

Progressive Scan Type

Black and White Camera

**KP-F2A/B**

## **OPERATION MANUAL**

Please read this operation manual carefully for proper operation, and keep it for future reference.

 **Hitachi Denshi, Ltd.**

CCDカメラ

**KP-F2A/B**

## **取扱説明書**

この取扱説明書には、あなたや他の人々への危害や財産への損害を未然に防ぎ、この機器を安全にお使いいただくために、守っていただきたい事項を示しています。ご使用になる前に、取扱説明書をよくお読みいただき、正しい使い方でご愛用ください。

お読みになった後も、この機器のそばなどいつも手元に置いてご使用ください。

 **日立電子株式会社**

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# 1. GENERAL

The Hitachi KP-F2A/B is a full frame shutter black and white camera using a 1/3-inch CCD having all pixel readout and sensitivity to near infrared light.

Among the many features are high performance, high sensitivity and high resolution. The broad array of functions includes multiple step electronic shutter,

external HD/VD sync, field/frame on demand and non-interlaced scanning.

The square lattice unit CCD pixels from a picture suitable of image processing systems.

# 2. MAJOR FEATURES

- Frame shutter function
- Choice of frame output (Type A) or simultaneous odd and even field outputs (Type B).
- Multiple step electronic shutter (Type B)
- Selectable internal/external synchronization (interlaced and non-interlaced)
- Frame/field-on-Demand function

# 3. COMPOSITION

## Standard composition

- (1) Camera body (w/grass)
- (2) Operation manual

## Optional accessories

- (1) Lens
- (2) Tripod adaptor, TA-M1
- (3) 12-pin plug, HR10A-10P-12S(01)

- (4) 6-pin plug, HR-10A-7R-6P(01)
- (5) AC adaptor, AP-130
- (6) Junction box, JU-F1
- (7) Dummy grass (AR coated)
- (8) Camera cables
  - 2m: C-201KSM or KSS
  - 5m: C-501KSM or KSS
  - 10m: C-102KSM or KSS
- (9) Trigger cables
  - 2m: C-201RK
  - 5m: C-501RK

# 4. NAME OF EACH SECTION

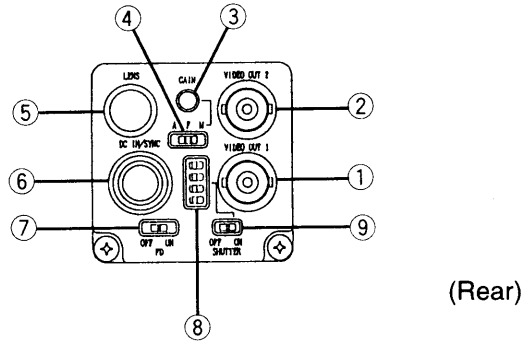


Fig. 1

## (1) Video Out 1 (BNC)

Composite video signal (VS) output (VIDEO OUT 1).

## (2) Video Out 2 (BNC)

Composite video signal (VS) output (VIDEO OUT 2). Type B.

## (3) Manual gain control

Adjustable when switch 4 is set to M (effective only for Video Out 1).

## (4) Gain select switch

Selects gain adjustment (effective only for Video Out 1).

A : Automatic (AGC)

F : Fixed

M : Manual

## (5) LENS (Trigger) connector

Use for iris lens, WEN signal output.

## (6) DC In/Sync connector

Connector for DC 12 V supply, composite video signal (VS) output and external sync input.

## (7) FD mode on/off

The frame/field on demand mode can be switched on and off as required.

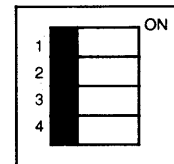
## (8) Shutter speed select switches

Set the shutter speed.  
Switches FD mode (1).

## (9) Shutter on/off switch

Shutter mode is produced in the on position.

Switch FD on when using fixed shutter.

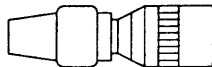


# 5. SIGNAL CONNECTION TO CONNECTOR

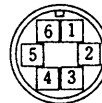
DC IN/SYNC  
HR10A-10P-12S(01)  
Product code : 23810AX



Viewd from this side



LENS  
HR10A-7P-6P(01)  
Part code : JMH0092



Viewd from this side



### (1)Signal connection to each pin

Pin No.	Internal sync mode	External sync mode		
		HD/VD	Frame/Field On-Demand	
			ONE Trigger	Fixed shutter
1	GND	GND	GND	GND
2	+12V	+12V	+12V	+12V
3	VIDEO 1 (GND)	VIDEO 1 (GND)	VIDEO 1 (GND)	VIDEO 1 (GND)
4	VIDEO 1 (Signal)	VIDEO 1 (Signal)	VIDEO 1 (Signal)	VIDEO 1 (Signal)
5	—	HD (GND)	—	—
6	—	HD (Signal)	—	—
7	—	VD (Signal)	TRIG (Signal)	TRIG (Signal)
8	VIDEO 2 (GND)	VIDEO 2 (GND)	VIDEO 2 (GND)	VIDEO 2 (GND)
9	VIDEO 2 (Signal)	VIDEO 2 (Signal)	VIDEO 2 (Signal)	VIDEO 2 (Signal)
10	GND	GND	GND	GND
11	+12V	+12V	+12V	+12V
12	—	VD (GND)	TRIG (GND)	TRIG (GND)

