

Progressive Scan Type
Black and White Camera

KP-F120

CCD カメラ

KP-F120

フレーム・オン・デマンド

OPERATION MANUAL

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

取扱説明書

このたびは日立KP-F120白黒CCDカメラをお買い上げいただきまことにありがとうございます。ご使用前にこの取扱説明書をよくお読みいただき、正しくお使いください。

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GENERAL

Hitachi's KP-F120 is a 2/3-inch size black and white CCD camera designed for high resolution and versatile functions.

- High resolution : 1392 (H) × 1040 (V) effective pixels
- RS-232C control

- Digital output
- Frame shutter function and multiple electronic shutter
- Frame-on-Demand function
- Partial scan

COMPOSITION

Standard composition

- (1) Camera (with infrared cut filter)
- (2) Operation manual

Optional accessories

- (1) Tripod adaptor TA-F120
- (2) 12 pin plug HR10A-10P-12S(01)
- (3) D. OUT connector (26 pins) DX30AM-50P or equivalent
- (4) Dummy glass (AR coated) ARC1214
- (5) Junction box JU-F1*
- (6) Camera cable HR10A-7P-6P
- (7) 6 pin plug

	Model type	Assembly type	Shield type
2m	C-201KSM	C-201KS	C-201KSS
5m	C-501KSM	C-501KS	C-501KSS
10m	C-102KSM	C-102KS	C-102KSS

Note : Assembly type made to order
In Europe, use the Shield type

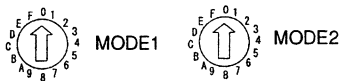
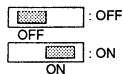
*12-pin connector output pin differences

Pin	JU-F1	KP-F120 output
4	VIDEO 1	VIDEO
6	HD/TRIG-B	HD(Input)
9	VIDEO 2	TRIG-B

REAR PANEL SWITCH

Remote on/off, mode1 and mode2 switches are located on the rear panel.

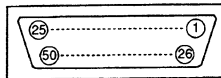
- (1) Remote on/off switch
- (2) Mode switch



SW POS.	MODE 1	SW POS.	MODE 1	SW POS.	MODE 1
0	Normal mode	6	Smear reduction mode TWO Trigger mode	C	Partial Scan(Normal mode) (READ POS. UPPER)
1	ONE Trigger mode	7	Smear reduction mode+4 × accelerated ONE Trigger mode	D	Partial Scan(ONE Trigger mode) (READ POS. CENTER)
2	TWO Trigger mode	8	Normal shutter mode	E	Partial Scan(ONE Trigger mode) (READ POS. UPPER)
3	4 × accelerated mode	9	Fixed shutter mode	F	2 × accelerated mode
4	4 × accelerated mode +ONE Trigger mode	A	Smear reduction mode Fixed shutter mode		
5	Smear reduction mode	B	Partial Scan (Normal mode) (READ POS. CENTER)		

2) Signal connection to DIGITAL OUT : EIA644

Pin No.	Signal	Pin No.	Signal	Pin No.	Signal	Pin No.	Signal
1	DATA DB-D0(+)	2	DATA DB-D0(-)	26	DATADA-D0(+)	27	DATADA-D0(-)
3	DATA DB-D1(+)	4	DATA DB-D1(-)	28	DATADA-D1(+)	29	DATADA-D1(-)
5	DATA DB-D2(+)	6	DATA DB-D2(-)	30	DATADA-D2(+)	31	DATADA-D2(-)
7	DATA DB-D3(+)	8	DATA DB-D3(-)	32	DATADA-D3(+)	33	DATADA-D3(-)
9	DATA DB-D4(+)	10	DATA DB-D4(-)	34	DATADA-D4(+)	35	DATADA-D4(-)
11	DATA DB-D5(+)	12	DATA DB-D5(-)	36	DATADA-D5(+)	37	DATADA-D5(-)
13	DATA DB-D6(+)	14	DATA DB-D6(-)	38	DATADA-D6(+)	39	DATADA-D6(-)
15	DATA DB-D7(+)	16	DATA DB-D7(-)	40	DATADA-D7(+)	41	DATADA-D7(-)
17	DATA DB-D8(+)	18	DATA DB-D8(-)	42	DATADA-D8(+)	43	DATADA-D8(-)
19	DATA DB-D9(+)	20	DATA DB-D9(-)	44	DATADA-D9(+)	45	DATADA-D9(-)
21	TX2	22	RX2	46	CLK OUT(+)	47	CLK OUT(-)
23	GND	24	GND	48	VD OUT(+)	49	VD OUT(-)
25	HD OUT(+)			50	HD OUT(-)		



