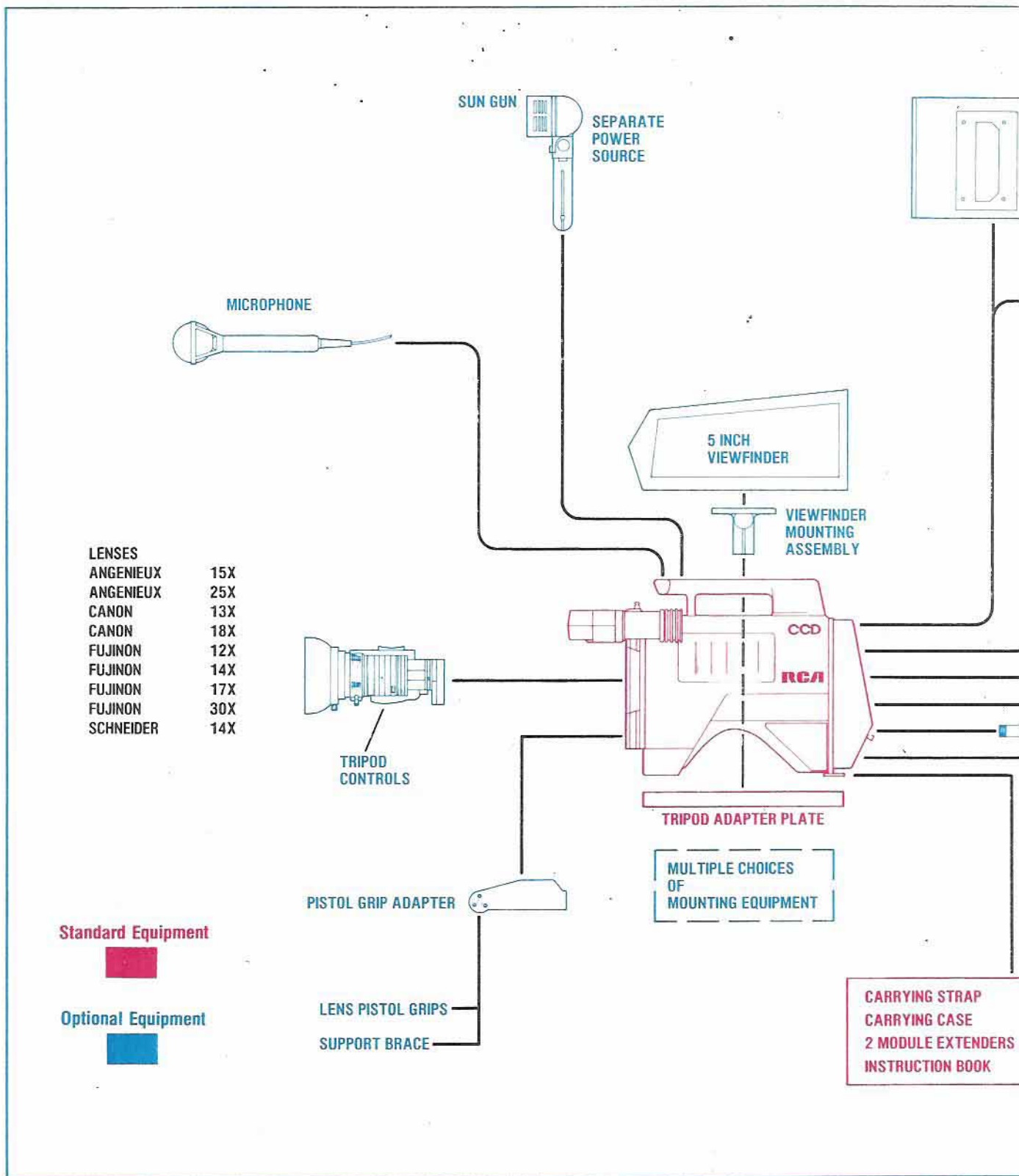
### VTR Cable

Camera to HRB-1	599551A1
Camera to BVU 110/BVU50	599572A1
Camera to any VTR	571038A1



# CCD-1 SYSTEM CONFIGURATIONS

The CCD-1 System offers unparalleled flexibility for all ENG, EFP and Studio applications. The CCD-1 is compatible with multiple video recording formats, and may be integrated into virtually any operating configuration.





