MATROX GENESIS
CAMERA INTERFACE APPLICATION NOTE
COHU 7512 FEBRUARY 13, 2001

Basics about the camera

Camera Descriptions

- 1300 × 1030 × 10-bit @ 12 fps.
- Single channel LVDS digital video output.
- Progressive scan.
- Internal or external sync.
- External exposure control.
- 20 MHz pixel clock rate.

Mode of operations as per Matrox Imaging (in parentheses as per camera manufacturer)

Basics about the interface modes

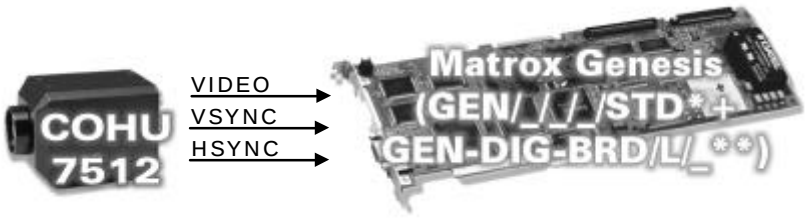
Interface Modes

- Continuous (Free running)
- Trigger (External Single/Double Trigger)

Camera Interface Briefs

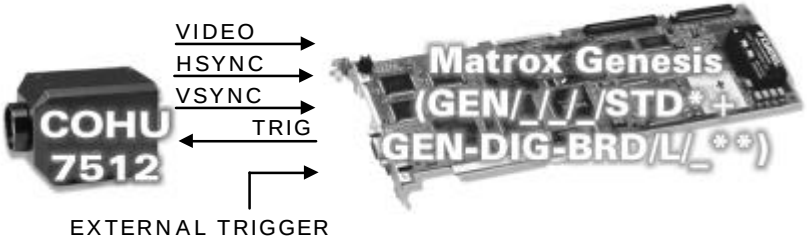
Mode 1: Continuous- Slave

- 1300 × 1030 × 10-bit @ 12 fps.
- Single channel LVDS digital video output.
- Progressive scan.
- Matrox Genesis receiving HSYNC, VSYNC and video signals from camera.
- DCF used: C7512C.DCF



Mode 2: Trigger (Ext. Single Trigger - Fixed Shutter)

- 1300 × 1030 × 10-bit.
- Single channel LVDS digital video output.
- Progressive scan.
- Matrox Genesis receiving external trigger signal.
- Matrox Genesis sending EXPOSURE1 (TRIG) signal to camera to initiate exposure time.
- Matrox Genesis receiving HSYNC, VSYNC and video signals from camera.
- DCF used: C7512TFE.DCF

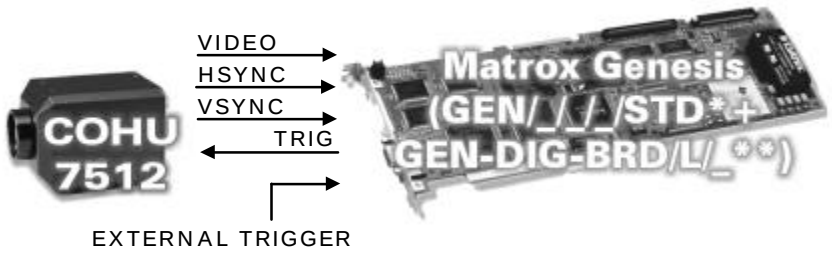


Basics about the interface modes

Camera Interface Briefs (Continued)

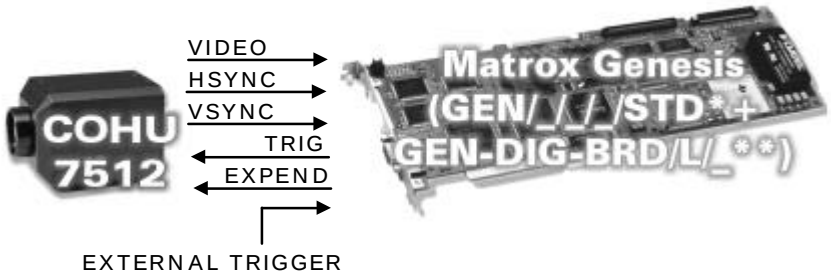
Mode 3: Trigger (Ext. Single Trigger – Pulse Width Shutter)

- 1300 × 1030 × 10-bit.
- Single channel LVDS digital video output.
- Progressive scan.
- Matrox Genesis receiving external trigger signal.
- Matrox Genesis sending EXPOSURE1 (TRIG) signal to camera to initiate and control exposure time.
- Matrox Genesis receiving VSYNC, HSYNC and video signals from camera.
- DCF used: C7512TPW.DCF



Mode 4: Trigger (Ext. Double Trigger)