DIGITAL OUT
DX30AM-50P
Part code : JMD0256

View from this side Camera side

(3) Signal connection to REMOTE connector

Pin No.	Signal
1	—
2	RD
3	TD
4	MANU/REM
5	GND
6	—



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

View from this side Camera side

Connect the ground terminal of a frame grabber or other equipment to the shield of the digital out cable.

The digital out cable should be comprised of a twisted pair of wires having 100 Ω characteristic impedance and an outer sheath shield type conductor.

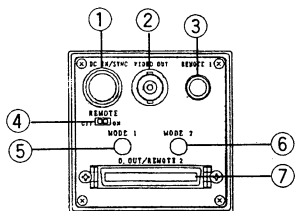
● Connect the cable between the camera Remote connector and the personal computer serial interface connector (D-SUB 9 pin).

● **Notes:** At the camera Remote plug, connect pin 4 Manual/remote and pin 5 ground. At the computer serial interface connector (D-SUB), short pins 7 (RTS) and 8 (CTS).

SPECIFICATIONS

1) Pickup element	2/3-inch interline CCD	(12) External sync input	HD/VD TTL level negative Input impedance: 10 k Ω Frequency deviation: ± 1%
Total pixels	1432 (H) × 1050 (V)	(13) Electronic shutter speed	Selectable by external switches: Off (frame rate), 1/30, 1/125, 1/250, 1/1000, 1/2000, 1/4000, 1/10000, 1/50000 second. Set by external switch..
Effective pixels	1392 (H) × 1040 (V)	(14) Gamma compensation	$\gamma = 1$
Pixel pitch	6.45(H) × 6.45(V) μ m (square lattice)	(15) Frame-on-demand	External switch setting on/off and modes (fixed shutter, two trigger, and one trigger). (a) Signal system
2) Imaging area	8.98mm(H) × 6.71mm (V)	External switch setup	
3) Scanning system	Non-interlaced	① Fixed shutter mode	
4) Aspect ratio	4 : 3	② ONE Trigger mode	
5) Frame rate	30 frames/second (full pixel readout)	③ TWO Trigger mode	
6) Horizontal scanning frequency	32.07 kHz	④ Smear reduction mode	
7) Vertical scanning frequency	30 Hz	(4 × accelerated mode + ONE Trigger mode, Fixed Shutter mode, ONE Trigger mode, TWO Trigger mode)	
8) Synchronization	Internal/external (automatic switching)		
9) Lens mount	C mount		
10) Flange focal distance	17.526 mm		
11) Video output	Digital output or analog output for image checking		
Digital output	Digital 10bits Note: Maximum digital out cable length is 10 meters.		

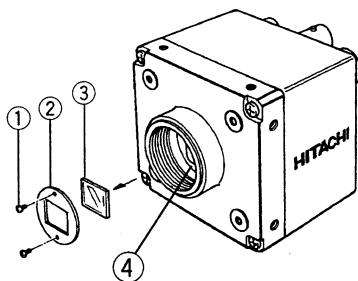
NAME OF EACH SECTION



- ① DC IN/SYNC connector
12 V DC input, composite video (VS) signal output, used for external sync and drive signal input.
- ② VIDE OUT (BNC)
Composite video (VS) signal output.
- ③ RS-232C connector (REMOTE)
Connect to computer for camera settings.
- ④ REMOTE ON/OFF switch
Selects RS-232C control
- ⑤ MODE 1 switch
Selects e. g., trigger input
- ⑥ MODE 2 switch
Selects e. g., electronic shutter speed, gain.
- ⑦ DIGITAL OUT connector
Used for digital and digital sync signal output.