## CCD-1S

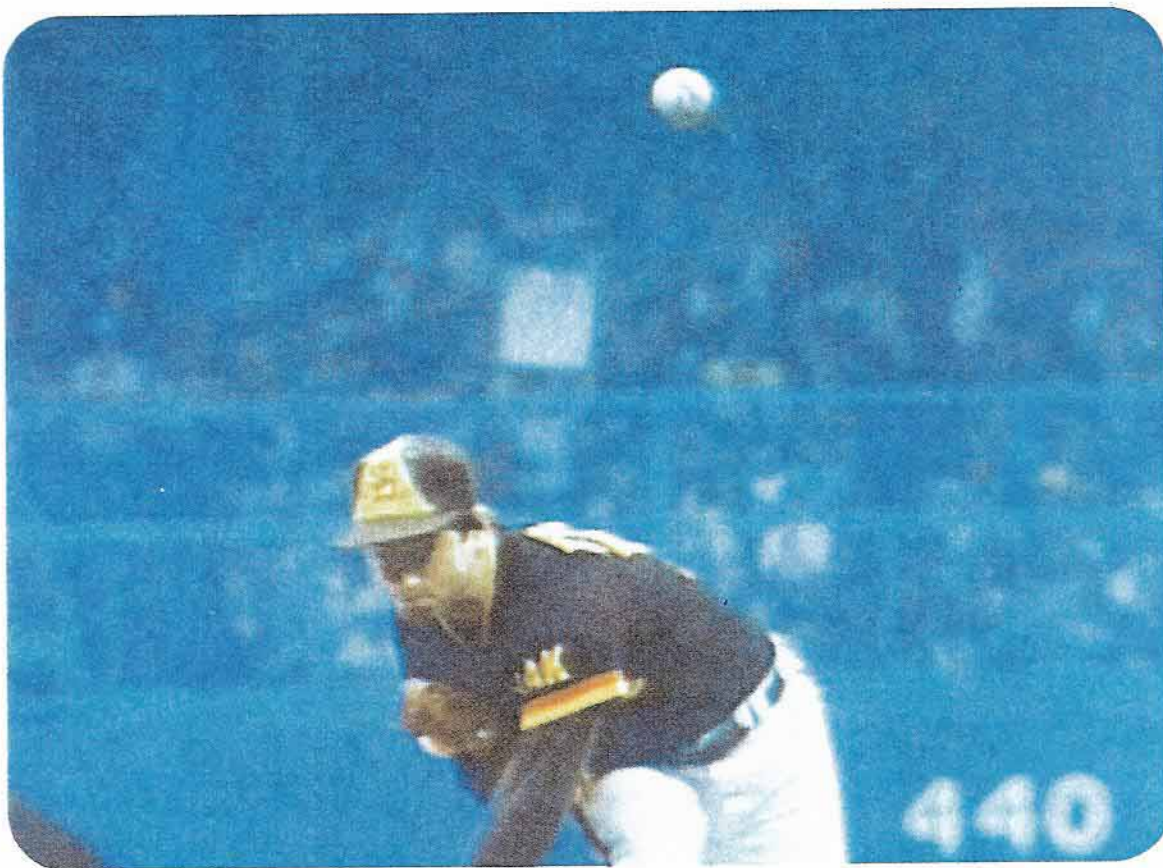
### SPORTS/EFP CAMERA

CCD-1S is the camera that first brought you NBC's "super-duper-slo-mo". In any application where stop action or slow motion is critical, the CCD-1S is the camera to use. The shutter in the standard CCD-1 camera is replaced with a 1/500th of a second unit in the CCD-1S to provide a 5:1 reduction in image motion blur during each television field.

The CCD-1S provides standard NTSC video (as well as component signals) and can therefore be broadcast live, or recorded on any standard tape recorder. Any VTR with slow motion replay capability can be used for subsequent playback of stop action or slow motion video. The complete absence of lag,

burn or comet-tailing, coupled with the outstanding full field resolution of the CCD image sensing system, yield a dramatic improvement in the capture of motion which just cannot be achieved with vacuum pickup tubes. The motion blur of a tube camera is replaced by crisp, clear images with the CCD-1S.

The fundamental sensitivity and dynamic range of the CCD sensor make it possible to use a very short exposure time per field. The CCD-1S is compatible with all CCD-1 accessories and system options, and shares all of the design/performance features of the CCD-1 camera.





# CCD-1 CAMERA SYSTEMS OPTIONS

## LENSES AND ACCESSORIES

A wide range of lenses are available to suit all ENG/EFM applications. To reduce stress on the lens, a pistol grip adaptor is available to mount the lens pistol grip directly to the camera frame. A mobile camera support can be attached to the same pistol grip adaptor bracket.

