



HAWKEYE: The System

The Broadcast Quality Recording Camera System
That's Talented, Versatile and Very Compatible

RCA

HAWKEYE: The System

An Exciting Concept . . . A Total Video Production System



HAWKEYE SYSTEM FEATURES

- Compact Recording Camera System with picture quality superior to 3/4-inch format
- Complete mobility—handles like a film camera
- Lightweight; superbly balanced for operator comfort
- Operational economy—a one-person video production system
- Camera and recorder are system-designed for total compatibility
- System-compatible studio VTR and editing/controller
- Integrated system achieves higher levels of performance, quality and reliability
- Unexcelled performance specifications in this format
- Single source system responsibility
- Accessory options for enhanced system flexibility

RCA's HAWKEYE Recording Camera is an exciting product; a concept that has captured the interest of broadcasters and teleproducers wherever it has been demonstrated.

However, with the attention centered on the one-piece hand-held Recording Camera, one fundamental element of the HAWKEYE design concept is easily overlooked:

HAWKEYE is a complete system of versatile components.

Comprising the HAWKEYE system are all of the key equipment components necessary for field and studio production and post-production:

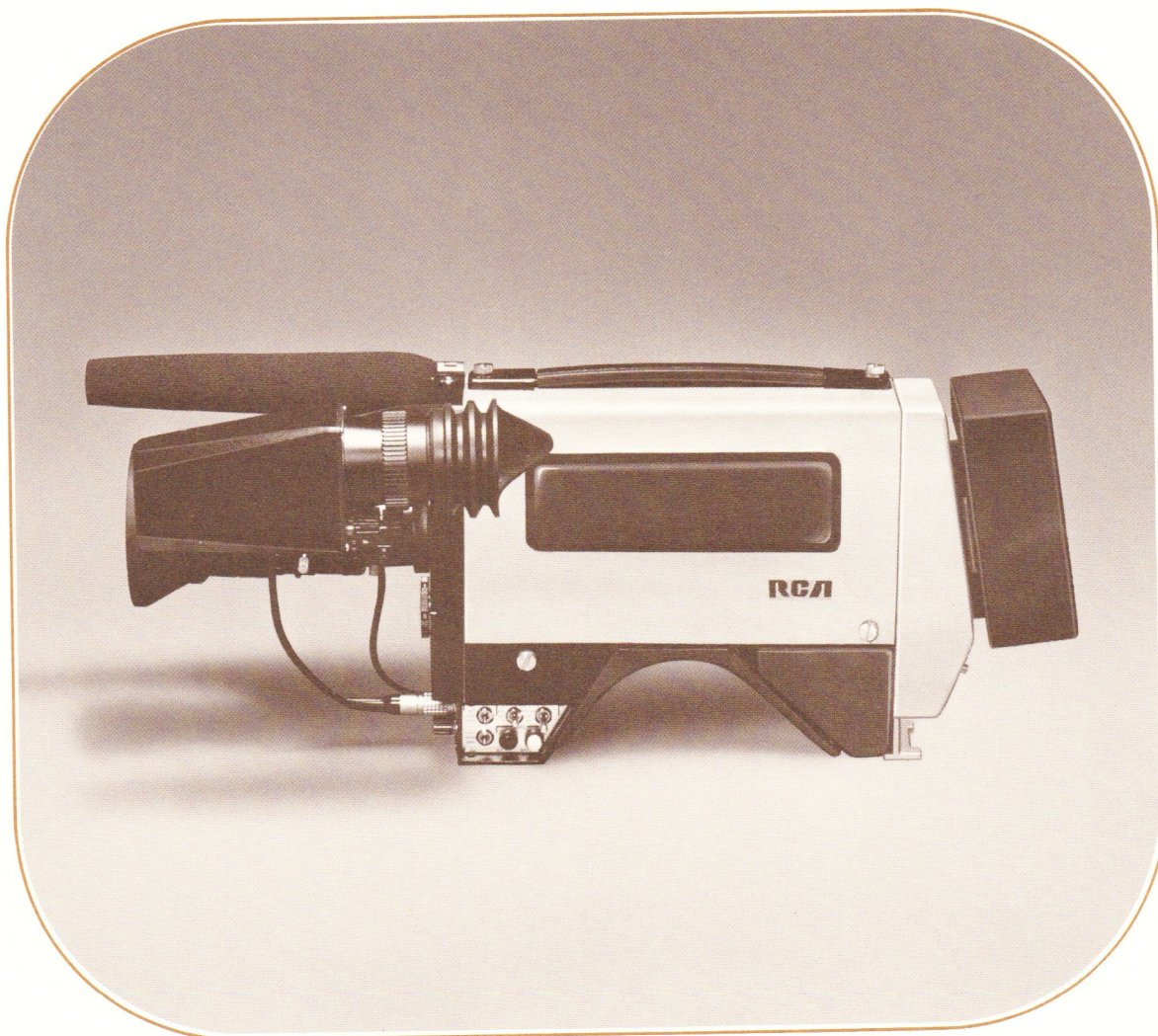
Camera: HC-1
In-Camera VTR: HR-1
Studio VTR: HR-2
Edit Controller: HE-1

The integrated HAWKEYE HCR-1 Recording Camera System delivers broadcast quality performance. So do each of the individual components.

All were designed to work together as an integrated system. And all are adaptable to fit into existing video systems. You can add a basic HAWKEYE system package at any time without discarding your current investment in ENG/EFP equipment.

HAWKEYE. Talented, versatile, very compatible—and more.

