SK-91

EFP Color TV Camera



HITACHI
Hitachi Denshi, Ltd.

Hitachi technology gives you the best and lightest EFP camera on the market

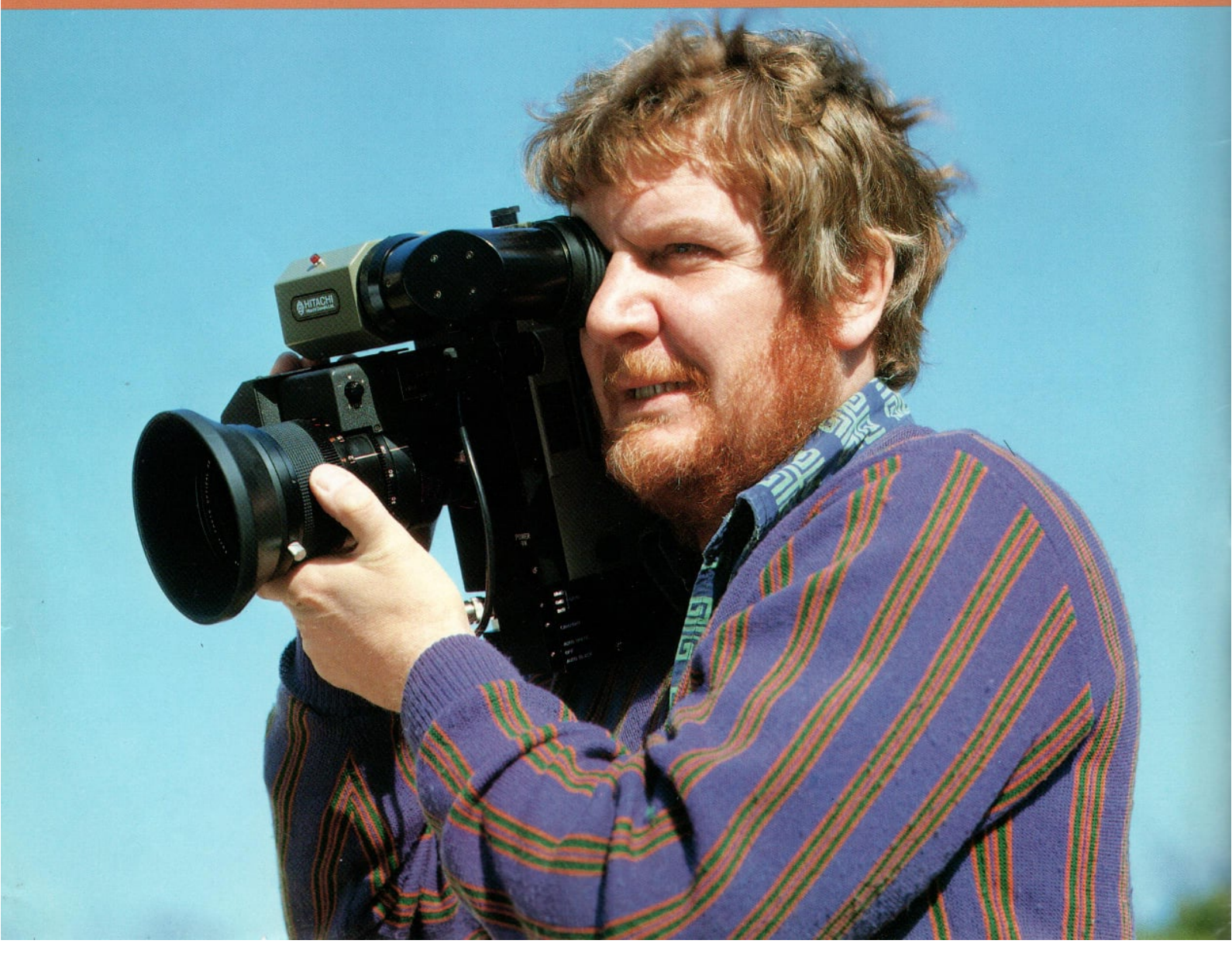
The Hitachi SK-91 is a new generation, ultra-light, EFP portable color television camera that provides unusually superior performance and operational simplicity.