## 5 INCH VIEWFINDER

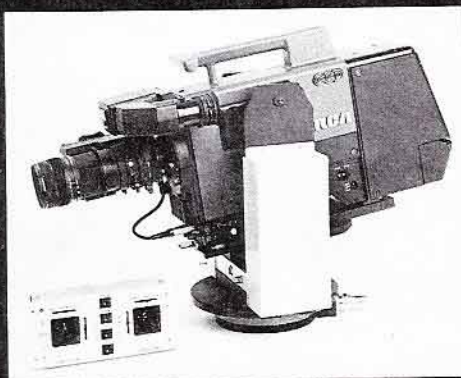
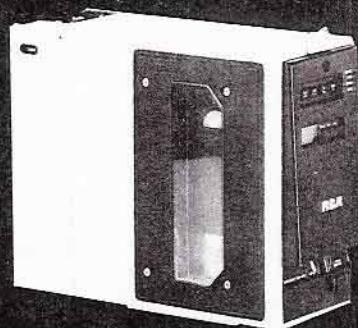
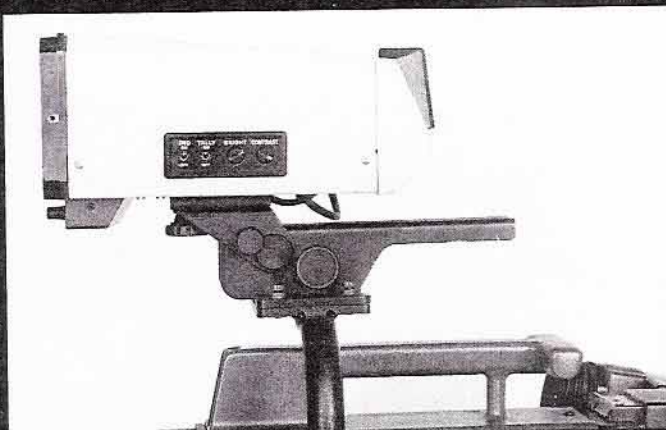
The optional 5" viewfinder is a lightweight (5.1 lbs.), high resolution unit (500 lines at picture center). The viewfinder is both tiltable and rotatable for operational convenience. A unique mounting assembly is also available which mounts the viewfinder directly to the tripod adaptor plate. This permits rapid removal of the camera from the tripod for hand-held use, without requiring mechanical disassembly of the 5" viewfinder.

## ENG CONFIGURATIONS

The CCD-1 is compatible with multiple recording formats. The HR-1A M-format 1/2-inch recorder can be attached in place of the CA-1 rear adaptor to form a one-piece camera/recorder. Or the HR-1A or the HR-3 portable M-format VTRs can be used as a two-piece system. Similarly, two piece recording systems are possible using Beta-component, U-matic or C-format VTRs.

## REMOTE PAN AND TILT CONTROL SYSTEM

The CCD-1 triax system is compatible with a remote pan and tilt control system. The control system provides two joystick controls, one for pan and tilt, and one for lens zoom and focus. The control signals are combined with the multiplexed camera signals in the triax base station for transmission via the triax cable to the camera head. A separate control cable for the pan and tilt table is *not* required. At the camera head, the pan, tilt, zoom and focus signals are separated from the camera signals in the pan and tilt table. DC power is derived from the triax cable. The configuration of the pan/tilt table permits full 360 degrees rotation for optimum flexibility. Preset position control panels can also be special ordered on a custom-built basis.

