Monochrome
Progressive Scan Camera

CV-M10SX

Operation Manual

Camera: Revision B
Manual: Version 1.2

Table of Contents

1. General

The CV-M10SX is the successor for the CV-M10BX/RS cameras. The major difference between CV-M10SX and its predecessors is that it only has a single video channel and RS-232C is included in all versions. The sensitivity is 6 dB higher. Pulse width control shutter and delayed read out is added. The camera can only work as non- interlaced.
CV-M10SX is a compact monochrome progressive scan camera designed for automated imaging applications. The 1/2" CCD with square pixels offers a superb image quality. The high-speed shutter function and asynchronous random trigger mode allows the camera to capture high quality images of fast moving objects. The camera can operate in continuous mode and with triggered edge pre-select and pulse width controlled shutter. Frame delayed read out and long time integration are also possible modes.
CV-M10SX has only single tap video output.

CV-M10SX revision B has new updated boards with some improvements. The H frequency is corrected.

The latest version of this manual can be downloaded from: www.jai.com
The latest version of Camera Control Tool for CV-M10SX can be downloaded from: www.jai.com

For camera revision history, please contact your local JAI distributor.

2. Standard Composition

The standard camera composition consists of the camera main body and tripod mount plate.

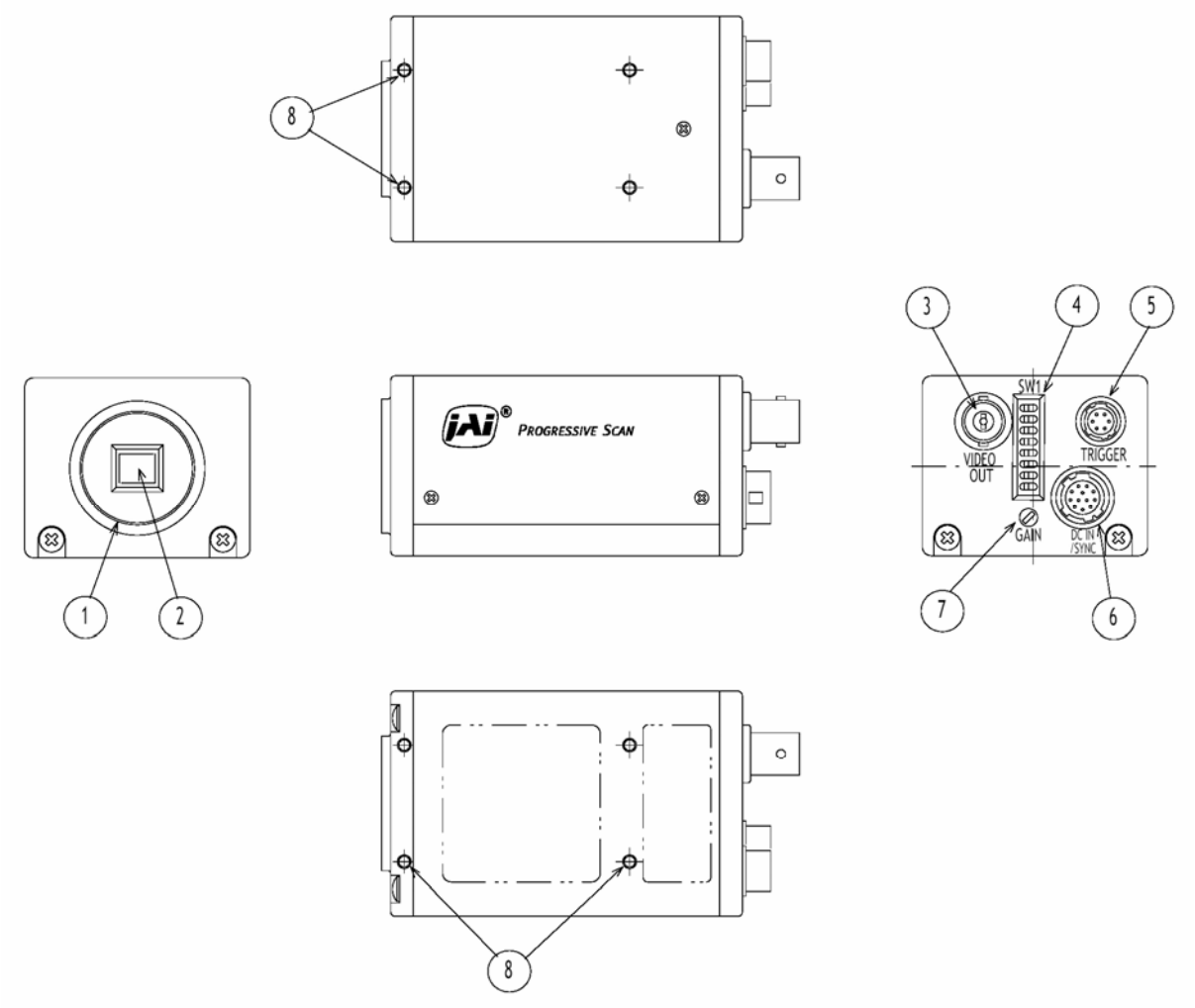
CV-M10SX is available in the following versions:

EIA:	CV-M10SX E. Set-up function by switch or via RS232C serial control.
CCIR:	CV-M10SX C. Set-up function by switch or via RS232C serial control.

3. Main Features

- 1/2” progressive scan monochrome interline transfer CCD sensor
- 782 (h) x 582 (v) 8.37µm square pixels (767 x 575 pixels read out) for CCIR
- 659 (h) x 494 (v) 9.9 µm square pixels (748 x 486 pixels read out) for EIA
- Improved sensitivity and reduced smear
- High speed shutter up to 1/800,000 sec. for EIA and 1/917,000 sec. for CCIR
- Single channel progressive full frame read out in 1/25 sec. or 1/30 sec.
- Pixel clock output optional
- Edge pre-select and pulse width external trigger modes
- Edge pre-select shutter with frame delay read out
- Long time integration up to 8 frames in non-interlaced mode
- Accepts standard C-mount lenses
- Same housing and fixture as CV-M10
- Setup via serial port or switches
- Setup by Windows 98/NT/2000 software via RS 232C

4. Locations and Functions



1 Lens mount of C-mount type. *1)
2 Interline-transfer CCD sensor.
3 Video output BNC connector
4 SW1 switch on the rear panel to set the shutter speed and other function modes.
5 6 pin connector for RS 232C signals, input of external trigger pulse and WEN output.
6 12 pin connector for DC +12V power external sync signals and output of video.
7 GAIN potentiometer for adjusting video level. (Min. gain is fully clockwise.)
8 mounting holes 8 x M3deept5.

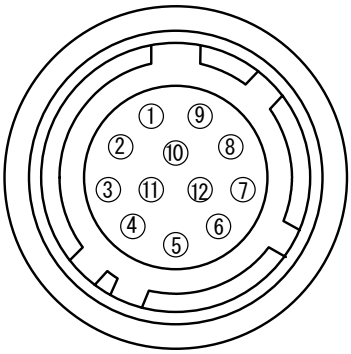
*1) ***Note***: *Rear protrusion on C-mount lens must be less than 10.0mm (0.4 inch approx.)*
When IR cut filter is used, it must be less than 7.0 mm (0.28 inch approx.)
The IR cut filter is placed in the C-mount thread.
The C-mount 25 mm IR cut filter must be ordered separately.

Fig. 1. Locations

5. Pin Assignment

5.1. 12-pin Multi-connector (DC-IN/SYNC)

Type: HR10A-10R-12PB-01(Hirose) male.
(Seen from rear of camera.)



Pin no.	Signal	Remarks
1	GND	
2	+12 V DC input	
3	GND	
4	Video output	Parallel with the BNC video output. Avoid double termination.
5	GND	
6	HD input/output	Ext. HD in as factory setting. *1)
7	VD input/output	Ext. VD in as factory setting. *1) *2)
8	GND	
9	NC/Pixel clock	Pixel clock output (R19 short) *1)
10	GND	
11	+12 V DC input	
12	GND	

*) ***Notes:***

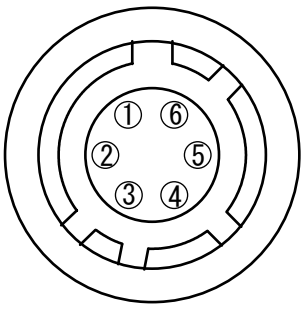
*1) *Signals on pin no. 6, 7and 9 can be changed by jumper setting. See "8. Jumper Settings" for more information.*

*2) *Do not input ext. VD signal in trigger modes.*

Fig. 2. 12-pin connector.

5.2. 6-pin Multi-connector (RS 232C/TRIGGER)

Type: HR10A-7R-6PB (Hirose) male.
(Seen from camera rear.)



Pin no.	Signal	Remarks
1	TXD out	
2	RXD in	
3	GND	
4	NC	
5	Ext. Trig input	
6	WEN output	* Note

**** Note:** WEN is generated in Normal Trig, Random Trig (normal and high speed shutter) and Low Speed Shutter. It is 1 H long and indicates the beginning of video read out.*

Fig. 3. 6-pin connector

5.3. Input and Output Circuits

In the following schematic diagrams the input and output circuits for video and timing signals are shown.

Video output

The video output is a 75 Ω AC coupled circuit. The video is shown with 75 Ω termination.