- 1300 × 1030 × 10-bit.
- Single channel LVDS digital video output.
- Progressive scan.
- Matrox Genesis receiving external trigger signal.
- Matrox Genesis sending EXPOSURE1 (TRIG) and EXPOSURE2 (EXPEND) signals to camera to initiate and control exposure time.
- Matrox Genesis receiving VSYNC, HSYNC and video signals from camera.
- DCF used: C7512TDP.DCF



Specifics about the interface modes

Camera Interface Details

Mode 1: Continuous-Slave

- **Frame Rate:** Matrox Genesis receives the continuous video from the camera at 12 frames per second.
- **Exposure time:** Exposure time is inversely proportionate to the frame rate (no shutter) or determined by the shutter setting. Refer to the camera manual for more information.
- **Camera control settings:** Various modes are controlled through the serial port using the COHU 7500 Control Panel software. Refer to the camera manual for additional information. Settings for this mode are as follows:

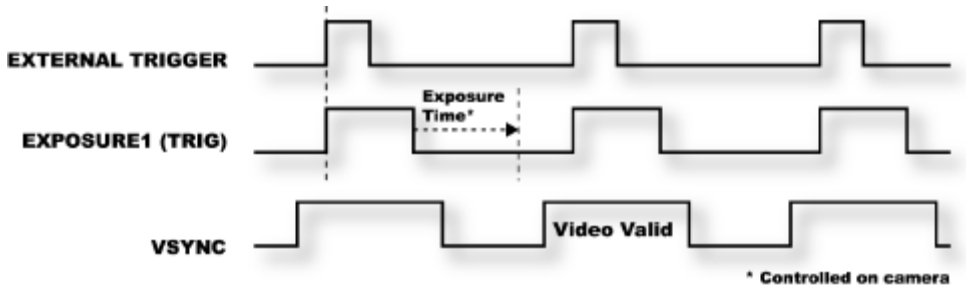
Control	*Setting*
VIDEO MODE	CONT/NORMAL SPEED
MISC.	ENABLE VD

Mode 2: Trigger (Ext. Single Trigger - Fixed Shutter)

- **Frame rate**: The frame rate is determined by the frequency of the external trigger signal.
- **Exposure time:** The falling edge of the EXPOSURE1 (TRIG) signal initiates the exposure (next valid frame is captured). Exposure time is controlled through the COHU 7500 Control Panel software. Consult the camera manual for more information.
- **Minimum exposure width:** As per the camera manufacturer, minimum external shutter pulse width equals **105 ms**.
- **Camera control settings:** Various modes are controlled through the serial port using the COHU 7500 Control Panel software. Refer to the camera manual for additional information. Settings for this mode are as follows:

Control	*Setting*
VIDEO MODE	SNAPSHOT/EXT. SINGLE TRIGGER
MISC.	ENABLE VD
SHUTTER	HS SHUTTER
ADJUSTMENTS	SHUTTER/VALUES as desired

- **Timing diagram:**



Specifics about the interface modes

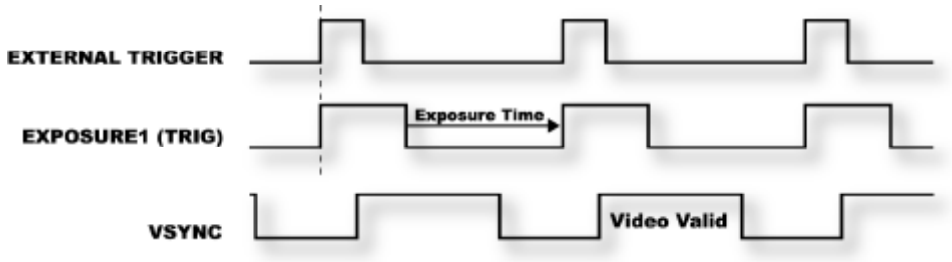
Camera Interface Details (continued)

Mode 3: Trigger (Ext. Single Trigger – Pulse Width Shutter)

- **Frame rate**: The frame rate is determined by the frequency of the external trigger signal.
- **Exposure time:** The width (falling edge to rising edge) of the EXPOSURE1 (TRIG) signal is the exposure time. The exposure time can be modified in the DCF using Matrox Intellicam or with the MIL MdigControl() function. Consult the respective manual for more information.
- **Minimum exposure width:** As per camera manufacturer, minimum external shutter pulse width equals **105** m**s**.
- **Camera control settings:** Various modes are controlled through the serial port using the COHU 7500 Control Panel software. Refer to the camera manual for additional information. Settings for this mode are as follows:

Control	*Setting*
VIDEO MODE	SNAPSHOT/EXT. PW Single TRIGGER
MISC.	ENABLE VD
SHUTTER	As desired
ADJUSTMENTS	As desired

- **Timing diagram:**



Mode 4: Trigger (Ext. Double Trigger)

- **Frame rate**: The frame rate is determined by the frequency of the external trigger signal.
- **Exposure time:** The period between the falling edge of the EXPOSURE1 (TRIG) signal and the falling edge of the EXPOSURE2 (EXPEND) signal is the exposure time. The exposure time can be modified in the DCF using Matrox Intellicam or with the MIL MdigControl() function. Consult the respective manual for more information.
- **Minimum exposure width:** As per the camera manufacturer, minimum external shutter pulse width equals **105** m**s**.

