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1. GENERAL

The KP-M2/M3 are compact, lightweight, black and white cameras. The KP-M2 uses the latest high grade 1/2-inch image size CCD and the KP-M3 uses the high

grade 1/3-inch image size CCD. The total pixel number of each CCD is 410,000 (490,000 for CCIR).

2. MAJOR FEATURES

- Compact: 44(W) × 29(H) × 72(D)mm
- Lightweight: 120g approx.
- Variable speed electronic shutter function
- Internal/external synchronization, interlaced/non-interlaced operation
- Field-on-Demand function
- Frame and field integration modes switchable

3. COMPOSITION

Standard composition

- (1) Camera body (with IR cut filter)
- (2) C-mount cap
- (3) Operation manual

Optional accessories

- | | |
|--------------------|--------------------|
| (1) Tripod adaptor | TA-M1 |
| (2) 12-pin plug | HR10A-10P-12S (01) |
| (3) AC adaptor | AP-130 |
| (4) Junction box | JU-M1A |
| (5) Camera cable | 2m: C-201KS |
| | 5m: C-501KS |
| | 10m: C-102KS |

4. NOTES TO USERS

4-1 Power supply

Connect $12V \pm 1V$ DC from an external power supply.

4-2 To protect CCD (sensor)

- Do not touch the glass surface of the sensor to avoid dirt and scratches.
- If the glass surface of the sensor should become dusty or dirty, wipe off dust or dirt carefully with a cotton-tipped applicator. Never use dry cloth or paper. The surface may be scratched and further the sensor may be damaged by static electricity.
- Be sure to mount a lens or the supplied mount cap on the camera to protect the sensor from dust.

4-3 To protect camera

- Do not use or store the camera under direct sunlight, in environments exposed to rain, or snow, or at a place exposed to flammable or corrosive gas.
- The camera operates in the temperature range between -10 and 50°C .
If the camera is used or left at a high temperature (40°C or more) for hours, the life of the camera may be shortened. When using the camera continuously for hours, avoid using the camera in such a high temperature or high humidity.

- Do not drop the camera. Do not apply strong shock or vibration to the camera.
- Before connecting or disconnecting a connector, turn off the camera. Be sure to hold the connector body to connect or disconnect the connector.

4-4 Arrangement of camera

When several cameras are installed very close with each other, the cameras may interfere with each other to cause noise. Install the cameras as far as possible from each other or operate the cameras by an external sync signal.

4-5 Fixing of camera

When a heavy lens is used, or when excessive shock or vibration is applied, fix the lens to the equipment, too.

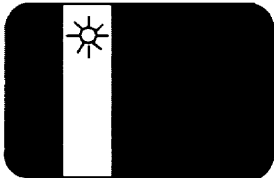
Phenomena inherent to CCD imaging device

Following are the phenomena inherent to a CCD imaging device, and not defects

1) Smear and blooming

When strong light (lamp, fluorescent lamp, reflected light, etc.) is shot, pale bands are displayed vertically above and below the light.

In this case, change the angle of the camera so that such strong light does not enter the camera through the lens.



2) Fixed pattern noise

When the camera is operated in a high temperature, fixed pattern noise may appear on the entire screen.

3) Moire

When fine patterns are shot, moire may be displayed.

5. NAME OF EACH SECTION

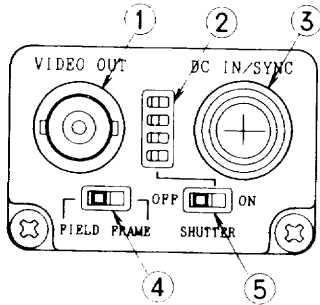


Fig. 1

(Rear)

(1) VIDEO OUT (BNC) connector

A composite video signal (VS) is fed from this connector. Connect a 75-ohm coaxial cable between the connector and a video monitor or other video equipment.

(2) Shutter speed select switches

Use these switches to set a shutter speed.

(3) DC IN/SYNC connector

This connector is for a 12V DC input, a composite video signal (VS) output and an external sync signal input.

(4) FIELD/FRAME integration mode select switch

Use this switch to select an integration mode. This switch is set to FRAME at factory.

(5) SHUTTER ON/OFF switch

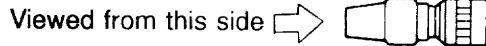
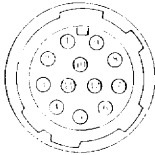
Set the SHUTTER ON/OFF switch to ON to establish the shutter mode.

