MODELS
KP-110/111/112/113/116
ALL SOLID-STATE CCTV CAMERAS

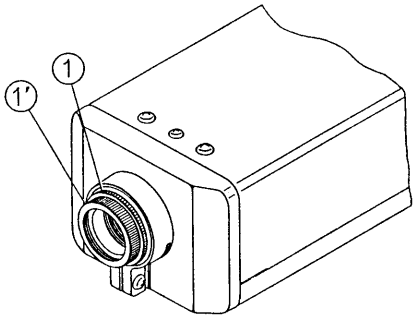
Operation Manual

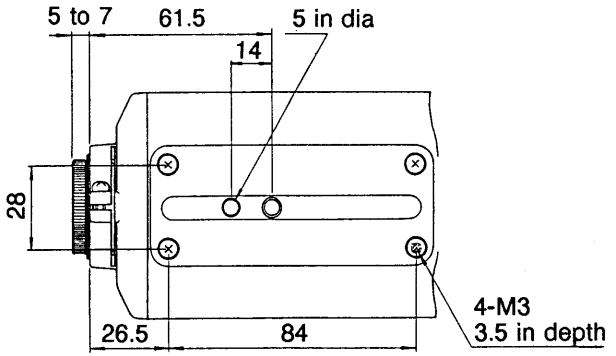
Hitachi Denshi, Ltd.

Instructions for use of CS-mount lens

A CS-mount lens (flange back :12.5mm) can also be used with the camera. The camera is set before shipment so that a C-mount lens can be mounted. When using a CS-mount lens, please follow the instructions below.

1. Name of each section and supplement





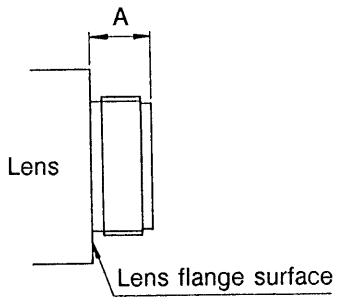
unit : mm

① Lens mount ring
Remove the C-mount adaptor①', and mount a CS-mount lens on this ring instead.

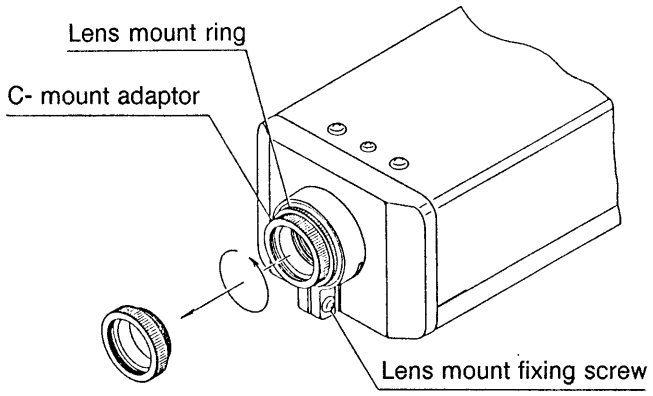
①' C- mount adaptor
Mount a C-mount lens on this adaptor. When using a CS-mount lens, remove this adaptor.

2. Instructions for use of CS-mount lens

(1) When using a CS-mount lens (flange back: 12.5mm), select a lens whose dimention (A) between the lens flange surface and the end on the thread side is 6.5mm or less.



(2) Since the flange back of the camera is adjusted for a C-mount lens, remove the C-mount adaptor from the lens mount ring and mount a CS-mount lens on the ring .



(3) You may not focus a lens on an object by turning the focus ring. In this case, adjust camara by referring to **ADJUSTMENT OF THE FLANGE BACK** on the operation manual.

3. Recommended lenses

A C-mount (CS-mount) lens with flange back of 12.5mm can be used in principle. However, some lenses cannot be mounted or cannot deliver their proper performance. The lenses shown in Table 1 are thus recommended to use.

Table 1 Recommended lense
(CS- mount lenses for 1/2 -inch format camera)

	Type	Focal length (mm)	F number	Field angle (Diagonal)	Minimum object distance (m)	Weight (g)
Manual iris lens	H316	3.7	1.6	115° 24'	0.2	60
	H614A	6	1.4	69° 36'	0.2	55
	H1214C	12	1.4	36° 36'	0.3	50
*Auto iris lens	H316HX	3.7	1.6	115° 24'	0.2	70
	H614AHX	6	1.4	69° 36'	0.2	75
	H1214CHX	12	1.4	36° 36'	0.3	65
	HS6ZME-3	8 to48 (X6)	1.4	51° 58' to 9° 31'	1.8	400

*Auto iris lens : Receives DC voltage for circuits inside the lens and the video signal from the camera for auto iris operation.

MODELS KP-110/111/112/113/116
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Operation Manual

Table of Contents

Note: The model and serial numbers of your CCTV CAMERA are important for you to keep for your convenience and protection. These numbers appear on the nameplate located on the bottom of the products. Please record these numbers in the spaces provided below, and retain this manual for future reference.

Model No. _____ **Serial No.** _____

MODELS KP-110/111/112/113/116
ALL SOLID-STATE CCTV CAMERAS

Major functional features of each model are listed in Table 1. For details, refer to 13.SPECIFICATIONS.