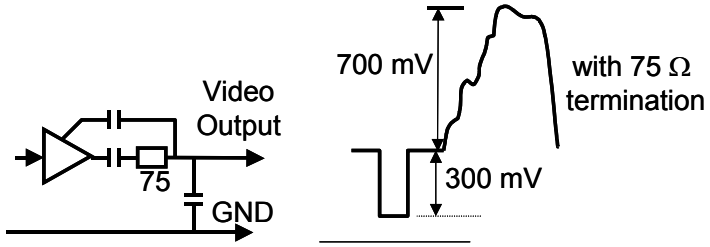


Fig. 4. Video output.

HD, VD and Trigger input

The inputs are AC coupled.
Input level 4 V ±1 V.
The trigger input impedance is High. It can be 75Ω terminated by jumper.
Note! *The first trigger after power up can result in a wrong exposure.*

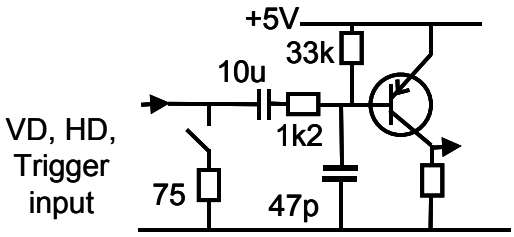


Fig. 5. HD, VD and Trigger input.

HD, VD, WEN output

The output circuit for HD, VD and WEN signals are shown. It is an emitter follower with 75 Ω in series.
Output level is 4V. (Non-terminated).

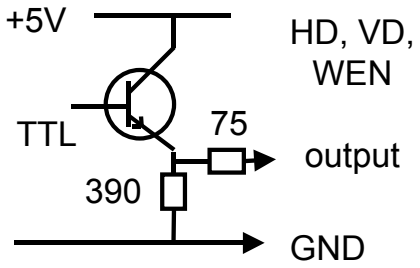


Fig.6. HD and VD input.

PCLK output

Output circuit for pixel clock is a TTL driver.
The output impedance is 75 Ω.
Output level ≥4 V from 75Ω. (Non-terminated).
If not used, the pixel clock should be disabled.

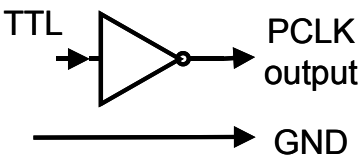


Fig. 7. PCLK output.

6. Functions and Operations

6.1. Basic functions

Apart from the standard continuous operation, the CV-M10SX features two external asynchronous trigger modes Edge Pre-select and Pulse Width Control mode. Edge Pre-select mode can operate with delayed read out, where the trigger falling edge start a pre-selected exposure, and the rising edge starts the read out. These external trigger modes can operate with either H reset or H non-reset. In Edge Pre-select and H reset, the internal HD is reset on the falling edge of the trigger and the exposure starts. For Pulse Width Control and H reset, the rising edge of the trigger will stop the exposure and reset the internal HD. In H non-reset, the exposure will be synchronized to the internal HD. It will start on the first HD after the trigger negative going edge.

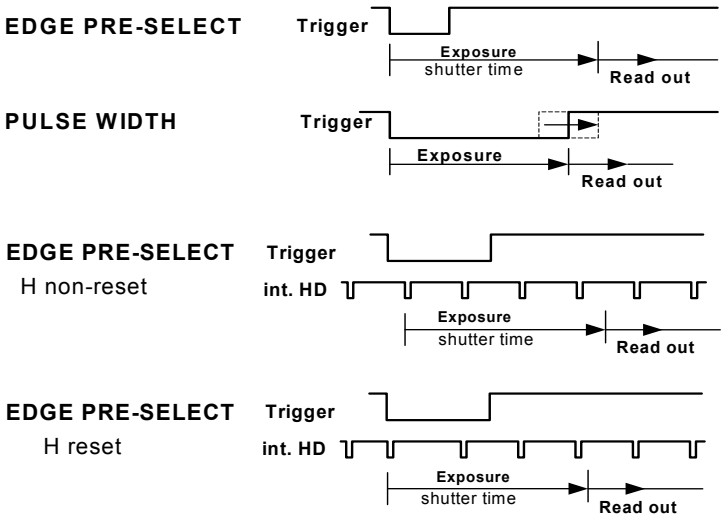


Fig. 8. Trigger modes principle

6.2. Input/Output of Timing Signals

For jumper settings, please refer to chapter "8. Jumper settings"

6.2.1. Input of External HD/VD signals

This setting is factory pre-set. The video output is synchronized with external HD/VD signals if applied. If no ext. HD is connected, the camera will switch to the internal X-tal controlled HD sync. If no ext. VD is connected, the camera will continue with its internal VD.
Note: The delay between external VD and internal VD is 3H
The external HD/VD signal should be 4.0 Vp-p ±2.0 V from a 75 Ω source. In case of TTL level input 2.0 to 5.0 V the 75 Ω termination can be removed by open JP3/JP6 on PK8482A board.
Do not input external VD in trigger modes.
The external sync system should be the same as the camera sync system.

6.2.2. Output of Internal HD/VD signals

In order to output internal HD/VD signal 4.0 Vp-p from a 75 Ω source, a jumper setting is required. JP1/JP4 on PK8482A board open, and JP5/JP7 short.

6.2.3. Input of external trigger

The external trigger signal should be 4.0 Vp-p ±2.0 V from a 75 Ω source. In case of TTL level input 2.0 to 5.0 V the 75 Ω termination can be removed by open JP10 on PK8480A board.