6. SIGNAL CONNECTION TO DC IN/SYNC CONNECTOR

Signal connection to each pin

Pin No.	Internal sync mode	External sync mode				
		HD-VD	Field-on-demand			
			ONE trigger	TWO-trigger	Fixed shutter	Ext. shutter
1	GND	GND	GND	GND	GND	GND
2	+12V	+12V	+12V	+12V	+12V	+12V
3	Video output (GND)	Video output (GND)	Video output (GND)	Video output (GND)	Video output (GND)	Video output (GND)
4	Video output (Signal)	Video output (Signal)	Video output (Signal)	Video output (Signal)	Video output (Signal)	Video output (Signal)
5	-	HD input (GND)	-	-	-	HD input (GND)
6	-	HD input (Signal)	-	-	-	HD input (Signal)
7	-	VD input (Signal)	Trigger A input (Signal)	Trigger A input (Signal)	Trigger A input (Signal)	VD input (Signal)
8	-	-	-	Trigger B input (GND)	-	Trigger B input (GND)
9	-	-	-	Trigger B input (Signal)	-	Trigger B input (Signal)
10	GND	GND	GND	GND	GND	GND
11	+12V	+12V	+12V	+12V	+12V	+12V
12	-	VD input (GND)	Trigger A input (GND)	Trigger A input (GND)	Trigger A input (GND)	VD input (GND)

Optional 12-pin plug: HR10A-10P-12S(01)

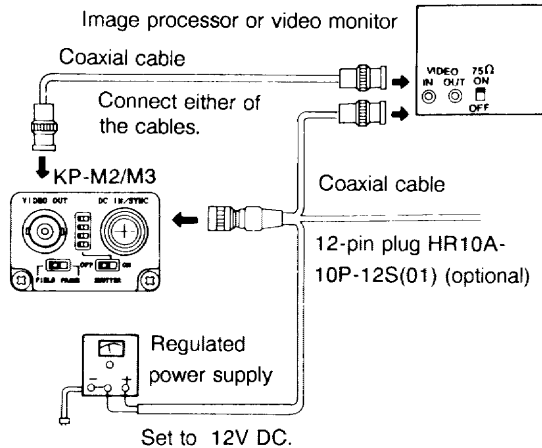


Note:

- The video signal cannot be fed simultaneously from both the VIDEO OUT connector and the DC IN/SYNC connector. If both the outputs are connected simultaneously, a proper picture cannot be obtained.
- Supply 12V DC in the range between 11 and 13V.

7. HOW TO CONNECT CABLES

7-1 Basic connection



When connecting more than one monitor, set the 75-ohm termination switch of the last unit only to ON.

When operating the camera in external sync drive mode, input the sync signal(HD/VD).

- Available voltage range is 11 to 13V.
- Before turning on an external power supply unit, be sure to check the polarities of the power supply.

Note: The video signal cannot be fed simultaneously from both the VIDEO OUT connector and the DC IN/SYNC connector.