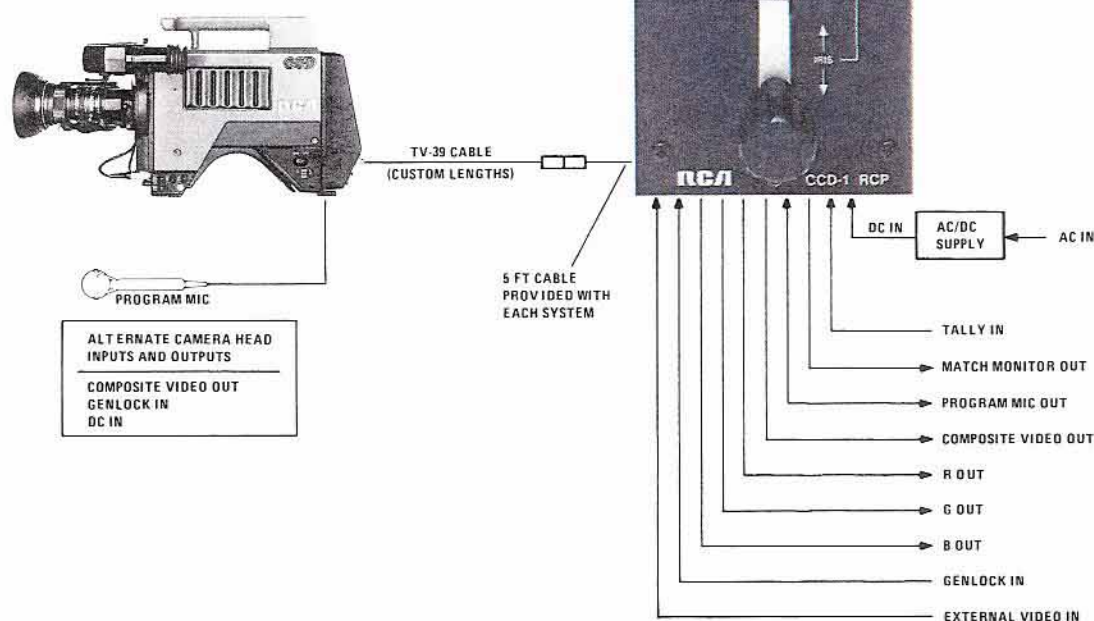




# EFP/STUDIO ACCESSORIES

## MULTICORE REMOTE CONTROL SYSTEM

The CCD-1 multicore remote control system offers a simple, economical system for EFP or studio applications. A single multicore cable connects a Remote Control Panel to the camera for a simple, "clean" installation. All system connections can be made at the Remote Control Panel. Or, as an alternative, DC power, composite video-out and genlock-in connections can be made at the camera head should this be desirable. Both composite video and RGB video outputs are available at the control panel.



### Cable Operating Length

The nominal maximum cable length for multicore operation is 200 feet. The maximum length has been determined to ensure that the DC power voltage drop (2 volts at 200 ft.) and chroma attenuation (2 dB at 200 ft.) through the cable are within acceptable limits. The actual operating length can be extended beyond 200 feet by using the auxiliary input/output at the camera head for: genlock video input; composite video output; power input.

The connection between the program microphone input at the camera at the camera, and the output at the control panel is through a shielded twisted pair.

An additional shielded pair is provided in the cable for customer installation of intercom facilities.

### Camera Power Requirements in Multicore Mode

DC Voltage ..... 11.5 to 17 volts  
Power ..... 24 watts

### Dimensions and Weight (Remote Control Panel)

Height ..... 8.5" (216mm)  
Width ..... 3.4" (86mm)  
Depth ..... 5.1" (130mm)  
Weight ..... 2.5 lbs. (1.1 kg)

# COMPREHENSIVE REMOTE CONTROL AND

## TRIAX SYSTEM

With the addition of the Triax system, the CCD-1 becomes a full feature camera for field production and studio applications. The triax system is comprised of a Camera Head Adaptor (which replaces the stand-alone CA-1 Adaptor); a half-rack Base Station, and a compact, yet comprehensive joystick Remote Control Panel.

The system permits cable runs of up to 5,000 feet and beyond. DC power and sync timing to the camera head are compensated automatically for actual cable length.

