

Progressive Scan Type
Black and White Camera

KP-F1A

OPERATION MANUAL

Hitachi Kokusai Electric Inc.

AUG.'02

1. GENERAL

The Hitachi KP-F1A is a full-frame shutter black and white camera using a 1/2" CCD of all pixels read-out type.

The KP-F1A features high performance, high sensitivity, and high resolution. The KP-F1A is provided with a variety of functions including a multiple step

electronic shutter, integration mode switching, external HD/VD sync input, Field-on-Demand, and non-interlaced scanning functions.

A picture suitable for image processing systems is obtained, because a CCD of square lattice unit pixels is used.

2. MAJOR FEATURES

Frame shutter function

Simultaneous odd/even outputs and frame output

Multiple step electronic shutter

- Selectable internal/external synchronization (interlaced and non-interlaced)

- Field-on-Demand function

3. COMPOSITION

Standard composition

1) Camera body (with IR cut filter)

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

5m: C-501KSM

10m: C-102KSM

(9) Trigger cables 2m: C-201RK

5m: C-501RK

4. NAME OF EACH SECTION

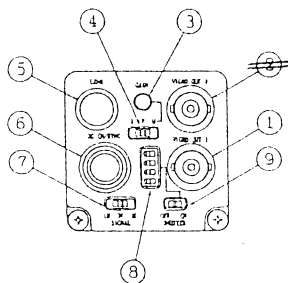


Fig. 1

(Rear)

(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).

(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, FLD signal output and trigger signal input C.

(6) DC In/Sync connector

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

(7) Video output mode select switch

The following modes can be selected.

2I: Continuous interlaced odd and even field signals are respectively output from Video Out 1 and Video Out 2 at 1/60 s (CCIR: 1/50 s).

2N: Continuous odd and even field signals are respectively output from Video Out 1 and Video Out 2 at 1/60 s (CCIR: 1/50 s).

1N: Non-interlaced output at 1/30 s (CCIR: 1/25 s) is obtained only from Video Out 1.

(8) Shutter speed select switches

Set the shutter speed.

(9) Shutter on/off switch

Shutter mode is produced in the on position.

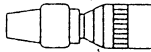
5. SIGNAL CONNECTION TO CONNECTOR

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

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



Viewd from this side



Viewd from this side



3

(1)Signal connection to each pin

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

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

PIN NO.	Signal
1	FLD pulse output
2	WEN pulse output
3	GND
4	TRIG C input (SYNC N. R. only)
5	Auto iris VIDEO output
6	+ 12V

Note:

The FLD pulse is not output in the field-on-demand function.

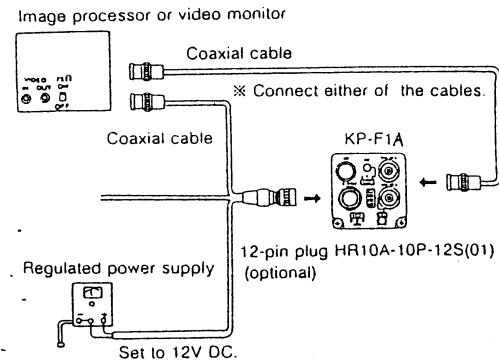
The auto iris video output function cannot be used when the field-on-demand function is used.

