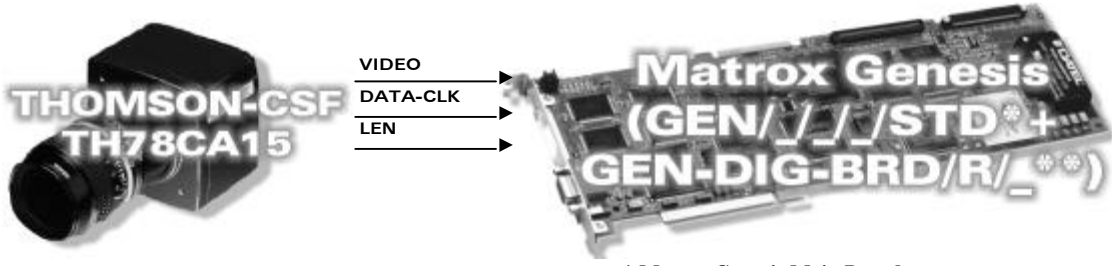
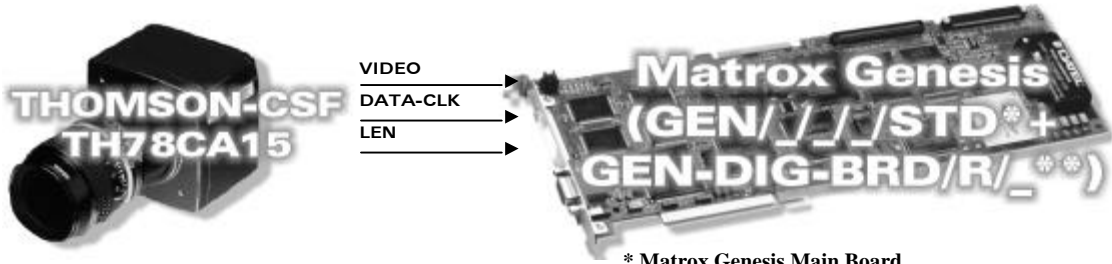


Application Note:

Interfacing non-standard cameras to Matrox Genesis

THOMSON-CSF TH78CA15

February 14, 2000

Camera Descriptions	<ul style="list-style-type: none"> • 4096 x 12-bit. • Dual channel RS-422 digital video output. • External or internal sync. • External or internal exposure control. • Pixel clock: up to 40 MHz
Interface modes	<ul style="list-style-type: none"> • Fixed line scan rate, variable line scan
Camera Interface Briefs	<p>Mode 1: Fixed line scan rate (Free running mode)</p>  <p>* Matrox Genesis Main Board ** Matrox RS-422 Digital Data Input Board</p> <ul style="list-style-type: none"> • 4096 x 12-bit. • Dual channel RS-422 digital video. • DCF configured for 512 lines per virtual frame. • Line scan rate is fixed and determined by HSYNC. • Matrox Genesis receiving PIXEL CLOCK (DATA-CLOCK @ 20 MHz), HSYNC (LEN) and video signals from camera. • DCF used: 78CA15M0.DCF <p>Mode 2: Fixed line scan rate (Free running mode with integration time set by camera)</p>  <p>* Matrox Genesis Main Board ** Matrox RS-422 Digital Data Input Board</p> <ul style="list-style-type: none"> • 4096 x 12-bit. • Dual channel RS-422 digital video. • DCF configured for 512 lines per virtual frame. • Line scan rate is fixed and determined by camera software (integration time). • Matrox Genesis receiving PIXEL CLOCK (DATA-CLOCK @ 20 MHz), HSYNC (LEN) and video signals from camera. • DCF used: 78CA15M1.DCF

Application Note:

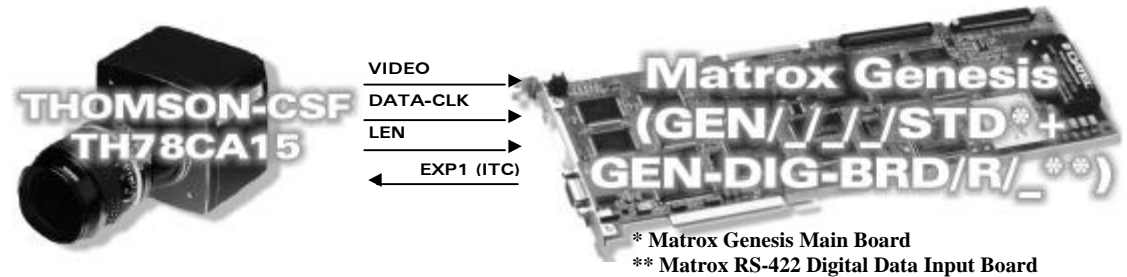
Interfacing non-standard cameras to Matrox Genesis