Table 1

	Power supply	Sync system	Ext. sync connector
KP-110	12V DC	INT/EXT (auto selection)	Provided
KP-111	Commercial AC source	INT only	Not provided
KP-112	24V AC	Line-lock	Not provided
KP-113	Commercial AC source	Line-lock	Not provided
KP-116	Commercial AC source	INT/EXT (auto selection)	Provided

1. INTRODUCTION

The Hitachi KP-110/111/112/113/116 are black-and-white TV cameras employing a solid-state imaging device instead of a conventional pickup tube.

2. FEATURES

* A high sensitivity solid-state imaging device with 570 horizontal and 485 vertical picture elements provides a clear and sharp picture. [579(H) x 583(V) for CCIR]
* Vertical smear and blooming are suppressed even for a strong incident light.
* The dynamic white suppress circuit ensures a high quality picture with a proper white level even for highly contrasted scenes.
* Internal and external sync modes.
  The external sync mode is automatically established when the external drive signals (HD, VD) or the composite video signal (VS) is supplied to the EXT connector.
* No geometric distortion, no burning, and a low lag.
* The solid-state imaging device provides long service life and high reliability.
* The EE/ES lens output connector is provided.

3. COMPOSITION

Table 2

	KP-110	KP-111	KP-112	KP-113	KP-116
Camera	1	1	1	1	1
EE/ES lens plug	1	1	1	1	1
External sync plug	1	—	—	—	1
Spare fuse	1	1	1	1	1
Operation manual	1	1	1	1	1
Power connector, R03-P3F	1	—	—	—	—
AC adaptor, AP-130	Option	—	—	—	—

4. PRECAUTION

4.1 Protection of the solid-state imaging device

* Do not touch the faceplate of the solid-state imaging device. The image deteriorates with dirt and scratches.
* If the faceplate of the solid-state imaging device becomes dirty, do not wipe it with a dry cloth or a paper to avoid possible damage to the faceplate. Moreover, static electricity caused by cleaning can cause damage to the imaging device.
  When cleaning the sensor, breathe on the faceplate until being clouded, then clean it with a cotten-tipped applicator gently once in a second as shown in Fig. 1.

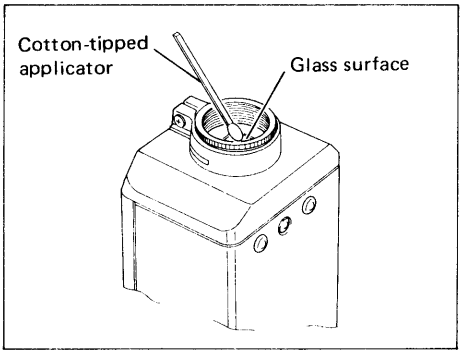


Fig. 1

* Mount the lens or the supplied cap on the camera to protect the imaging device from dust.

4.2 Protection of the camera

* Do not expose the camera to direct sunlight, rain, or snow.
* Do not locate the camera near inflammable and explosive substances.
* Do not subject the camera to heavy shock or vibration.
* Although the camera can operate in the temperature ranging from −10 to 50°C (14 to 122°F), the life may be shortened if it is used or stored in the higher temperature than 40°C (104°F) for a long period.
* Avoid continuous using of the camera for a long time in a high temperature environment.
  To use the camera continuously for a long period, avoid installing it in such a high temperature environment. Also avoid installing it in a humid environment.