HC-1 HAWKEYE Portable Color Camera



FEATURES

- Uses new 1/2-inch tubes—Saticon® or Plumbicon®—with performance equivalent to present 2/3-inch tubes
- New, totally sealed f/1.4 optical system with 6-position filter wheel
- Signal-To-Noise: 55 dB NTSC/53 dB PAL
- Superbly balanced; low center of gravity
- Automatic white balance, automatic black balance, and automatic flare control
- Automatic iris
- Long-term memory for balance setting
- Automatic Comet Tail Suppression (CTS)
- Self-contained, high-resolution viewfinder, with full range of metering indicators
- Contrast Compression
- Excellent resolution (600 lines limiting)
- Rugged case sealed against dust, moisture and RFI
- Designed for worldwide operating standards (NTSC, PAL-B, PAL-M, SECAM)
- Remote Control capability
- Playback-In-Viewfinder capability

From its sturdy aluminum diecast mainframe to its digitally programmable pulse generator, the HC-1 is a completely new camera design—an amalgamation of latest advances in optics; in video circuitry, and in pickup tube technology.

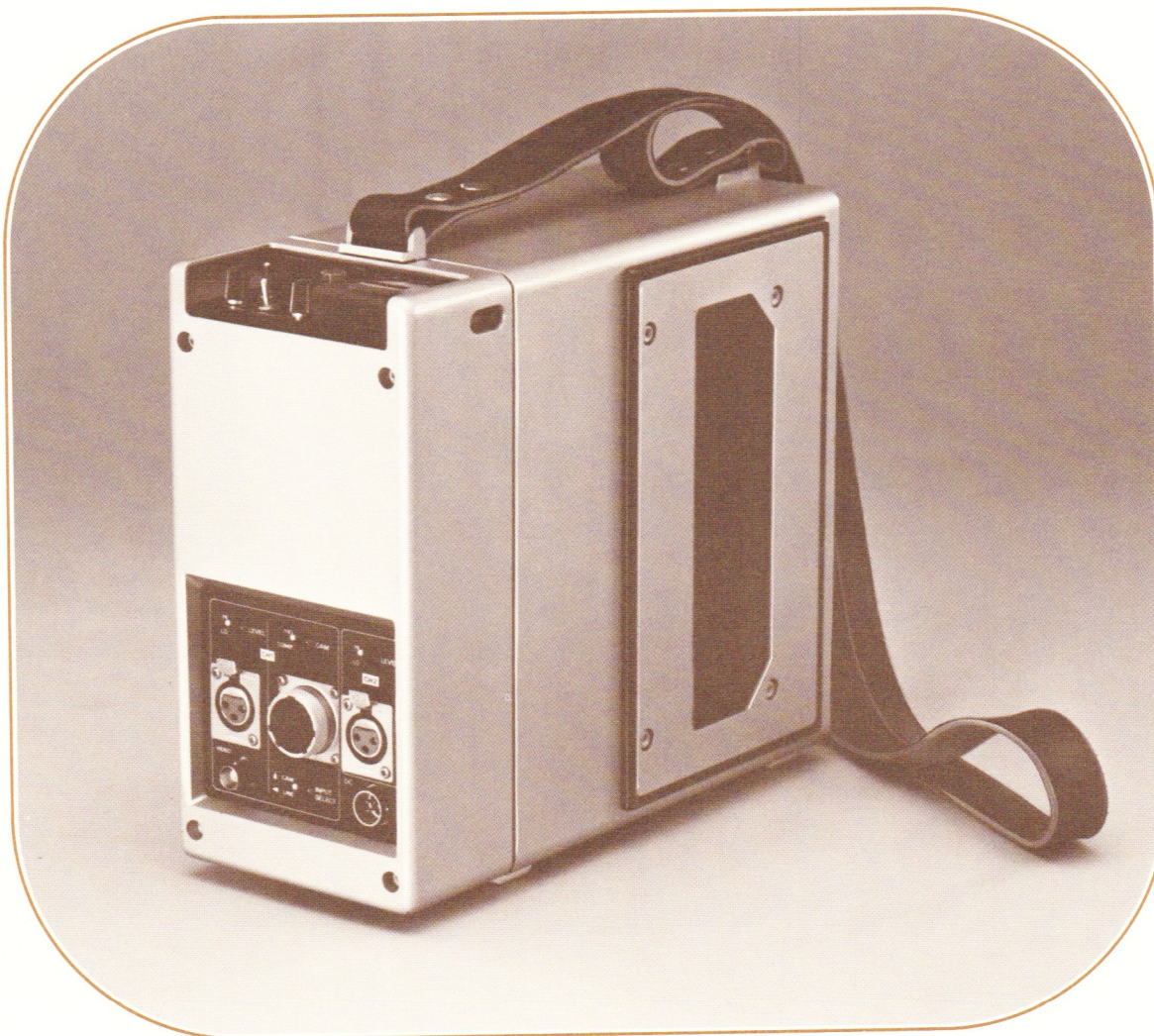
Designed as an integral element in the HAWKEYE Recording Camera System, it also provides full capability for independent operation as a new generation portable color camera.

The camera is a tough lightweight—easy to handle and operate, and built to take the abuse portable cameras are frequently subjected to. It is also capable of producing superior, broadcast quality pictures under a wide range of operating environments.

New High Performance 1/2-Inch Pickup Tubes

Using new design 1/2-inch pickup tubes, the HC-1 achieves resolution and sensitivity equivalent to that of present 2/3-inch tubes. The camera employs 1/2-inch electrostatically focussed (diode gun) Plumbicons® or 1/2-inch all-magnetic Saticons®. Precision tube and yoke assemblies and factory-collimation of each channel provide a degree of registration stability that was heretofore unattainable in the smaller tube formats. New pre-amp circuits in the camera contribute to its exceptionally high signal-to-noise ratio and sensitivity.