Continued…

Specifics about the interface modes

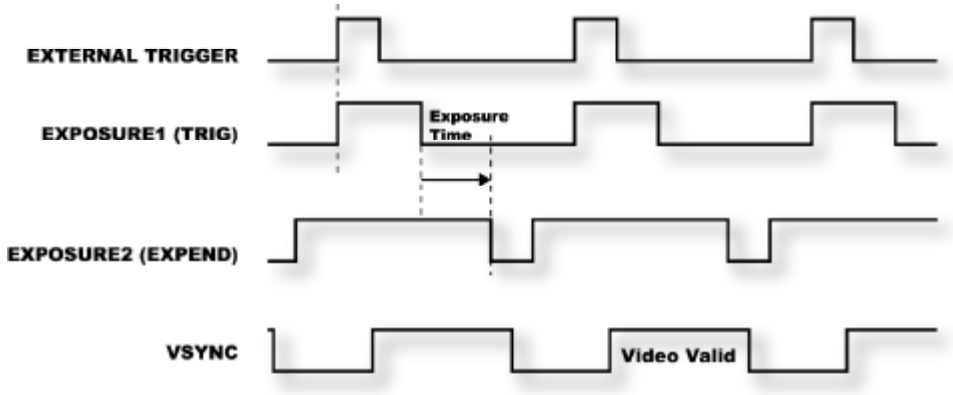
Camera Interface Details (continued)

Mode 4: Trigger (Ext. Double Trigger)

- **Camera control settings:** Various modes are controlled through the serial port using the COHU 7500 Control Panel software. Refer to the camera manual for additional information. Settings for this mode are as follows:

Control	*Setting*
VIDEO MODE	SNAPSHOT/EXT. PW Single TRIGGER
MISC.	ENABLE VD
SHUTTER	As desired
ADJUSTMENTS	As desired

- **Timing diagram:**



Cabling details for the interface modes

Cabling Requirements

Mode 1: Continuous-Slave

- **Cable:** DBHD100-TO-OPEN (open ended) cable required for video, synchronization and control signals.
- **Connection:** Connections between the 44-pin connector of the camera and the 100-pin connector of the Matrox Genesis are as follows:

Matrox Genesis (100-pin connector)			**COHU 7512 (44-pin connector)**	
Pin name	***Pin no.***		***Pin name***	***Pin no.***
DATA, INPUT, 0 +	1	←	VID0 +	1
DATA, INPUT, 0 -	2	←	VID0 -	16
DATA, INPUT, 1 +	3	←	VID1 +	2
DATA, INPUT, 1 -	4	←	VID1 -	17
DATA, INPUT, 2 +	5	←	VID2 +	3
DATA, INPUT, 2 -	6	←	VID2 -	18

Cabling continued…

Cabling details for the interface modes

Cabling Requirements (continued)

Mode 1: Continuous-Slave

- **Cable:** DBHD100-TO-OPEN (open ended) cable required for video, synchronization and control signals.
- **Connection:** Connections between the 44-pin connector of the camera and the 100-pin connector of the Matrox Genesis are as follows:

Matrox Genesis (100-pin connector)			**COHU 7512 (44-pin connector)**	
Pin name	***Pin no.***		***Pin name***	***Pin no.***
DATA, INPUT, 3 +	7	←	VID3 +	4
DATA, INPUT, 3 -	8	←	VID3 -	19
DATA, INPUT, 4 +	9	←	VID4 +	5
DATA, INPUT, 4 -	10	←	VID4 -	20
DATA, INPUT, 5 +	11	←	VID5 +	6
DATA, INPUT, 5 -	12	←	VID5 -	21
DATA, INPUT, 6 +	13	←	VID6 +	7
DATA, INPUT, 6 -	14	←	VID6 -	22
DATA, INPUT, 7 +	15	←	VID7 +	8
DATA, INPUT, 7 -	16	←	VID7 -	23
DATA, INPUT, 8 +	17	←	VID8 +	9
DATA, INPUT, 8 -	18	←	VID8 -	24
DATA, INPUT, 9 +	19	←	VID9 +	10
DATA, INPUT, 9 -	20	←	VID9 -	25
HSYNC, OUTPUT, +	83*	→	HSYNC (IN) +	11*
HSYNC, OUTPUT, -	84*	→	HSYNC (IN) -	26*
VSYNC, OUTPUT, +	85*	→	VSYNC (IN) +	12*
VSYNC, OUTPUT, -	86*	→	VSYNC (IN) -	27*
GROUND	37	--	GND	15
GROUND	38	--	GND	30
CLOCK, INPUT, +	39	←	CLK OUT +	31
CLOCK, INPUT, -	40	←	CLK OUT -	32
HSYNC, INPUT, +	33	←	HSYNC (OUT) +	33
HSYNC, INPUT, -	34	←	HSYNC (OUT) -	34
VSYNC, INPUT, +	35	←	VSYNC (OUT) +	35
VSYNC, INPUT, -	36	←	VSYNC (OUT)-	36