6.3. CCD layout and timing

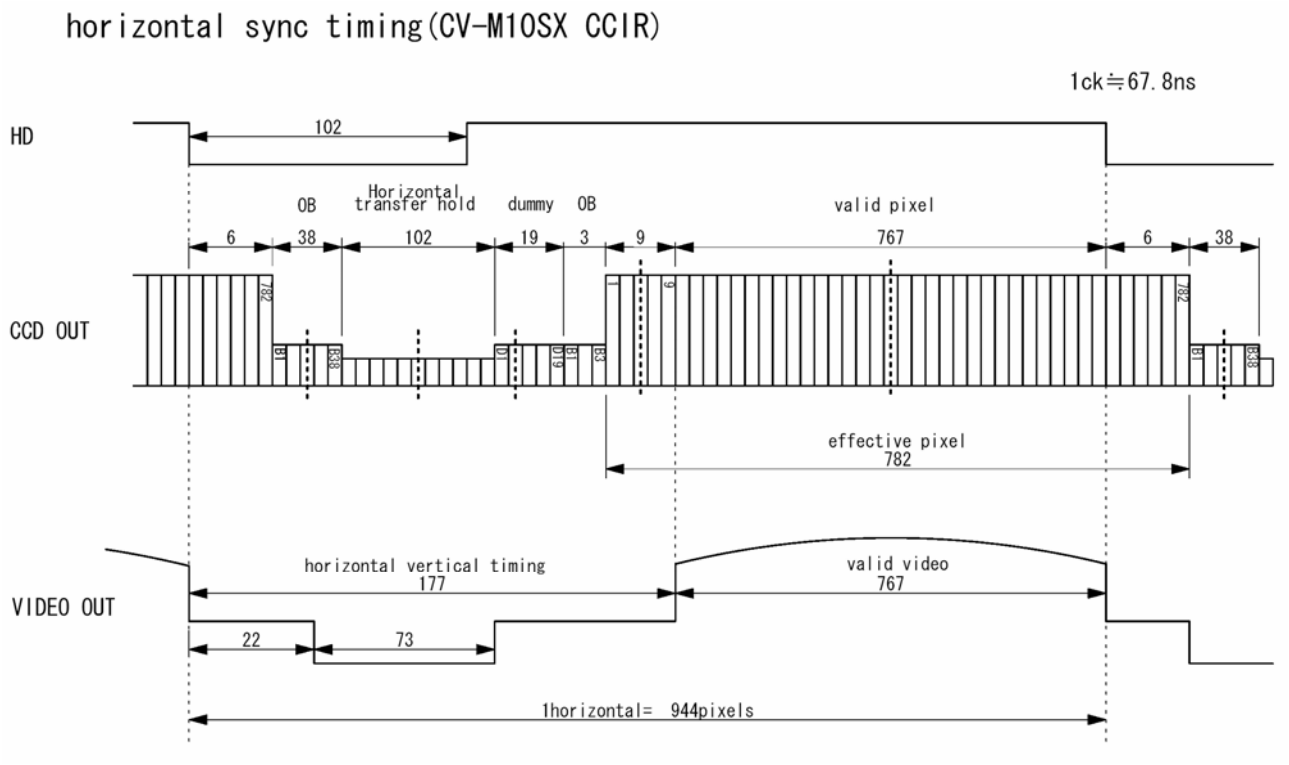


Fig. 9. Horizontal timing CCIR

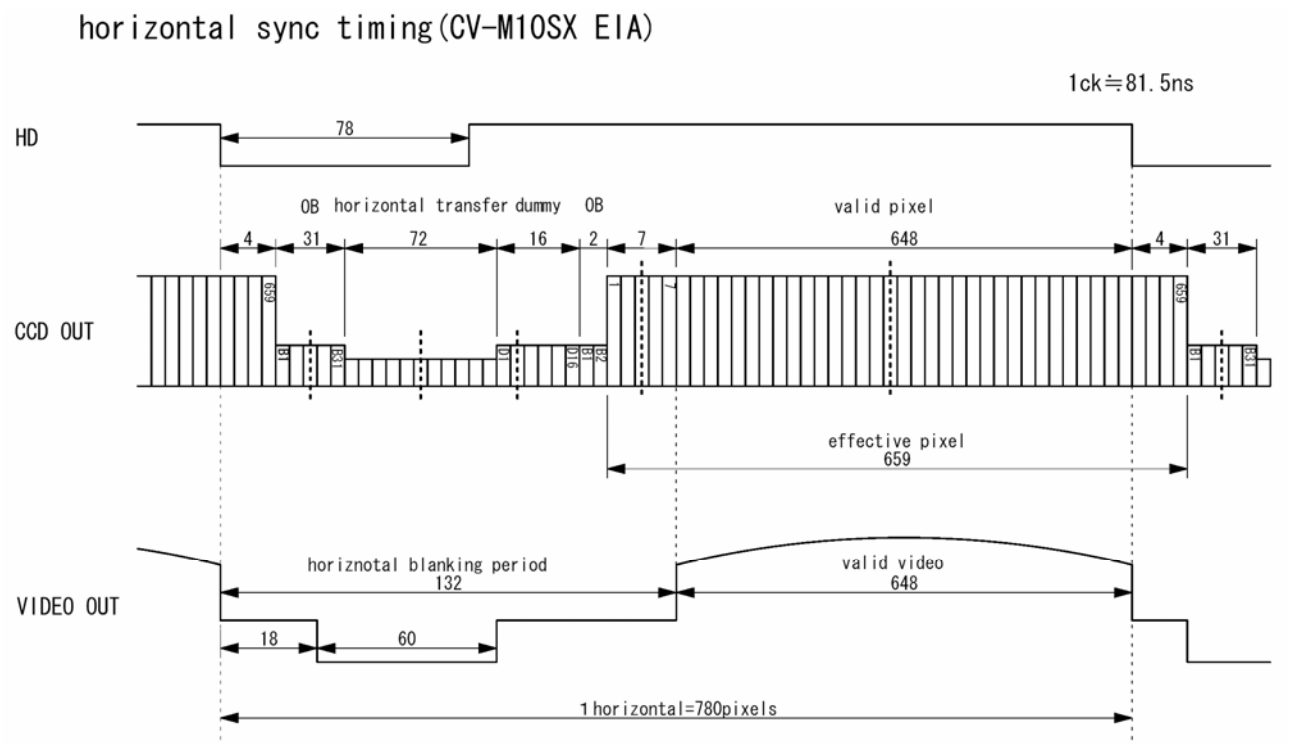


Fig.10. Horizontal timing EIA

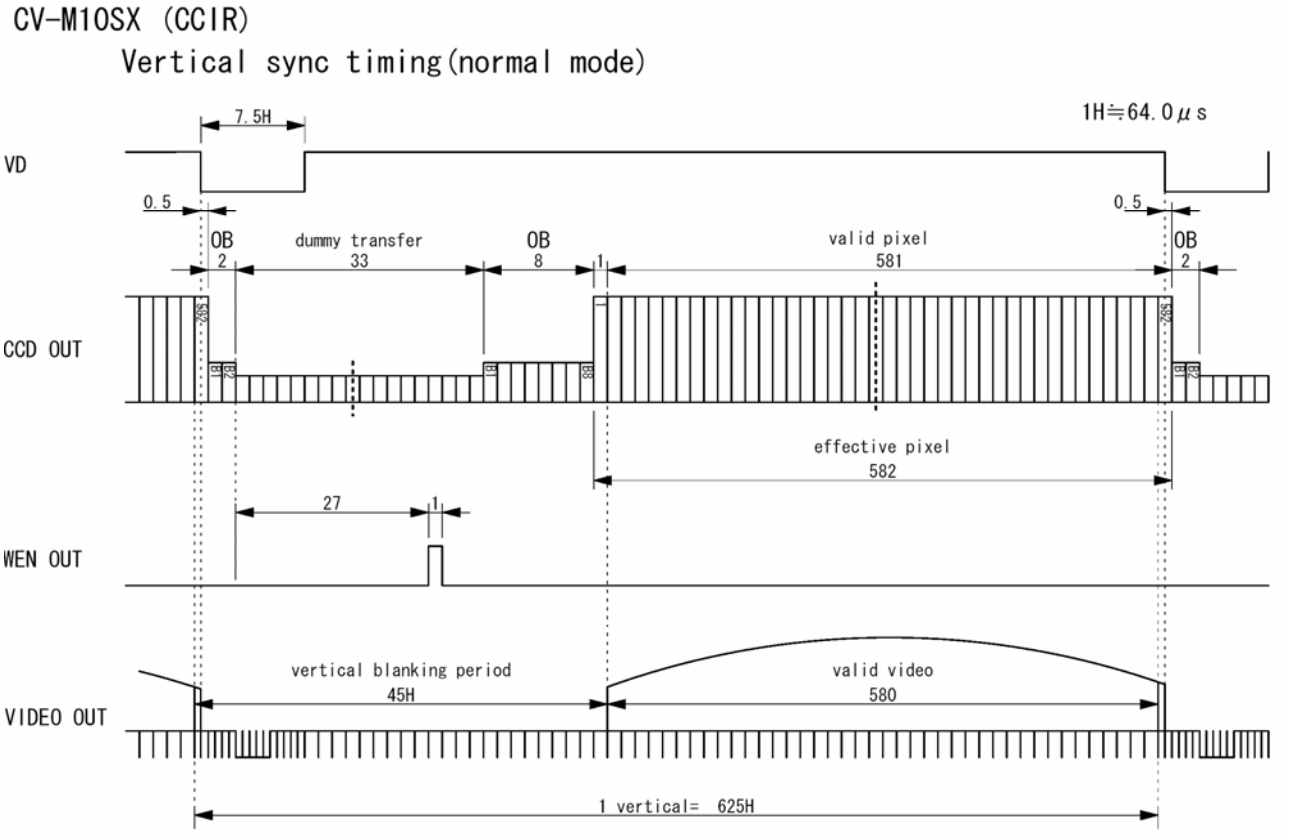


Fig. 11. Vertical timing CCIR

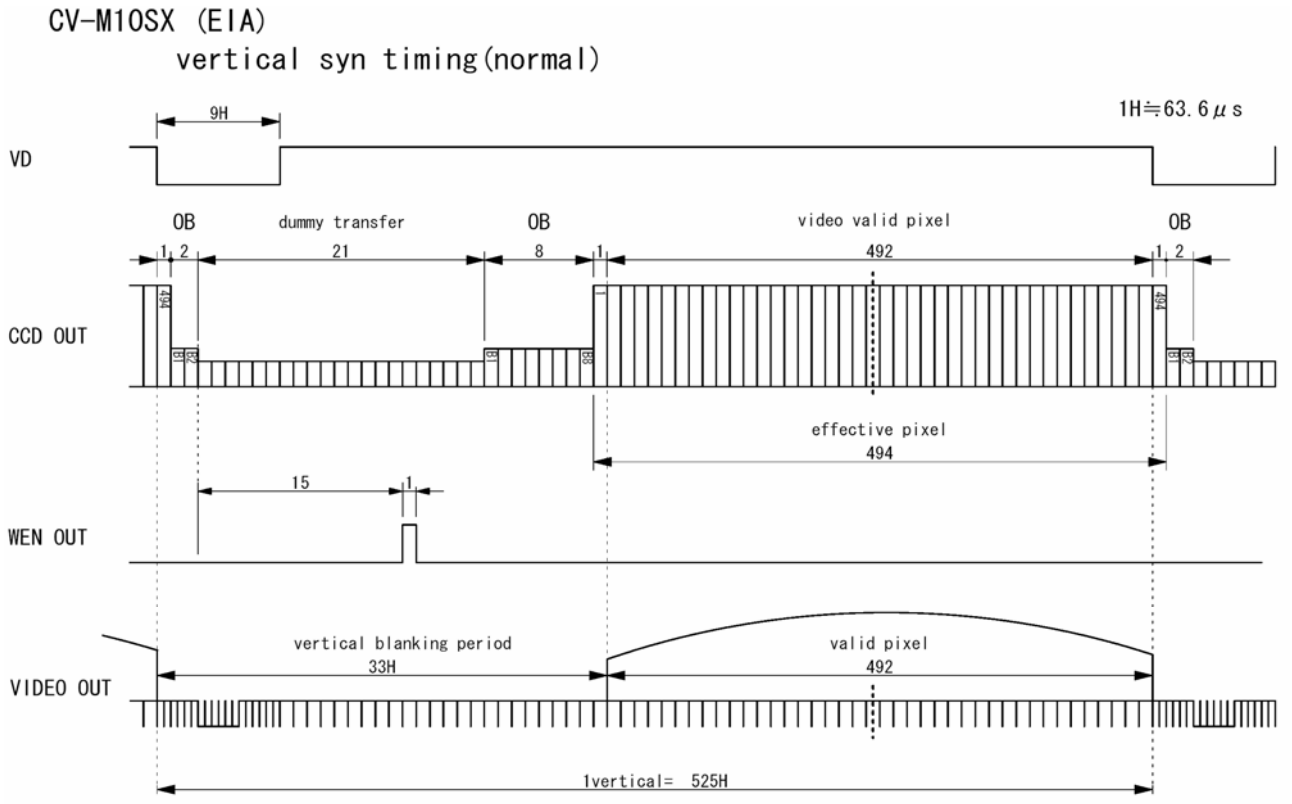
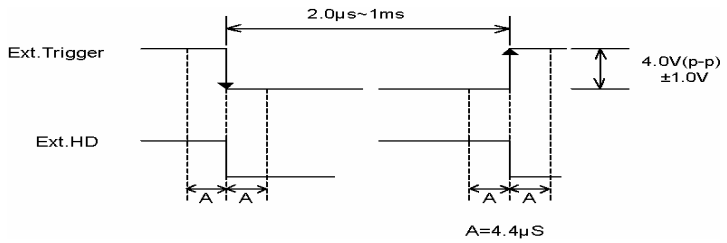


Fig. 12. Vertical timing EIA

6.4. Operation Modes

This camera can operate in 4 primary modes. 1 non-triggered, 3 external asynchronous trigger modes. The triggered shutter can be HD synchronous or with H reset.
To avoid <1H time jitter in H non-reset mode, it is recommended to synchronize the trigger to HD as shown in fig. 13.
In trigger modes there are no vertical sync in the composite sync signal.