Fig. 2

7-2 Connection of options

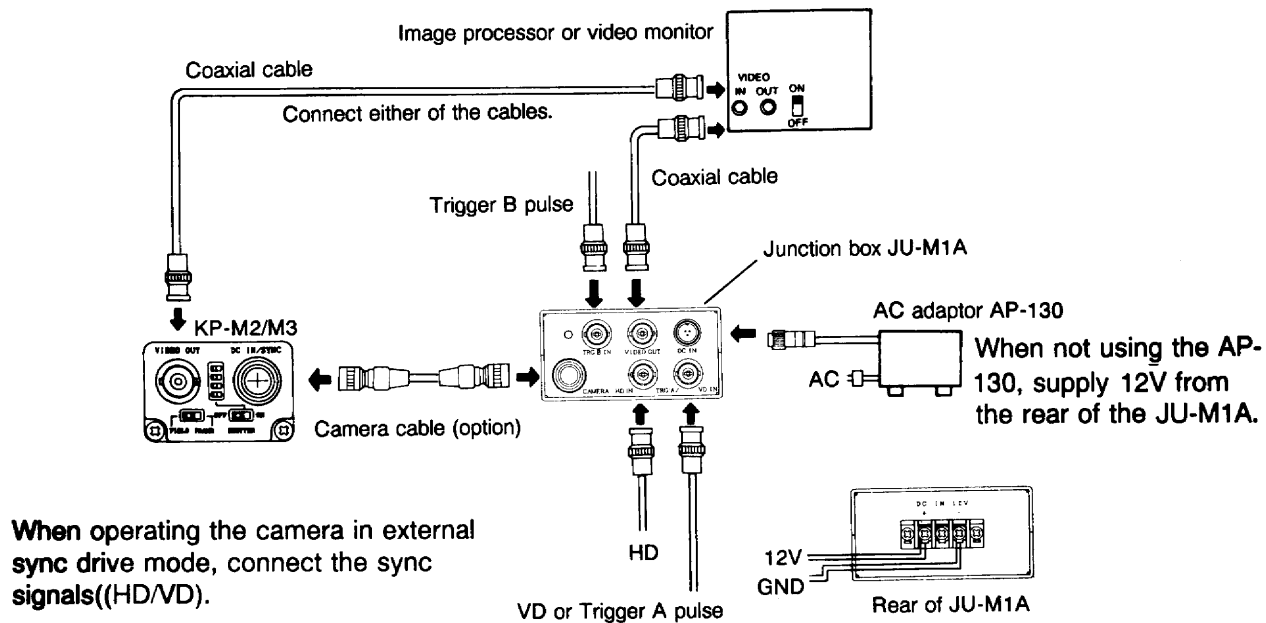
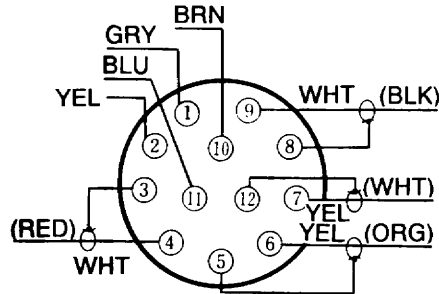


Fig. 3

7-3 Optional cables

Cables dedicated for connecting the camera head and the junction box JU-M1 are available as option.



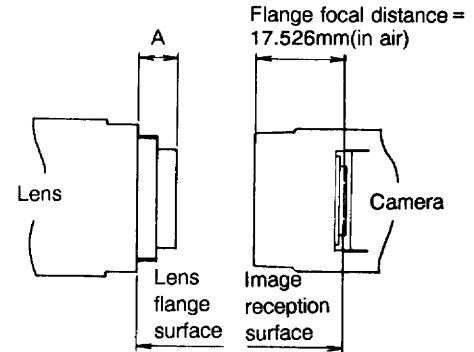
Length	Type
2m	C-201KS
5m	C-501KS
10m	C-102KS

Fig. 4

- Voltage drop due to a cable is about 0.01V per meter.
- The H phase delays by about 5ns per meter.
- When an optional cable is used, the video signal cannot be fed from the VIDEO OUT connector.
- When using a cable only to supply power, use the cable C-201KS (2m).

8. OPTICAL SYSTEM

- Image size.
KP-M2:1/2-inch
KP-M3:1/3-inch
- The flange focal distance is 17.526mm (in air).
- Select such a lens as the length (A) from the flange surface of the lens to the end of the screw side is 8mm or less.



Note

Flange focal distance cannot be adjusted.

Fig. 5

9. IR (INFRARED RAY) CUT FILTER

This camera is provided with an IR cut filter.

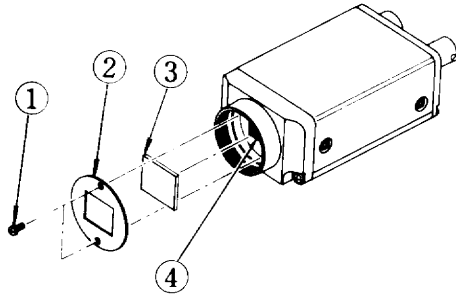
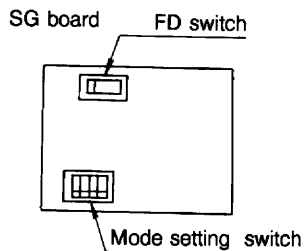
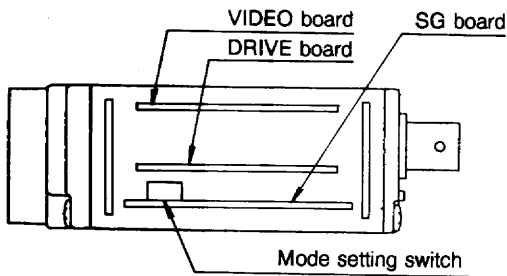
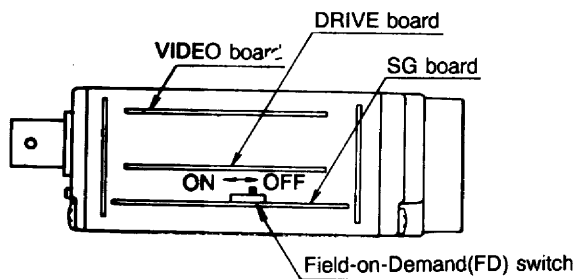


Fig. 6

How to remove the IR cut filter.