5. NAME OF PARTS, AND THEIR FUNCTIONS

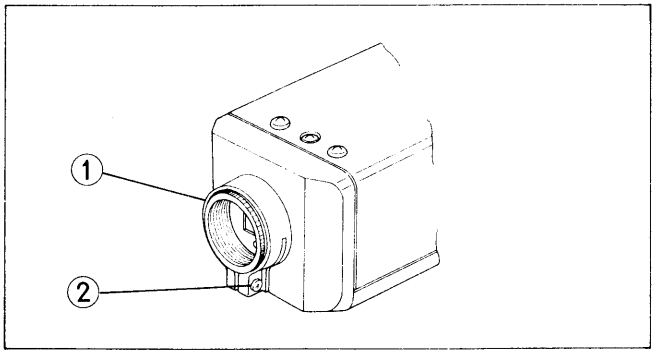


Fig. 2 Front View

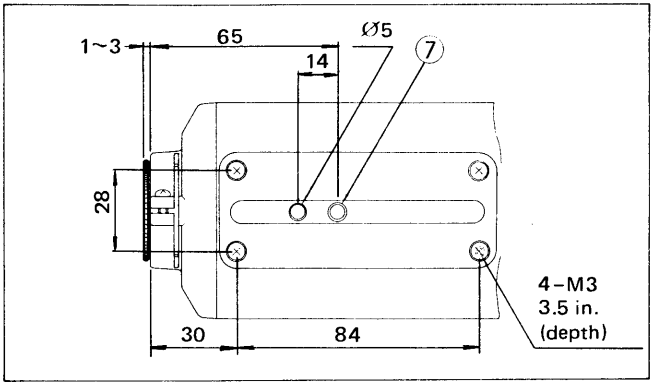


Fig. 3 Bottom View

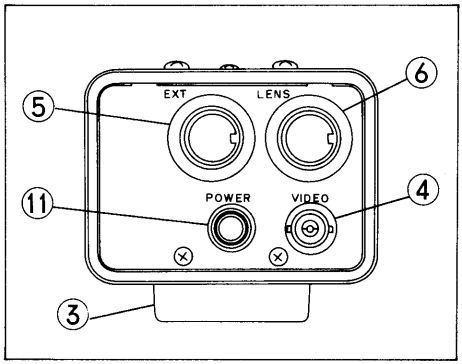


Fig. 4 Rear View of the KP-110

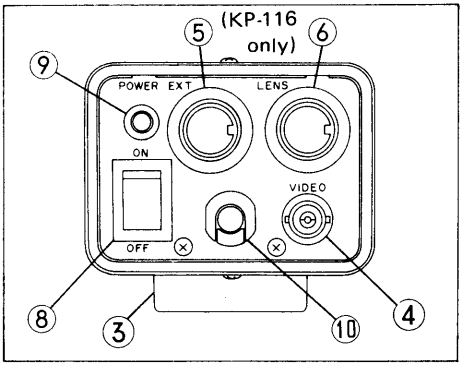


Fig. 5 Rear View of the KP-111/113/116

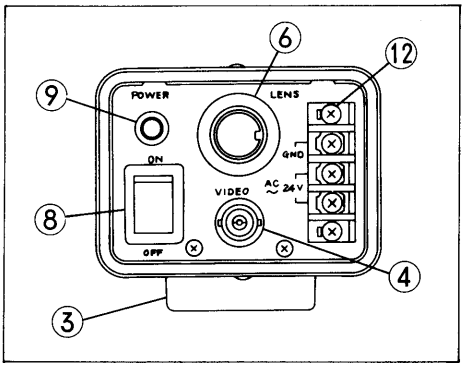


Fig. 6 Rear View of the KP-112

① **Lens mount ring**

Mount a C-mount lens.

② **Lens mount fixing screw**

Used to secure the lens mount for flange back adjustment (For details, see page 16.)

③ **Tripod adaptor**

Used to secure the camera on a tripod with the fixing screws. This tripod adaptor can be mounted on the top of the camera. In this case, remove the trim screws. The camera can be directly mounted with four screws after removing the tripod adaptor.

④ **Video signal output connector (VIDEO)**

Connect the composite video signal output to a video monitor, etc. through a 75-ohm coaxial cable. (BNC connector)

⑤ **External signal input connector (EXT): (KP-110/116 only)**

This connector is also used to connect an external sync signal. (For details, see page11 .)

⑥ **LENS connector**

Connect the cable of an EE/ES lens. (For details, see page 10.)

⑦ **Camera mounting holes**

Used to mount the camera (1/4-20 UNC). Depth of screw hole is 7 mm.

⑧ **Power switch (ON/OFF)**

⑨ **Power indicator lamp**

Lights when the power switch is ON.

⑩ **AC power cord**

Connect to AC outlet.

⑪ **Power connector**

Connect the optional AC adaptor to this connector. For details, see page 7.

⑫ **Power input terminal block**

Connect 24V AC supply.

Note:

When power switch is turned to ON immediately after it is turned to OFF, the power may not be supplied correctly, because the protection circuit in the camera is activated. In this case, turn on power switch after several minutes.