#### 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.
- Video 2 output at pins 8 and 9 is used for type B only.

**(2) Signal connection to LENS(trigger) connector (6 pins)**

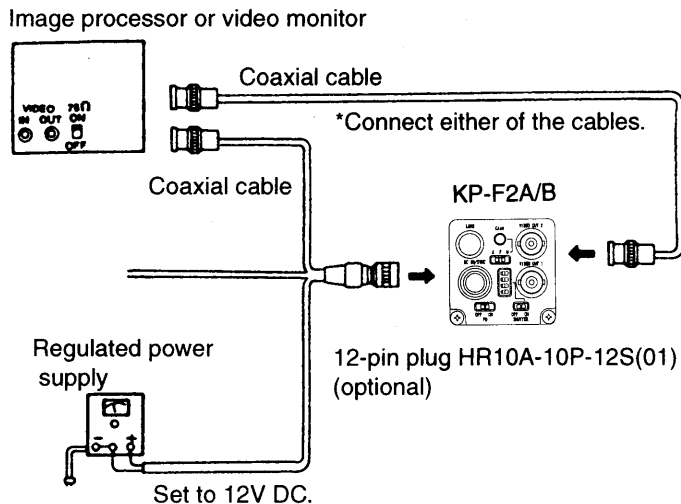
<b>PIN NO.</b>	<b>Signal</b>
1	NC
2	WEN pulse output
3	GND
4	NC
5	Auto iris VIDEO output
6	+12V

**Note:**

- The auto iris video output function cannot be used when the frame/field-on-demand function is used.
- WEN pulse output is CMOS level.
- Strobe is inhibited in the L period of WEN pulse.

# 6. HOW TO CONNECT CABLES

## 6-1 Basic connection



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

Fig. 2

- Set on 75Ω termination switch only of the end monitor when plural monitors are connected in loop-through.
- Supply HD and VD pulses to the KP-F1 for external sync drive.
- Use stable external power supply within 11 to 13V DC free from ripples or noises.
- Make sure voltage polarity before connecting external power supply.
- 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

Since type A is not EIA format, proper display is not obtained on an ordinary monitor.



## 6-2 Connection of options

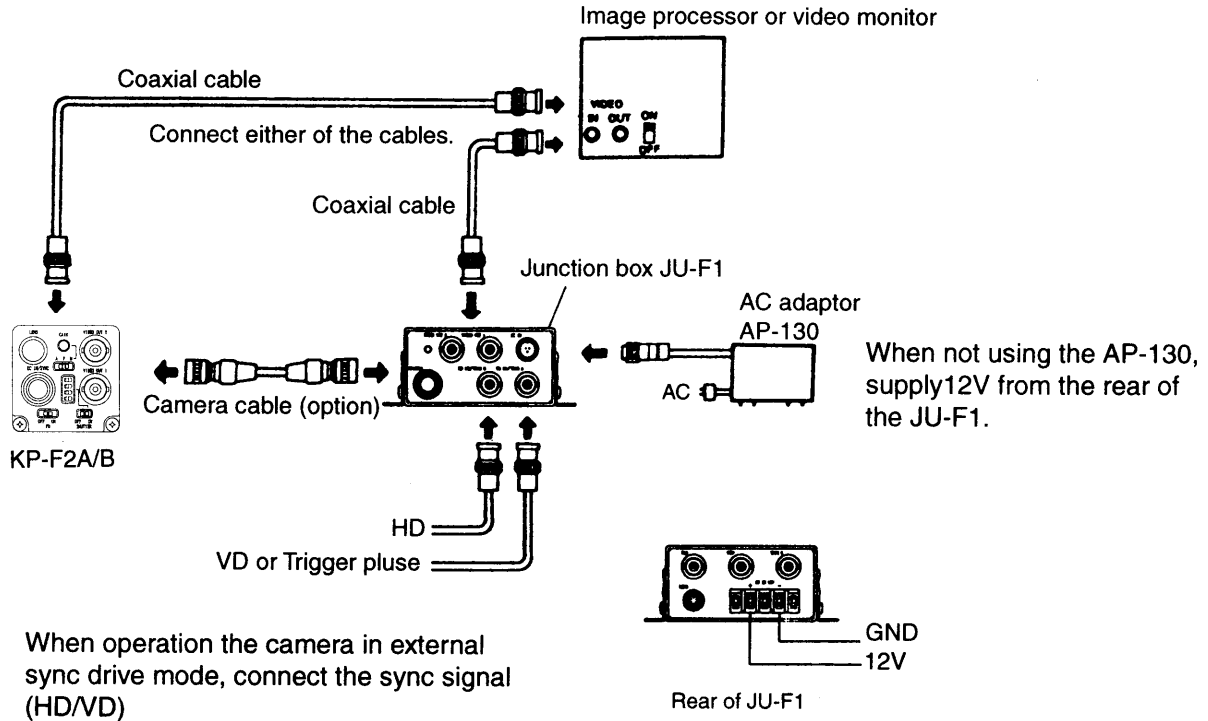
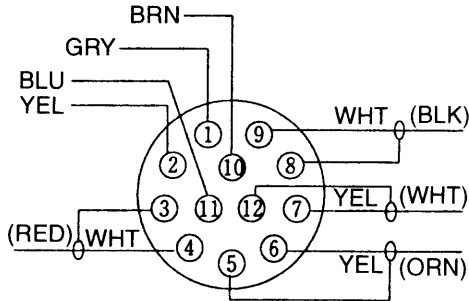