1. *Normal continuous Mode.* Pre-selected exposure and long time exposure.
2. *Edge Pre-select Mode.* Pre-selected exposure.
3. *Pulse Width Control Mode.* Pulse width controlled exposure.
4. *EPS with delayed read out* Pre-selected exposure with delayed read out



Trigger pulse width:

EPS H reset	>2μs - <1ms
EPS H non-reset	>1H - <16H
PWC	>1H - <625H
EPS delay read out	>3H - <1250H >shutter speed

Fig. 13. Trigger HD relation

Please refer to chapter "7. Configuring the Camera" and chapter "8. Jumper settings" for details in mode settings.

6.4.1. Continuous operation

For applications not requiring asynchronous external trigger, but should run in continuous operation, this mode is used.
The shutter time can be selected within the following range:

Normal shutter	8 steps, 1/25 to 1/10,000 sec. for CCIR.
	8 steps, 1/30 to 1/10,000 sec. for EIA
	By RS-232C only: Shutter OFF. (1/25 for CCIR. 1/30 for EIA)
High speed shutter	8 steps. 1/25,000 to 1/917,000 sec for CCIR.
	1/20,000 sec. to 1/800,000 sec. for EIA
Low speed shutter	8 steps. 2 frames to 16 frames.

To use this mode

Set: **SW1-4 on rear to ON** for normal. For RS-232C select **continuous** trigger mode. SW1-1 through SW1-3 on rear for exposure time. For RS-232C select shutter time. Other functions.

Input: Ext. HD and Ext. VD if used.

Note: High speed shutter, Low speed shutter and shutter OFF is only selectable by RS-232C, or if the mode has been selected as default by RS-232C.
By shift to the low speed shutter range, it can take up to 20 seconds before the camera operates correctly.

For timing details refer to fig. 9. through fig. 12.

6.4.2. Edge Pre-select Trigger Mode

This trigger mode can operate in H reset mode or H non-reset mode.
In H reset mode the falling edge of the trigger will immediately reset the internal HD and start the exposure. In H non-reset mode the exposure will start at the first internal HD after the trigger. An external trigger pulse initiates the capture, and the exposure time (accumulation time) is governed by the fixed shutter speed set up by the rear panel DIP-switches or via RS-232C. The resulting video signal will start to be read out after the selected shutter time.
To avoid up to 1H time jitter it is recommended to synchronize the trigger to HD. The falling edge of the trigger should be within 4.4 μsec. from the falling edge of the ext. HD. (fig. 13.).
The WEN pulse indicates the start of valid video signal. Refer to timing charts for details. A new trigger pulse must not be applied before the video read out has been finished.

To use this mode

Set: SW1-4 on rear to **OFF** for random trigger. For RS-232C select trigger mode.
JP12 on PK8480A **OPEN for Edge Pre-select**
JP13 on PK8480A **OPEN for H Reset. JP13** PK8480A **Short for H Non Reset**
SW1-1 through SW1-3 on rear for exposure time. For RS-232C select shutter time
Other functions.

Input: Trigger signal. H reset: >2 μsec to <1 msec. H non-reset: >1H to <625H.
Ext HD if used.

Note: The selection of Edge Pre-select, Pulse Width Control H Reset and H non-reset cannot be done by RS-232C. (See chapter 7 and 8 for details)
In trigger modes there are no vertical sync in the composite sync signal.

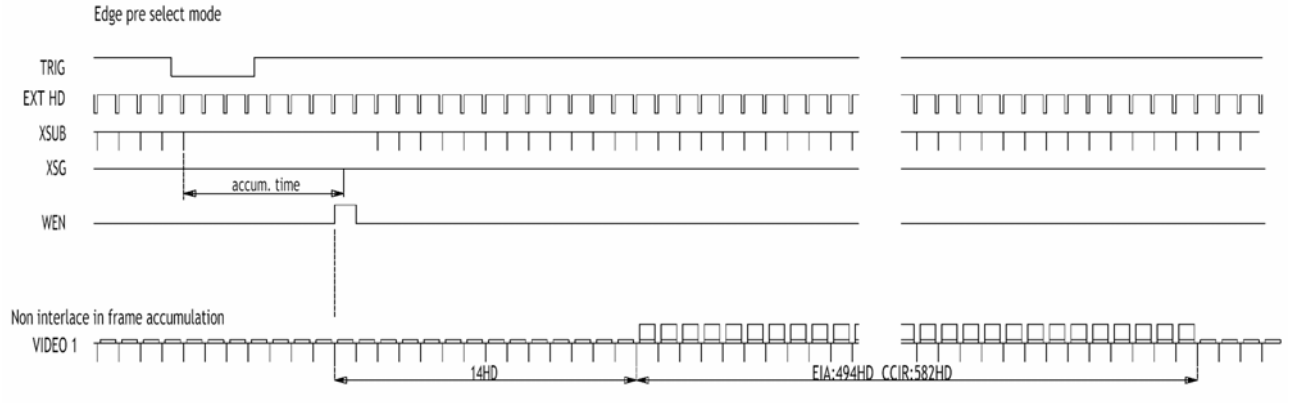


Fig. 14. Edge pre-select. H non-reset

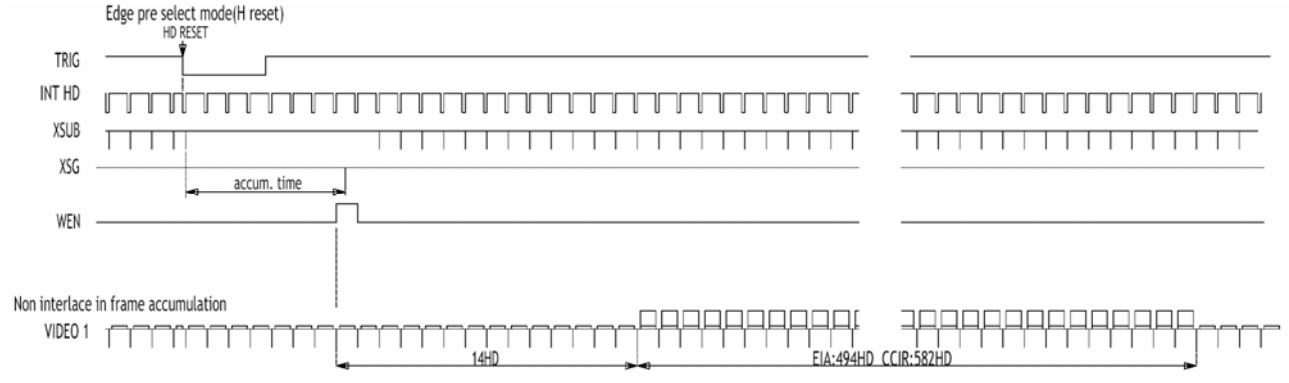


Fig. 15. Edge pre-select. H reset

6.4.3. Pulse Width Control Trigger Mode

This trigger mode can operate in H reset mode or H non-reset mode.
In H reset mode the exposure will start immediately at the falling edge of the trigger. (The internal H will not be reset). The exposure will end and the internal H will be reset at the rising edge of the trigger.
In H-non-reset mode the exposure will start at the first HD pulse after the falling edge of the trigger. The exposure stops at the trigger raising edge.
To avoid up to 1H time jitter it is recommended to synchronize the trigger to HD. The falling edge of the trigger should be within 4.4 μsec. from the falling edge of the ext. HD. (fig. 13.).
The resulting video signal will start to be read out after the trigger rising edge. The WEN pulse indicates the start of valid video signal. Refer to timing charts for details.
A new trigger pulse must not be applied before the video read out has been finished.

To use this mode:

Set: SW1-4 on rear to **OFF** for random trigger. For RS-232C select trigger mode
JP12 on PK8480A **Short for Pulse Width Control**
JP13 on PK8480A **OPEN for H Reset. JP13** on PK8480A **Short for H Non Reset**
SW1-1 through SW1-3 on rear to ON (1/10,000) For RS.232C select 1/10,000
Other functions.

Input: Trigger signal. >1H to <625H.
Ext HD if used.

Note: *For CV-M10SX the selection of Edge Pre-select, Pulse Width Control H Reset and H non-reset cannot be done by RS232C.* (See chapter 7 and 8 for details)
In trigger modes there are no vertical sync in the composite sync signal.