HR-1 HAWKEYE Portable VTR



FEATURES

- ChromaTrak recording format achieves exceptional video quality
- Microprocessor-controlled machine functions
- Rugged case sealed against dust, moisture and RFI
- Built-in SMPTE/EBU Time Code Generator
- Sturdy videocassette system in weather-tight case
- Uses ½-inch tape in standard 250 meter VHS cassette
- 20-minute recording time
- Easy to load and unload
- Simple, reliable mechanical operation; fewer moving parts
- Two audio tracks plus dedicated Time Code Track
- Built-in Backspace Editor
- Complete "Mode" control functions
- Five automatic LED warning indicators
- Accessories for flexible system configurations
- Play back in camera viewfinder

Compact, lightweight and versatile, the HR-1 VTR can be effectively employed in several configurations:

In the one-piece HCR-1 HAWKEYE Recording Camera, the HR-1 is directly coupled to the HC-1 Camera.

When the HC-1 Camera and the HR-1 VTR are separated for operation as a two-unit system, a Baseband Adaptor for cabling is used with the HR-1.

Equipped with a decoding adaptor, the HR-1 can be used with any camera or video source with a composite output.

Two audio tracks and a dedicated SMPTE/EBU Time Code Track are standard on the HR-1, as are a built-in Backspace Editor and built-in Time Code Generator. Controls located at the rear of the VTR are easily accessible for adjustment, and machine operational functions are microprocessor-controlled for added reliability, and smooth tape handling. A built-in fault detection facility performs a self-check procedure to verify that the system and components are functioning within prescribed parameters.

With its ChromaTrak recording format, the performance quality of the HR-1 exceeds previously acceptable standards for ENG/EFP. This VTR is perfectly capable of handling demanding production assignments as well as covering news and sports events.

HR-2 HAWKEYE Studio VTR



FEATURES

- ChromaTrak recording format
- Microprocessor-based design
- Four Direct Drive Servoed Motors
- Rugged, die-cast aluminum transport
- Vertical packaging enhances operation and maintenance
- Built-in JOG and SEARCH capability (16 Dial-Selectable SEARCH speeds plus STILL)
- Two Audio Tracks plus dedicated Time Code Track
- Built-in Dropout Compensator
- Built-in Audio Limiter
- Insert or Add-On Edits
- Split Audio/Video Edits
- Direct Dubbing I/O Connectors
- Automatic Built-in Pre-roll function
- Optional Built-in Digital Time Base Corrector (HT-1)
- Interfaces time code editors

The HR-2 Studio Recorder is a new generation VTR designed around the ChromaTrak recording format, using 1/2-inch tape in standard 250 meter VHS cassettes. Picture quality with ChromaTrak is superior to that attainable from any 3/4-inch VTR currently available (See Table, Page 11). And ChromaTrak tapes maintain their integrity from the original recording through multiple generation dubs.

The versatile HR-2 provides more than enough operational capability for producing fast, picture-perfect edited tapes with minimum effort. Precision electronic editing on the HR-2 is enhanced by the built-in SEARCH and JOG functions. A single large Search/Jog control dial is used for both functions, providing bi-directional search capability over a full range of speeds.

The JOG mode permits film-type frame-by-frame movement and control of the tape. The SEARCH mode permits search with viewable monitor pictures at sixteen tape speeds plus STILL ($\pm 1/16$; $1/8$; $1/4$; $1/2$; 1 ; 2 ; 4 ; 8). A row of LED indicators positioned above the Jog/Search dial displays tape speed and direction during Search and Jog operations.

The HR-2 produces consistent broadcast quality pictures, day-in, day-out. It is designed for heavy system usage—and is flexible enough to be used in a variety of system applications.

HE-1 HAWKEYE Edit Controller



FEATURES

- Microprocessor control of two VTR's
- Quick, simple location of edit points
- Sixteen dial-selectable tape search speeds plus Jog
- Automatic Insert and Add-On Edits
- Automatic Preview and Review Edit functions
- Split Audio/Video Edits
- Control Track Counter Display
- Selectable Edit decision points "on-the-fly"
- Selectable Playback or Record VTR as source of edit decision points

The editing companion of the HR-2 Studio VTR, the HE-1 is ideally suited to news or production operations requiring a control track edit controller. It provides microprocessor control of two HR-2 Recorders.

Precise edit points are located quickly, using the JOG and SEARCH dial. The Jogging capability as well as sixteen dial-selectable forward and reverse Search speeds permit "moviola" type editing and speed and accuracy. Selectable speeds are: $\pm 1/16$; $1/8$; $1/4$; $1/2$; 1; 2; 4; 8 and Still—with viewable pictures at all speeds.

Edits can be made using either the playback or record VTR as a decision point reference. Decision points also can be located "on-the-fly". The HE-1 performs split audio/video edits routinely, as well as automated insert and add-on edits. Automatic Preview and Review functions are also included.

Fast, simple and precise edits become routine with the HE-1.