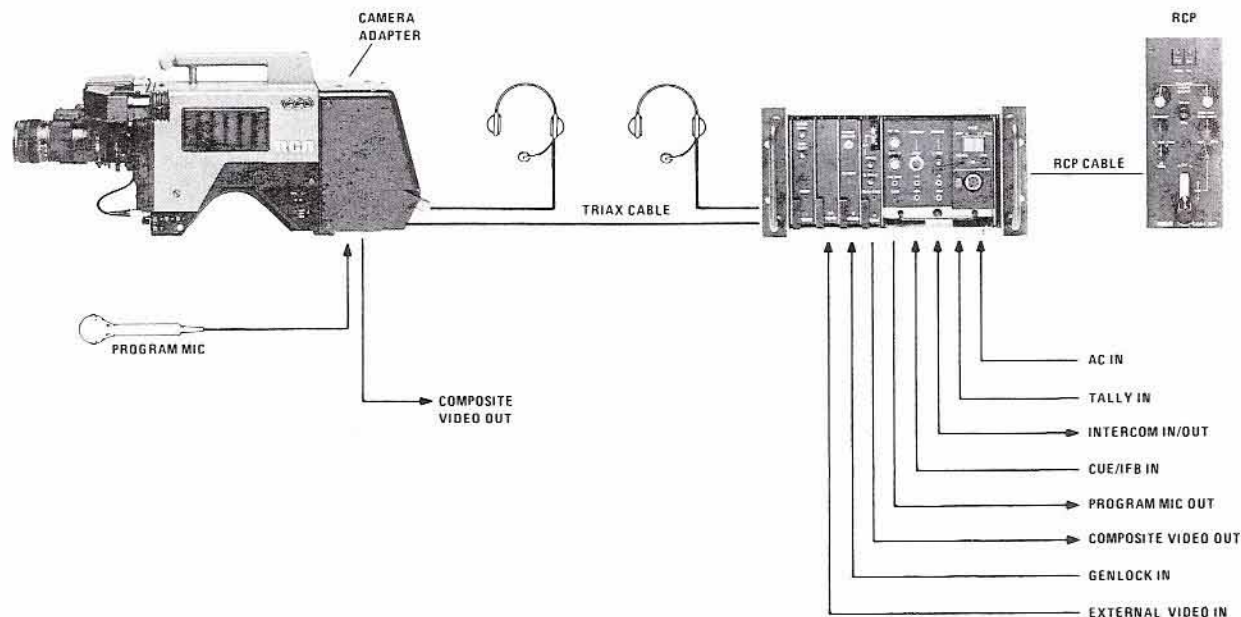
### Video

Composite video is transmitted from the camera head to the base station. In addition to the video output from the base station, a composite video output is provided at the camera head for convenience. An external video input at the base

station permits the camera operator to select this external video for display on the camera viewfinder in place of the normal luminance signal. Genlock to a composite video signal such as black burst is also provided.

### Intercom and Audio

The CCD-1 triax system includes flexible intercom facilities. Two wire operation compatible with RTS systems (or equivalent systems) is provided. Or, full four wire operation can be selected. Cue (IFB) audio can be transmitted from the base station to the camera head, with a separate volume control for the camera operator headset. An auxiliary headset is provided at the base station for maintenance convenience. A standby power mode feeds low level DC to the camera head to power only the intercom channel. A high quality program microphone channel with output at the base station is also provided. Switchable gains of +20, +40 +60 DBM accommodate a wide range of microphones.



### Remote Control Panel

The compact joystick remote panel provides a full range of operating controls, as follows:

### Switch Functions

Bars On-Off  
Balance On-Off  
Tally Call  
Gain—0, 12, 24 dB  
Auto/Manual Iris  
Match Monitor

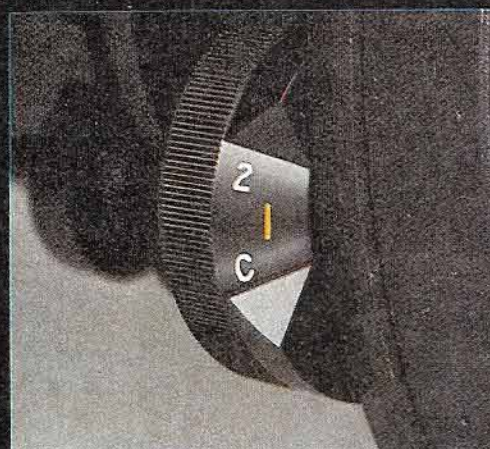
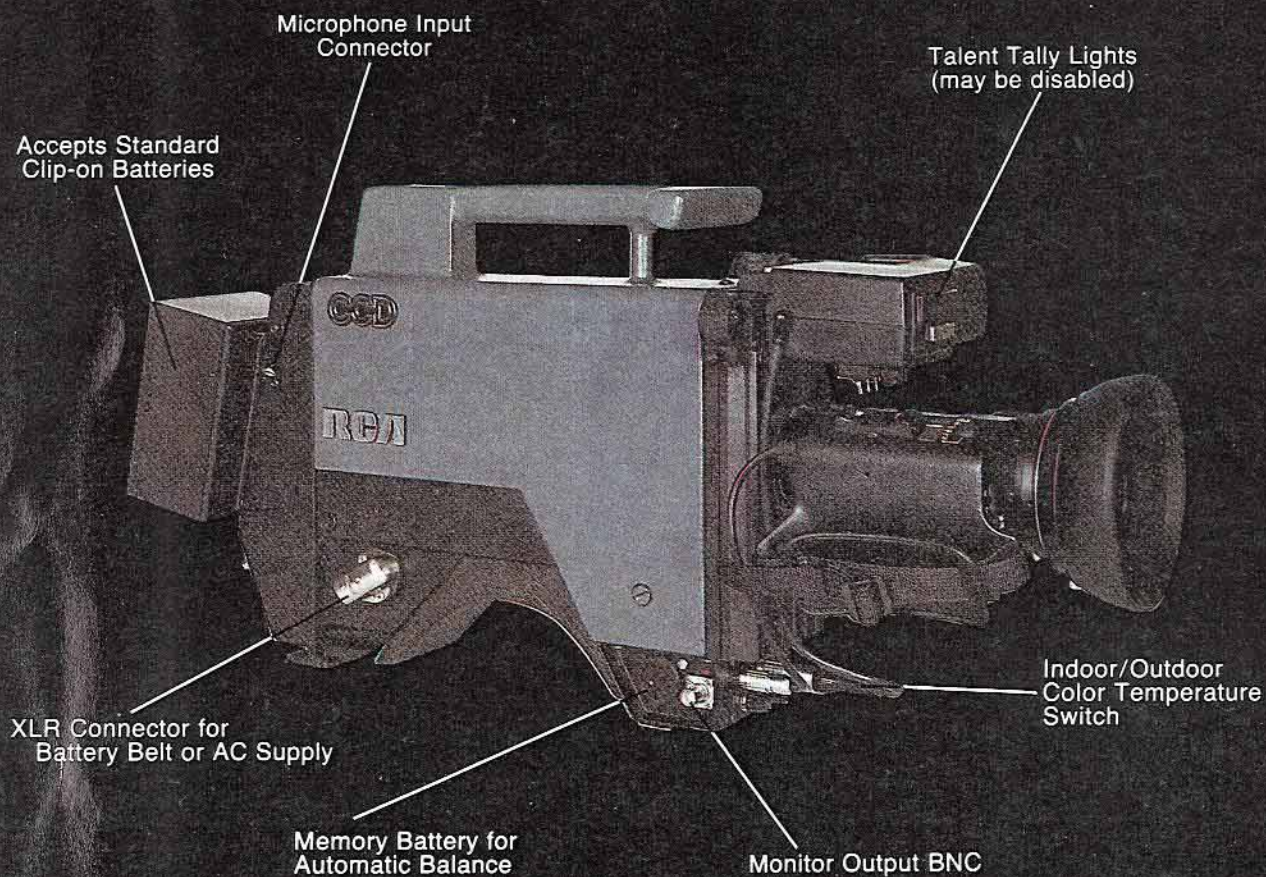
### Indicators