OPTICAL FILTER

This camera is provided with an IR cut filter.



How to remove the IR cut filter.

- (1) Remove two screws ① 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

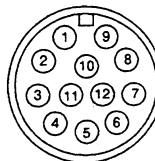
Prior to removal of the optical filter, be sure to turn off the power.

SIGNAL CONNECTION TO CONNECTOR

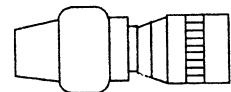
(1) Signal connections to DC IN and SYNC (DC IN/SYNC)

Pin No.	Internal SYNC mode	External SYNC mode			
		HV/VD	Frame-On-Demand		
			Fixed shutter/ ONE Trigger	TWO trigger	4Xaccelerated +ONE Trigger mode
1	GND	GND	GND	GND	GND
2	+12V	+12V	+12V	+12V	+12V
3	GND	GND	GND	GND	GND
4	VIDEO	VIDEO	VIDEO	VIDEO	VIDEO
5	—	EXTHD (GND)	—	—	—
6	—	EXTHD (SIGNAL)	—	—	—
7	—	EXTVD (SIGNAL)	TRIG-A (SIGNAL)	TRIG-A (SIGNAL)	TRIG-A (SIGNAL)
8	—	—	—	TRIG-B (GND)	—
9	—	—	—	TRIG-B (SIGNAL)	—
10	GND	GND	GND	GND	GND
11	+12V	+12V	+12V	+12V	+12V
12	—	EXTVD (GND)	TRIG-A (GND)	TRIG-A (GND)	TRIG-A (GND)

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



View from this side →

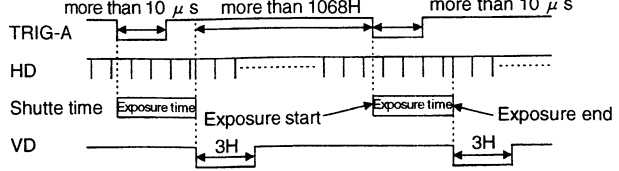


Camera side

(4) TRIG-A input and HD & VD phase during Fixed shutter mode

Transmit TRIG-A at TTL level

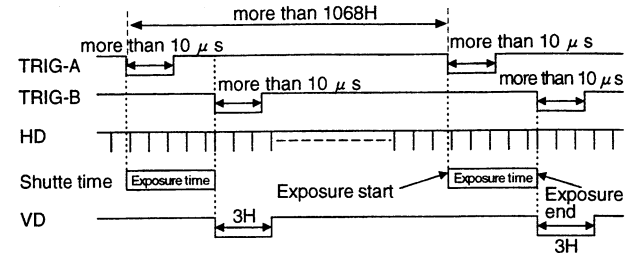
Please use the Low period of TRIG-A in 100 microseconds or more at the time of the HD reset ON.



(5) TRIG-A & B input phase and HD & VD phase during Two trigger mode

Transmit TRIG-A & B at TTL level

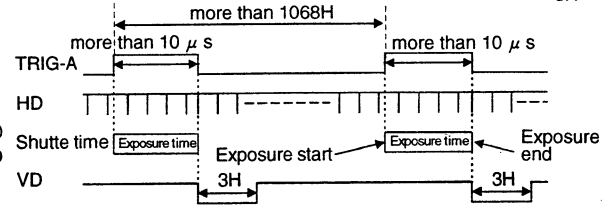
Please use the Low period of TRIG-A and TRIG-B in 100 microseconds or more at the time of the HD reset ON.



(6) One trigger mode

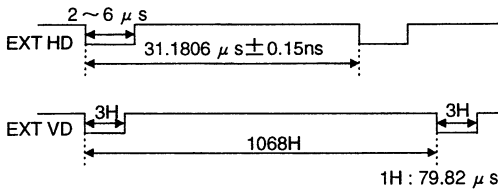
Transmit TRIG-A at TTL level

Please use the High period of TRIG-A in 100 microseconds or more at the time of the HD reset ON.