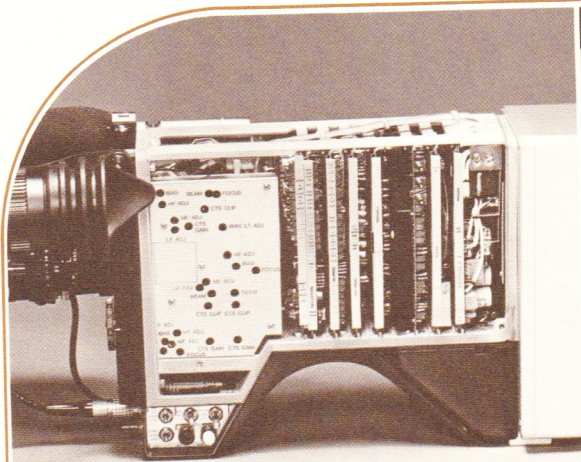
HAWKEYE: The System



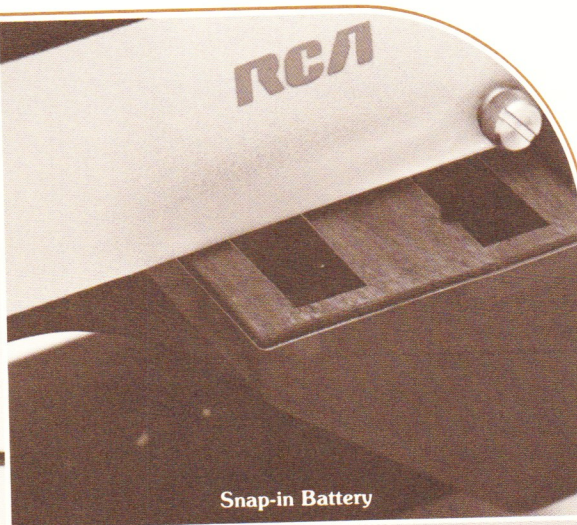
TOTAL SYSTEM RESPONSIBILITY

HAWKEYE is a fully integrated system of camera; field and studio VTR's; and editing equipment. The result of this system-compatible design is significant: Superior performance. New levels of video quality and reliability. And total system responsibility from a single trusted source—RCA.

With this unique new system, "electronic cinematography" is no longer just a catch phrase. HAWKEYE matches a lightweight, high performance camera and the state-of-the art ChromaTrak video recording format to produce a total system of unprecedented versatility.



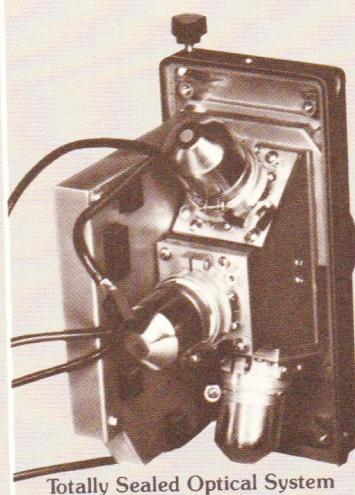
Plug-in construction



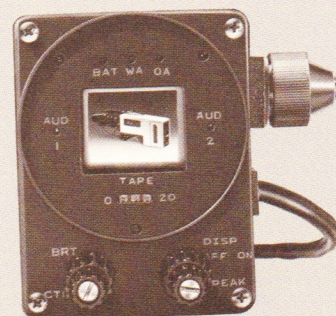
Snap-in Battery



Remote Control Panel



Totally Sealed Optical System



High Resolution Viewfinder

Sturdy, Plug-In Construction

The HC-1 is designed for ease of operating and maintenance. Interior electronics are mounted on eight module boards, seven of which are of the plug-in type. The remaining module carries the pre-amps and CTS circuitry and is easily accessed with probes. This arrangement separates the high and low voltage circuits. For added reliability and long-term performance, traditional wire harnesses and ribbon cable have been replaced with military type flex strips which are flexible and pre-shaped.

Snap-In Battery

The battery for the HC-1 powers both the camera and the HR-1 Recorder when used as a Recording Camera System. The battery snaps in and out for quick replacement.

Self-Contained, High Resolution Viewfinder

The viewfinder for the HC-1 is self-contained, including a high resolution 1.5" (diagonal) kinescope plus an array of useful information displays for the operator. LED displays in the

viewfinder provide the following information:

- Peak indicators for two audio channels
- Low Battery
- Record Confidence (for VTR)
- Tape Ending Warning
- Warning (that a VTR function requires checking)
- Minutes of unrecorded tape remaining in videocassette (20-15-10-5)

The viewfinder is fully adjustable in three planes for convenient positioning, and is fitted with a flexible, optically focussed eyepiece, which provides correction from -4 to $+2$ diopter.

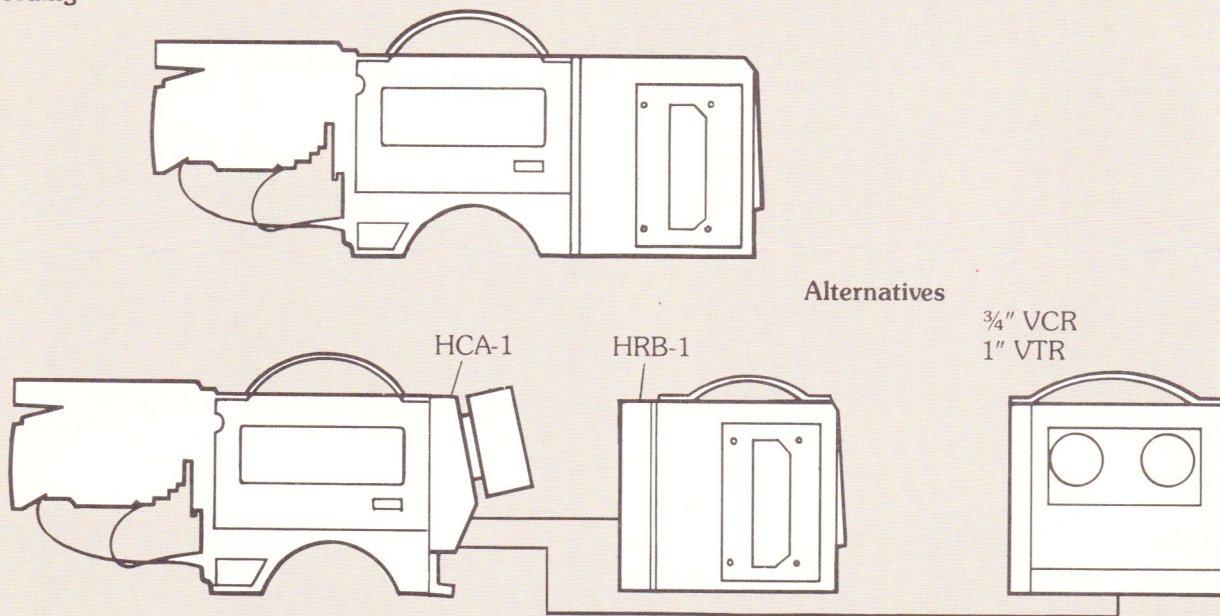
A Rugged Camera Package — Built for Survival

With its integrated design and one-piece cover, the HC-1 maintains full picture quality under extreme operating conditions. The Camera frame is a rigid aluminum die casting for maximum durability.