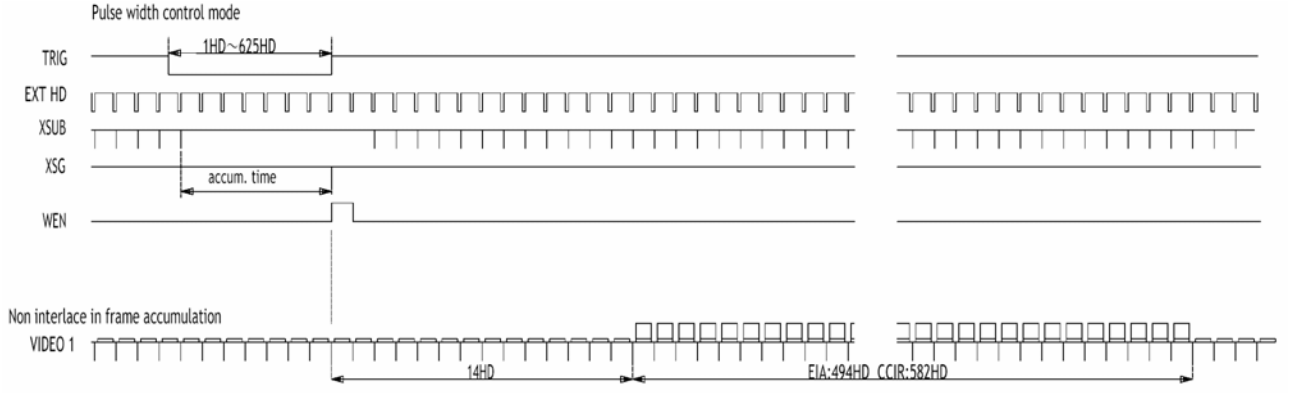


Fig. 16. Pulse width control. H non-reset

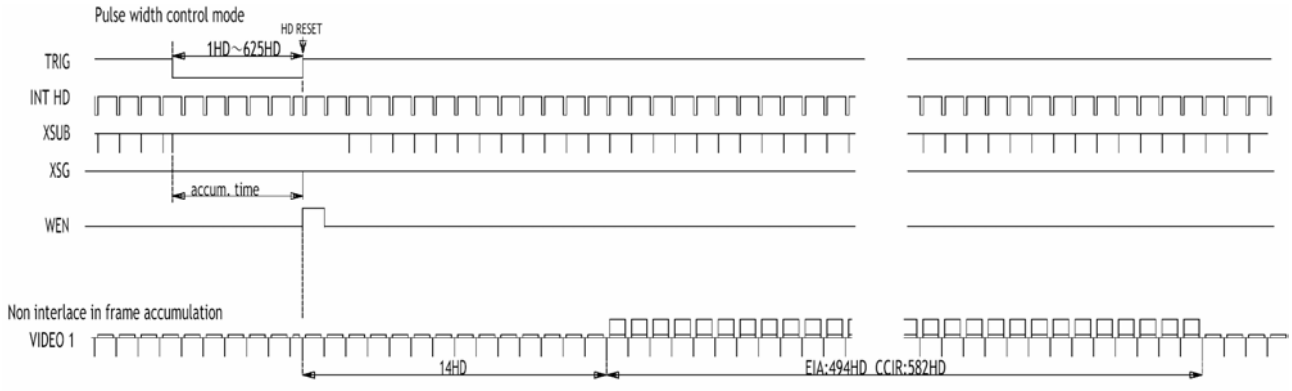


Fig. 17. Pulse width control. H reset

6.4.4. Frame delay read out Mode.

This mode allows simultaneous capture of multiple cameras using a common external trigger pulse and sequential multiplexed read out to a single input frame grabber. This trigger mode can operate in H reset mode or H non-reset mode as in Edge Pre-Select mode.
In H reset mode the falling edge of the trigger will immediately reset the internal HD and start the pre-selected exposure. In H non-reset mode the exposure will start at the first internal HD after the trigger. A WEN pulse indicate the start of valid video out.
The resulting image is read out at the rising edge of the trigger. The trigger pulse width should be longer than the pre-selected exposure time.

To use this mode

Set: SW1-4 on rear to **OFF** for random trigger. For RS-232C select trigger mode.
R 27 on PK8480A **SHORT for frame delay read out**
JP12 on PK8480A **SHORT for frame delay read out**
JP13 on PK8480A **OPEN for H Reset. JP13** PK8480A **Short for H Non Reset**
SW1-1 through SW1-3 on rear for exposure time. For RS-232C select shutter time
Other functions.

Input: Trigger signal. >3H to <1250H. Pulse width should be >exposure time.
Ext HD if used.

Note: *For CV-M10SX the selection of Edge Pre-select, Pulse Width Control H Reset and H non-reset cannot be done by RS-232C.* (See chapter 7 and 8 for details).
Avoid highlighted scene areas during the delay period.
In trigger modes there are no vertical sync in the composite sync signal.

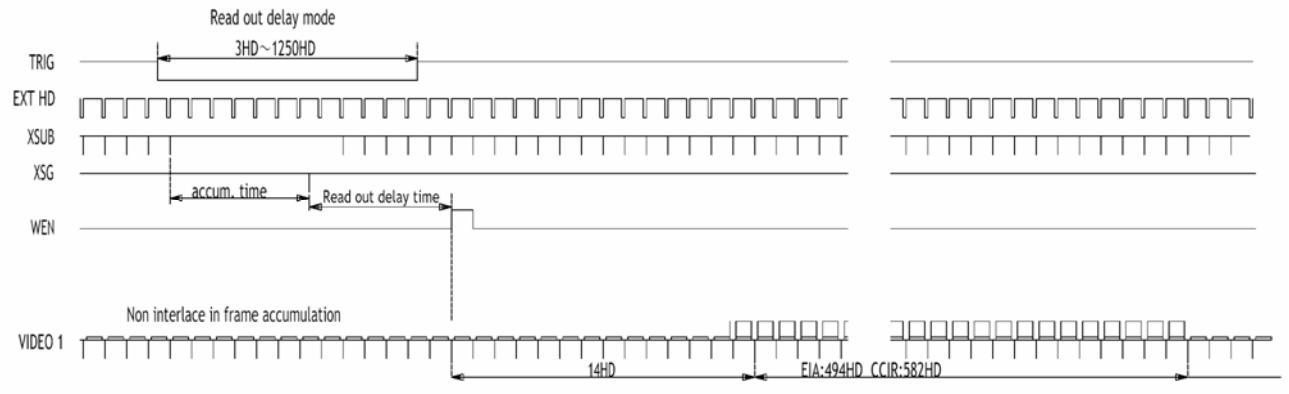


Fig. 18. Frame delay read out. H non-reset

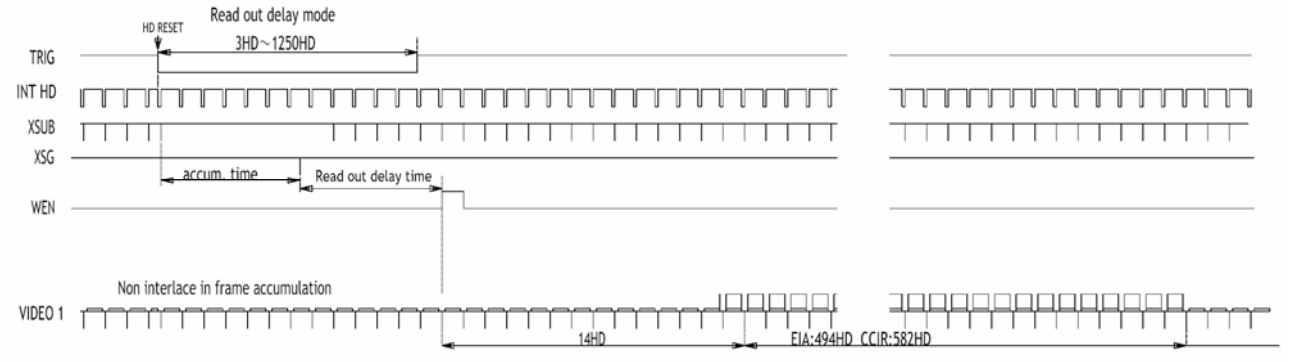


Fig. 19. Frame delay read out. H reset

6.5. Other Functions.

Scanning.
This function is set to non-interlaced, as the camera only work as a progressive scan non-interlaced.

Gamma.
Gamma can be set to 1.0 (linear) or 0.45.

Gain settings.
The video gain has 3 modes, which can be selected by the rear switch SW1-7 and SW1-8 or by RS-232C. Please refer to chapter 7 for details.

The 3 modes are:

1. **Fixed** where the gain level is set by RS-232C. Input range 100 to 180 for gain 0dB to 24dB.
2. **Rear potentiometer** where the gain can be set by the potentiometer on rear.
3. **AGC.** Here the gain is automatic controlled to keep the video level constant.

The **AGC reference level.**
Can be set by RS-232C only.
In AGC mode the video level is kept constant by the automatic gain control circuit within a 12 dB range. Normal 700 mVpp ±30 mV.

Black level.
Can be set by RS-232C only. Input range 100 to 180 for black level 0 to 140 mV.
Black level (or set-up level) can set the video level for black. Normal 20 mV ±2 mV.

White clip level.
Can be set by RS-232C only. Input range 100 to 180 for clip level 0.3 to 1.3 Vpp
The white clipper will clip highlighted video signal peaks. Normal clip level is 800 mVpp ±30 mV.

Local/remote control.
The camera can be controlled from the rear switch or by RS-232C.
RS-232C control if SW1-7 is ON and SW1-8 is ON.
Please refer to chapter 7 for details.

By RS-232C two more camera functions are present.