FLD and 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



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

Fig. 2

6-2 Connection of options

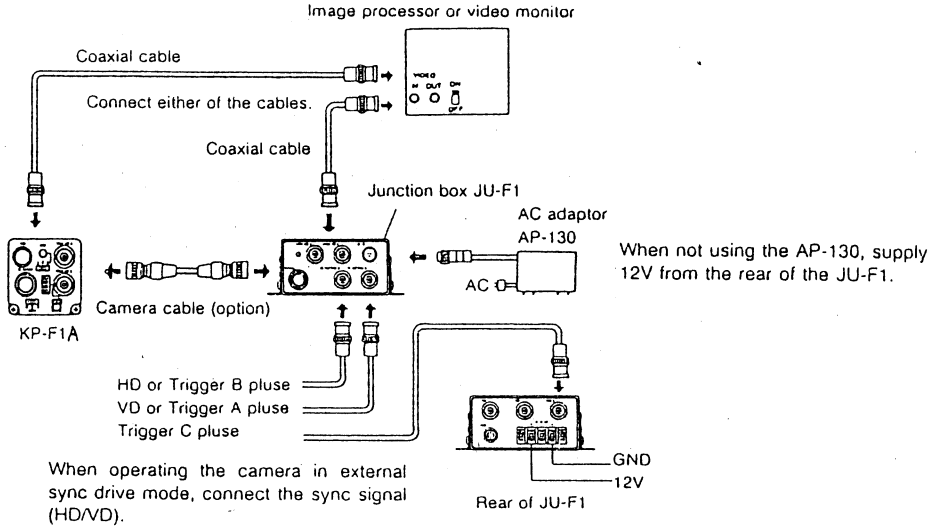


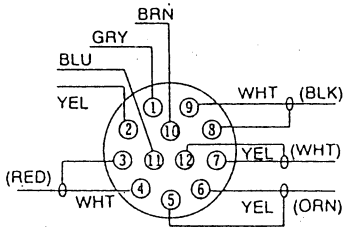
Fig. 3

7

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-201KSH
5m	C-501KSH
10m	C-102KSH

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).

(2) Trigger cable

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

- Image size: 1/2-inch
- The flange focal distance is 17.526mm (in air).
- Flange focal distance cannot be adjusted.

This camera is provided with an IR cut filter.

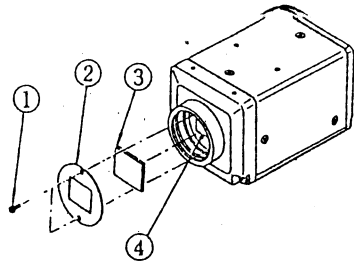
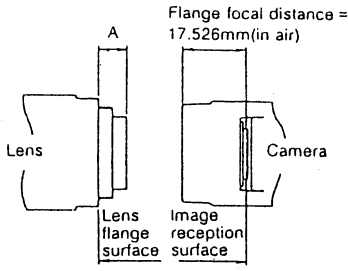


Fig. 6

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.

Fig. 5

How to remove the IR cut filter.

- (1) Remove two screws ① 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.

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.

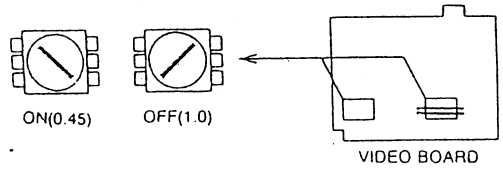
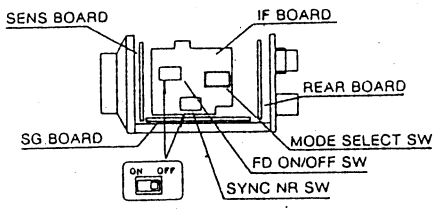
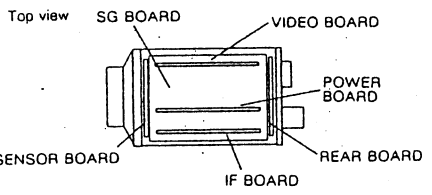
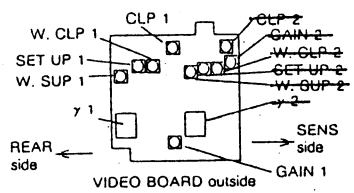
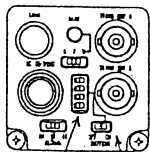


Fig. 7



- Caution**
1. Prior to switching the FIELD/FRAME 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.

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

Speed (second)	※ 1	※ 2	1/125	1/250	1/500
Setting position					
Speed (second)	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.

11. SETTING OF FIELD-ON-DEMAND FUNCTION

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

Mode	SW301	SW302								SW303
		1	2	3	4	5	6	7	8	
Initial setting							ON			
ONE trigger	ON	ON	ON	ON	ON					
TWO trigger	ON	ON	ON		ON	ON				
Fixed shutter*	ON									
SYNC NR			ON					ON		ON

Note: Blanks mean OFF.