- (1) Remove two screws shown in Fig. 6, and filter holder ② will come off.
- (2) Remove the IR cut filter ③ from filter frame ④ .
- (3) Then, reinstall and secure filter holder ② with two screws ①.

10. ARRANGEMENT OF INTERNAL SWITCHES



	Normal mode	ONE trigger mode	TWO-trigger mode	Fixed shutter mode	Ext. shutter control mode
Mode setting switch					
FD switch	OFF (Setting at factory)	ON	ON	ON	OFF

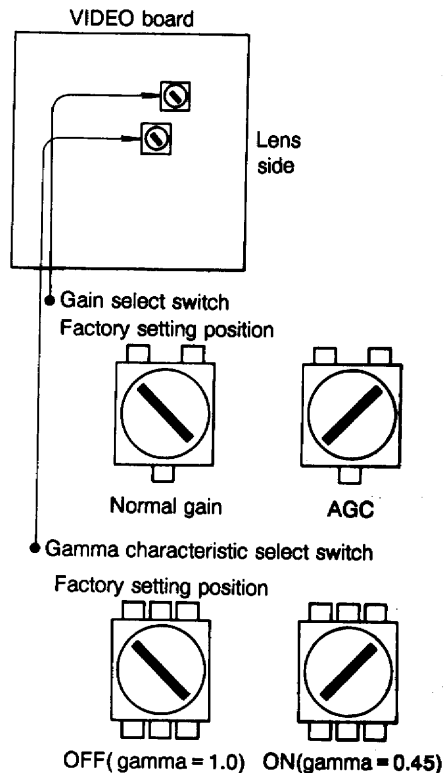


Fig. 7

11. GAMMA CHARACTERISTIC SELECT SWITCH

The camera is provided with the gamma characteristic select switch. This switch is set to OFF at the factory. (For the location of the switch, refer to Fig. 7 on page 13.)

- (1) Gamma: OFF (Gamma = 1.0)
In this mode, a linear output signal in accordance with the brightness of an object can be obtained.
- (2) Gamma: ON (Gamma = 0.45)
This mode is suitable for viewing a picture on a monitor screen.

12. GAIN SELECT SWITCH

The gain of the camera can be switched between the normal gain mode and the AGC mode. This switch is set to the normal gain mode at the factory. (For the location of the switch, refer to Fig. 7 on page 13.)

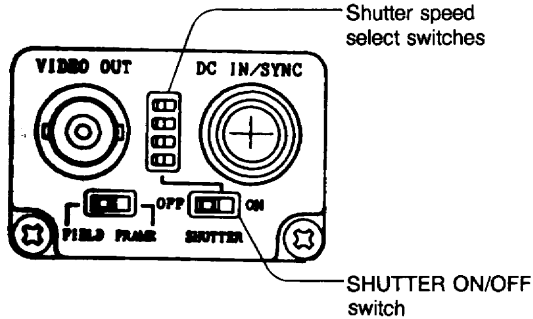
(1) Normal gain mode

In this mode, the video gain is fixed. (The noise amount is also fixed.)

(2) AGC mode


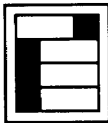


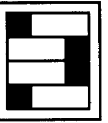

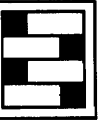


When the illumination on an object becomes lower than the rated level, gain is automatically increased. As gain increases, noise also increases.

13. HOW TO USE ELECTRONIC SHUTTER



Set the SHUTTER ON/OFF switch to ON, then set a shutter speed with the shutter speed select switches. (The shutter operates in the field integration mode.)

Setting of shutter speed

Speed(second)	※ 1	※ 2	1/125	1/250	1/500	1/1000	1/2000	1/4000	1/10000
Setting position									

※ 1 1/60(EIA), 1/50(CCIR)

※ 2 1/100(EIA), 1/120(CCIR)

The higher the shutter speed, the greater the effect. However, since sensitivity lowers, adjust the lens iris or increase illumination. When the shutter is used, the flicker of an object may be emphasized. In such a case, use a light such as a DC lighting lamp which causes no flicker.