Bars On  
Balance On  
Tally Call

### Variable Controls

Red Black Paint  
Blue Black Paint  
Red White Paint  
Blue White Paint  
Contrast Compression  
Level  
Iris Sensitivity  
Iris Range  
Master Iris  
Master Black





6-Position Filter Wheel



## CCD-1 ADDITIONAL FEATURES

### Switchable Contrast Compression

An internal full field color bar generator is standard as is genlock. Switchable contrast compression is provided, which is useful when shooting backlit scenes.

### Camera Outputs

In addition to the primary composite video output BNC, a monitor output BNC is provided. A 26 pin VTR connector is provided, along with a 53 pin remote control connector. The video signals selectable through these connectors are:

Signal	Monitor BNC	VTR	Remote
Composite	x	x	x
Y	x	x	x
R	x		x
G	x		x
B	x		x
I		x	x
Q		x	x
R-Y		x	x
B-Y		x	x

### Optical Assembly and Filterwheel

The entire optical assembly, including CCD sensors is enclosed in a dust sealed package, minimizing the risk of accidental damage. The 6-position filterwheel includes a 4-point and 6-point star filter and the filter selection is clearly displayed by the yellow number in the indicator window. Smaller white numbers in the window indicate which direction to turn for the next filter.

### Rugged Construction

ENG cameras are seldom pampered—and the CCD-1 is built with emphasis on durability. It features an aluminum diecast main frame, cast covers and impregnated gaskets to seal out moisture, dirt and RFI. A sturdy T-bar handle provides easier camera handling and effective control for those difficult off-the-shoulder angle shots. This rugged construction is achieved at the surprisingly low overall weight of 13.5 pounds (6.1 kg).

### Reliability

From its sturdy mechanical construction to its solid state pickup devices, the CCD-1 is designed for long-term reliability. The CCDs have no known failure mechanism; they will not wear out, and cannot be accidentally damaged by pointing the camera at lights or the sun. Plug-in modules and flex cable inter-

connections enhance the fundamental reliability of the entire camera.

With the CCDs permanently bonded to the prism assembly, there are no mechanical or electrical registration adjustments whatsoever. Not only does this provide a substantial improvement in reliability, but long term maintenance requirements are significantly reduced.

### Power

State-of-the-art circuit design results in low power consumption of only 24 watts. The CCD-1 will accept power from an on-board Anton Bauer Snap-on mount (TM), a 4-pin XLR input, or from the VTR connectors. A source selection switch is provided, as are two circuit breakers: one for the camera, and one for the onboard VTR (in the one-piece configuration). No longer do you have to worry about using the last fuse on a shoot and having a camera down as a result.

A standby power mode is provided to keep the viewfinder kine warm for fast turn-on. Since the camera is truly all solid state, and no warmup is required, none of the camera circuitry is powered in standby, so battery power is conserved. In standby mode, power consumption is less than 3 watts.

### High Resolution Viewfinder

The integral viewfinder has a high brightness, high resolution display. The adjustable diopter viewer accommodates eyesight variations among camera operators. The viewfinder eyepiece position is also adjustable fore-and-aft. Switchable high peaking and a switchable external tally indicator are provided. A range of indicators in the viewfinder aid the camera operator in producing optimized pictures.