* The switch on the rear 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.)

SW301 : FD ON/OFF SW

SW302 : MODE SELECT SW

SW303 : SYNC NR SW

2. VIDEO OUTPUT MODES

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

• Simultaneous odd/even field output mode
 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.

There are two kinds of output methods: interlaced (2I) and non-interlaced (2N).

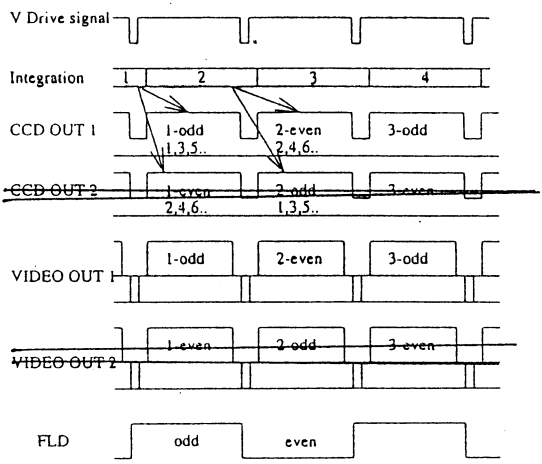
Non-interlaced (2N) :

- EIA: 518 lines/frame
- CCIR: 620 lines/frame

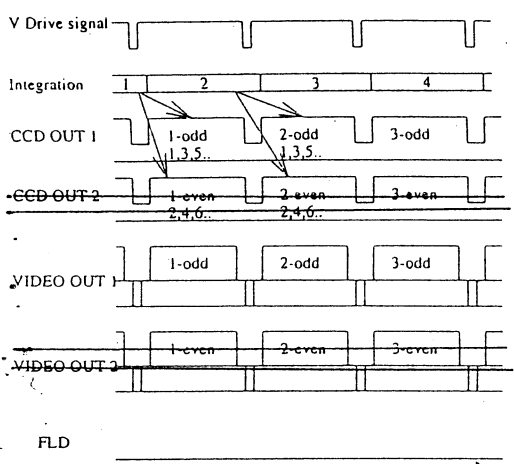
• Frame output mode

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

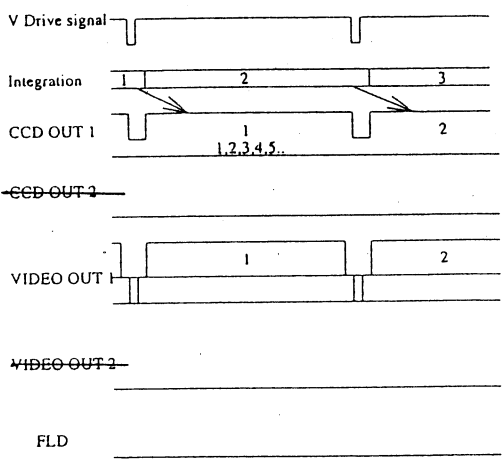
Interlaced (EIA: 1/60 s, CCIR: 1/50 s)



Non-interlaced (EIA: 1/60 s, CCIR: 1/50 s)

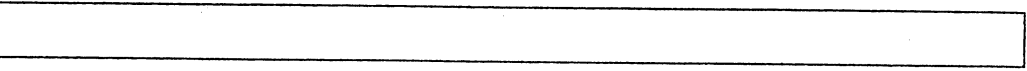
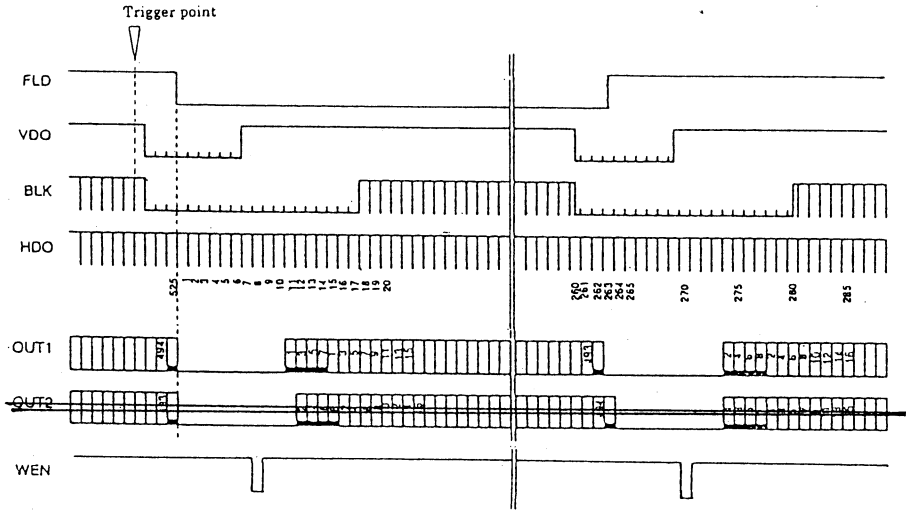