14. EXTERNAL SYNCHRONIZATION (2:1 INTERLACED)

When operating the camera by external drive signals, connect sync drive signals (HD,VD) to the DC IN/SYNC connector, then the mode is automatically switched from the internal sync mode to the external sync mode.

- **Input signals**

HD and VD signals

HD EIA : $f(H) = 15.734\text{kHz} \pm 1\%$

CCIR : $f(H) = 15.625\text{kHz} \pm 1\%$

VD EIA : $f(V) = 59.94\text{Hz}$ [$f(V) = f(H) \div 262.5$]

CCIR : $f(V) = 50\text{Hz}$ [$f(V) = f(H) \div 312.5$]

- **Input level**

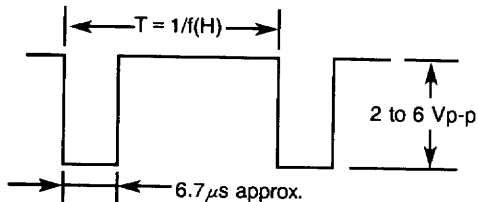
HD 2 to 6Vp-p, negative

VD 2 to 6Vp-p, negative

- **Input impedance** 1k ohms

- **Input waveforms**

- Horizontal drive signal (HD)



- Vertical drive signal (VD)

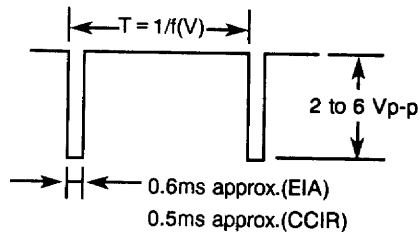
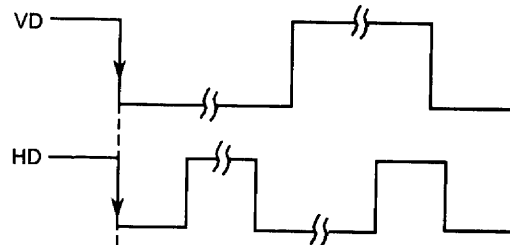


Fig. 8

- **Phase relationship between horizontal drive signal (HD) and vertical drive signal (VD)**



Adjust the phases so that the falling edges of HD and VD are in phase ($0 \pm 5\mu\text{s}$).

Fig. 9

15. NON-INTERLACED OPERATION

When non-interlaced external sync drive signals (HD/VD) are connected from an external unit, the mode is automatically switched to non-interlaced scanning mode. When the following external sync drive signals are connected, the camera operates in the non-interlaced mode.

- Input signals HD EIA : $f(H) = 15.734\text{kHz} \pm 1\%$
CCIR : $f(H) = 15.625\text{kHz} \pm 1\%$
VD EIA : $f(V) = f(H) \div (260 \text{ to } 1023) \text{ (Hz)}$
CCIR : $f(V) = f(H) \div (310 \text{ to } 1023) \text{ (Hz)}$

- Input level 2 to 6Vp-p, negative
- Input impedance 1k ohms
- Waveforms of external drive signals (non-interlaced scanning)
The waveforms are the same as those of 2:1 interlaced external sync drive signals. Refer to Fig 8.

16. FIELD-ON-DEMAND FUNCTION

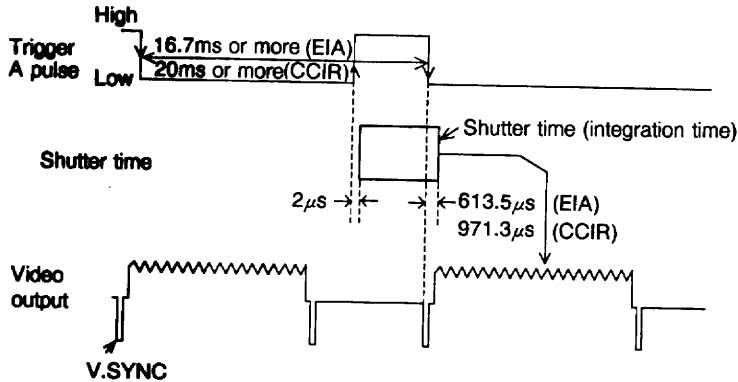
The KP-M2/M3 is provided with the Field-on-Demand function to record a picture obtained at an optional timing by triggering to an image memory, etc. Four modes are switchable by the internal switch.