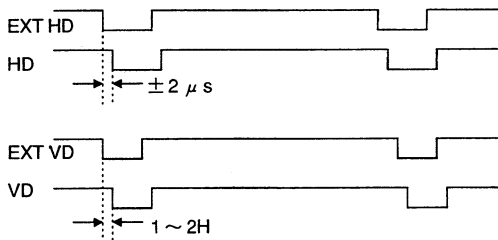


(7) External HD & VD input levels and phase

Level: TTL level

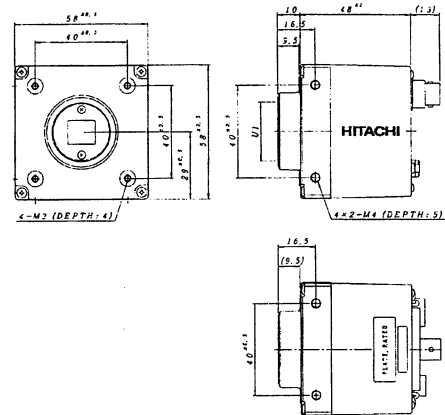


Align falling edges of external HD and VD.



VD output is delayed 2H compared to EXT VD.

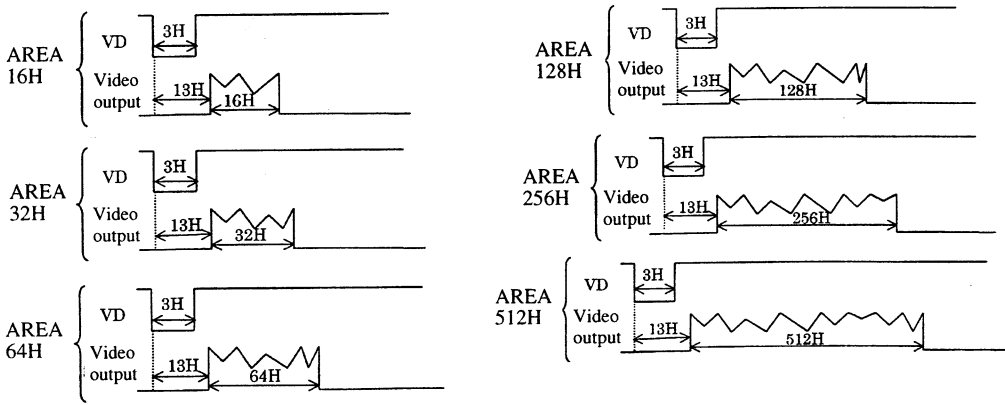
EXTERNAL VIEW



Caution

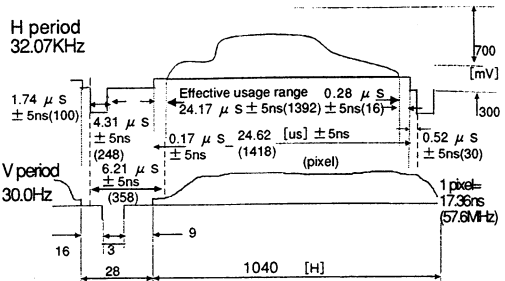
When a heavy lens is used, or when excessive shock or vibration is applied, fix the lens to the equipment, too.