6. CONNECTIONS

6.1 Connection of power supply

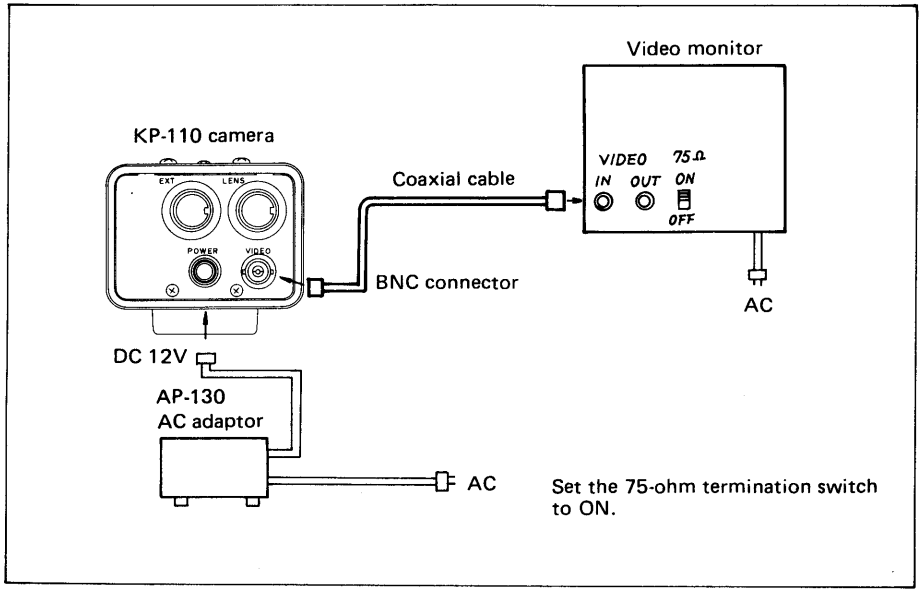


Fig. 7 When the optional AC adaptor is used

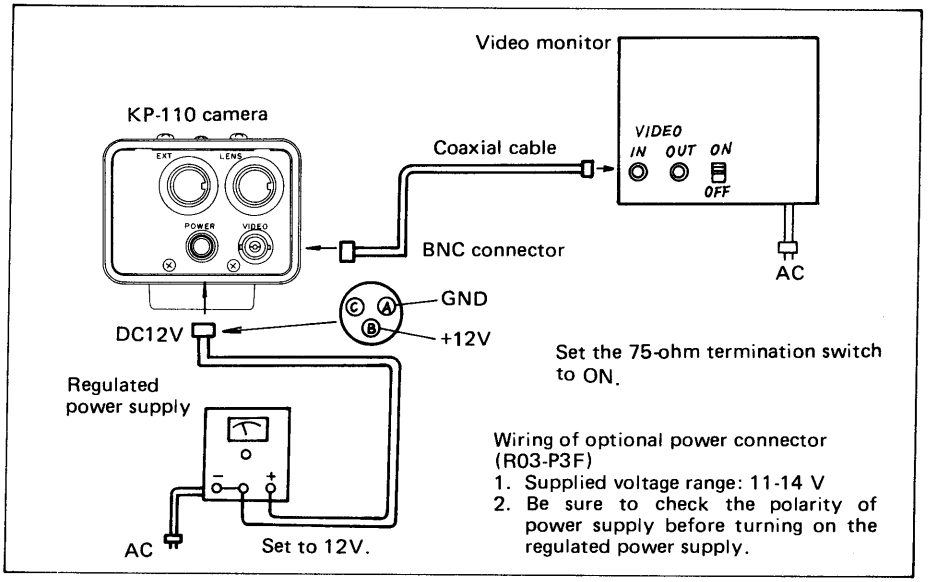


Fig. 8 When a regulated power supply is used

(2) KP-111/113/116

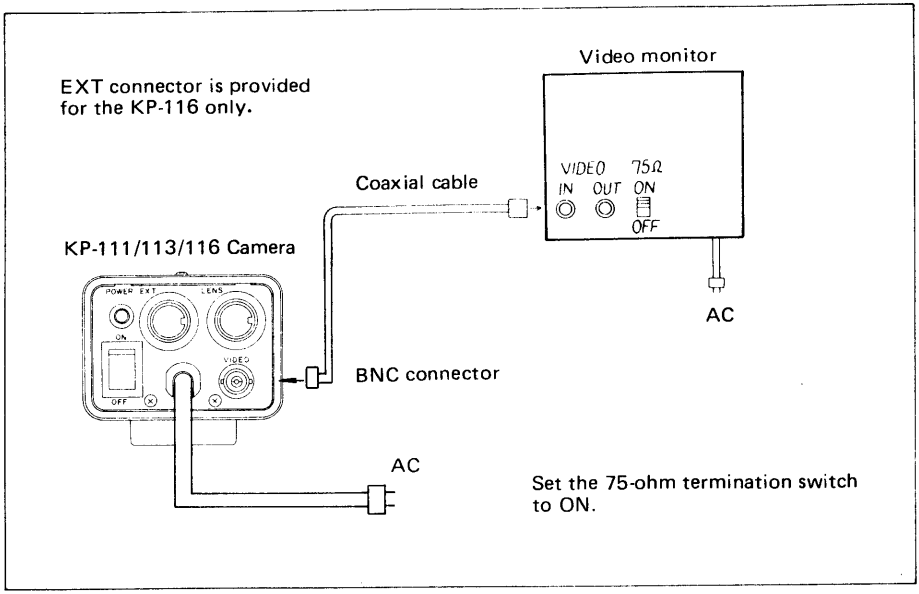


Fig. 9

(3) KP-112

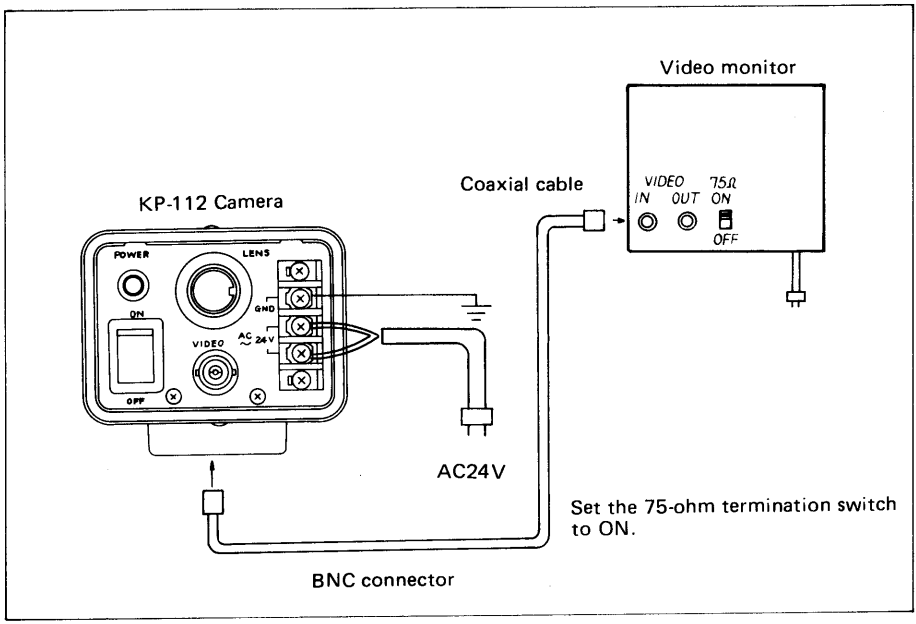


Fig. 10

6.2 Connection of KP-112/113

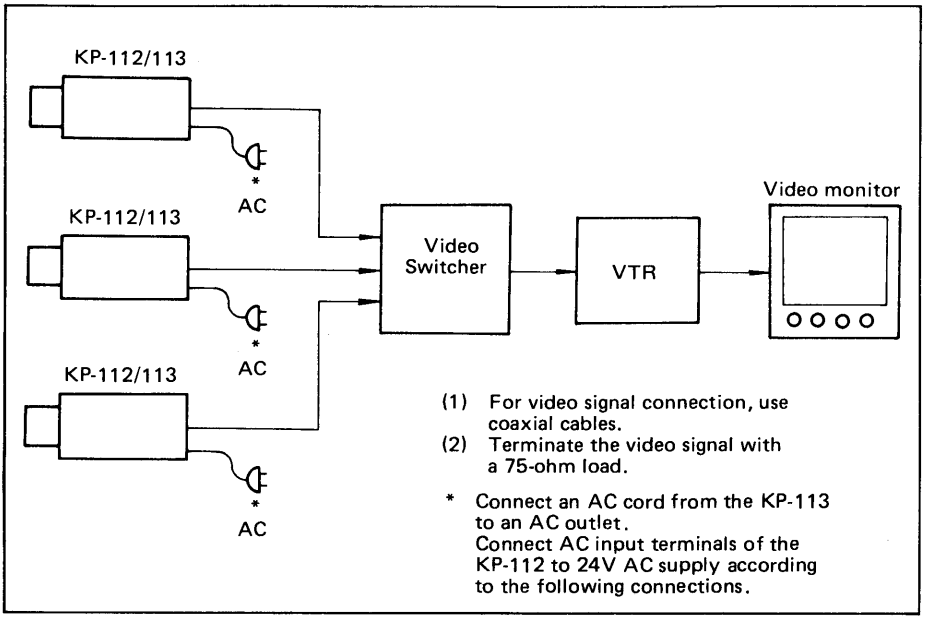


Fig. 11

6.3 When connecting plural video monitors

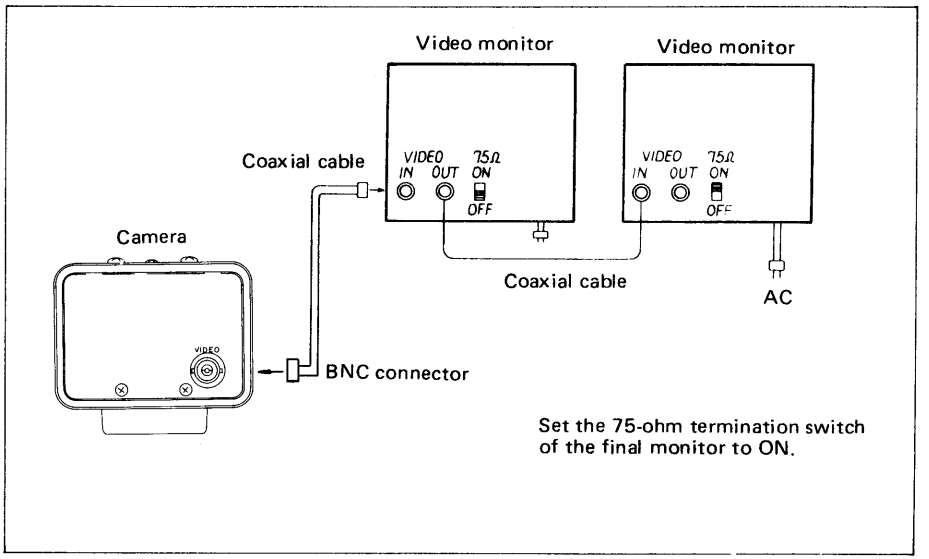


Fig. 12

6.4 When external drive signals are used (KP-110/116)

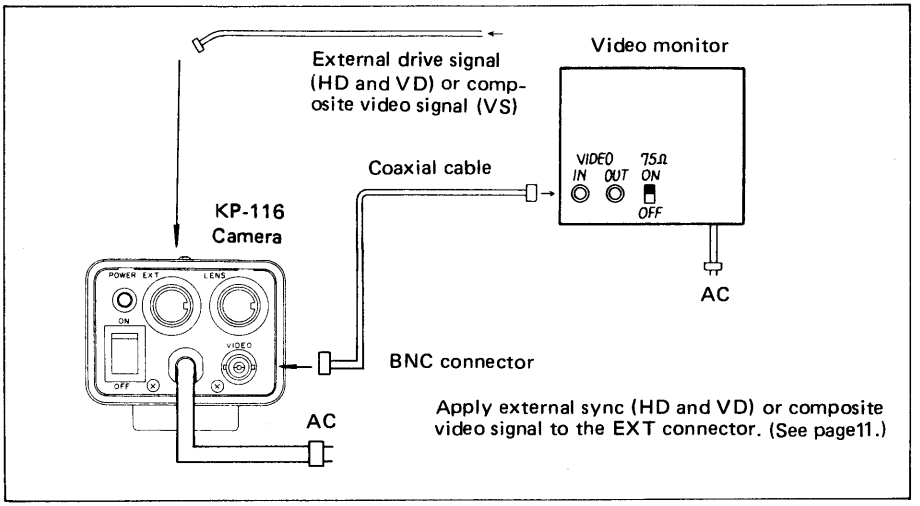


Fig. 13

7. CONNECTION OF EE/ES LENS

When shooting an object with a slight change in brightness, the lens iris can be fixed. When brightness changes, the lens iris requires to be adjusted according to the illumination. To automatically adjust the lens iris, an EE or ES lens is used.