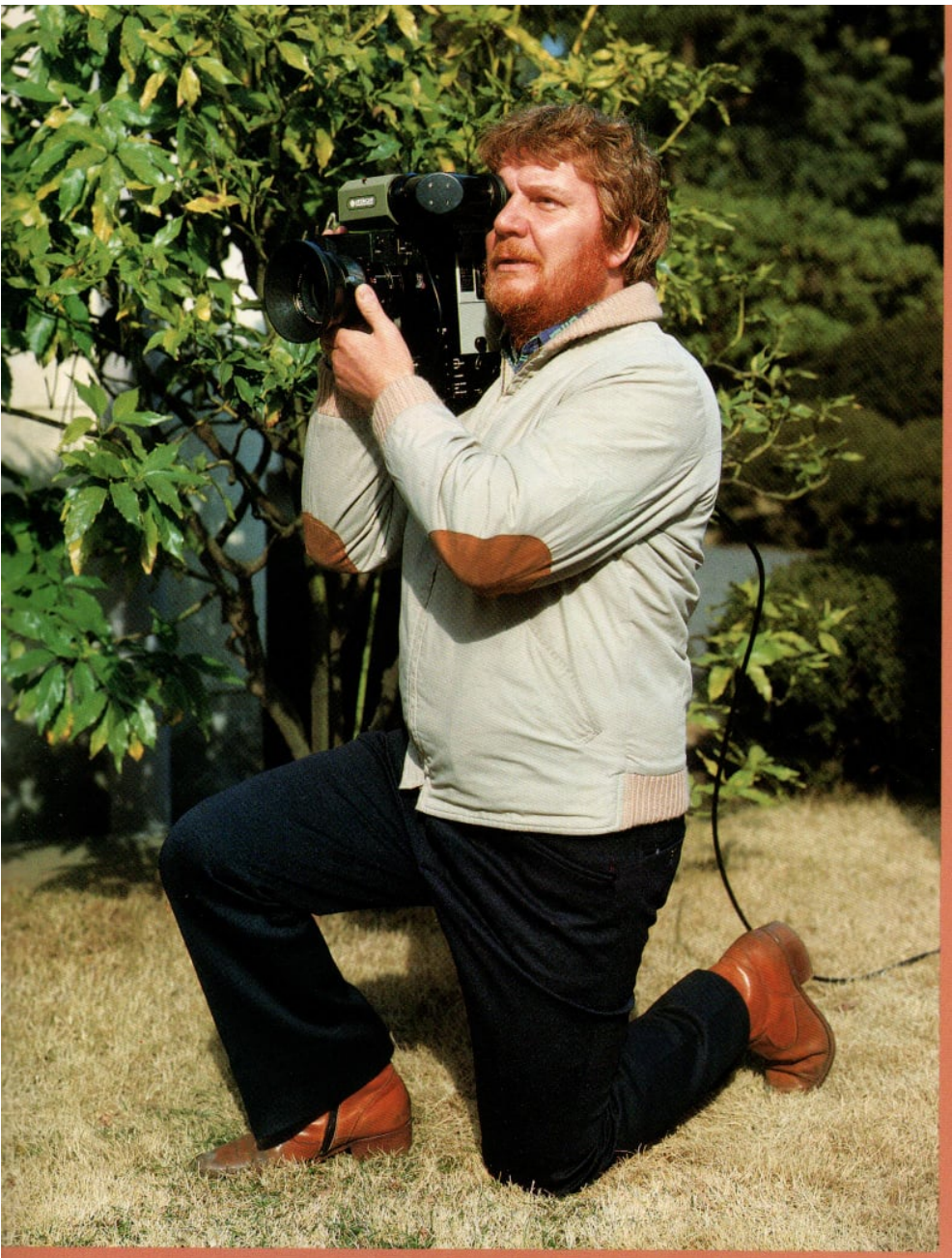
Weighing only 4.4 kg (9.7 lb), the camera sits balanced on the operator's shoulder and provides the operator with full freedom to concentrate on picture composition.

The SK-91 offers a usable picture in 5 seconds and runs for over 2 hours on a rechargeable battery belt. The rugged magnesium alloy casting and excellent circuit stability make the camera withstand rough handling and extreme conditions of heat and cold. Built-in automatics for beam current, lens iris, white balance and black balance further make it possible for the camera to operate even under wide variations of lighting conditions.

Ample accessories including the Operation Panel, Remote Operation Unit, Digital Command Unit, 5-inch Viewfinder, etc. are available for adding usefulness in ENG/EFP applications as well as in studio use.

The Hitachi SK-91 will work with professional results wherever you have the imagination and the physical courage to take it.






HITACHI
SK-91

Features

New Design of Construction

- **Ultra-Light and Rugged**
  Advanced design of the camera housing with magnesium alloy casting, new construction of the optical and mechanical sub-assemblies and careful selection of the electronic parts have realized the compact, ultra-light and rugged, self-contained, hand-held camera. It weighs only 4.4 kg (9.7 lb) including 1.5-inch viewfinder and withstands rough handling and environmental extremes.
- **Shock- and Vibration-Free**
  A new shock-mounted optical system, with prism, yokes and tubes packaged as a single assembly, assures registration stability and makes the camera virtually impervious even to the severe shocks, vibrations and jolts encountered in transportation.
- **RF Interference-Free**
  Improved shields for tubes, yokes and preamplifiers guarantee practically interference-free operation even in the 120 dB electromagnetic field from MF to UHF.

Excellent Picture Quality

- **Improved Prism Beam-splitter**
  A newly developed, high-speed (f1.4) prismatic beam-splitter, together with low-noise pre-amplifiers, provides high sensitivity and excellent signal-to-noise ratio. A deviation of optical registration due to temperature changes and a bias light shading of the prism are also improved substantially.
- **ABO (Automatic Beam Optimizer)**
  The Hitachi developed ABO circuit greatly extends dynamic range, reduces comet-tailing and thereby guarantees easy highlight handling.
- **Shading Correction**
  Adjustable H/V sawtooth, parabolic and portholing axis shading correction for each color channel, and also V sawtooth modulation shading correction are adopted to assure perfectly flat pictures.
- **2H Contour Correction**
  2-line horizontal and vertical out-of-green signals, level dependent with coring and comb-filtering, are added to R, G and B channels to ensure optimum picture sharpness with minimum noise contribution.
- **Gamma Correction**
  Gamma correction is continuously adjustable in each color channel from 0.35 to 1, which permits easy matching to other cameras.
- **Linear Matrix Masking**
  A linear matrix masking amplifier is built in to get high-fidelity color rendition and fine tone-matching among the cameras.