(4) Partial scan ONE Trigger mode (UPPER)

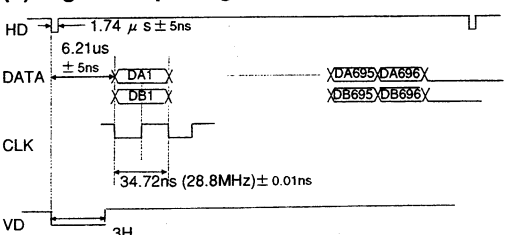


INPUT/OUTPUT SIGNAL LEVELS AND TIMING

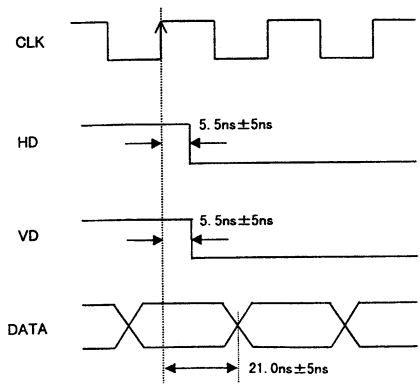
(1) Analog output signal



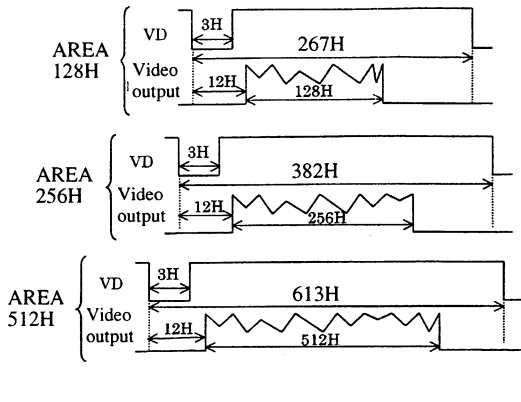
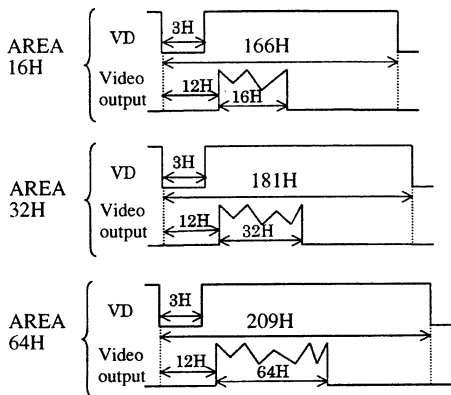
(2) Digital output signal



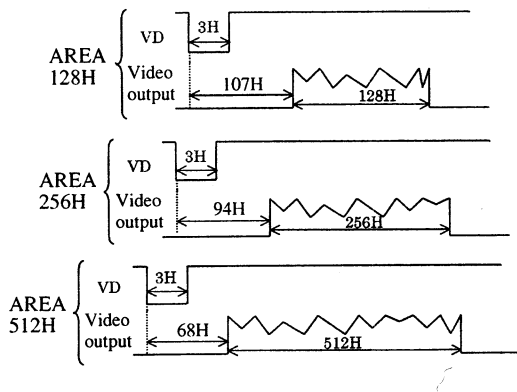
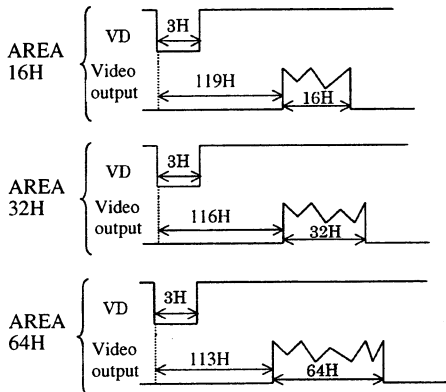
(3) Digital output Timing



(2) Partial scan normal mode (UPPER)



(3) Partial scan ONE Trigger mode (CENTER)



(3)1 Trigger mode (CENTER) frame rate

Operating range (V direction)	Trigger period T (ms)
16H	Exposure time $+5.9 \leq T \leq 33.3$
32H	Exposure time $+6.3 \leq T \leq 33.3$
64H	Exposure time $+7.2 \leq T \leq 33.3$
128H	Exposure time $+8.9 \leq T \leq 33.3$
256H	Exposure time $+12.3 \leq T \leq 33.3$
512H	Exposure time $+19.0 \leq T \leq 33.3$