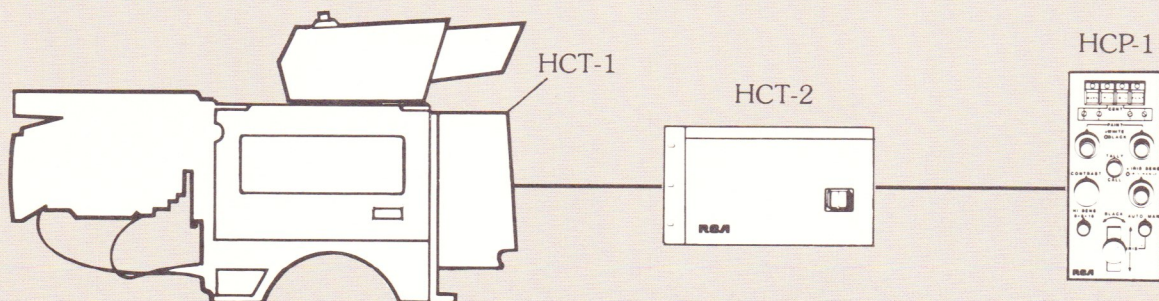
HC-1 HAWKEYE Portable Camera Systems

Applications

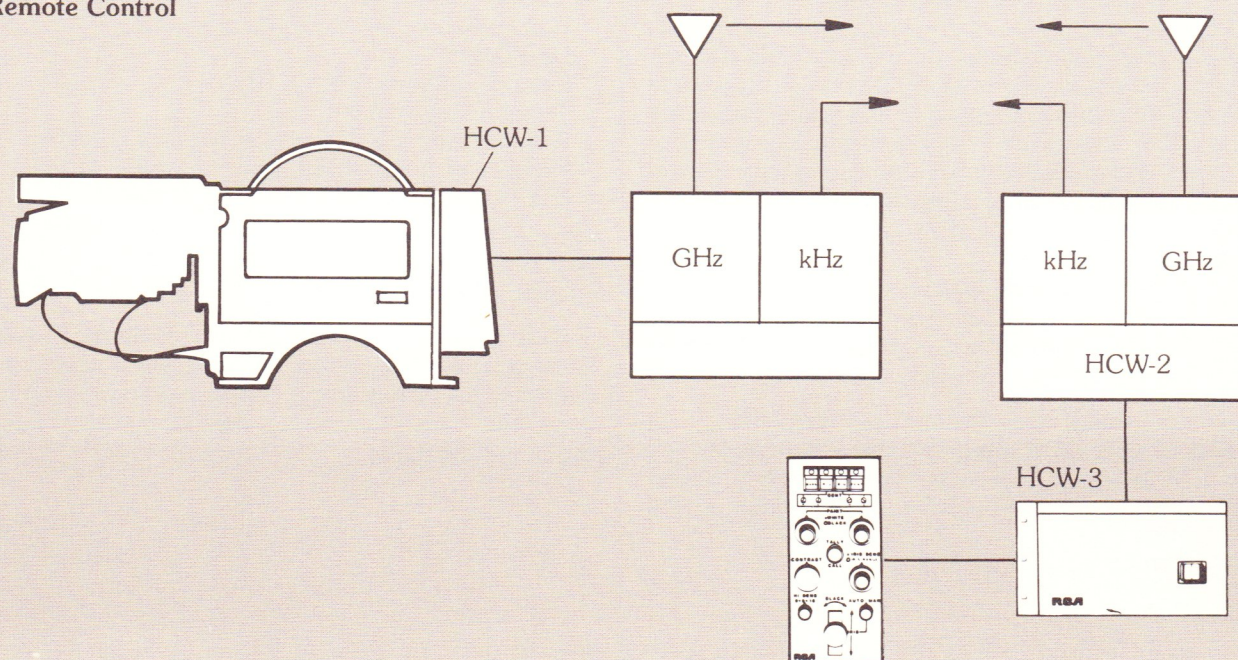
Field Recording



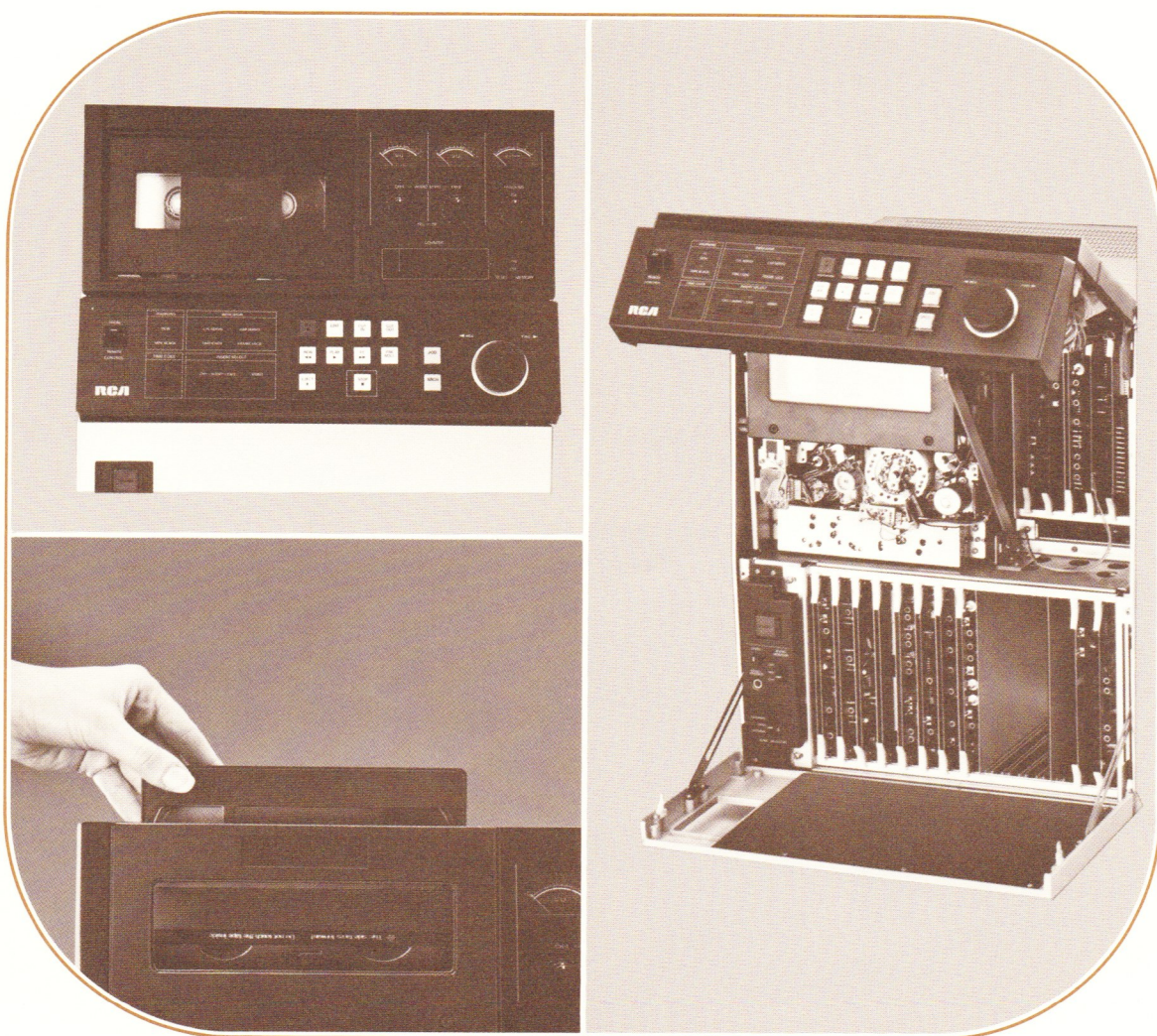
Triax Remote Control



Wireless Remote Control



HR-2 HAWKEYE Studio VTR



The HR-2 is a microprocessor-based system which provides fast response to machine mode commands. The result is smooth tape handling which saves wear and tear and speeds editing. Mode changes can be made without stopping the tape. The HR-2 also includes a built-in diagnostic facility, programmed to execute a self-check routine to verify the operational integrity of system components.

Vastly improved operational reliability is achieved in the HR-2 as a result of technologically advanced circuit designs and packaging techniques; fewer parts, and an all-new rugged transport design that reduces threading mechanism wear. The HR-2 also features full direct DC motor drive of video head drum, capstan and reel motors; head switching in vertical interval, and electronic record interlock.

With the optional built-in HT-1 Digital Time Base Corrector, the HR-2 can be used for direct on-air broadcast. For superior performance, the HT-1 independently corrects all three component channels before encoding. A built-in Dropout Compensator and Velocity Error Corrector further enhance TBC performance. The HT-1 adds more flexibility by permitting titling and special effects to be inserted on the tape during recording instead of in real time — and in a cost-effective manner. The HR-2 can also be used with any TBC which feeds a subcarrier out.