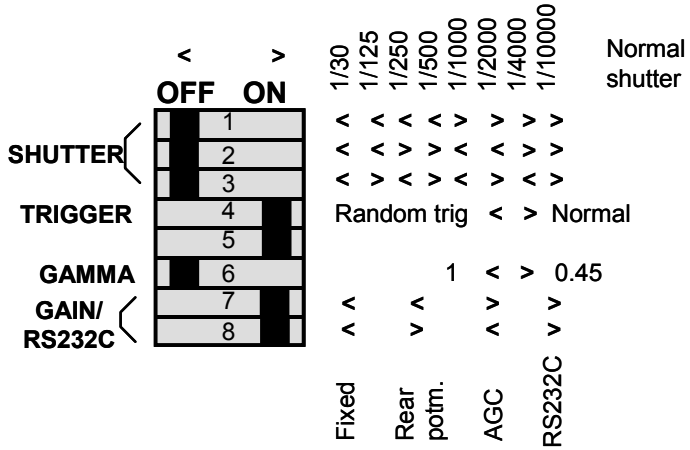
Shutter Off
This function will switch the shutter off, so the camera will work with frame accumulation. For CCIR it is 1/25 second, and for EIA it is 1/30 second.

Flicker-less
For a CCIR camera this function will change the shutter to 1/120 sec. For EIA 1/100 sec.
This function will reduce the image flicker if fluorescent illumination is used.

7. Configuring the Camera

7.1. Mode Setting by Switch

Before making any mode or jumper settings switch the power off.



Note: *The shown switch settings are the factory setting. Values are shown for EIA.*

Fig. 20. Switch on camera rear.

7.1.1. Shutter setting (On rear panel)

The shutter settings are done with the first 3 switches on SW1 on rear

SW1-1 MSB	SW1-2	SW1-3 LSB	Normal shutter *)		High speed shutter *1)		Low speed shutter *1)
			EIA	CCIR	EIA	CCIR	
OFF	OFF	OFF	1/30	1/25	1/20,000	1/25,000	2 frames
OFF	OFF	ON	1/125	1/125	1/40,000	1/50,000	4 frames
OFF	ON	OFF	1/250	1/250	1/60,000	1/70,000	6 frames
OFF	ON	ON	1/500	1/500	1/80,000	1/90,000	8 frames
ON	OFF	OFF	1/1000	1/1000	1/100,000	1/125,000	10 frames
ON	OFF	ON	1/2000	1/2000	1/200,000	1/250,000	12 frames
ON	ON	OFF	1/4000	1/4000	1/400,000	1/495,000	14 frames
ON	ON	ON	1/10000	1/10000	1/800,000	1/917,000	16 frames

*) If shutter OFF is selected by RS-232C, the shutter is 1/25 for CCIR, and 1/30 for EIA.
If Flicker-less is selected by RS-232C, the shutter is 1/120 for CCIR, and 1/100 for EIA.
*1) High speed shutter and Low speed shutter only selectable by RS232C, or if the mode has been selected as default by RS232C.
Note: By shift to the low speed shutter range it can take up to 20 sec. before the camera operates correctly.

7.1.2. Trigger select

When the trigger select SW1-4 is ON, the camera is in normal mode. The camera is running continuously with an exposure as selected with SW1-1 to SW1-3 or by RS- 232C.

When the trigger select SW1-4 is OFF, the camera is in random trigger mode. Here an external trigger pulse will start the exposure. Depending of JP12, JP13 and R27 setting on PK8480A, the camera will operate in edge pre-select (and edge pre-select with delayed read out) or pulse width control mode with H reset or H non-reset.

7.1.3. Gamma Correction

SW 1-6 will select the gamma correction. OFF is gamma 1.0, which is linear and normally used for vision. ON is gamma 0.45, which is non-linear.

7.1.4. Gain Control/RS 232C control

SW1-7 and SW1-8 has different functions.
SW1-7 OFF and SW1-8 OFF is fixed gain. Here the gain is fixed. Can be adjusted by RS-232C.
SW1-7 OFF and SW1-8 ON is rear potentiometer for gain setting.
SW1-7 ON and SW1-8 OFF is the AGC mode. The AGC level can be adjusted by RS-232C.
SW1-7 and SW1-8 OFF will enable the settings from the SW1 on rear.
SW1-7 and SW1-8 ON will enable the RS232C serial input for camera control.

Notes: *The setting should be done with power off. If the camera should be used with rear switch setting, the user setting from RS232C should be in the normal shutter range.*
By shift to the low speed range it can take up to 20 sec. before the camera operates correctly.

Table showing functions set by SW1-7 and SW1-8.

SW1-7	SW1-8	Function	Remarks
OFF	OFF	Fixed gain	Rear switch control enabled
OFF	ON	Rear potentiometer	
ON	OFF	AGC	
ON	**ON**	**RS-232C control**	**RS-232C control enabled**

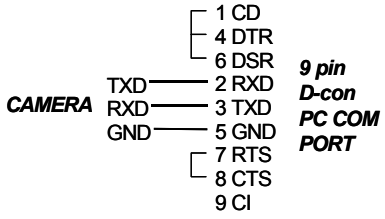
7.2. RS-232C control

Configuration of the CV-M10SX camera can also be done via the RS-232C port on the 6 pin HR connector.
SW1.6 and SW1.8 on camera rear should be ON for RS-232C control.
On power up, the latest stored user setting will be default.

Communication setting.

Baud Rate	9600 bps
Data Length	**8 bit**
Start Bit	1 bit
Stop Bit	1 bit
Parity	None
Xon/Xoff Control	None

RS 232C cable



7.3. Camera Control Tool for CV-M10SX

From www.jai.com Camera Control Tool for Windows 98/NT/2000 can be downloaded.
The control tool contents a camera control program and tools for making your own program.
For the integrator and experienced user, the Camera Control Toll is much more than a program with a window interface. It also provides an easy and efficient ActiveX interface built for MS Windows 98, ME, NT and 2000. The OCX interface has the ability to connect to the camera using the serial interface of the PC by reading and writing properties for the camera. This integration requires simple programming skills within Visual Basic, Visual C++ or similar languages in a Microsoft Windows environment.
Below the different windows are shown.

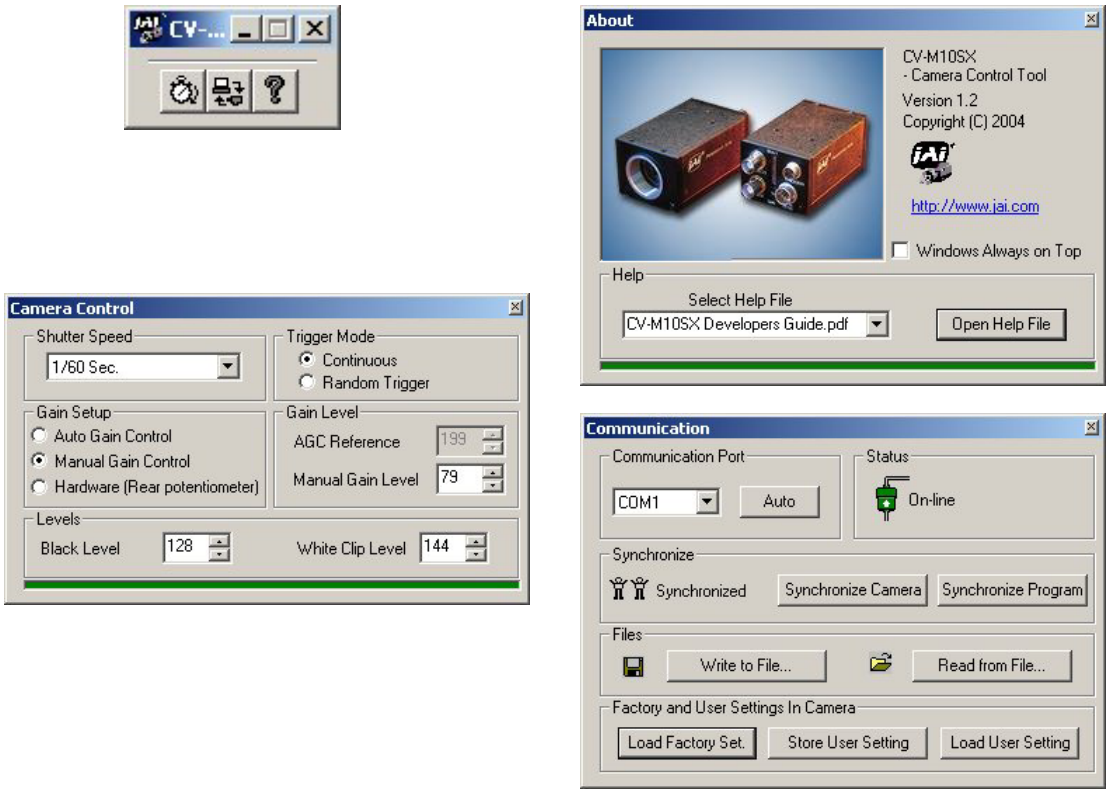


Fig. 21. Camera control tool windows.

8. Jumper settings

Switch off the power before making any mode or jumper settings.
The following modes are available with jumper setting:
Input/Output Mode of HD/VD signal. (HD/VD input is factory setting)
Termination of HD/VD input. (75 ohm is factory setting.)
Trigger input termination. (Factory setting is TTL)
Trigger mode select. (Edge Pre-select is factory setting)
H-reset or H non-reset. (Fatory setting is H reset.)
Alternative pins for inputs/outputs.
Jumper settings in "***italic bold***" are factory setting.

8.1. HD/VD signals

Jumpers on PK8482A.