1/30 s (CCIR: 1/25 s) non-interlaced

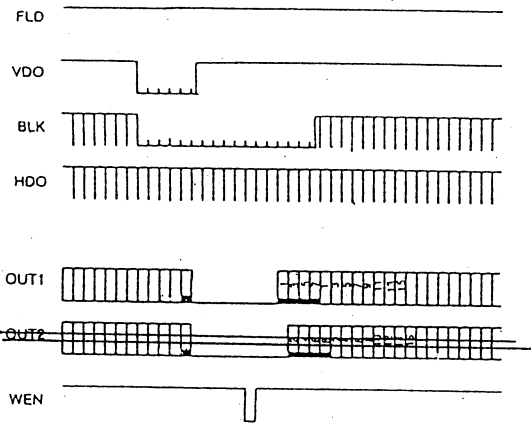


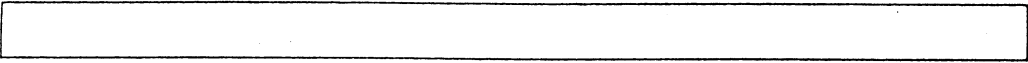
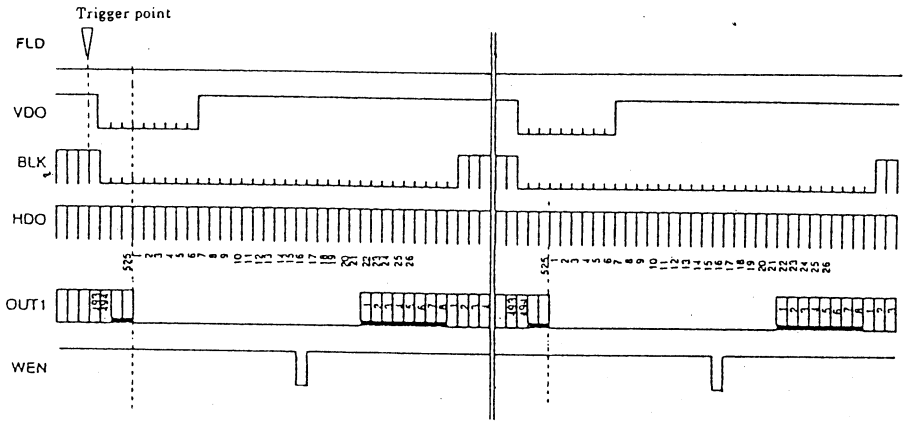
Timing diagrams

- EIA
- 1/60sec interlace(V)