- 1) ONE trigger mode
- 2) TWO-trigger mode
- 3) Fixed shutter mode: 1/1600s (EIA)/1/1000s(CCIR)
- 4) External shutter control mode

For the switch position and setting, see Fig. 7 on page 13.

Set the electronic shutter to OFF.

16.1 ONE trigger mode



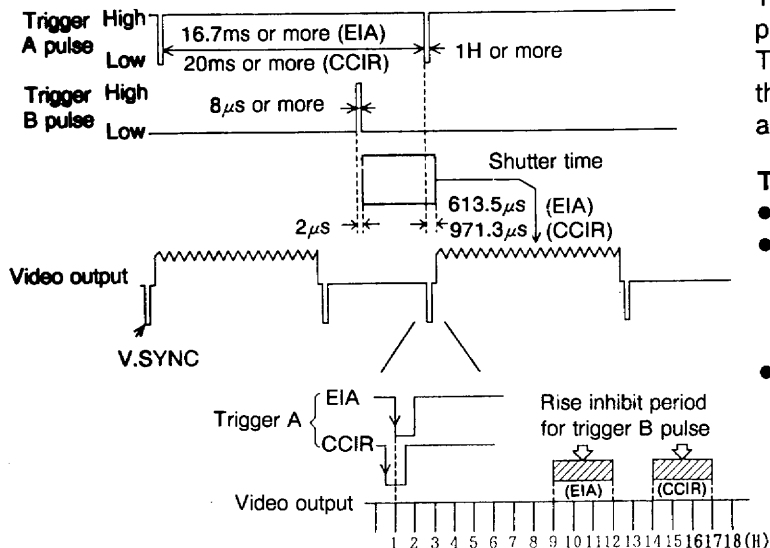
The shutter is started by the rising edge of the trigger A pulse, and V. SYNC is reset by the falling edge of the trigger A pulse. (After reset, the first field is delivered) A shutter time is controlled by the duration when the trigger pulse is high.

Only one field image is delivered by one trigger pulse, and a sync signal lasts till the next pulse.

Trigger pulse

- 5Vp-p + 0.5/-1.0Vp-p
- Low period: EIA: 16.7ms or more
CCIR: 20ms or more
- High period: $8\mu\text{s}$ or more

16.2 TWO trigger mode



V.SYNC is reset by the falling edge of the trigger A pulse. (After reset, the first field is delivered.)

The shutter is started by the rising edge of the trigger B pulse.

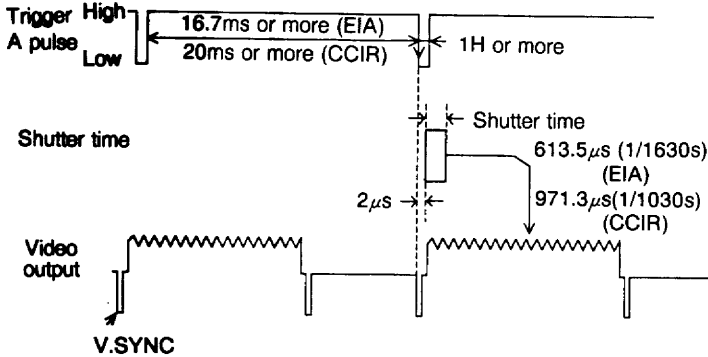
The trigger B pulse is inhibited from the falling edge of the trigger A pulse to 9 to 12H (EIA)/14 to 17H (CCIR), and a correct picture is not obtained.

Trigger pulses

- 5Vp-p
- Trigger A: Low period: EIA: 63.5µs or more
CCIR: 64µs or more
High period: EIA: 16.7ms or more
CCIR: 20ms or more
- Trigger B: Low period: Not specified
High period: 8µs or more