Connect the cable connector of the EE or ES lens to the EE LENS connector on the rear of the camera.

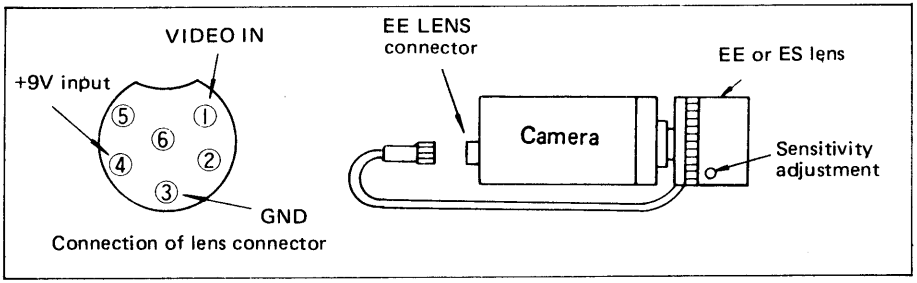


Fig. 14

Notes:

(1) The required power supply for the EE (ES) lens is 9V DC and 35 mA max. Use the applicable EE (ES) lens.
When an EE (ES) lens of different voltage and current is used, use an external power supply unit.

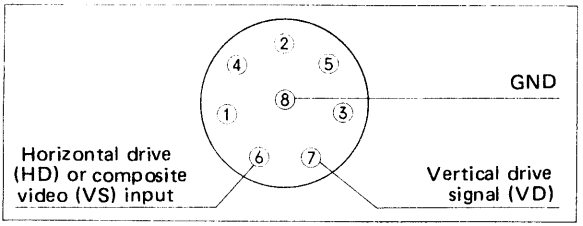
(2) Since most ES lenses have a sensitivity adjustment hole, adjust for the optimum sensitivity by a screwdriver.

8. EXTERNAL SYNC MODE (2:1 INTERLACE)

To drive the camera by the external sync signal, connect the sync drive signals (HD and VD) or the composite video signal (VS) to the EXT connector.
When the external sync signal is supplied, the sync mode is automatically switched to the external mode.

8.1 Connection of the EXT connector

Connect the horizontal and vertical drive signals to pins ⑥ and ⑦, respectively.
In case of the composite video signal, connect the signal to pin ⑥.