Since the HR-2 VTR has standard video inputs and outputs, it is a system-compatible machine which can be controlled from a number of editing systems, including those most common to ENG and EFP operations. The HR-2 can be interfaced to any system which has a post-production editing controller.

In the editing suite, it serves as the Record/Playback source for the HE-1 Edit Controller. The HR-2 can also be operated as a free-standing studio VTR or it can be integrated into sophisticated multi-format post-production systems, via various time code editors.

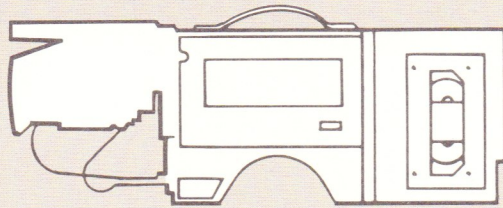
Accessibility is another plus feature of the HR-2 Studio VTR. Transport and electronics are packaged in a vertical configuration so the recorder can be rack-mounted, or installed in an editing desk. Hinged covers at the top and bottom lift up and

drop down to provide front access to the plug-in circuits and to the transport assembly. The transport is equally accessible for maintenance. A unitized, modular assembly, it is hinged and mounted on a slide rail for in-place service, or quick removal.

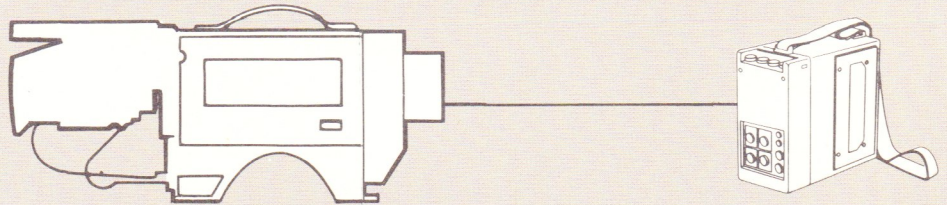
The efficient vertical packaging of the HR-2 makes it an ideal VTR for mobile TV units. It can operate with the HC-1 HAWKEYE camera, the RCA TK-76, TK-86, TK-47, or other cameras with NTSC composite video outputs.