(4)1 Trigger mode (UPPER) frame rate

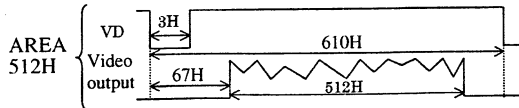
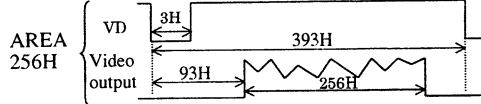
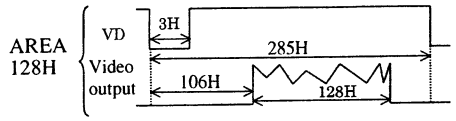
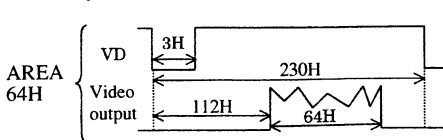
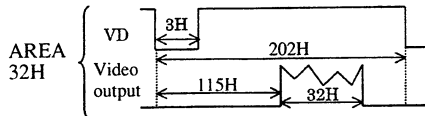
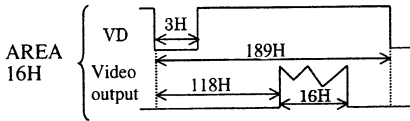
Operating range (V direction)	Trigger period T (ms)
16H	Exposure time $+5.2 \leq T \leq 33.3$
32H	Exposure time $+5.6 \leq T \leq 33.3$
64H	Exposure time $+6.5 \leq T \leq 33.3$
128H	Exposure time $+8.3 \leq T \leq 33.3$
256H	Exposure time $+11.9 \leq T \leq 33.3$
512H	Exposure time $+19.1 \leq T \leq 33.3$

Note

The first frame image may be disrupted during partial scan operation.

PARTIAL SCAN TIMING CHART

(1) Partial scan normal mode (CENTER)



RS-232C CONTROL

The RS-232C control mode is produced by connecting the serial interface (D-sub 9 pin) of a personal computer with the camera rear panel 6 pin connector and setting the camera rear panel Remote on/off switch to on.

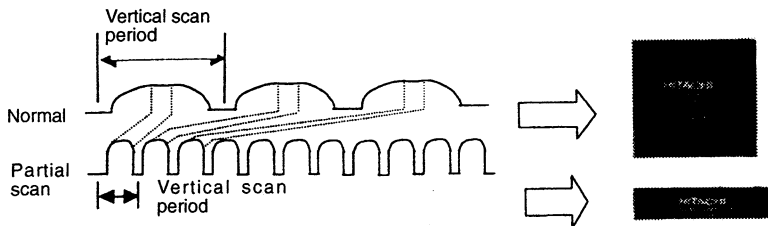
The RS-232C setting status can be stored in memory.

- **FD(Frame on Demand)**
Fixed shutter, TWO Trigger, ONE Trigger
- **Gain**
0 ~ 15dB
- **Partial scan**
Normal, ONE Trigger
- **Black level**
- **Shutter speed**
1/30, 1/60, 1/125, 1/250, 1/1000, 1/2000, 1/10000, 1/50000

Consult dealer regarding protocol.

PARTIAL SCAN FUNCTION

The frame rate is increased by reading part of the CCD image.



(1)Normal mode (CENTER) frame rate

Operating range (V direction)	Period T (msec)	Frame rate(frame/sec)	Remarks
16H	5.9	169	Shutter speed 1/250, 1/1000, 1/2000, 1/10000, 1/50000 and shutter off
32H	6.3	158	
64H	7.2	138	
128H	8.9	112	
256H	12.3	81	
512H	19.0	52	

(2)Normal mode (UPPER) frame rate

Operating range (V direction)	Period T (msec)	Frame rate(frame/sec)	Remarks
16H	5.2	193	Shutter speed 1/250, 1/1000, 1/2000, 1/10000, 1/50000 and shutter off
32H	5.6	177	
64H	6.5	153	
128H	8.3	120	
256H	11.9	83	
512H	19.1	52	