Fig. 3

## 6-3 Optional cables

### (1) Camera cable

Cables dedicated for connecting the camera head and the junction box JU-F1 are available as option.



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

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-201KSM (2m).

### (2) Trigger cable

Length	Type
2m	C-201RK
5m	C-501RK

#### NOTE:

In Europe, use the following cables.

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

## 7. OPTICAL SYSTEM

- Image size: 1/3-inch
- The flange focal distance is 17.526mm (in air).
- Flange focal distance cannot be adjusted.

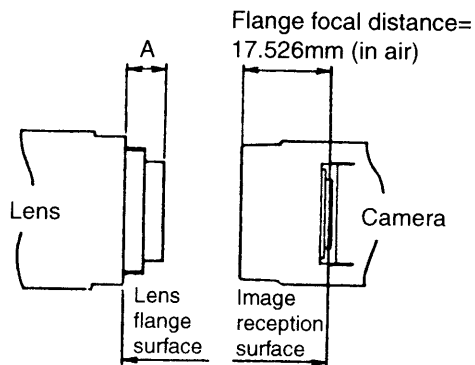


Fig. 5

**Note:**  
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.

## 8. OPTICAL FILTER

This camera is provided with a dummy glass.

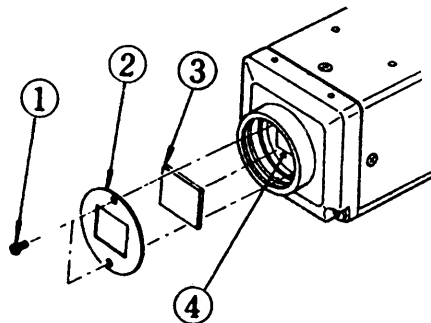


Fig. 6

### How to remove the dummy glass.

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

### Caution

Prior to removal of the optical filter, be sure to turn off the power.

# 9. ARRANGEMENT OF INTERNAL SWITCHES

## Gamma correction

Factory setting is OFF (1.0), but it is changeable if necessary.

VIDEO OUT 1 and VIDEO OUT 2 can be set separately.

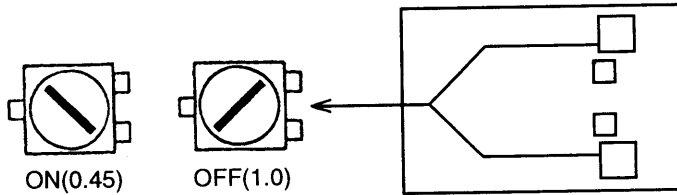
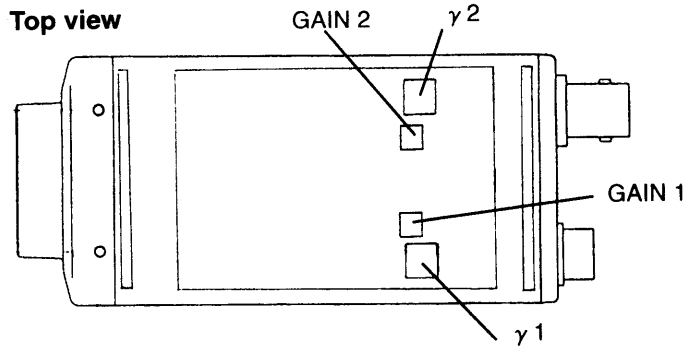


Fig. 7 VIDEO BOARD

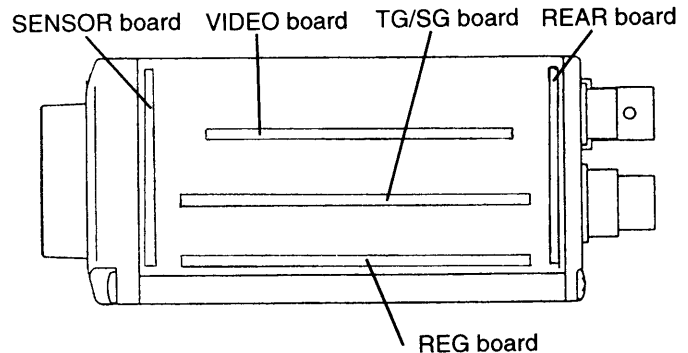
## Caution

1. Prior to switching a switch, be sure to turn off the power.
2. Do not turn on the power with the cover removed.
3. Do not touch to parts other than specified.