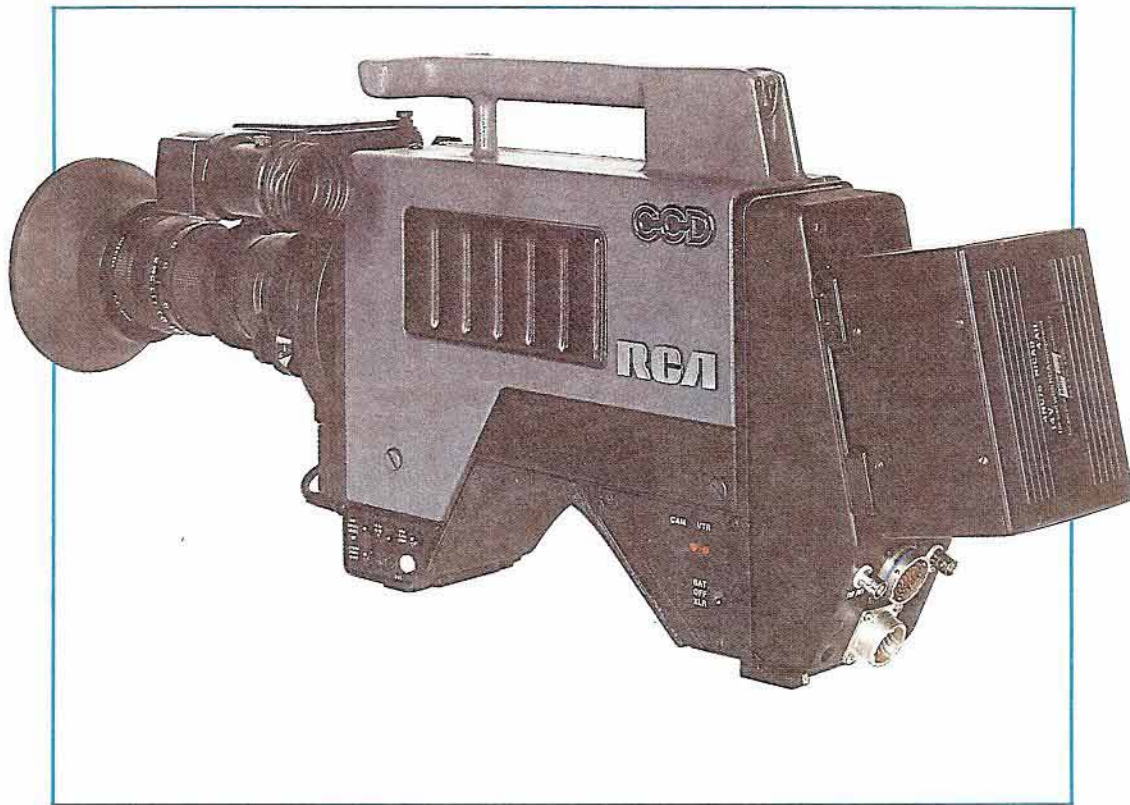
LED displays are:

- Low Battery Voltage
- Tally/VTR Record Mode
- VTR Warning
- VTR Record Time
- Audio CH1 and CH2 Peak Indicators

A zebra pattern can be switched into the viewfinder video to indicate preset video level. In addition, a video flicker over-level indicator is available.



# CAMERA PERFORMANCE



Without yokes and focus coils, magnetic fields have no influence on the CCD-1. In addition, the CCD-1 has no microphonics such as those which deteriorate tube camera performance at rock concerts or in other high acoustic shock environments.

## **Automatics**

The advanced design of the CCD-1 provides a full range of operational automatics, including both auto white balance and auto black balance with non-volatile digital memory. An electronic color temperature switch complements the auto white balance mode. After auto white balance is set for either indoor or

outdoor operation, it is only necessary to throw the switch to reset the color temperature characteristics of the camera. This is useful when it is not possible to move the filter wheel to achieve color balance such as when following a subject from indoors to outdoors and vice versa. Permanent registration and perfect geometry eliminate the need for any centering, registration or geometry controls. Beam controls are, of course, totally absent.



# SOLID STATE **CCD-1** SETS NEW STANDARDS FOR

With the introduction of RCA's solid state CCD-1, camera selection becomes a whole new ball game!

The CCD-1 produces unbelievably great pictures, night or day, under all lighting conditions. Noise-free pictures *at less than three footcandles*.

The advanced technology design of the CCD-1 eliminates the inherent limitations of tube-type cameras. It operates with no lag, no burn-in, no image retention and no comet-tailing. In short, the CCD-1 has established new performance criteria for video cameras.