HAWKEYE VTR'S: Flexibility... Versatility... Compatability

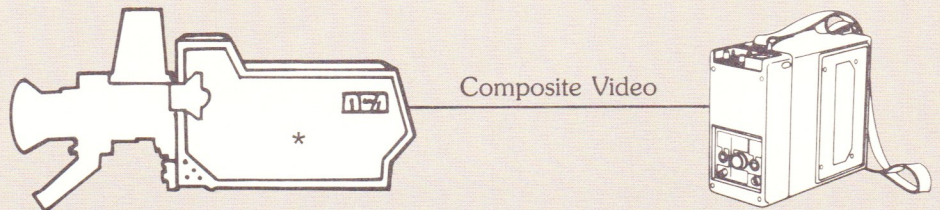
HR-1 Portable VTR Hawkeye Recording Camera Systems



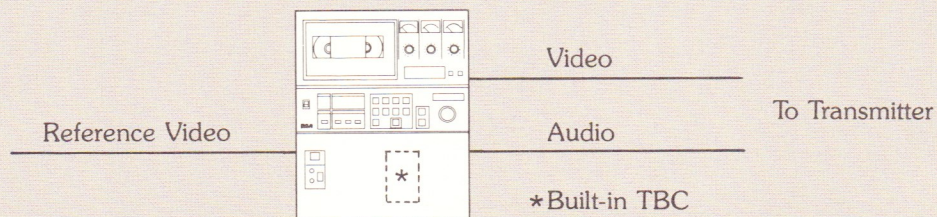
HR-1 and HC-1 in Two-piece System



*TK-76 and Other Cameras or Video Sources With Composite Video Output

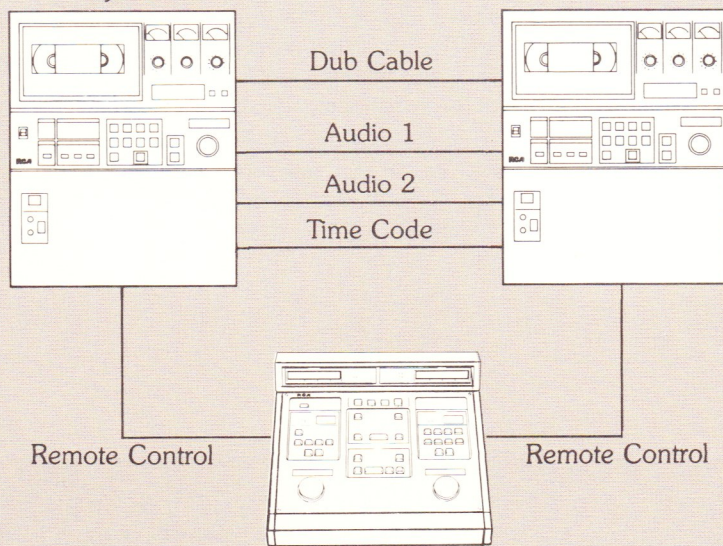


HR-2-Studio VTR Direct On-Air Play



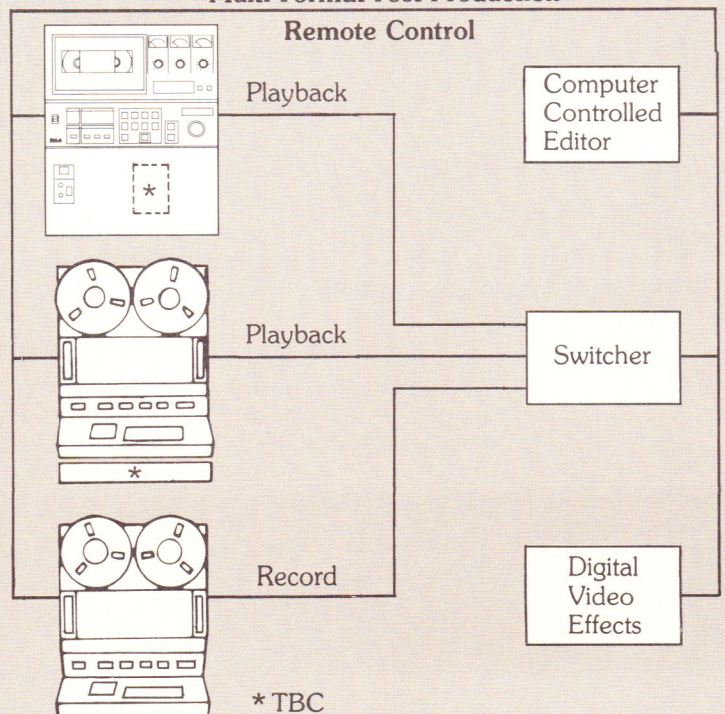
Control Track Editing Playback

Record



Multi-Format Post Production

Remote Control



HAWKEYE VTR System Specifications

General

Recording Format RCA ChromaTrak
 Recording Time 20 minutes (250 m VHS Videocassette)
 Tape Speed 0.2 m/sec (8 ips)
 Writing Speed 5.7 m/sec (225 ips)

Differential Gain5%
 Differential Phase5°
 K-Factor (2T Sin² Pulse)2%
 Chrominance-Luminance Delay30 nsec

Color Standards

Types available for NTSC, PAL-B, PAL-M, SECAM-IIIB

Audio Performance (Channels 1 & 2)

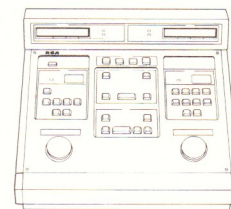
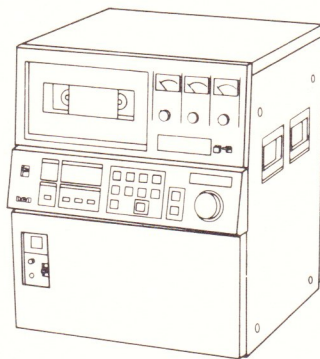
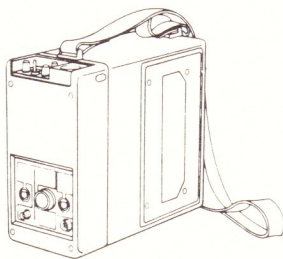
Frequency Response 50-15,000 kHz ± 3 dB
 Signal-to-Noise (3% Distortion @ 1 kHz)50 dB
 Wow and Flutter (NAB unweighted)0.2% rms
 Crosstalk Better than -40 dB