## Top view

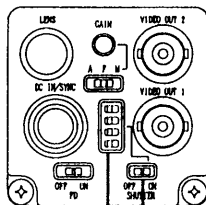


## Side view



# 10. HOW TO USE ELECTRONIC SHUTTER

The electric shutter speed is set by turning the ON/OFF switch to the ON position and using the shutter speed selection switch. The shutter always operates in the field storage mode



Shutter speed select switches

SHUTTER ON/OFF switch

## Setting of shutter speed

<b>Speed (second)</b>	1/60	1/125	1/250	1/500
<b>Setting position</b>				
<b>Speed (second)</b>	1/1000	1/2000	1/4000	1/8000
<b>Setting position</b>				

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.

# 11. SETTING OF FRAME/FIELD-ON-DEMAND FUNCTION

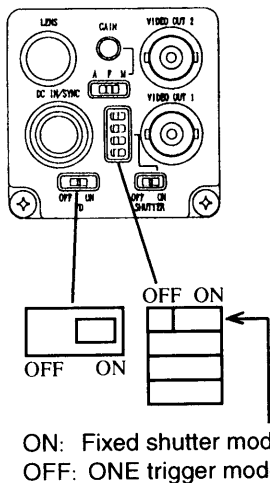
The Frame/field-on-demand function is set as follows.

\* The shutter speed is set in the fixed shutter mode.

Shutter ON/OFF switch: ON

shutter speed selection switch: shutter speed is set.

(Refer to setting of electronic shutter.)



# 12. VIDEO OUTPUT TYPE

The frame shutter function operates in either of the following modes.

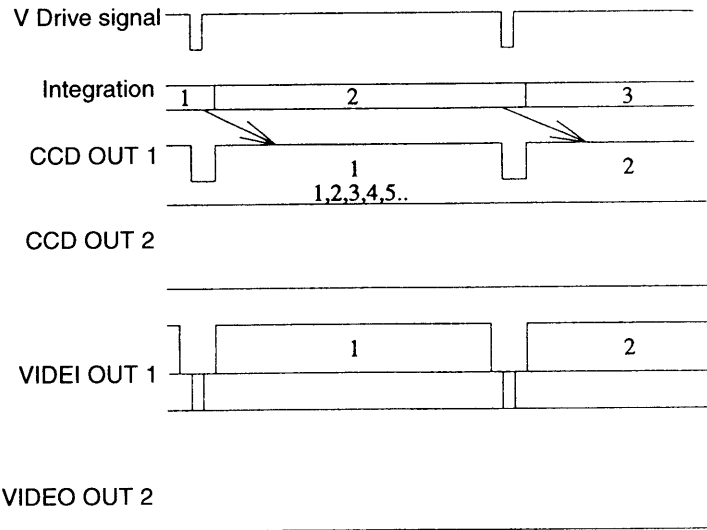
- **Frame output mode (KP-F2A)**

The non-interlaced video data of all exposed pixels are output (Video 1 only) at one frame intervals .

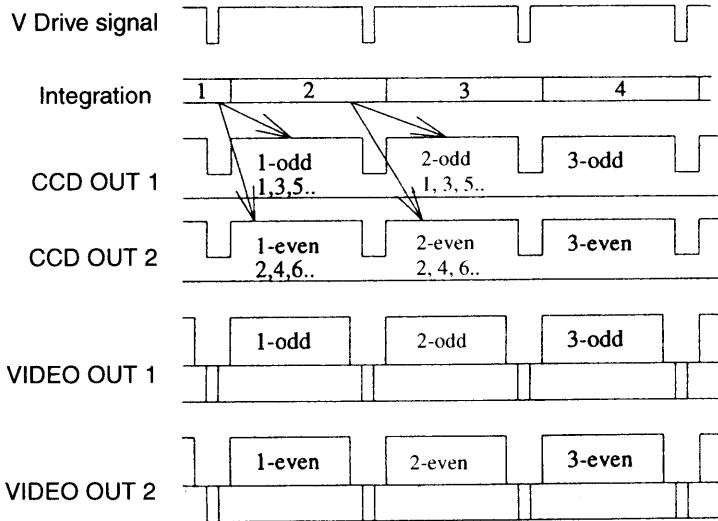
- **Simultaneous odd/even field output type (KP-F2B)**

The CCD odd and even line pixels are read simultaneously and are separately output simultaneously (video 2-channel output). The two output methods are interlaced and non-interlaced .