Note:
When the composite sync signal (SYNC) is used, it is not needed to connect a signal to the VD input pin ⑦

Fig. 15

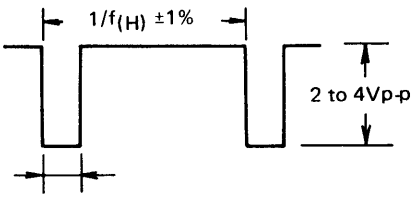
8.2 External sync signals

- Sync signals
  Horizontal drive (HD): $f_{(H)}$ 15,734 Hz ± 1% (CCIR: 15,625 Hz ± 1%)

  Vertical drive (VD) or composite video (VS): $f_{(V)}$ 59.94 Hz ($f_{(V)} = f_{(H)} \div 262.5$) (CCIR: 50 Hz [$f_{(V)} = f_{(H)} \div 312.5$])
- Input level
  Horizontal drive (HD): 2 to 4 Vp-p, negative
  Vertical drive (VD): 2 to 4 Vp-p, negative
  Composite video (VS): 1.0 Vp-p, sync negative
- Input impedance: Terminated with a 75-ohm in the camera.

○ Drive signal waveforms

• Horizontal drive signal (HD)



• Vertical drive signal (VD)

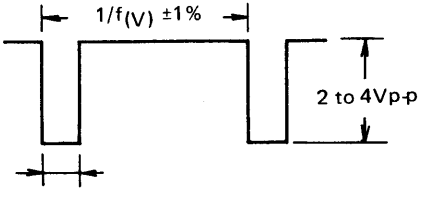
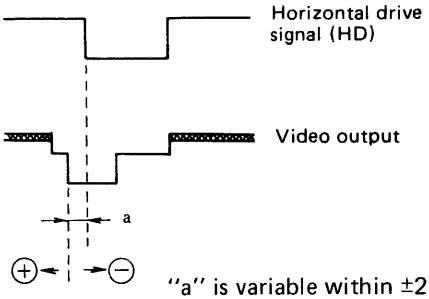


Fig. 16

• Horizontal phase



"a" is variable within ±2 μs by the horizontal phase control located on the DRIVE board.