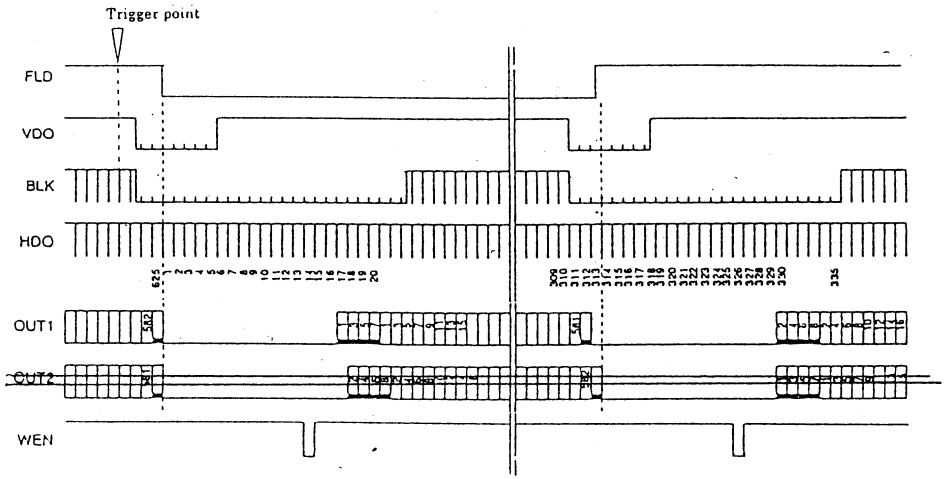


1/60sec non-interlace(V)

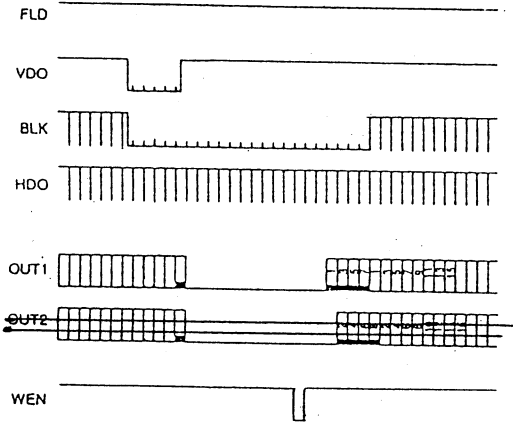




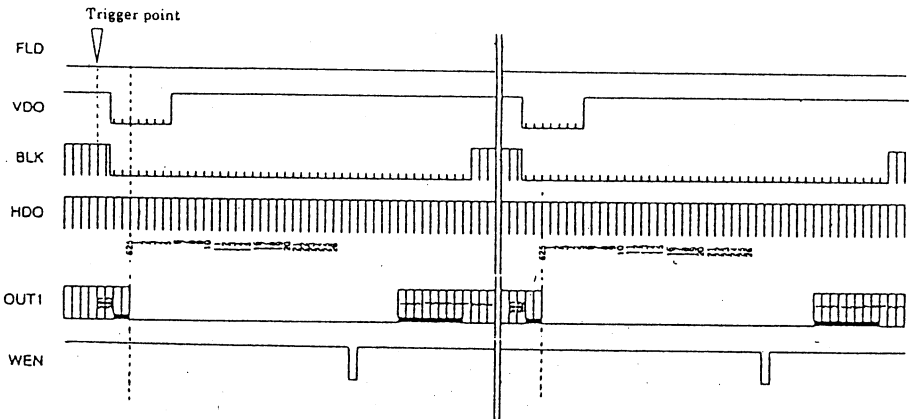
• CCIR
1/50sec interlace(V)



1/50sec non-interlace(V)



1/25sec non-interlace(V)



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

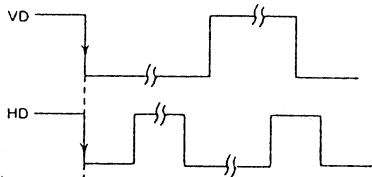
- Input level

- HD 2 to 6Vp-p, negative

- VD 2 to 6Vp-p, negative

- Input impedance 1k ohms

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

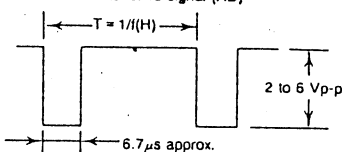


Adjust the phases so that the falling edges of HD and VD are in phase ($0 \pm 5\mu\text{s}$).