**KP-F2A**  
**1/30s non-interlaced**

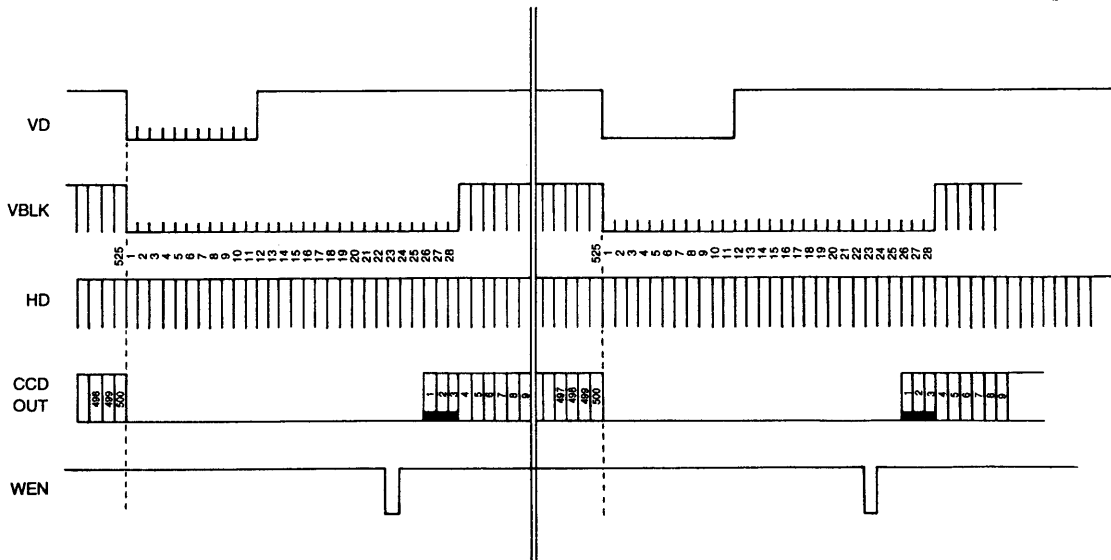


**KP-F2B**  
**1/60s non-Interlaced**





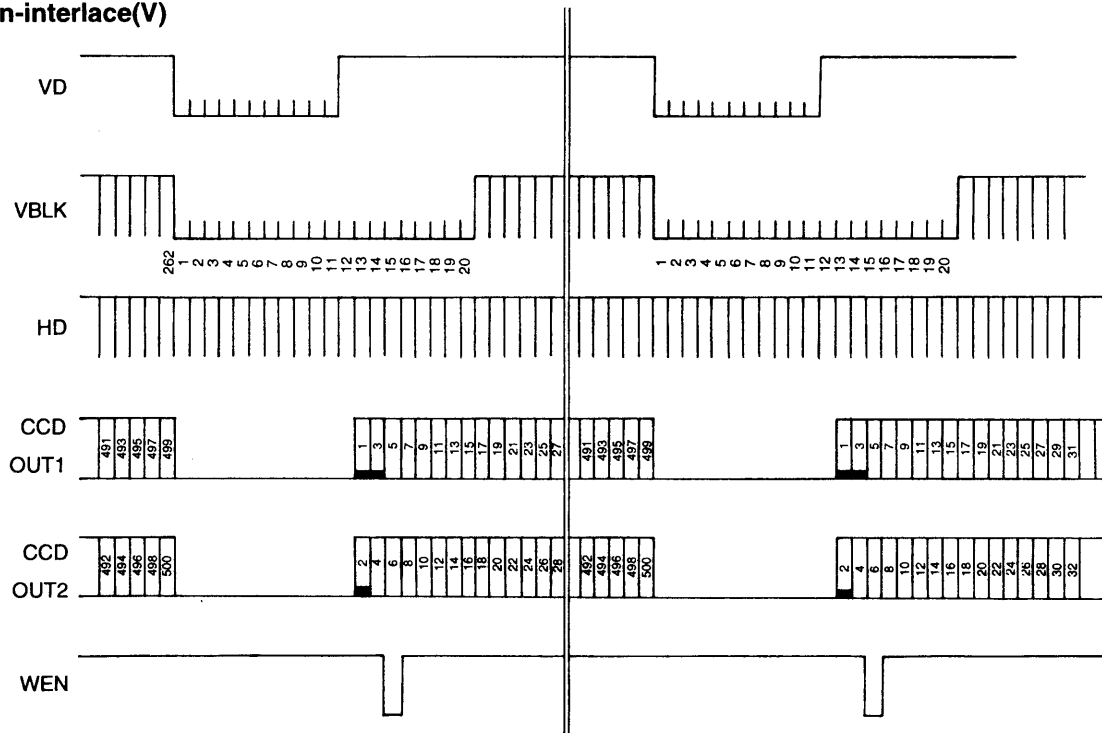
• Type A  
1/30sec non-interlace(V)