Automated Routine Controls

- **Auto Iris**
  Automatic iris control by video level detection maintains constant video level under wide variations of lighting conditions.
- **Auto White Balance**
  White balance is achieved automatically in half a second by the "AUTO WHT" switch, if a white object is focused in the center of the picture. Digital memory retains the white balance semi-eternally even after the camera is turned off or to standby, or the power supply is disconnected.
- **Auto Black Balance**
  Black balance is also automatic by turning on the "AUTO BLK" switch, which closes the lens iris and sets up the video black level in each color channel. Digital memory is used also for this control.

Simple and Easy Operation

- **Video Level Indicator**
  For manual iris operation of lenses, an over-signal indication of tiger stripes is superimposed on the viewfinder display.
- **Auto Iris Closure**
  A lens iris is automatically closed for protecting the camera tubes from possible damage due to highlight when the camera is turned off or to standby, and for setting up the video black level when the "AUTO BLK" switch is turned on.
- **4-Position Filter Disc**
  A filter disc includes 3200°K, 4700°K, 6000°K +50% ND, and 0% ND filters. These filters, together with the auto white balance and auto iris, provide sufficient color temperature compensation and scene illumination correction.

- **Power Supply Options**
  The SK-91 may be powered from any of a conventional battery belt, an attachable battery pack, a car battery and an AC power adaptor. Low power consumption of mere 20W at single +12V DC assures continuous operation in excess of two hours with the battery belt or one hour with the attachable battery pack.
- **Low Battery Voltage Warning**
  A flashing LED in the viewfinder alerts the cameraman to low battery voltage.
- **Standby/Operate Switch**
  The camera draws only 5% of the normal power in the "STANDBY" mode. Return to the "OPERATE" mode is accomplished in a few seconds.
- **+9/+18 dB High-Gain Switch**
  Master gain of +9/+18 dB operates on the gain of all three color channels simultaneously and is quite useful for the camera operation under extremely low light levels. Usable pictures with acceptable signal-to-noise ratio is provided down to 20 lux (2 fc) scene illumination at +18 dB and f 1.4.
- **Master Black Control**
  Master black level control is provided for brightness matching to other cameras.
- **Registration Controls**
  H/V centering trim pots in R and B channels and R, G, B, R–G and B–G monitor outputs are provided to check and control fine registration.
- **Split-Field Color Bars**
  A built-in color bar generator produces split white with 75% and 100% white as well as six hues and black. This makes it easy to set 100% modulation level in VTR recording.
- **Separate Video Outputs**
  In addition to the two isolated encoded video outputs for line and VTR, a separate monitor output is provided. This delivers R, G, B, R–G, B–G or encoded video signal by switch selection.
- **Return Video Input**
  An external synchronous or non-synchronous composite video signal may be switched in the viewfinder.
- **Genlock Input**
  A built-in sync generator can be genlocked to an external color composite or black burst signal. Horizontal pulse timing and sub-carrier phase are adjustable. In a PAL model the genlock unit is externally attached to the camera.
- **Blanking Width Adjustment**
  Both H and V blanking widths are adjustable over a wide range to compensate for the errors introduced into the recorded video signal in the recording/time base correction/editing process.
- **High-Resolution Viewfinder**
  A 1.5-inch, tiltable, high-brightness, high-resolution viewfinder with a magnifying eyepiece assures precise focusing and picture composition. A built-in peaking circuit further assists in attaining sharp optical focusing of the lens.
  An optional 5-inch viewfinder is also available for studio use.
- **Viewfinder Indicators**
  The 1.5-inch viewfinder includes the following indicators; Tally, White Balance, Video Level (tiger stripe), Battery Voltage and VTR Record.
- **Hi-Fi Microphone Amplifier**
  A built-in microphone amplifier accepts a mike having output level from −45 to −60 dBm. Two-time-constant limiting amplifier assures natural sounds even when a sound level varies abruptly.
- **VTR Trigger Button**
  A trigger button is provided on the lens for remote control of a portable VTR. VTR record is indicated in the viewfinder with an LED.

For Easy Maintenance

In order to permit the easy check of the camera, the SK-91 is provided with:

- **Beam Alignment Controls**
- **Synchronous Focus Wobbling**
- **Overscan Deflection**
- **Calibrated Test Sawtooth**
- **Monitor Video Output for Precise Registration**
- **Individual Shading Adjustment**

Optional Systems Configuration

■ **OP (Operation Panel)**

- Max. Cable Length: 50 m (150 ft) with camera cable
- Control Items:
  1. Iris
  2. Master Black
  3. Red Black
  4. Blue Black
  5. Red Gain
  6. Blue Gain
  7. Cam/Bar Select
  8. Auto/Man Select for White Balance and Black Level
  9. Cable Compensation (5, 50 m)

■ **ROU (Remote Operation Unit)**

- Max. Cable Length: 300 m (900 ft) with camera cable
- Control Items:
  1. Iris
  2. Master Black
  3. Red Black
  4. Blue Black
  5. Red Gain
  6. Blue Gain
  7. Red-H Centering
  8. Red-V Centering
  9. Blue-H Centering
  10. Blue-V Centering
  11. Cam/Bar Select
  12. Detail ON/OFF
  13. Auto White Balance
  14. Camera Call
  15. Cable Compensation (50 to 300m in 50m steps)