* These connections are not required for this mode, however allows this cable to be used in undocumented MASTER mode.

Cabling details for this interface mode

Cabling Requirements (continued)

Modes 2-4: Trigger

- **Cable:** IMG-7W2-TO-5BNC and DBHD100-TO-OPEN (open ended) cables required for video, synchronization and control signals.
- **External trigger:** Should be connected to GRAY BNC of IMG-7W2-TO-5BNC cable.
- **Connection:** Connections between the 44-pin connector of the camera and the 100-pin connector of the Matrox Genesis are as follows:

Matrox Genesis (100-pin connector)			**COHU 7512 (44-pin connector)**	
Pin name	***Pin no.***		***Pin name***	***Pin no.***
DATA, INPUT, 0 +	1	←	VID0 +	1
DATA, INPUT, 0 -	2	←	VID0 -	16
DATA, INPUT, 1 +	3	←	VID1 +	2
DATA, INPUT, 1 -	4	←	VID1 -	17
DATA, INPUT, 2 +	5	←	VID2 +	3
DATA, INPUT, 2 -	6	←	VID2 -	18
DATA, INPUT, 3 +	7	←	VID3 +	4
DATA, INPUT, 3 -	8	←	VID3 -	19
DATA, INPUT, 4 +	9	←	VID4 +	5
DATA, INPUT, 4 -	10	←	VID4 -	20
DATA, INPUT, 5 +	11	←	VID5 +	6
DATA, INPUT, 5 -	12	←	VID5 -	21
DATA, INPUT, 6 +	13	←	VID6 +	7
DATA, INPUT, 6 -	14	←	VID6 -	22
DATA, INPUT, 7 +	15	←	VID7 +	8
DATA, INPUT, 7 -	16	←	VID7 -	23
DATA, INPUT, 8 +	17	←	VID8 +	9
DATA, INPUT, 8 -	18	←	VID8 -	24
DATA, INPUT, 9 +	19	←	VID9 +	10
DATA, INPUT, 9 -	20	←	VID9 -	25
HSYNC, OUTPUT, +	83*	→	HSYNC (IN) +	11*
HSYNC, OUTPUT, -	84*	→	HSYNC (IN) -	26*
VSYNC, OUTPUT, +	85*	→	VSYNC (IN) +	12*
VSYNC, OUTPUT, -	86*	→	VSYNC (IN) -	27*
EXPOSURE1, OUTPUT, +	95	→	TRIG +	13
EXPOSURE1, OUTPUT, -	96	→	TRIG -	28
EXPOSURE2, OUTPUT, +	97**	→	EXPEND +	14**
EXPOSURE2, OUTPUT, -	98**	→	EXPEND -	29**

Cabling continued…

* These connections are not required for this mode, however allows this cable to be used with all modes.

** These connections required only for Mode 4: Trigger (Ext. Double Trigger).

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Cabling details for the interface modes

Cabling Requirements (continued)

Modes 2-4: Trigger

- **Connection:** Connections between the 44-pin connector of the camera and the 100-pin connector of the Matrox Genesis are as follows:

Matrox Genesis (100-pin connector)			**COHU 7512 (44-pin connector)**	
Pin name	***Pin no.***		***Pin name***	***Pin no.***
GROUND	37	--	GND	15
GROUND	38	--	GND	30
CLOCK, INPUT, +	39	←	CLK OUT +	31
CLOCK, INPUT, -	40	←	CLK OUT -	32
HSYNC, INPUT, +	33	←	HSYNC (OUT) +	33
HSYNC, INPUT, -	34	←	HSYNC (OUT) -	34
VSYNC, INPUT, +	35	←	VSYNC (OUT) +	35
VSYNC, INPUT, -	36	←	VSYNC (OUT)-	36

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). 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 Imaging Applications at 514-822-6061 for assistance.

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