# Timing diagrams

## • Type B

### 1/60sec non-interlace(V)



# 13. EXTERNAL SYNCHRONIZATION

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

VD : Type A  $f(V)=29.97\text{Hz} [f(V)=f(H) \div 525]$

Type B  $f(V)=59.94\text{Hz} [f(V)=f(H) \div 262]$

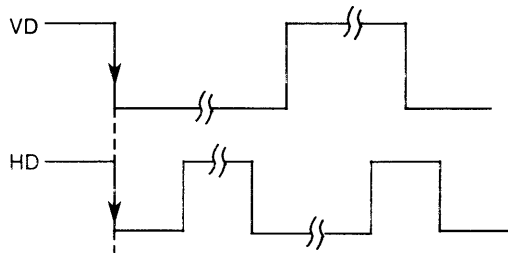
- Input level

HD 2 to 6Vp-p, negative

VD 2 to 6Vp-p, negative

- Input impedance 1k ohms

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

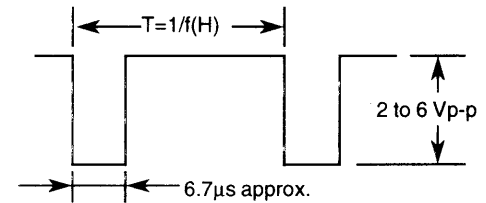


Adjust the phases so that the falling edges of HD and VD are in phase ( $0 \pm 5\mu\text{s}$ ).

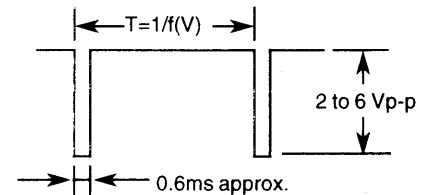
**Fig. 8**

- Input waveforms

- Horizontal drive signal (HD)



- Vertical drive signal (VD)



**Fig. 9**

## 14. FRAME/FIELD-ON-DEMAND FUNCTION

Frame/Field-on-demand refers to a function for picking up rapidly moving objects by applying a trigger pulse input at a desired timing to provide a desired or a fixed exposure time. The function is effective since the object is always

taken at the same position in the picture.

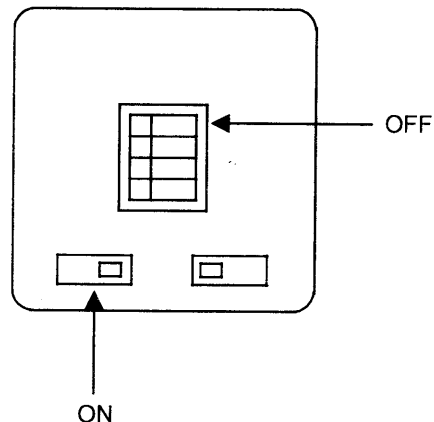
The camera is provided with four modes. Simultaneous odd and even field output and frame output can be produced for each of these modes. However, one image output is obtained per trigger.

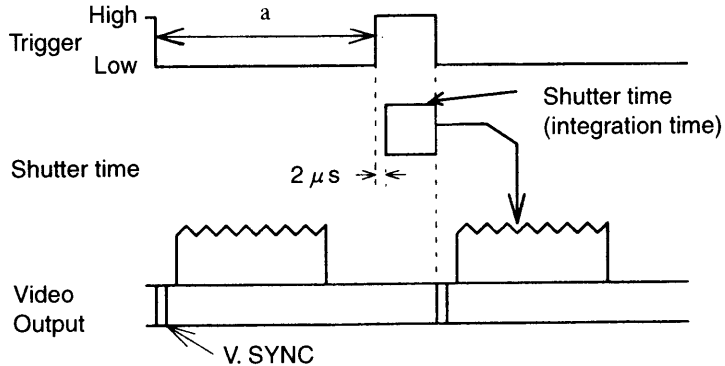
### • One trigger mode

At a single trigger pulse input (Trig), exposure starts at the pulse rising edge and ends at the pulse falling edge. The vertical sync is reset and the video output is obtained immediately.

The pulse width equals the exposure time.

Switch setting on the REAR





### Trigger specifications

- $5V_{p-p} + 0.5 / -1.0V_{p-p}$
- a: Type A: 1 frame or more : 33.4ms or more  
Type B: 1 field or more : 16.7ms or more
- High period  $8\mu s$  or more

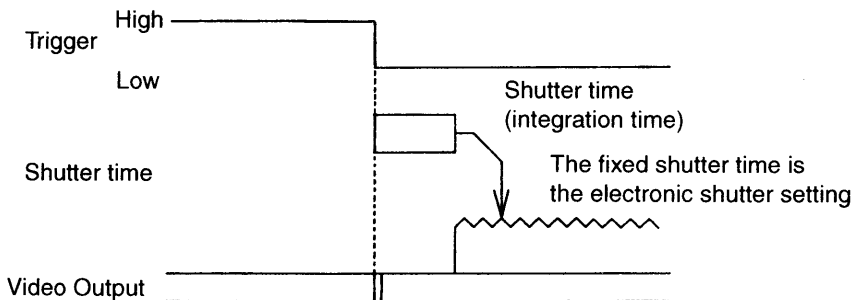
**Note** : Use a sync signal free of noise.