Fig. 8

- Input waveforms

- Horizontal drive signal (HD)



- Vertical drive signal (VD)

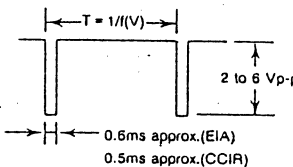


Fig. 9

14. 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 and VD signals

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

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

- VD EIA : $f(V) = f(H) \div (262 \pm 2)(\text{Hz})$

- CCIR : $f(V) = f(H) \div (312 \pm 2)(\text{Hz})$

- Input level

- 2 to 6Vp-p, negative

- Input impedance

- 1k ohms

- Waveforms of external drive signal (non-interlaced scanning).

The waveforms are the same as those of 2:1 interlaced external sync drive signals.

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.

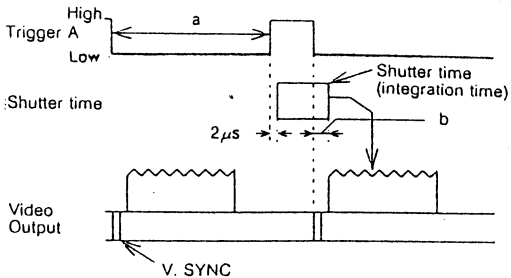
The camera is provided with four modes. Simultaneous odd and even field output and frame output can be produced for each of these modes. However, one image output is obtained per trigger.

This function is unavailable in the 2N mode.

• One trigger mode

At a single trigger pulse input (Trig-A), 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.

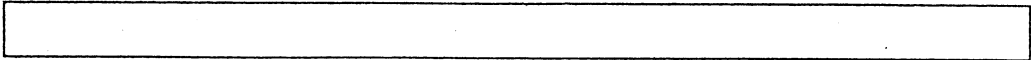
The pulse width equals the exposure time.



Trigger specifications

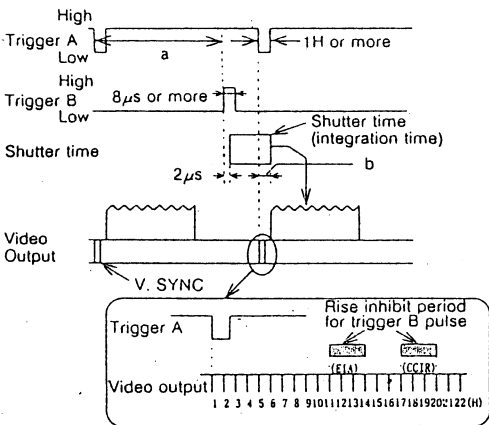
- 5Vp-p + 0.5/-1.0Vp-p
- a: 2I: 1 field or more EIA : 16.7ms or more
CCIR : 20ms or more
1N: 1 frame or more EIA : 33.4ms or more
CCIR : 40ms or more
- b: 2I: 741.6µs(EIA)
1131.3µs(CCIR)
1N: 1250.1µs(EIA)
2027.3µs(CCIR)
- High period 8µs or more

Note : Use a sync signal free of noise.



• Two trigger modes

Two trigger pulses are input. Exposure starts at the Trig-B rising edge and ends at the Trig-A falling edge. The vertical sync is reset and the video output is obtained immediately. The interval between the two trigger pulses equals the exposure time.



Trigger specifications

- 5Vp-p + 0.5/-1.0Vp-p
- Trig-A Low Period : EIA 63.5 µs or more
CCIR 64 µs or more
- Trig-B Low period : Not specified
High period : 8µs or more
- a: 2I: EIA : 16.7ms or more
CCIR : 20ms or more
1N: EIA : 33.4ms or more
CCIR : 40ms or more
- b: 2I: 741.6µs(EIA)
1131.3µs(CCIR)
1N: 1250.1µs(EIA)
2027.3µs(CCIR)

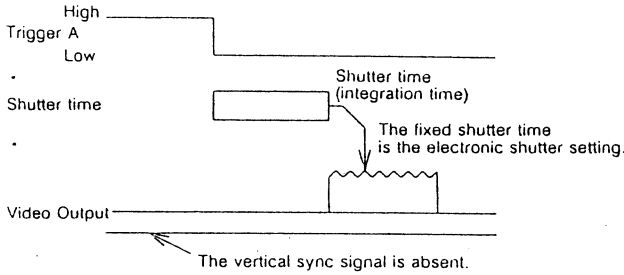
Note : Use a sync signal free of noise.