MODE2 SW POS. MODE1 SW POS.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0 ~ 7, F	0dB	1dB	2dB	3dB	4dB	5dB	6dB	7dB	8dB	9dB	10dB	11dB	12dB	13dB	14dB	15dB
8 ~ A	1/30s	1/125	1/250	1/1000	1/2000	1/10000	1/50000	1/50000	1/50000	1/50000	1/50000	1/50000	1/50000	1/50000	1/50000	1/50000
B ~ E	16H	32H	64H	128H	256H	512H	512H	512H	512H	512H	512H	512H	512H	512H	512H	512H

Various mode 2 settings

Mode 1 positions 0-7 and F : Gain setting

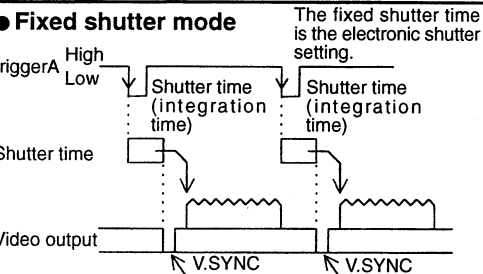
8-A : Shutter speed setting

B-E : Partial scan width setting

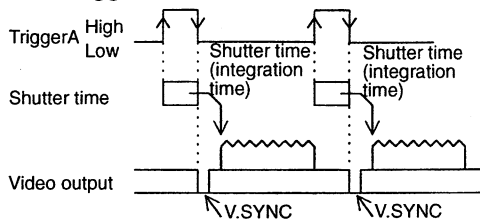
The rear panel mode 2 switch setting remains held in memory. For example, after setting Gain, that setting remains stored even if the front panel mode 1 switch setting is changed.

FRAME-ON-DEMAND-FUNCTION

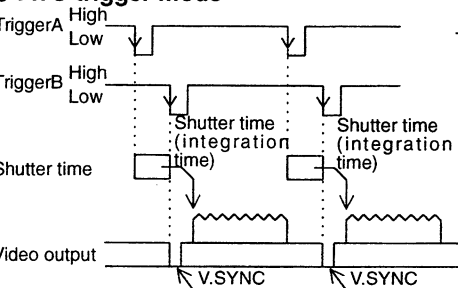
● Fixed shutter mode



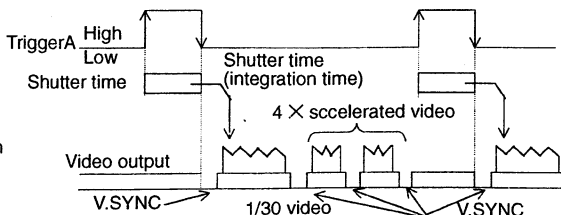
● ONE trigger mode



● TWO trigger mode



● 4 × accelerated ONE trigger mode



At the 4 × accelerated speed mode, CCD irregularity can cause horizontal streaking to appear in the image. This is normal and not a defect.

- 16) Power supply voltage 12 ± 1 VDC
17) Current consumption Approx. 400 mA
- 18) Ambient, operating 0 to +40 °C (+32 to ; 104 F), less than 90 % RH
Ambient, storage -10 to +50 °C (+14 to +122 F), less than 70 % RH
Note: If operated continuously, be sure to use at less than +40 °C (104 F) for long term stable performance.
- 19) Vibration endurance 3G (3 directions, 30 minutes each)
20) Shock endurance 30G (vertical, horizontal, once each face)
21) External dimensions 58(W) × 58(H) × 48 (D) mm
22) Mass Approx. 220 g
23) RS-232C control

(a) Signal system

- ① Control system Start-stop synchronization system
② Transmission rate 9600 bps
③ Data length 8 bits
④ Start bit 1 bit
⑤ Stop bits 2 bit
⑥ Parity None
⑦ Bit transfer LSB first

(b) Communication control method

Overall control of transmission is from the communication software. Data send/receive (BSC handshake) by sending text data to the camera control CPU

※ Specifications are subject to change without notice.

● Operation Guide

For more details, see the operation guide.

Please ask your sales representative about the Operation Guide.