Video Performance

	525 Line	625 Line
Bandwidth:		
Luminance	3.6 MHz	3.4 MHz
Chrominance	1.0 MHz	1.5 MHz
Signal-to-Noise:		
Luminance	47 dB	46 dB
Chrominance	48 dB	48 dB

Environmental

Temperature 0-40°C
 Humidity 10% to 85% (non-condensing)



PHYSICAL DIMENSIONS

HR-1
In-Camera VTR

HR-2
Studio VTR

HE-1
Edit Controller

Height 9.2" (234mm)
 Width 4.6" (117mm)
 Depth 9.0" (229mm)
 Weight 9 lbs. (4.1 kg)

Height 19.6" (498mm)
 Width 16.6" (421mm)
 Depth 15.7" (400mm)
 Weight 110 lbs. (50.0 kg)

Height 9.8" (250mm)
 Width 17.7" (450mm)
 Depth 17.7" (450mm)
 Weight 30 lbs. (13.6 kg)

Power Inputs

Voltage 12 VDC (nom.)
 Frequency N/A
 Power 12 W (nom.)

110/220 VAC $\pm 10\%$
 50/60 Hz
 210 W

110/220 VAC $\pm 10\%$
 50/60 Hz
 60 W

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

HAWKEYE Camera and Recording Camera

Specifications

SCAN STANDARDS

EIA	.525/60
CCIR	.625/50

COLOR STANDARDS

Types available for NTSC, PAL-B, PAL-M, SECAM-IIIB

HC-1 CAMERA

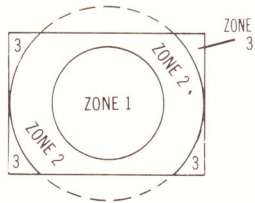
TUBE-RELATED PARAMETERS*

SENSITIVITY

3200° K light incident on a
60% reflectance Munsell56 footcandles
white, to make 100 I.R.E.
units video at f/1.4

REGISTRATION

Zone 1	.01%
Zone 2	.02%
Zone 3	.03%



(Excludes Registration Deviation in Lens)

GEOMETRY

..... ≤1.0%, Zone 1, 2 and 3
(Excludes Geometry Deviation in Lens)

SIGNAL-TO-NOISE RATIO

(1) Measurement conditions:
170 nanoamps signal,
gamma = 1.0, capped
black, aperture correc-
tion off, electrical band-
width 100% at 4.2 MHz,
Rhode & Schwarz meter,
subcarrier trap, 10 kHz
trap

NTSC
55 dB

PAL
53 dB

(2) Operating conditions:

Gamma = 0.45, 14% Re-
flectance chart, 3200° K
illumination, aperture
corrected to 100% at 4.2
MHz, Rhode & Schwarz
meter with subcarrier
trap, 10 kHz trap

47 dB

45 dB

RESOLUTION**

[Green, Center, $\delta = 1.0$,] @ 320 lines
[w/o aperture correction] @ 400 lines
Limiting, w/aperture corr.

SATICON PLUMBICON

61% 45%
51% 35%
600 lines 600 lines

WEIGHT

	SATICON	PLUMBICON
HC-1 Camera	10.5 lbs (4.8 kg)	9.7 lbs (4.4 kg)
HCA-1 Two-piece adaptor (for use when HR-1 VTR is separated, or when another composite-type VTR is used)	1.5 lbs (.7 kg)	1.5 lbs (.7 kg)
HCT-1 Triax adaptor	3.5 lbs (1.6 kg)	3.5 lbs (1.6 kg)

STABILITY . Specifications are met over a range of $\pm 27^\circ\text{F}$ ($\pm 15^\circ\text{C}$)
from the set-up ambient temperature

POWER

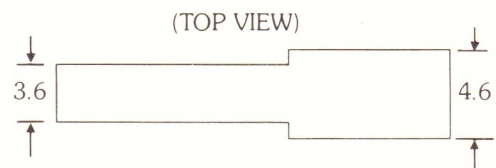
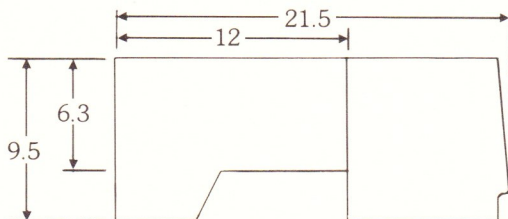
Input 12v DC nominal (11.5-14v)

Consumption

SATICON	PLUMBICON
28 watts	24 watts

DIMENSIONS

Length	12" (305 mm)
Height: — Optics Area	9.5" (241 mm)
— Module Area	6.3" (160 mm)
Width	3.6" (91 mm)



HCR-1 HAWKEYE RECORDING CAMERA . . . NEW, IMPROVED SPECIFICATIONS

WEIGHT

HC-1 Camera (Pb0)	9.7 lbs	4.4 kg
Adaptor Plate	.3	.1
HR-1 Recorder	9.0	4.1
Cassette (250m VHS)	.5	.2
Lens (Fuji 12x)	2.8	1.3
Battery (4.5 amp-hr silver-zinc)	1.5	.7
Total	23.8 lbs	10.8 kg

DIMENSIONS

Length	21.5 in (546 mm)
Height—Optics & VTR Area	9.5 in (241 mm)
—Camera Module Area	6.3 in (160 mm)
Width—Camera	3.6 in (91 mm)
—VTR	4.6 in (117 mm)

POWER

HC-1 Camera (Pb0)	24 watts
HR-1 Recorder	12 watts
	36 watts

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*Typical values—actual values may vary slightly from one tube set to another.

**Assuming typical lens M.T.F. of 75%.

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