+ 0.5/-1.0Vp-p

16.3 Fixed shutter mode: 1/1600s (EIA)/1/1000s (CCIR)



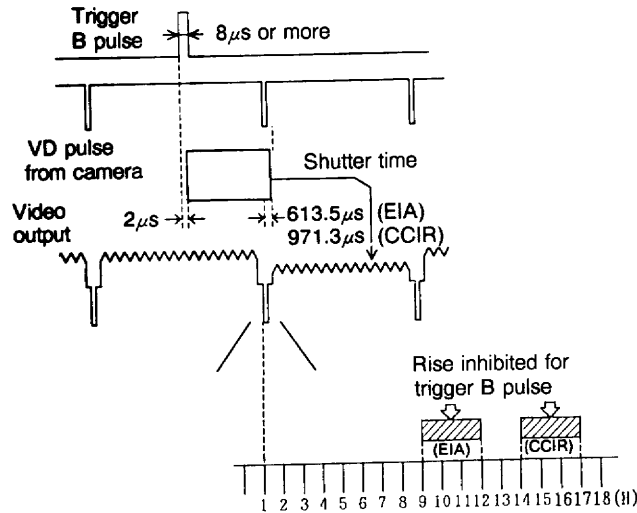
Trigger pulse

- 5Vp-p + 0.5/-1.0Vp-p
- Low period: EIA: 63.5 μ s or more
CCIR: 64 μ s or more
- High period: EIA: 16.7ms or more
CCIR: 20ms or more

The shutter is started by the falling edge of the trigger A pulse, and at the same time V.SYNC is reset. (After reset, the first field is delivered.)

In this mode, the shutter speed is fixed to 1/1600s (EIA)/1/1000s (CCIR). Only one field is delivered by one trigger pulse, and a sync signal lasts till the next pulse.

16.4 External shutter control mode



The shutter is started by the rising edge of the trigger B pulse. The shutter is effective only for the next field of the pulse input. When the trigger B pulse is not supplied, the normal exposure results.

The V.SYNC pulse of the camera is not reset.

Trigger pulse

- 5Vp-p +0.5/-1.0Vp-p
- Low period: Not specified
- High period: $8\mu\text{s}$ or more

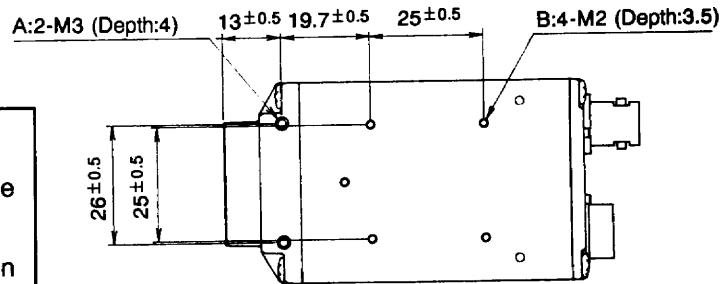
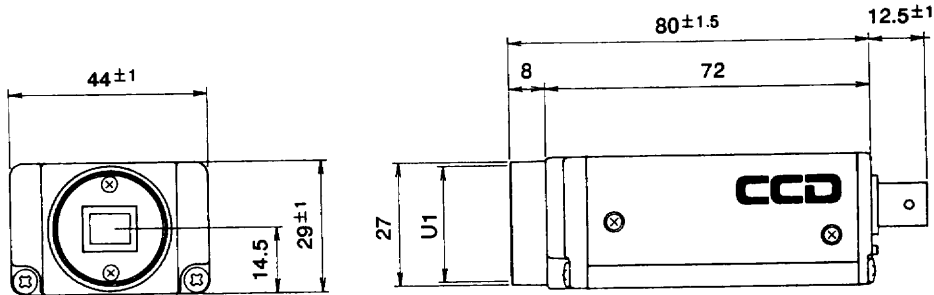
	CCIR: 621 to 2047 TV lines/2 fields (1 field: 51 to 15Hz)	(17) Electronic shutter:	1/10000, 1/4000, 1/2000, 1/1000, 1/500, 1/250, 1/125, 1/120(CCIR), 1/100(EIA) OFF(normal exposure) Set to OFF at the factory.
Non-interlaced	EIA: 260 to 1023 TV lines/field (1 field: 61 to 15Hz)	(18) Integration mode:	Field or frame integration mode Set to frame integration mode at the factory.
	CCIR: 310 to 1023 TV lines/field (1 field: 51 to 15Hz)	(19) Gamma correction:	Gamma = 1.0 or correction Set to 1.0 at the factory.
(12) Video output:	1.0Vp-p, 75 ohms, unbalanced Video: 0.7Vp-p Sync: 0.3Vp-p, negative	(20) AGC:	Fixed gain or AGC Set to fixed gain at the factory.
(13) Horizontal resolution	EIA: 570 TV lines	(21) Field-on-Demand function	● ON/OFF switchable by internal switch ● Switchable modes: ONE trigger, TWO-trigger, 1/1600s (EIA)/1/1000s (CCIR) fixed shutter, external shutter control, OFF (normal exposure) * Set to OFF at the factory
Vertical resolution	CCIR: 560 TV lines EIA: 485 TV lines CCIR: 575 TV lines	(22) Power requirement:	12V DC \pm 1V
(14) Sensitivity:	400 lx, f4, 3200K	(23) Power consumption:	180mA approx.
(15) Minimum illumination:	0.5 lx, f1.4, AGC and GAMMA: ON, without IR cut filter		
(16) S/N:	56dB		