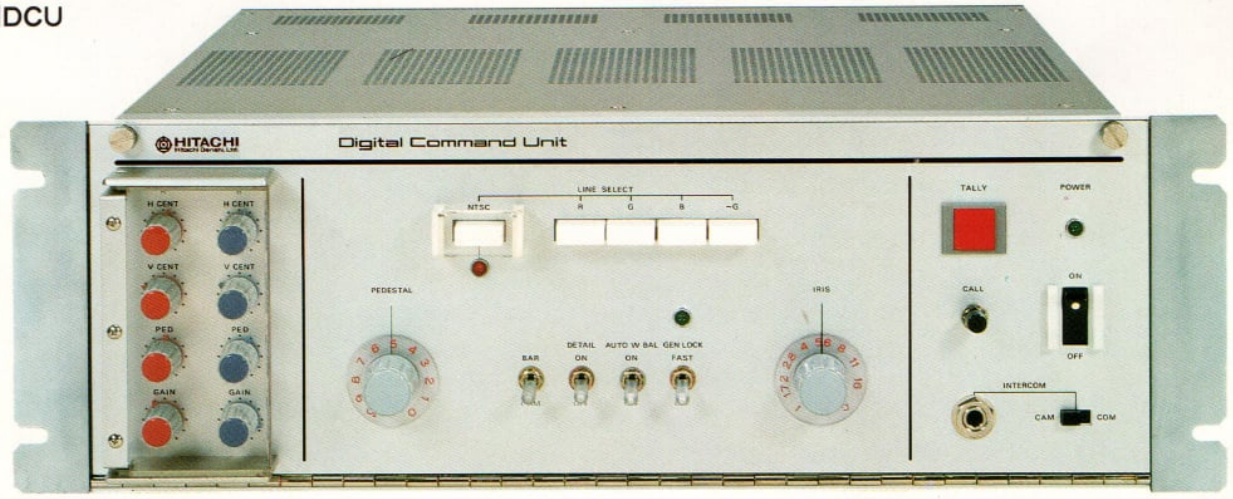
■ **DCU (Digital Command Unit)**

- Max. Cable Length: 1,000m (3,000 ft) with a triaxial cable, or an RG-11A/U coaxial cable
- Control Items:
  1. Iris
  2. Master Black
  3. Red Black
  4. Blue Black
  5. Red Gain
  6. Blue Gain
  7. Red-H Centering
  8. Red-V Centering
  9. Blue-H Centering
  10. Blue-V Centering
  11. Cam/Bar Select
  12. Detail ON/OFF
  13. Genlock ON/OFF
  14. Auto White Balance
  15. Monitor Select; R, G, B, R–G, B–G, and encoded video
  16. Camera Call
  17. Cable Compensation (200 to 1,000 m in 200 m steps)

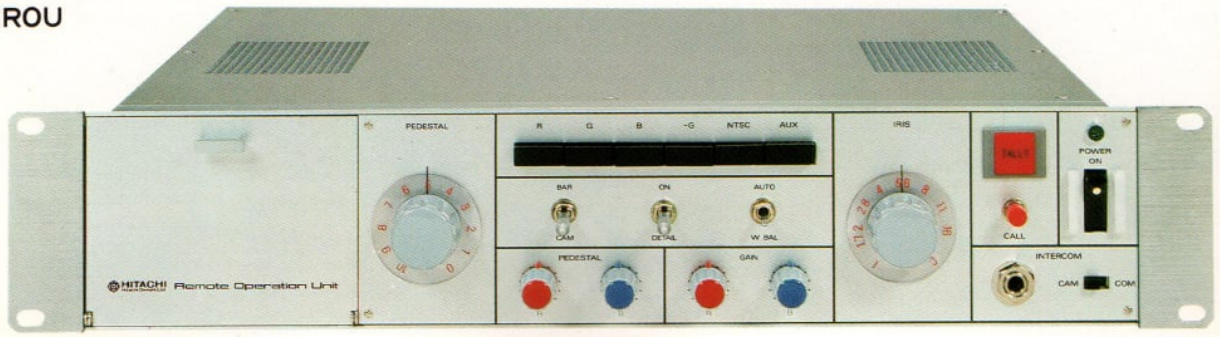
■ **Studio Application**

By a combination with an optional 5-inch viewfinder and OP, ROU or DCU, the SK-91 turns into a useful backup camera for studio use.