• Fixed shutter mode

At a single trigger pulse input (Trig-A), 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.



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

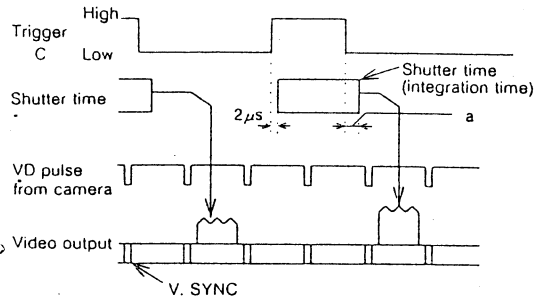
Use a sync signal free of noise.

Trigger specifications

- 5Vp-p + 0.5/-1.0Vp-p
- High period 8 μ s or more

• Sync non-reset mode

At a single trigger pulse input (Trig-C), exposure starts at the pulse rising edge and ends at the pulse falling edge. The video output is obtained at the next field after the end of exposure. The pulse width equals the exposure time.



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
- a: 2I: 741.6 μ s(EIA)
1131.3 μ s(CCIR)
- 1N: 1250.1 μ s(EIA)
2027.3 μ s(CCIR)
- High period 8 μ s or more

10. SPECIFICATIONS

<p>(1) Imaging device: Interline CCD No. of total pixels EIA: 692(H) × 504(V) CCIR: 823(H) × 592(V) Pixel pitch EIA: 9.9(H) × 9.9(V) μm CCIR: 8.3(H) × 8.3(V) μm No. of effective pixels EIA: 659(H) × 494(V) CCIR: 782(H) × 582(V)</p> <p>(2) Sensing area: EIA: 6.52(H) × 4.89(V) mm CCIR: 6.49(H) × 4.83(V) mm (1/2-inch size)</p> <p>(3) Signal format Conforming to EIA/CCIR (Normal mode)</p> <p>(4) Lens mount C-mount</p> <p>(5) Flange focal distance 17.526mm (Not adjustable)</p> <p>(6) Hor. scanning frequency EIA: 15.734kHz CCIR: 15.625kHz</p> <p>(7) Vert. scanning frequency EIA: 59.94Hz CCIR: 50Hz</p> <p>(8) Sync system Internal/external (automatically switchable)</p> <p>(9) Int. sync operation 2:1 interlaced / non-interlaced</p>	<p>(10) Ext. sync input HD/VD: 2 to 6Vp-p, negative Input impedance: 1kΩ Frequency deviation: ± 1%</p> <p>(11) Video output 1.0Vp-p, 75Ω, unbalanced Video: 0.7Vp-p Sync: 0.3Vp-p, negative EIA: 500 TVL(H)/485 TVL(V) CCIR: 580 TVL(H)/575 TVL(V)</p> <p>(12) Resolution</p> <p>(13) Sensitivity 400 lx, 44 3200K 18</p> <p>(14) Minimum illumination 3lx, f1.4, AGC: ON, gamma: ON, no IR cut filter</p> <p>(15) Signal-to-noise ratio 60dB</p> <p>(16) Electronic shutter 1/10000, 1/4000, 1/2000, 1/1000, 1/500, 1/250, 1/125, 1/100 (1/120 CCIR)s (External switch selectable) OFF mode: Normal exposure (Factory setting)</p>
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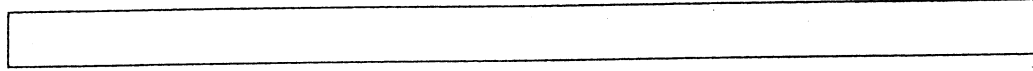
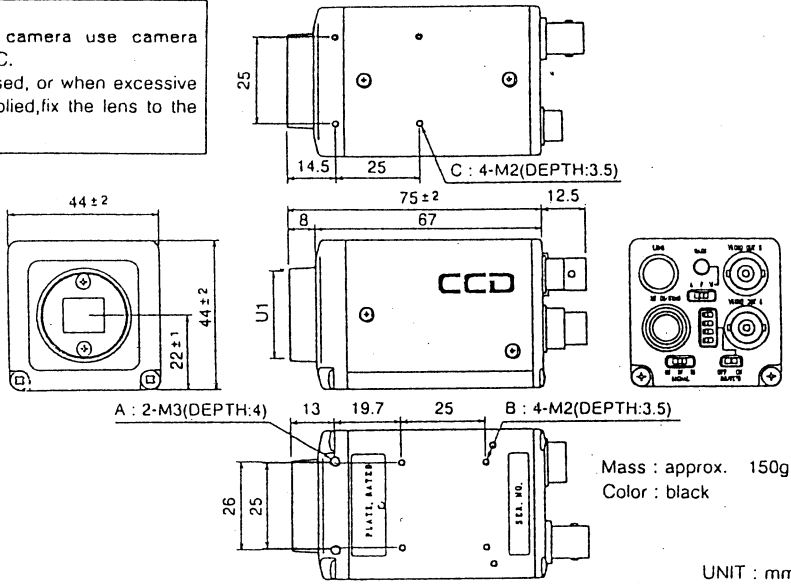
27