Jumper	Function	HV and VD signals			Remarks
		Input 75 ohm	Input TTL	Output	
JP 1	***Ext. HD input***	***Short***	Short	Open	
JP 3	***Ext. HD input 75 ohm term.***	***Short***	Open	Open	
JP 7	Int. HD output	***Open***	Open	Short	
JP 4	***Ext. VD input***	***Short***	Short	Open	
JP 6	***Ext. VD input 75 ohm term.***	***Short***	Open	Open	
JP 5	Int. VD output	***Open***	Open	Short	

8.2. Trigger input termination

Jumper on PK8483A

Jumper	Function	Trigger input		Remarks
		TTL input	75 ohm terminated	
JP10	Trigger input termination	***Open***	Short	

8.3. Trigger mode selection

Jumpers on PK8483A

Jumper	Function	Random Trigger Shutter Mode					
		Edge Pre-select		Pulse Width Control *****)***		EPS frame delay	
		H-reset	H non-reset	H reset	H non-reset	H reset	H non-reset
JP 12	Trigger mode	***Open***	Open	Short	Short	Short	Short
JP 13	H reset/non-reset	***Open***	Short	Open	Short	Open	Short
R 27	Delayed read out	***Open***	Open	Open	Open	Short	Short

****) Note:*** *For Pulse Width Control, shutter speed must be set to 1/10,000 sec. (By SW1 and by RS-232C)*

8.4. Pixel clock on pin #9 (12 pin con.)

Jumpers on PK8480A.

Jumper	Function	Pixel clock on Pin #9 (12 pin con.)		Remarks
		NC	Pixel clock	
R 19	Pixel clock out on pin #9	***Open***	Short	

8.5. Alternative input/outputs on pin #6 and #7 (12 pin con.)

Jumpers on PK8480A.

Jumper	***Factory set***	Alternative signals on pin #6 and #7			Remarks
	HD on #6, VD on #7	WEN on #7	Trigger on #6	Trigger on #7	
R 25	***Short***	-	Open	-	HD or Trigger on #6
R 26	***Open***	-	Short	-	
R 22	***Short***	Open	-	Open	VD, WEN or Trigger on #7
R 27	***Open***	Open	-	Short	
R 21	***Open***	Short	-	Open	

8.6. Locations of Jumper

Jumpers positions are shorted with a 0 ohm resistor or by a soldering between the 2 points. To remove the solder tin from a jumper position, use a special tin remover such as de-solder wick.

8.6.1. Location of Jumper on PK8482A

On this board the jumpers for HD/VD input, output and 75ohm termination are found.

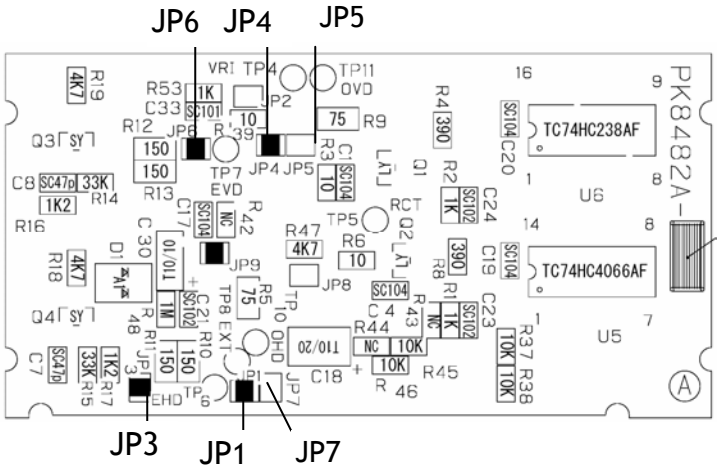


Fig. 22. Jumper on PK8482A

8.6.2. Location of Jumper on PK8480A

On this board the jumpers for alternative outputs on the 12 pin connector are found.

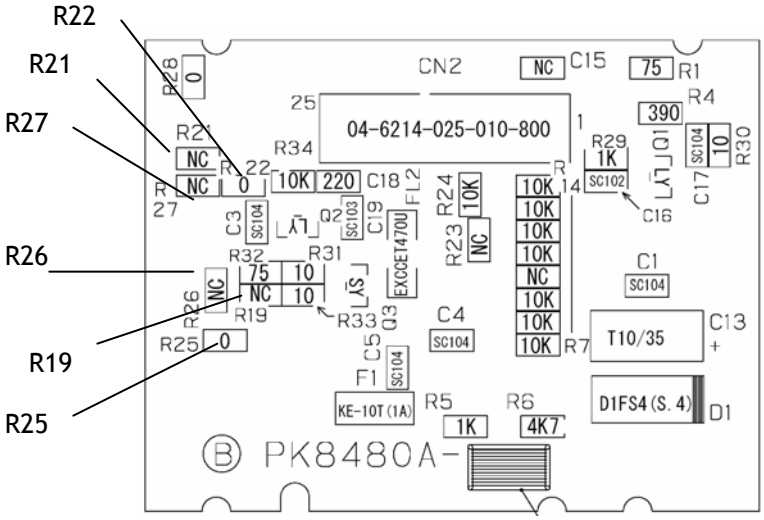
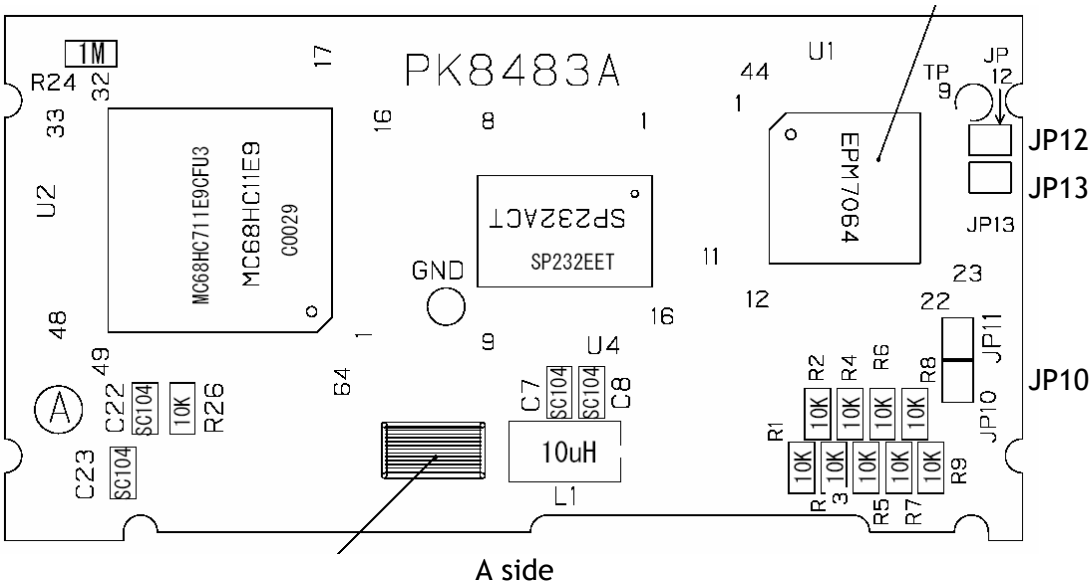


Fig. 23. Jumper on PK8480A

8.6.3. Location of Jumper on PK8483A

Jumpers for selecting random trigger modes for CV-M10SX. It is edge pre-select, pulse width control, H reset and H non-reset. These modes can not be selected by RS232C.
Jumper for trigger input 75 ohm termination is also found here.