■DCU



■ROU



Applications

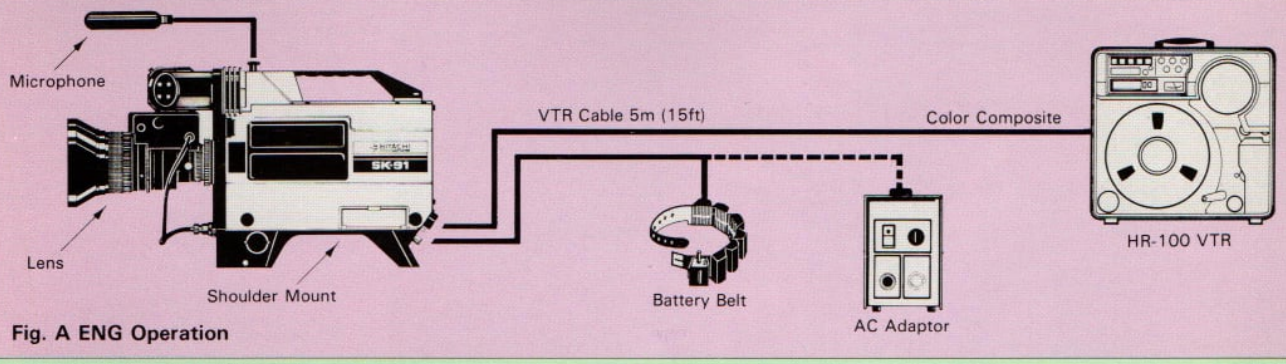


Fig. A ENG Operation

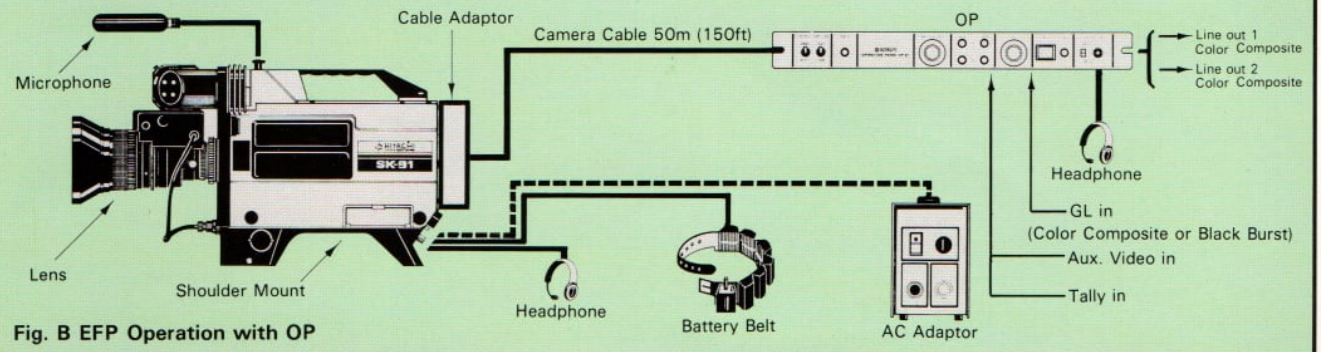


Fig. B EFP Operation with OP

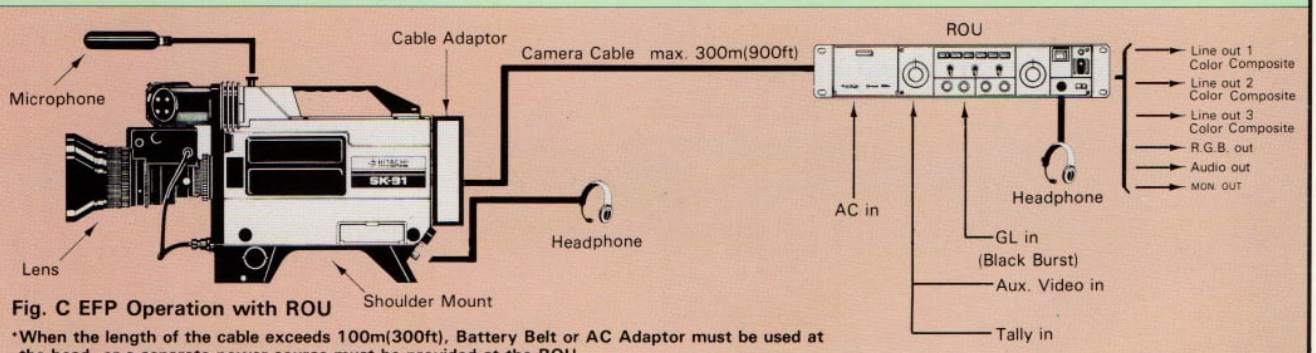


Fig. C EFP Operation with ROU

*When the length of the cable exceeds 100m(300ft), Battery Belt or AC Adaptor must be used at the head, or a separate power source must be provided at the ROU.

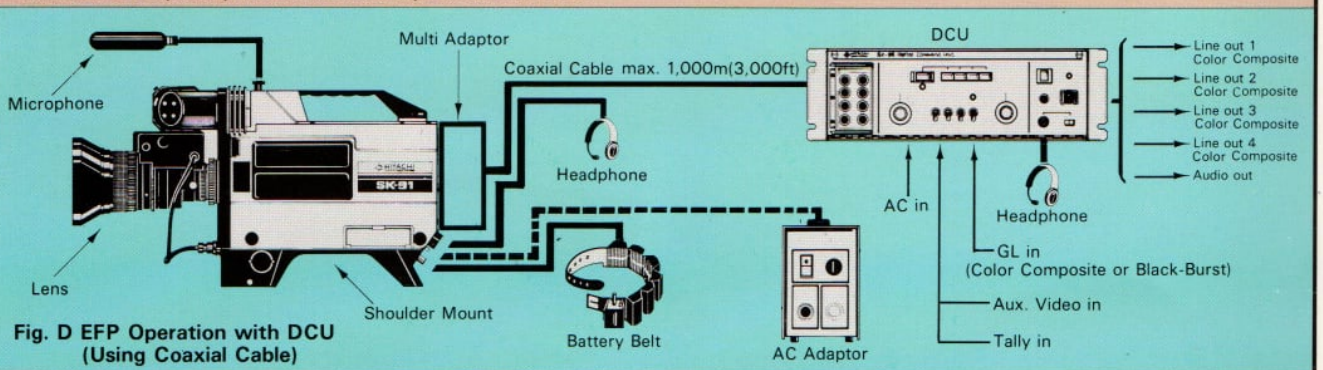


Fig. D EFP Operation with DCU (Using Coaxial Cable)