<p>(17) Gamma correction 1 (factory setting) or selectable by internal switch Separately settable to two video channels</p> <p>(18) AGC Fixed or AGC: Available to only VIDEO OUT 1. The external switch is selectable. Fixed at factory setting.</p> <p>(19) 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)</p> <p>(20) Field-on-Demand function ON/OFF: Internally switchable ONE trigger, TWO trigger, and Fixed shutter mode selectable by internal switch. (Factory setting: OFF) External trigger input is required.</p>	<p>(21) Power supply 12VDC ± 1V</p> <p>(22) Power consumption 250mA or less</p> <p>(23) Ambient conditions Operating: -10 to 50°C, 90%RH or less Storage: -20 to 60 C, 70%RH or less</p> <p>(24) Anti-vibration 68.6m/s² (10 to 60Hz, amplitude: 0.98mm constant, 60 to 200Hz, amplitude: variable) (10 to 150Hz, sweep: 1 min., XYZ, 30 min.)</p> <p>(25) Resistance to shock 686m/s² (Drop test, once each top, bottom, left and right)</p> <p>(26) Dimensions 44(W) × 44(H) × 67(D)mm</p> <p>(27) Mass 150g approx.</p>
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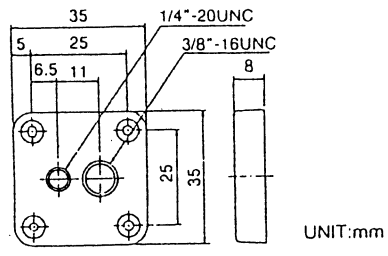
*Specifications are subject to change without notice.

Camera KP-F1A (Sample)

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.



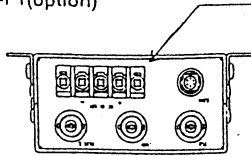
Tripod adaptor TA-M1 (option)



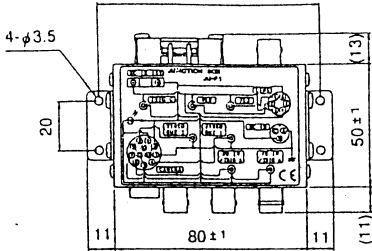
Secure the adaptor to camera mounting holes B or C, using four supplied screws(M2 × 5).

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 ± 1.5



20

11

80 ± 1

4-φ3.5

(13)

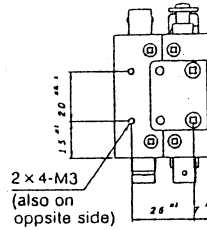
(11)

50 ± 1

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 than the AP-130 at your own risk.



2 x 4-M3
(also on
opposite side)

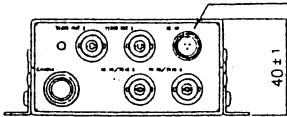
1.5 ± 0.05

2.6 ± 0.1

Connects the AC adaptor AP-130 to this connector.

MASS : APPROX. 200g

UNIT:mm



40 ± 1