### •Fixed shutter mode

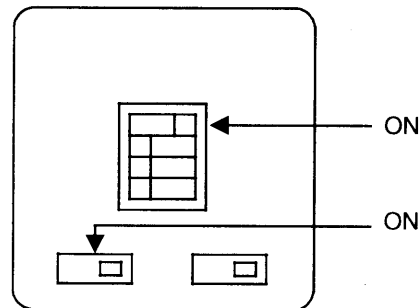
At a single trigger pulse input (Trig), exposure starts at the pulse rising edge. The exposure time is set by the camera electronic shutter switch.

The video output is obtained immediately after the end of fixed exposure.

In this mode, the vertical sync signal is absent from the video output.



### Switch setting on the REAR



**Note :** Trigger input cannot be applied to fields of the video output where a picture is produced (a normal picture will not be obtained).

Use a sync signal free of noise.

### Trigger specifications

- 5Vp-p +0.5/-1.0Vp-p
- High period 8 $\mu$ s or more

See shutter speed table of page 11.

# 15. SPECIFICATIONS

<b>(1) Imaging device:</b>	CCD	<b>(10) Ext. sync input</b>	HD/VD: 2 to 6Vp-p, negative
No. of total pixels	680(H)×500(V)		Input impedance: 1kΩ
Pixel pitch	7.4(H)×7.4(V)μm		Frequency deviation: ±1%
No. of effective pixels	658(H)×496(V)	<b>(11) Video output</b>	1.0Vp-p, 75Ω, unbalanced
<b>(2) Sensing area:</b>	4.87(H)×3.67(V) mm (1/3-inch size)		Video: 0.7Vp-p
<b>(3) format</b>	Type A: Progressive (1/30 second)	<b>(12) Sensitivity</b>	Sync: 0.3Vp-p, negative
	Type B: Non-interlace (1/60 second)	<b>(13) Minimum illumination</b>	30 Lx, f4, 3200K
<b>(4) Lens mount</b>	C-mount		0.3 Lx, f1.4, AGC:ON, gamma: ON
<b>(5) Flange focal distance</b>	17.526mm (Not adjustable)	<b>(14) Signal-to-noise ratio</b>	50dB
<b>(6) Hor. scanning frequency</b>	15.734kHz	<b>(15) Electronic shutter</b>	1/8000, 1/4000, 1/2000, 1/1000, 1/500, 1/250, 1/125
<b>(7) Vert. scanning frequency</b>	A type 29.97Hz B type 59.94Hz		(External switch selectable)
<b>(8) Sync system</b>	Internal/external (automatically switchable)		OFF mode: Normal exposure (Factory setting)
<b>(9) Int. sync operation</b>	Type A: 525 horizontal lines	<b>(16) Gamma correction</b>	1 (factory setting) or selectable by internal switch
	Type B: 262 horizontal lines (1 output line)		Separately settable to two video channels

**(17) AGC**

Fixed or AGC: Available to only VIDEO OUT 1.

The external switch is selectable.

Fixed at factory setting.

**(18) Gain selection**

VIDEO 1: Fixed or set by knob.

VIDEO 2: Fixed

The external switch is selectable.

Finely adjustable to 2 channels by knob.

(Fixed gain at factory setting)

**(19) Frame/Field-on-Demand function**

ON/OFF: Externally switchable ONE trigger, and

Fixed shutter mode selectable by external switch.

(Factory setting: OFF)

External trigger input is required.

**(20) Power supply**

12VDC $\pm$ 1V

**(21) Power consumption**

200mA or less

**(22) Ambient conditions**

Operating: -10 to 50°C,  
90%RH or less Storage:

**(23) Anti-vibration**

-20 to 60 C, 70%RH or less

7G (10 to 60Hz, amplitude: 0.98mm constant, 60 to 200Hz, amplitude: variable) (10 to 200Hz, sweep: 1 min., XYZ, 30 min.)

**(24) Resistance to shock**

70G

(Drop test, once each top, bottom, left and right)

**(25) Dimensions**

44(W) $\times$ 44(H) $\times$ 87(D)mm

**(26) Mass**

170g approx.