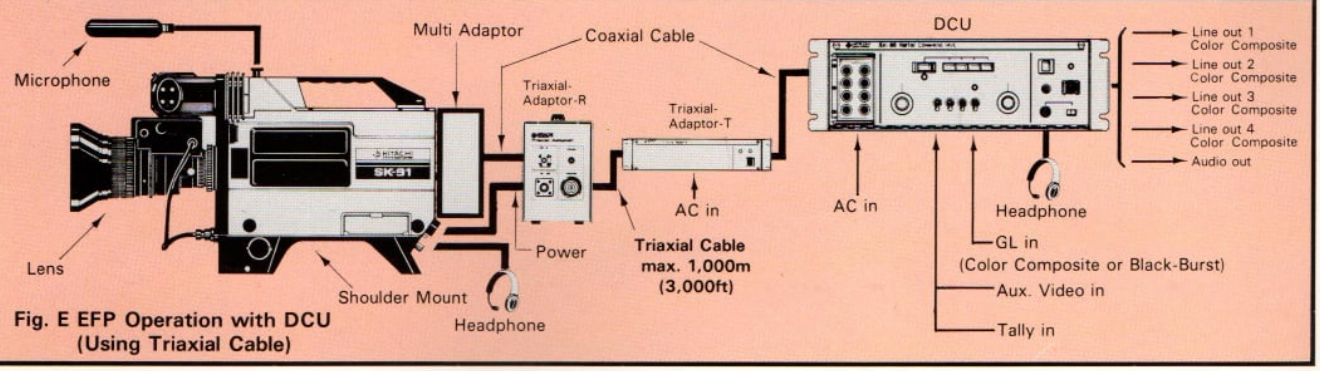


Fig. E EFP Operation with DCU (Using Triaxial Cable)

Suggested Compositions

Component	Type	Applications					
		A	B	C	D	E	F
Camera Head w/Tubes	SK-91	○	○	○	○	○	○
1.5" Viewfinder	VF-153	○	○	○	○	○	
Standard Accessories a. Shoulder Mount b. Camera Cover c. Extension Board		○	○	○	○	○	○
Zoom Lens	A12×9BERM-67	○*1	○*1	○*1	○*1	○*1	○*1
Zoom Lens	A14×9.5BERM-7	○*1	○*1	○*1	○*1	○*1	○*1
Battery Belt		○*2	○*2	△	○*2		
Battery Pack (w/Attachment)		○*2	○*2	△	○*2		
Battery Charger		○	○	△	○		
AC Adaptor		△	△	△	△	△	○
Operation Panel (w/Cable Adaptor)	OP-91		○				○*3
Remote Operation Unit (w/Cable Adaptor)	RU-90			○			○*3
Digital Command Unit	DU-90				○	○	○*3
Triaxial Adaptor	TX-90T/TX-90R					○	△
5" Viewfinder	VF-501						○
Tripod Mounting Attachment		△	○	○	○	○	○
Shoulder Mount (w/Breast Pad)		△	△	△	△	△	
Heating Cover		△	△	△	△	△	
Microphone, Sennheiser	MKH-416TU	△	△	△	△	△	△
VTR Cable 5 m (15 feet)		○					
Camera Cable 50 m (150 feet)	C-502-C3		○	△			△
Camera Cable 100 m (300 feet)	C-103-C3			○			△
Coaxial Cable 200 m (600 feet)	C-203VD-MM				○		△
Coaxial Cable 400 m (1,200 feet)	C-403VD-MM				△		△
Triaxial Cable 200 m (600 feet)	C-203-T1					○	△
Triaxial Cable 400 m (1,200 feet)	C-403-T1					△	△

○ Components necessary for applications A to F
△ Available for special applications
* Select one out of those bearing the same number

A ENG Application
B EFP Application with OP
C EFP Application with ROU
D EFP Application with DCU via coaxial cable
E EFP Application with DCU via triaxial cable
F Studio Application