- (24) Ambient temperature and humidity**
- Operating** -10 to 50°C, 90% RH or less
 - Full specification** 0 to 40°C, 50 to 70% RH
 - Storage:** -20 to 60°C, 70% RH or less
- (25) Resistance to vibration:** 9G max.(Cycle: 10 to 60Hz,amplitude:0.98 mm constant)
7G constant (Cycle: 60 to 150Hz, amplitude-variable)
(Cycle: 10 to 150Hz per minute, 30 min in each direction of X, Y and Z)
- (26) Dimensions:** 44(W) × 29(H) × 72(D) mm
- (27) Mass:** 120g approx.

※ Specifications are subject to change without notice.

18. EXTERNAL VIEW

● Camera KP-M2/M3



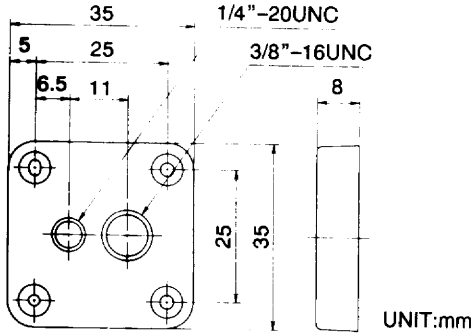
Caution

For installation of the camera, use camera mounting holes A or B.

When a heavy lens is used, or when excessive shock or vibration is applied, fix the lens to the equipment, too.

UNIT:mm

● Tripod adaptor TA-M1

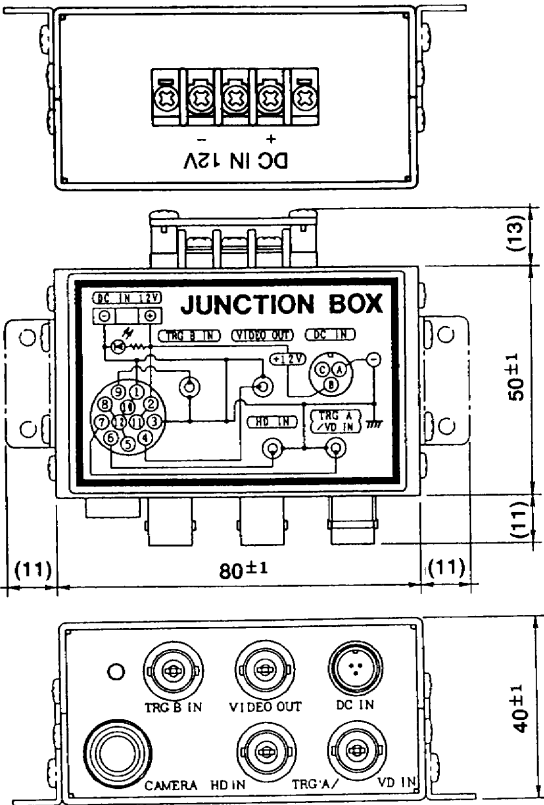


Secure the adaptor to camera mounting holes B, using four supplied screws(M2 × 5).

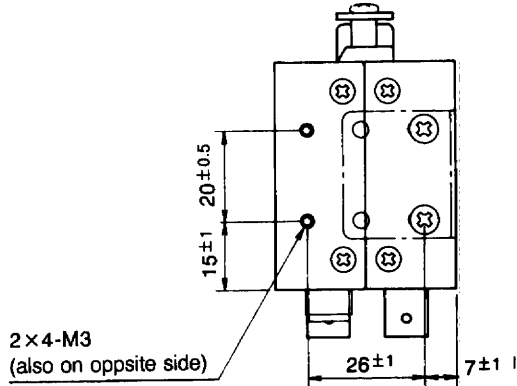
Note:

If the screws are too long, they will cause trouble to the camera.

Be sure to check the length before use.



● Junction box JU-M1A



UNIT:mm

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