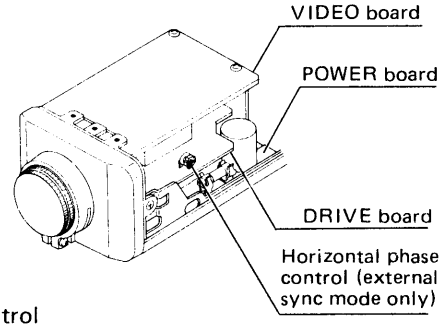


Fig. 17

9. VERTICAL SYNC PHASE ADJUSTMENT (KP-112/113)

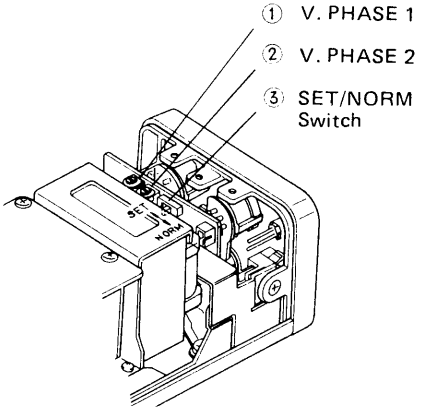


Fig. 18

Matching the vertical synchronization with the power frequency is called the line lock.

For example, when a non-line-lock type camera is switched by the video switcher for recording in a system shown in Fig. 11 on Page 9, the vertical sync signal is disturbed at the time of switching.

When the KP-112/113 of line lock type are used, however, the vertical sync phase can be locked with the power frequency and a stable vertical sync is obtained.

A single-phase AC power, which is usually used for a camera, is converted from a three-phase AC power. The vertical sync phases of cameras should be adjusted to that of a reference camera, since the phases of the converted single-phase AC power are displaced by 120° each other in a large building. This is the vertical phase adjustment.

Vertical sync phase adjustment between two cameras

Use one camera as a reference, and adjust the vertical sync phase of the other to that of the reference camera as follows.

1) Set the NORM/SET switch ③ of the camera to be adjusted to SET.
2) Alternately switch the video signals of the two cameras by the video switcher. Adjust the V. PHASE 1 and 2 controls (① and ②) so that the vertical sync is not disturbed on a monitor. (A dual-trace oscilloscope is recommended for more precise adjustment. In this case, set the trigger mode of the oscilloscope to LINE, and adjust so that the vertical sync signals of the video outputs are synchronized.)
3) After completion of the adjustment, set the NORM/SET switch to NORM.

Notes:

1. In case of the vertical sync phase adjustment among three cameras or more, adjust the cameras one after another.
2. When the vertical sync signals of the adjusted cameras are observed on the oscilloscope, the phases may be displaced each other by several H's. However, this does not cause any trouble in a practical operation.

3. The NORM/SET switch (3) should be set to SET only at setup.
   SET: The lock time constant is short for easy setup.
   In this mode, the camera is affected by power noise.
   NORM: The lock time constant is long.
   The camera operates stably against power noise.
4. The V. PHASE 1 and 2 controls ((1) and (2)) can vary the phase by approximately 180° each, 360° in total.

CAUTION

1. The KP-112/113 are synchronized to the power frequency 60(or 50)±1 Hz, and covers a normal fluctuation of the power frequency. However, the camera may not cover a large fluctuation caused from the power generated by an engine generator, etc.
2. It takes over 10 seconds until a stable synchronization is obtained after the power is turned on. This is not a trouble, because the lock time constant is made long to stabilize the camera against power noise.

10. ILLUMINATION AND LENS STOP

(1) About 150 lux is needed at the lens stop of f4. Refer to Table 1 for the relationship between illumination and lens stop.

(2) When there is a strong reflected light causing halation or extremely strong light causing white vertical stripes (vertical smear or blooming) adjust the illumination (position, angle, etc.) because Table 1 may not be applicable. If such reflection is not eliminated, adjust the lens stop appropriately corresponding to the purpose of shooting.

(3) When shooting an object which emits intense light such as sparks and arcs, the screen looks white due to the video signal saturation because the iris of ordinary lenses (f2 to f22) cannot control such excessive light. In such cases, a lens with a high f-number is recommended.
(Reference) Cosmicar C1616AES, 16 mm, f1.6 to 360 or equivalent.

Table 3 Guide to illumination and lens stop

Illuminance of object (lux)	Lens stop (f)
4,800	22
2,400	16
1,200	11
600	8
300	5.6
150	4
75	2.8
35	2
15	1.4

Notes:

The values listed in Table 3 are obtained under the following conditions:

(1) Gain: AGC ON
(2) Gamma: ON
(3) Object: 90% reflectance type chart
(4) Light source: Halogen lamp (3200 K)
(5) Video output level: 100%

11. RECOMMENDED LENSES

A C-mount lens of 1/2- or 2/3-inch may be used on this camera. To ensure optimum performance, the following lenses are recommended.