Specifications

Ratings

1. Scan Standard: (EIA) 525/60 fields
   (CCIR) 625/50 fields
2. Color Standard: NTSC or PAL-B
3. Pickup Tubes: 2/3-inch SATICON*[1] or Plumbicon*[2]
4. Optical System: Dichroic prism (f1.4) with built-in bias light
5. Lens Mount: Bayonet
6. Filter Complement: 3200°K, 4700°K, 6000°K +50% ND, 0% ND
7. Viewfinder: (Standard) 1.5-inch CRT
   (Option) 5-inch CRT
8. Inputs Signals
   a) Genlock: Color composite 1.0±0.3Vp-p or Black burst; Sync 0.3±0.1Vp-p, Burst 0.3±0.1Vp-p
   b) VF. AUX.: Color composite 1.0Vp-p
   c) Audio (Mike): −45 to −60 dBm
9. Output Signals
   a) Line: Color composite 1.0Vp-p
   b) Monitor: Selectable from R, G, B, R−G, B−G, and color composite 1.0Vp-p
   c) Audio (Mike amp.): −20 or 0 dBm
   d) For VTR (Multi-pin connector): Color composite 1.0Vp-p and Program audio −20 or 0 dBm
10. Operating Controls
    a) Beam Current: Automatic (ABO)
    b) Lens Iris: Auto/Man
    Lens iris is automatically closed at power "OFF/STANDBY" and "AUTO BLK"
    c) Master Gain: 0, +9, +18 dB
    d) White Balance: Automatic
    Manually controllable at OP, ROU or DCU
    e) R, B Gain: ±3 dB
    f) Master Black: ±30%
    g) Black Balance: Automatic
    Manually controllable at OP, ROU or DCU
    h) R, B Black: ±10%
    i) R, B H/V Centering: Controllable at Camera, OP, ROU or DCU
11. Overall System Delay
    a) H Timing: Adjustable −0.5 to +2μs
    b) SC Phase: Adjustable 0 to 360°
12. Blanking Width
    a) H: Adjustable 10.3 to 11.5μs
    b) V: Adjustable 18 to 21 lines
13. Power Requirement:

Unit	Requirement
Camera	12V DC (10 to 17V), approx. 20W
AC Adaptor	100/117/220/240V AC ±10%, 70VA
ROU	100/117/220/240V AC ±10%, 30VA*
DCU	100/117/220/240V AC ±10%, 40VA*

*exclud. camera power

14. Dimensions and Weight

Unit		Height	Width	Depth	Weight	
Camera	mm	260	90	295	kg	4.4*
	in	10.2	3.5	11.6	lb	9.7*
OP	mm	49	482	140	kg	3.0
	in	1.9	19	5.5	lb	6.6
ROU	mm	88	482	378	kg	11
	in	3.5	19	14.9	lb	24.2
DCU	mm	149	482	370	kg	18
	in	5.9	19	14.6	lb	39.6

*includ. 1.5" viewfinder

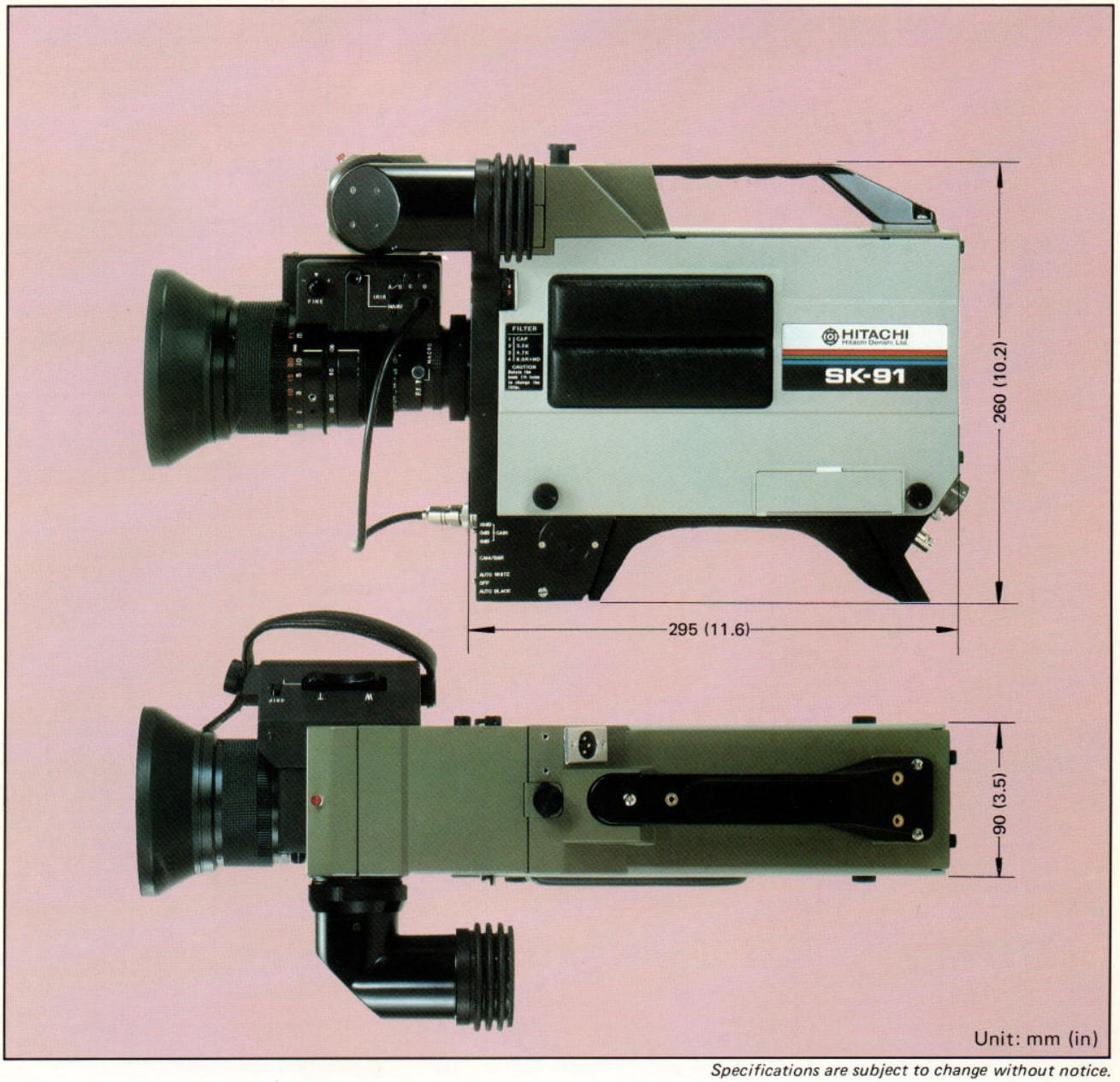
15. Environmental Conditions
    a) Operating Temperature: −20 to +50°C (−4 to +122°F)
    b) Relative Humidity: 35 to 90%
    c) Operating Altitude: Up to 3,000 m (10,000ft) ASL
    d) RF Interference: 120 dBμ from MF to UHF