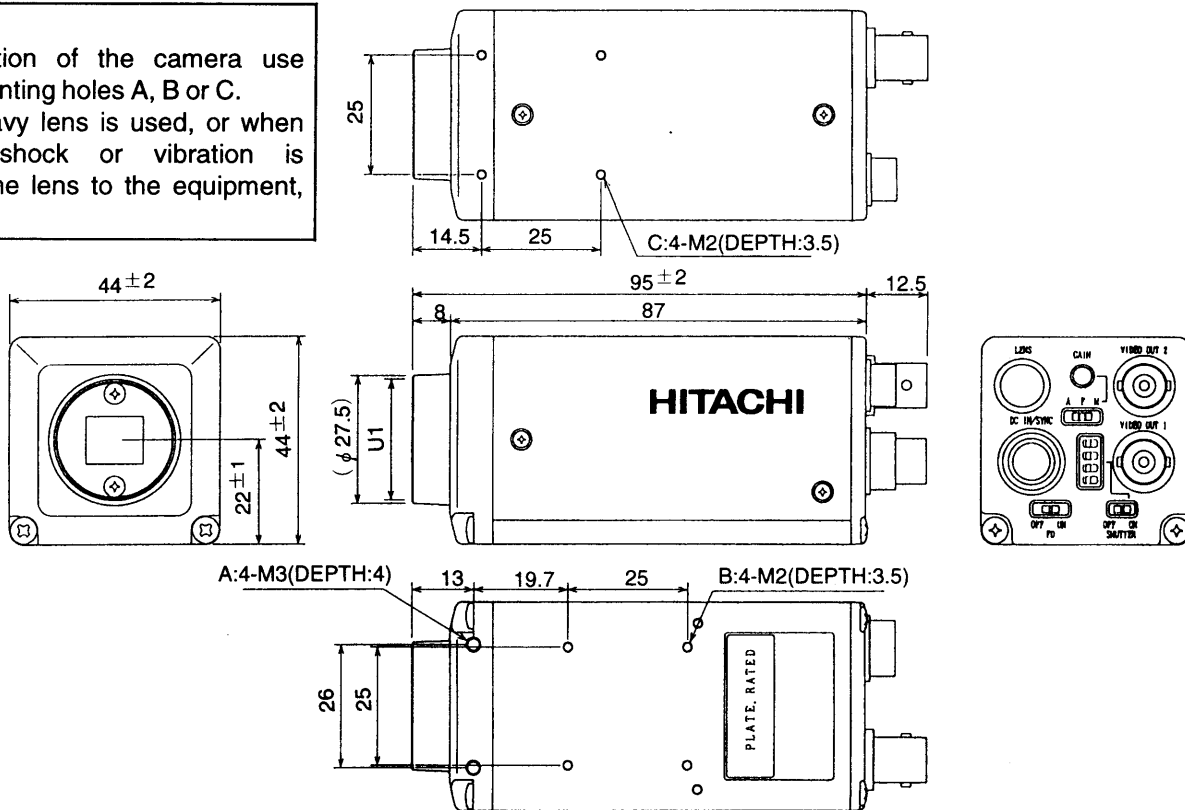


# 16. EXTERNAL VIEW

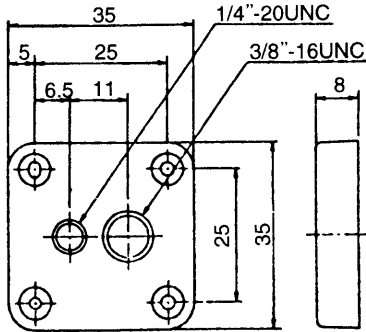
## Camera KP-F2A/B

### Caution

For installation of the camera use camera mounting holes A, B or C.  
When a heavy lens is used, or when excessive shock or vibration is applied, fix the lens to the equipment, too.



### Tripod adaptor TA-M1 (option)



UNIT: mm

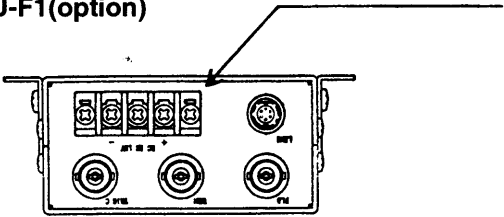
Secure the adaptor to camera mounting holes B or C, using four supplied screws(M2×5).

#### Note

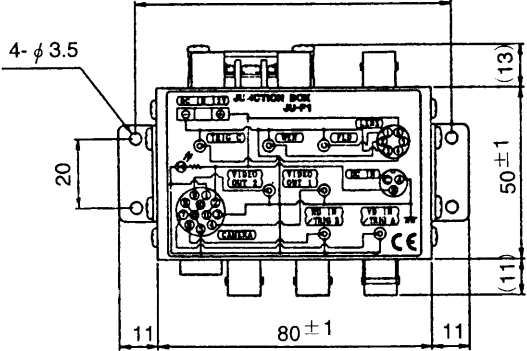
If the screws are too long, they will cause trouble to the camera.

Be sure to check the length before use.

**Junction box JU-F1(option)**



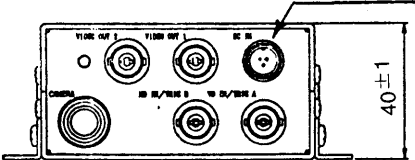
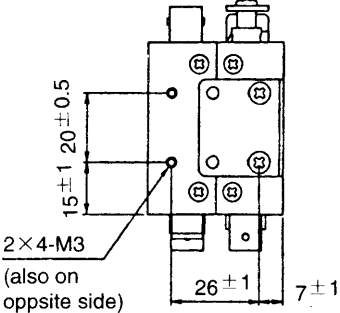
$92 \pm 1.5$



Connect power supply to these terminal when the AP-130 is not used.

**Notes:**

- \* Supply voltage ranged 11 to 13 V.
- \* Make sure voltage polarity before connection of an external power supply.
- \* Use an external power supply other then the AP-130 at your own risk.



Connects the AC adaptor AP-130 to this connector.  
MASS: APPROX. 200g

UNIT:mm

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