Table 4 Recommended Lenses

Category	Type No.	Focal length (mm)	Zoom ratio	f-number	Minimum object distance (m)	Weight (g)
Fixed	C814	8	–	1:1.4	0.2	150
	C815-3	8.5	–	1:1.5	0.2	110
	C1614	16	–	1:1.4	0.5	90
Fixed ES	C1614EX-2	16	–	1:1.4	0.5	160
Manual zoom	C6Z1218	12.5 to 75	6	1:1.8	1.0	320

When using other lenses, they must meet the following conditions. For further details, consult your local Hitachi Denshi sales office.

(1) The length "A" between the lens flange surface and the end of the projecting part should be less than 9.5 mm.

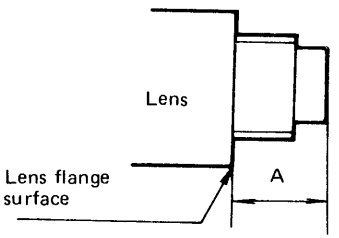


Fig. 19

(2) The lens should be lighter than the camera.
Since the camera is compact and lightweight, a heavy lens may cause unbalance, which may cause malfunction.
When the lens exceeds 1.5 kg, use a tripod to support the lens.

12. ADJUSTMENT OF THE FLANGE BACK

Depending on the lens used, optimum focusing may not be obtained even if the lens focus itself has been adjusted. In such cases, perform the flange back adjustment.

(1) Loosen the screw ② (see section 5 NAME OF PARTS, AND THEIR FUNCTIONS), and then rotate the ring ① .
(2) Set the lens to infinity and then rotate the lens and lens mount ring together so that the object at least 20 meters (66 feets) away (far away as possible) is brought into focus.
(3) Stop rotating when the optimum focus is obtained, and tighten the screws.

13. SPECIFICATIONS

(1)	**Imaging device:**	Solid-state EIA: 570(H) x 485(V) elements CCIR: 579(H) x 583(V) elements
(2)	**Scanning area:**	4.85 x 6.5 mm^2 (equivalent to 1/2-inch vidicon)
(3)	**Sync system:**	KP-110/116 Internal (non-line-lock) /External sync KP-111 Internal (non-line-lock) KP-112/113 Line lock
(4)	**Scanning system:**	2:1 interlaced scanning
(5)	**Scanning frequency:**	
	KP-110/111/116	
	Horizontal	EIA: 15,734 Hz CCIR: 15,625 Hz
	Vertical	EIA: 59.94 Hz CCIR: 50 Hz
	KP-112/113	
	Horizontal	EIA: 15,750 Hz CCIR: 15,625 Hz
	Vertical	EIA: 60 Hz CCIR: 50 Hz
(6)	**Video output:**	Composite video signal (VS), 1.0 Vp-p/ 75Ω, sync negative (BNC connector)
(7)	**Resolution at center:**	
	Horizontal	430 TV lines
	Vertical	350 TV lines
(8)	**S/N:**	46 dB (Gamma = 1, Normal gain)
(9)	**Illumination:**	
	Standard	150 lux, f4
	Minimum	3 lux, f1.4 (AGC ON, Gamma ON, 50 IRE output)
(10)	**Output signals for EE(ES) lens:**	
	Video signal (V)	1.0 Vp-p/high impedance
	Power supply	9V DC, 35 mA max.
(11)	**Sync signal input: KP-110/116 only**	
	Horizontal drive (HD)	4 Vp-p, negative
	Vertical drive (VD)	4 Vp-p, negative
	or composite video signal (VS)	1.0 Vp-p/75Ω, sync negative
(12)	**Gamma:**	0.45 (fixed)
(13)	**Lens mount:**	C-mount

(14) Ambient temperature/humidity		
Within specifications:	0 to 40°C, (32 to 104°F), 50 to 70% RH	
Full operation:	−10 to +50°C (14 to 122°F), 90% or less RH	
Storage:	−20 to +60°C (−4 to 140°F), 70% or less RH	
(15) Power requirements:	KP-110	12V DC
	KP-111/116	(U) 117V AC±10%, 60 Hz
		(E) 220V AC±10%, 50 Hz
		(K) 240V AC±10%, 50 Hz
	KP-112	(U) 24V AC±10%, 60 Hz
		(E/K) 24V AC±10%, 50 Hz
	KP-113	(U) 117V AC±10%, 60 Hz
		(E) 220V AC±10%, 50 Hz
		(K) 240V AC±10%, 50 Hz
(16) Power consumption:	KP-110	12V DC, 200mA approx.
	KP-111/116	5W approx.
	KP-112/113	5.5W approx.
(17) Dimensions: (excluding projection)		
	KP-110	75(W) x 55(H) x 120(D) mm
		3.0(W) x 2.2(H) x 4.9(D) in
	KP-111/116	75(W) x 55(H) x 170(D) mm
		3.0(W) x 2.2(H) x 6.9(D) in
	KP-112/113	75(W) x 55(H) x 190(D) mm
		3.0(W) x 2.2(H) x 7.8(D) in
(18) Weight: (excluding lens)	KP-110	0.6 kg (1.3 lb) approx.
	KP-111/112/116	1.3 kg (2.9 lb) approx.
	KP-113	1.4 kg (3.1 lb) approx.

***Specifications are subject to change without notice.**

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