Performance

1. Sensitivity: f4, 2000 lux (200 fc) at 3200°K, gray chart of 89.9% reflectance, 0 dB video gain, with SATICON's
2. Min. Illumination: f1.4, 20 lux (2 fc) at +18 dB video gain
3. Signal-to-Noise Ratio: More than 54 dB (NTSC), More than 52 dB (PAL), at Y-channel output, G-channel signal current of 0.2μA, Gamma OFF, Detail OFF
4. Horizontal Resolution: More than 500 lines at center, More than 400 lines at corners
5. Amplitude Response: More than 30% at 400 TV lines, at center
6. Registration Accuracy
   a) Zone 1 (Within a circle of a diameter equal to 80% picture height): Less than 0.1% of picture height
   b) Zone 2 (Within a circle of a diameter equal to picture height): Less than 0.2% of picture height
   c) Zone 3 (Outside of Zone 2): Less than 0.4% of picture height
7. Geometric Distortion
   a) Zone 2: Less than 1%
   b) Zone 3: Less than 1.5%
8. Microphone Amplifier
   a) Distortion: Less than 1% at 1 kHz
   b) Signal-to-Noise Ratio: More than 50 dB
9. Stability: Specifications are satisfied without re-adjustment over variations of ±10°C (±18°F) from the setup temperature, within the range of −10 to +50°C (+14 to +122°F), except for the following items.
   a) Video Level
   Variations: Within ±2%
   Inter-Channel Deviations: Less than 2%
   b) Black Level
   Variations: Within ±14 mW
   Inter-Channel Deviations: Less than 7 mV
   c) Registration
   Zone 1: Within ±0.1%

*[1] ® Hitachi, Ltd.
*[2] ® N.V. Philips

Dimensions



Specifications are subject to change without notice.

Hitachi Denshi, Ltd.

1-23-2, Kanda Suda-cho, Chiyoda-ku, Tokyo 101, Japan Phone: (03) 255-8411 Telex: J24178

- **Hitachi Denshi America, Ltd.**

Headquarters and East Coast Office	:	175 Crossways Park West, Woodbury, New York 11797, U.S.A. Phone: (516) 921-7200, TWX: (25) 510-211-1899
West Coast Office	:	21015-21023 So. Figueroa Street, Carson, Calif. 90745, U.S.A. Phone: (213) 328-2110, TWX: (25) 910-349-6952
Midwest Office	:	1725 North 33rd Ave., Melrose Park, Illinois 60160, U.S.A. Phone: (312) 344-4020, TWX: (25) 910-226-0411
Southwest Office	:	14169 Proton Road, Dallas, Texas 75240, U.S.A. Phone: (214) 233-7623, TWX: (25) 910-860-5775
Southeast Office	:	3610 Clearview Parkway, Doraville, Georgia 30340, U.S.A. Phone: (404) 451-9453, TWX: (25) 810-757-4228
Central Western Office	:	3538 Peoria, Aurora, Colorado 80010, U.S.A. Phone: (303) 344-3156, TWX: (25) 910-932-2993
Northwest Office	:	1051 Andover Park West, Tukwila, Wash. 98188, U.S.A. Phone: (206) 575-1680, TWX: (25) 910-444-2155

- **Hitachi Denshi, Ltd. (Canada)**

Head Office	:	922 Dillingham Road, Pickering, Ontario L1W 1Z6, Canada Phone: (416) 839-5134, Telex: (21) 698-1286
Quebec Office	:	8100-G Trans-Canada, St-Laurent, Quebec H4S 1M5, Canada Phone: (514) 332-6687, Telex: (21) 582-5739
Western Office	:	3433-12th St North-East, Calgary, Alberta T2E 6S6, Canada Phone: (403) 276-8508, Telex: (21) 382-5861

- **Hitachi Denshi (Europa) GmbH**

Head Office	:	Weiskircher Straße 88, D-6054 Rodgau 1 (Jügesheim), West Germany Phone: (06106) 3027/8/9, Telex: (41) 417-849

- **Hitachi Denshi (U.K.) Ltd.**

Head Office	:	Lodge House, Lodge Road, Hendon, London NW4 4DQ, United Kingdom Phone: (01) 203-4242 Telex: (51) 27449
Leeds Office	:	Video House, 55 Manor Road, Leeds, LS11, 5PZ, United Kingdom Phone: 0532-30294/5

DB-E041 Printed in Japan YT-S(H)