Now, with a complete complement of system accessories, the CCD-1 becomes a versatile "one-for-all" camera for ENG, for field

production and for studio use.

Triax and multicore remote control facilities are available, as are a wide selection of lenses, a five-inch viewfinder, and interface capability for operation with M and Beta component 1/2-inch VTRs and U-matic and C-format tape systems.

And the new CCD-1S Sports/EPF model with its high speed shutter provides "super-duper-slo-mo"—at a surprisingly modest cost—for applications where stop action or slow motion effects are desirable.

RCA's CCD-1 camera changes your concepts of television picture quality and television camera performance.

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## PERFORMANCE

The combination of CCD imagers +12 and +24 gain and fast f/1.4 lenses create phenomenal pictures even at light levels of less than 3 fc. (30 Lux). Advanced video processing and a signal-to-noise ratio of 62 dB result in essentially noise-free pictures. Extraordinary picture sharpness is maintained at low light levels.

In the CCD-1 the imagers have no lag, burn, comet-tailing whatsoever. With absolutely no field-to-field contamination and with a 1/98th second shutter exposure per field, each field of the CCD-1 picture is as clear as you can take with a shuttered still camera.

Geometry errors in the CCD sensors are essentially zero, and exceptional registration of the 3 CCDs of better than .05% over the entire field contribute to spectacular overall resolution, not just in the picture center but in the corners as well. In tube type cameras, response drops off rapidly from picture center to edges, due to registration errors and electron beam landing errors.

The CCD-1 Camera provides video with the "film look". The first factor contributing to this film look is the unprecedented dynamic range of the camera. Secondly, the CCD sensors have unlimited highlight handling and can produce clean, noise-free images in shadows while simultaneously handling direct bright lights in the same scene. The CCD-1 is in a class of its own, far surpassing the performance of the best vacuum tube cameras.



# Specifications: CCD-1 Camera

## Standard

EIA, NTCS .....525 lines, 60 Hz

## Optical System

f/1.4 prism with polarizing quarterwave plate.

## Filter Wheel

6 position: Cap, Clear, Daylight, Day + .8 ND, 4 pt. star, 6 pt. star.

## Geometry (excluding lens)

Essentially zero errors over entire picture area.

**Registration (excluding lens)** .....0.05%  
Over entire picture area.

**Sensitivity** .....178 fc (1913 lux)  
Scene illumination required (3200°K) on 89.9% reflectance white, 0 dB gain with lens opening f/2.8.

**Low Light Sensitivity** .....< 3 fc (30 lux)  
Scene illumination required (3200°K) on 89.9% reflectance white, 24 dB gain with lens opening f/1.4.

**Signal-to-Noise** .....62 dB  
Unity gamma, 0 dB gain, camera capped, aperture correction off, 10 kHz-4.2 MHz, 23°C, subcarrier trap on.

## Image Retention, Lag, Burn

After an instantaneous image change (occurring in field 1), lag, retention and burn in field 2 and subsequent fields is zero.

## Static Resolution

Horizontal response (without contours)  
at 300 TVL PPH .....> 60%

## Dynamic Resolution

Horizontal response at 50 TVL PPH, moving  
horizontally at 1.8 picture widths/sec .....> 70%  
(Relative to response at 50 TVL, static chart.)

## Power

Input Voltage .....11.5-17V  
Consumption .....24 watts

## Environmental

Ambient Temperature Limits ....-20°C +50°C (-4°F ~ 122°F)  
Relative Humidity .....0-90% noncondensing  
Operational Altitude (max) .....15,000 ft. ASL (3048 m)

## Dimensions

Length .....15" (381 mm)  
Height .....9.75" (248 mm)  
Width .....3.75" (95 mm)

## Weight

With Viewfinder, less lens .....13.5 lbs. (6.1 kg)

# CCD-1 Triax System

## Triax Power Requirements

Line Voltage .....100 to 120; 200 to 260 VAC  
Line Frequency .....47 to 63 Hz  
Input Power .....100 VA Approx.

## Triax Dimensions and Weights

	Height (in./mm)	Width (in./mm)	Length/ Depth (in./mm)	Weight (lb./kg)
Camera Head Adaptor ..	9.5/241	4.0/102	6.5/165	5/2.3
Base Station .....	5.2/132	8.6/218	15.5/394	25/11.4
Remote Control Panel ..	18.5/216	3.4/86	5.1/130	2.5/1.1

## Triax Cable Operating Lengths

Cable Type	Maximum Length
Belden 9267	3,000 ft./ 900 mm
Belden 9232	5,000 ft./1,500 mm
Felten 1.ILS/10	6,300 ft./1,900 mm

Specifications subject to change without notice.