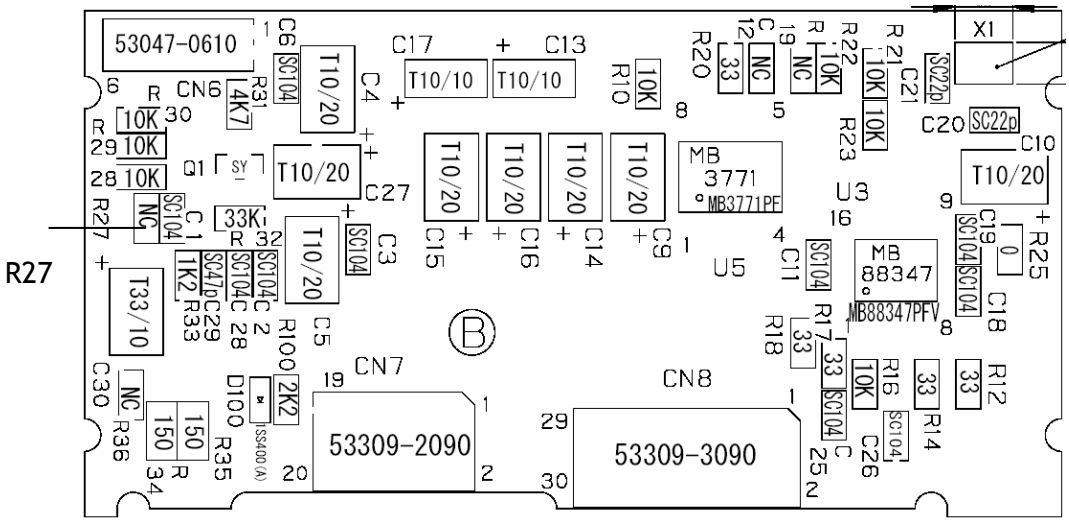


Fig. 24. Jumper on PK8483A

9. External Appearance and Dimensions

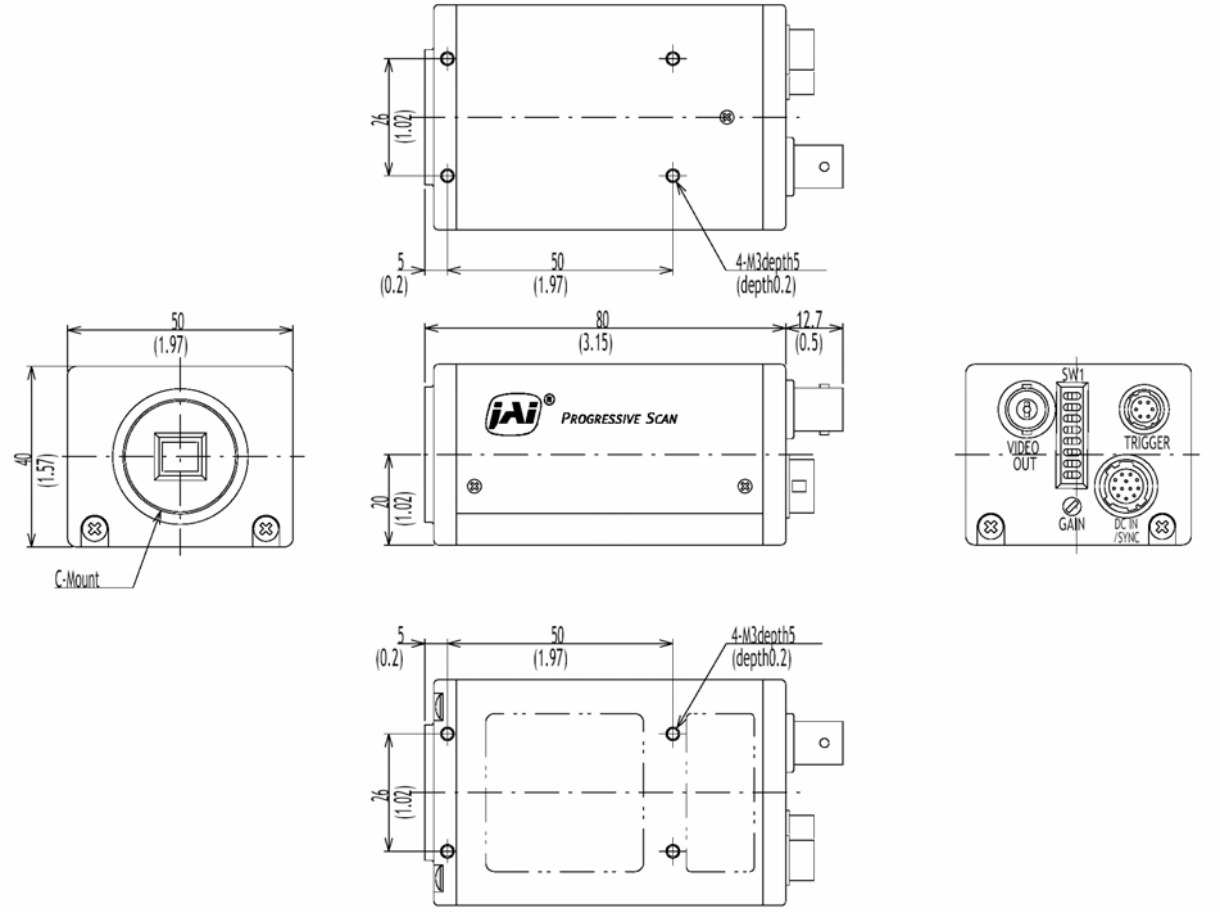


Fig. 25. Outline.

10. Specifications

10.1. Spectral sensitivity

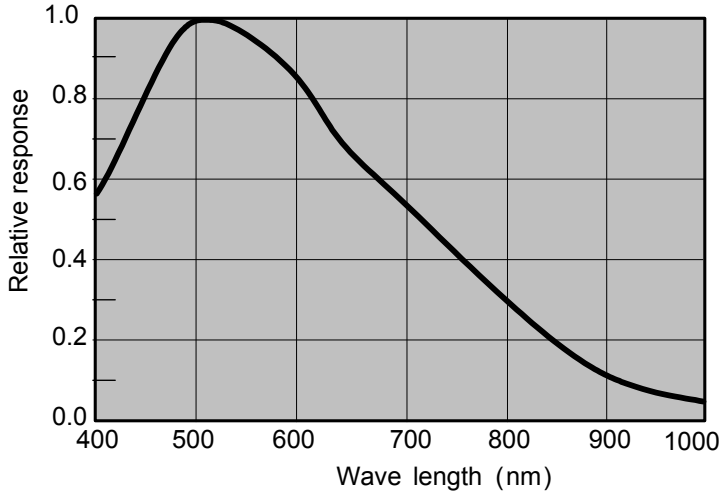


Fig. 26. Spectral sensitivity for CV-M10SX

10.2. Specification table

Specifications	CV-M10SX CCIR	CV-M10SX EIA
Scanning system	Progressive scan	
Frame rate full frame progressive	25 frames/sec. (625 lines/frame)	29.97 frames/sec. (525 lines/frame)
Pixel clock	14.75 MHz	12.272725 MHz
Line frequency	15.625 kHz (944 pixels clock/line) (64 μsec)	15.734 kHz (780 pixels clock/line) (63.5 μsec)
CCD sensor: 1/2" progressive scan monochrome IT	ICX-415AL-6	ICX-414AL-6
Sensing area	6.61 (h) x 4.97 (v) mm	
Cell size	8.3 (h) x 8.3(v) μm	9.9 (h) x 9.9(v) μm
Effective pixels	782 (h) x 582 (v)	659 (h) x 494 (v)
Pixels in video output	767(h) x 580 (v)	648 (h) x 492 (v)
Sensitivity on sensor	0.5Lux (Min. Gain, 100% video) 0.05 Lux (Max. gain, 50% video)	
S/N ratio	>55dB	
Video output	Composite 1.0Vpp 75Ω	
Gain Gain range	Manual - automatic 0 to +24 dB	
Gamma	0.45 – 1.0	
Synchronization	Int. X-tal. Ext. HD/VD, random trigger	
HD/VD input	4 V ±1 V. TTL or 75 Ω terminated	
HD/VD output	4 V from 75 Ω source	
Trigger input	4 V ±1 V. TTL or 75 Ω terminated	
EEN WEN output	4 V from 75 Ω source	
Pixel clock output	4 V from 75 Ω source	
Trigger modes	Continuous, Edge pre-select, Pulse width control, Frame delay read out	
Triggered shutter functions	HD synchronous or H reset	
Shutter speed EPS	16 steps. 1/25 to 1/917,000 sec.	16 steps. 1/30 to 1/800,000 sec.
Shutter low speed. Normal mode	8 steps. 2 to 16 frames	
Shutter, Flicker-less. Normal mode	1/120 sec.	1/100 sec
Pulse width control	1H to 625H	
Frame delay read out	3H to 1250H	
Control interface	Switches on rear, TXD and RXD via RS 232C	
Functions controlled by RS 232C	Shutter, Trigger, Black level and Gain. AGC level, white clip	
Operating temperature	-5°C to +45°C	
Humidity	20 – 80% non-condensing	
Storage temp/humidity	-25°C to +60°C/20% to 90%	
Vibration	10G (20Hz to 200Hz in all directions)	
Shock	70G	
EMC	CE (EN50081-1 and EN50082-1), FCC part 15, UL94	
Power	12V DC ± 10%. 2.3 W	
Lens mount	C-mount (Flange back 17.526 mm ±0.05mm) Image centre ±0.1mm from C-mount centre	
Dimensions	40 x 50 x 80 mm (HxWxD)	
Weight	245g	

***Note**: Above specifications are subject to change without notice.*

11. Appendix

11.1. Precautions

Personnel not trained in dealing with similar electronic devices should not service this camera.
The camera contains components sensitive to electrostatic discharge. The handling of these devices should follow the requirements of electrostatic sensitive components.
Do not attempt to disassemble this camera.
Do not expose this camera to rain or moisture.
Do not face this camera towards the sun, extreme bright light or light reflecting objects.
When this camera is not in use, put the supplied lens cap on the lens mount.
Handle this camera with the maximum care.
Operate this camera only from the type of power source indicated on the camera.
Power off the camera during any modification such as changes of jumper and switch setting.

11.2. Typical Sensor Characteristics

The following effects may be observed on the video monitor screen. They do not indicate any fault of the camera, but do associate with typical sensor characteristics.

V. Aliasing
When the CCD camera captures stripes, straight lines or similar sharp patterns, jagged image on the monitor may appear.

Blemishes
Some pixel defects can occur, but this does not have en effect on the practical operation.

Patterned Noise
When the sensor captures a dark object at high temperature or is used for long time integration, fixed pattern noise may appear on the video monitor screen.

11.3. References

1. This manual can and datasheet for CV-M10SX can be downloaded from www.jai.com
2. Camera control software can be downloaded from www.jai.com
3. Specifications for the EIA CCD sensor ICX-414L can be found on www.jai.com
4. Specifications for the CCIR CCD sensor ICX-415L can be found on www.jai.com

12. Users Record

Camera type: **CV-M10SX**

Revision: **(Revision .)**

Serial No. **……..**

Firmware version. **……..**

For camera revision history, please contact your local JAI distributor.

Users Mode Settings.

Users Modifications.

DECLARATION OF CONFORMITY
AS DEFINED BY THE COUNCIL DIRECTIVE
89/336/EEC
EMC (ELECTROMAGNETIC COMPABILITY)
WE HEREWITH DECLARE THAT THIS PRODUCT
COMPLIES WITH THE FOLOWING PROVISIONS APPLYING TO IT.
EN-50081-1
EN-50082-1

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