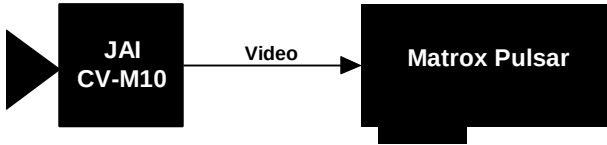
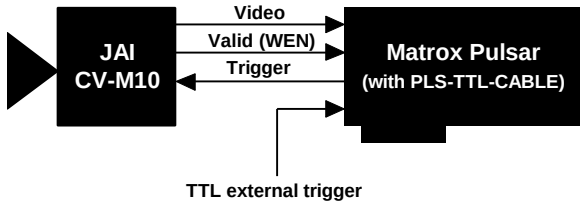


Application Note: Interfacing non-standard cameras to Matrox Pulsar

JAI CV-M10

February 19, 1996

Camera Interface Overview	• 640 x 480 x 8-bit (VGA) • Analog video output • Non-interlaced (progressive scan) • Internal exposure control • 2 modes: continuous mode, asynchronous reset mode (trigger mode)
Camera Interface Details	1. Continuous mode  • 640 x 480 x 8-bit (VGA) @ 30fps • Analog (composite) video output • Non-interlaced • Continuous video • DCF used: CVM10.DCF 2. Asynchronous reset mode (trigger mode)  • 640 x 480 x 8-bit (VGA) • Non-interlaced • Analog (composite) video output • Internal exposure control with times ranging from (1/60)s to (1/800 000)s • Matrox Pulsar receiving TTL external trigger • Matrox Pulsar sends TTL exposure signal to trigger input of camera to initiate exposure • Matrox Pulsar receiving TTL VALID (WEN) signal from camera • DCF used: CVM10A.DCF
Cabling Requirements	1. Continuous mode • IMG-7W2-TO-1BNC required • Video input BNC of IMG-7W2-TO-1BNC cable should be connected to VIDEO OUT BNC connector of camera • The switches on the rear panel of the camera must be correctly configured such that switch #4 is set to ON (normal mode) and switch #5 is set to ON (non-interlaced mode)

Application Note:

Interfacing non-standard cameras to Matrox Pulsar

JAI CV-M10

February 19, 1996

Cabling Requirements (continued)	1. Continuous mode • IMG-7W2-TO-1BNC required • Video input BNC of IMG-7W2-TO-1BNC cable should be connected to VIDEO OUT BNC connector of camera • The switches on the rear panel of the camera must be correctly configured such that switch #4 is set to ON (normal mode) and switch #5 is set to ON (non-interlaced mode) 2. Asynchronous reset mode (trigger mode) • IMG-7W2-TO-5BNC cable and PLS-TTL-CABLE required • Video input BNC of IMG-7W2-TO-5BNC cable should be connected to VIDEO OUT BNC connector of camera • The switches on the rear panel of the camera must be correctly configured such that switch #4 is set to OFF (random trigger mode) and switch #5 is set to ON (non-interlaced mode) • The connections between the DB-37 connector of the PLS-TTL-CABLE and the 6-pin male Hirose connector of the camera are as follows: <table><tr><td colspan="2">PLS-TTL-CABLE (DB-37 connector)</td><td></td><td colspan="2">JAI CV-M10 (6-pin male Hirose connector)</td></tr><tr><td>Pin name</td><td>Pin no.</td><td></td><td>Pin name</td><td>Pin no.</td></tr><tr><td>TTL_EXPOSURE1</td><td>9</td><td>→</td><td>TRIGGER</td><td>5</td></tr><tr><td>TTL_VSYNC</td><td>11</td><td>←</td><td>VALID (WEN)</td><td>6</td></tr><tr><td>GROUND</td><td>6&7</td><td></td><td>GROUND</td><td>3</td></tr></table> • TTL external trigger source should be connected to the TTL Trigger Input of the IMG-7W2-TO-5BNC cable	PLS-TTL-CABLE (DB-37 connector)			JAI CV-M10 (6-pin male Hirose connector)		Pin name	Pin no.		Pin name	Pin no.	TTL_EXPOSURE1	9	→	TRIGGER	5	TTL_VSYNC	11	←	VALID (WEN)	6	GROUND	6&7		GROUND	3
PLS-TTL-CABLE (DB-37 connector)			JAI CV-M10 (6-pin male Hirose connector)																							
Pin name	Pin no.		Pin name	Pin no.																						
TTL_EXPOSURE1	9	→	TRIGGER	5																						
TTL_VSYNC	11	←	VALID (WEN)	6																						
GROUND	6&7		GROUND	3																						
Special Considerations	Asynchronous reset mode (trigger mode) • The shutter mode is selected by using the SW1 switches inside the camera. The shutter mode can be set to: shutter OFF, “normal speed” shutter ON, “high speed” shutter ON and “long time exposure” shutter ON. • Once in asynchronous reset mode and having set the shutter mode either to “normal speed” shutter ON or to “high speed” shutter ON, the exposure time is set using switches #1, #2 and #3 on the rear panel of the camera. In “normal speed” shutter ON mode, exposure times range from (1/60)s to (1/10 000)s. In “high speed” shutter ON mode, exposure times range from (1/20 000)s to (1/800 000)s. Consult the CV-M10 manual as to the positions of these three switches in addition to the corresponding exposure times.																									

Application Note:

Interfacing non-standard cameras to Matrox Pulsar

JAI CV-M10

February 19, 1996

Special Considerations (continued)

- Once it has received the external signal to trigger, the Pulsar sends a TTL exposure signal to the camera. The camera awaits the falling edge of the signal, at which point it initiates exposure. The minimum duration of the active low portion of an exposure pulse must be 2 μ s
- The DCF may be modified using Matrox Intellicam; however, the manually altered registers must not be overwritten!

NOTE: whereas the vertical timing is solely reset in most cameras in asynchronous reset mode, the distinguishing characteristic of this camera is that upon the arrival of the exposure pulse both the horizontal timing as well as the vertical timing are reset, resulting in total asynchronous reset. Since the PLL of the Pulsar is line-locked to the analog video signal, any discontinuity in the horizontal timing of this signal will unlock the PLL. The PLL will then require many lines in order to resynchronize itself with the horizontal timing of the camera, resulting in a poor alignment of the first few lines of the new frame.

The CVM10A.DCF is correctly configured for proper functionality between the Pulsar and the JAI CV-M10 in asynchronous reset mode. The problem was averted by horizontally aligning the exposure pulse in such a way that the camera is triggered to reset identically upon where its last hsync would have fallen; in this way the horizontal timing of the camera seems constant. This is accomplished through the use of TIMER1 on the Pulsar, which is clocked on the rising edge of the PSG hsync and triggered by the external trigger pulse. The PSG_HESYNC register in the DCF is used to shift the position of the exposure pulse so that the camera resets at the right place and effectively appears to maintain its hsync frequency. This register must be set in an empirical manner.

The DCF(s) mentioned in this application note can be found on the MIL and MIL-Lite CD, or our FTP site ([ftp.matrox.com](ftp://ftp.matrox.com)). The information furnished by Matrox Electronics System, Ltd. is believed to be accurate and reliable. Please verify all interface connections with camera documentation or manual. Contact your local sales representative or Matrox Sales office or Matrox Imaging Applications at 514-822-6061 for assistance.

Corporate Headquarters:
Canada and U.S.A.
Matrox Electronic Systems Ltd.
1055 St.Regis Blvd.
Dorval, Quebec, Canada
H9P 2T4
Tel: (514) 685-7230
Fax: (514) 822-6273