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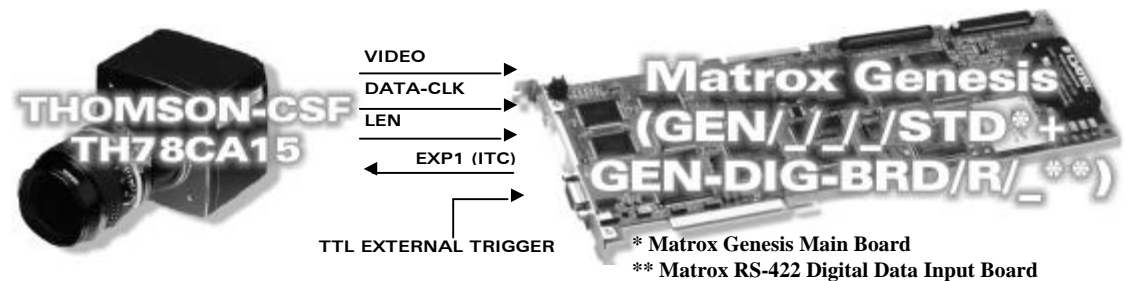
Camera Interface Briefs (continued)

Mode 3: Variable line scan rate (Triggered mode with integration time set by camera)



- 4096 × 12-bit.
- Dual channel RS-422 digital video.
- DCF configured for 512 lines per virtual frame.
- Line scan rate is variable and determined by EXPOSURE1 (ITC) and camera software setting.
- Matrox Genesis sending periodic EXPOSURE1 (ITC) signal to camera: the EXPOSURE1 signal both initiates exposure and controls exposure time.
- Matrox Genesis receiving PIXEL CLOCK (DATA-CLOCK @ 20 MHz), HSYNC (LEN) and video signals from camera.
- DCF used: [78CA15M2.DCF](#)

Mode 4: Variable line scan rate (Triggered mode with integration time set by camera)



- 4096 × 12-bit.
- Dual channel RS-422 digital video.
- DCF configured for 512 lines per virtual frame.
- Line scan rate is variable and controlled by external trigger signal.
- Matrox Genesis receiving TTL external trigger signal.
- Matrox Genesis sends EXPOSURE1 (ITC) signal to camera: the EXPOSURE1 signal both initiates exposure and controls exposure time.
- Line scan rate is variable and determined by EXPOSURE1 (ITC) and camera software setting; EXPOSURE1 (ITC) signal initiates exposure, camera software setting determines integration period.
- DCF used: [78CA15M3.DCF](#)

Application Note:

Interfacing non-standard cameras to Matrox Genesis

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Camera Interface Details

Mode 1: Fixed line scan rate (Free running mode)

- Matrox Genesis is operating in a slave mode and receiving PIXEL CLOCK (DATA-CLOCK @ 20 MHz), HSYNC (LEN) and video signals from camera. There is no exposure (integration) control for this mode.
- **Line rate:** The HSYNC (LEN) period in the DCF specifies the line rate of the camera. The HSYNC (LEN) period is **2510 pixels**. With a **20 MHz** pixel clock, this translates to a **9.59 kHz** line rate.
- **Exposure time:** The inverse of the line rate frequency is the exposure time (integration time). The exposure time for this mode is fixed and equal to **208.4 μ s**.
- **Camera configuration settings (RS232 settings):**

Setting Type	RS232 Command
Timing	T=0

Mode 2: Fixed line scan rate (Free running mode with integration time set by camera)

- Matrox Genesis is operating in a slave mode and receiving PIXEL CLOCK (DATA-CLOCK @ 20 MHz), HSYNC (LEN) and video signals from camera. The camera configuration software (CommCam) provides exposure (integration) control for this mode.
- **Line rate:** The HSYNC (LEN) period in the DCF specifies the line rate of the camera. The HSYNC (LEN) period is currently set to **2510 pixels**. With a **20 MHz** pixel clock, this translates to a **9.59 kHz** line rate.
- **Exposure time:** The Integration setting in the camera configuration software (CommCam) determines the exposure time (integration time).
- **Maximum / minimum exposure time:** The maximum exposure time is **13000 μ s** and the minimum exposure time is **105 μ s**.

Setting Type	RS232 Command
Timing	T=1
Integration	I=xxx

Mode 3: Variable line scan rate (Triggered mode with integration time set by camera)

- Matrox Genesis is operating in a master mode and sending a periodic EXPOSURE1 (EXSYNC) signal to the camera; the camera awaits the rising edge of the signal and initiates line readout. The camera configuration software (CommCam) provides exposure (integration) control for this mode.
- **Line rate:** The EXPOSURE1 (EXSYNC) period in the DCF specifies the line rate of the camera. The EXPOSURE1 (EXSYNC) period is currently set to **2510 pixels**. With a **25 MHz** pixel clock, this translates to a **10.0 kHz** line rate.

Application Note:

Interfacing non-standard cameras to Matrox Genesis

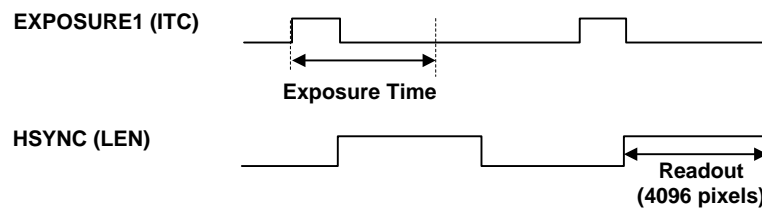
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Camera Interface Details (continued)

- **Exposure time:** The Integration setting in the camera configuration software (CommCam) controls the exposure time (integration time).
- **Maximum / minimum exposure time:** The maximum exposure time is = **13000 μ s** and the minimum exposure time is **75 μ s**.

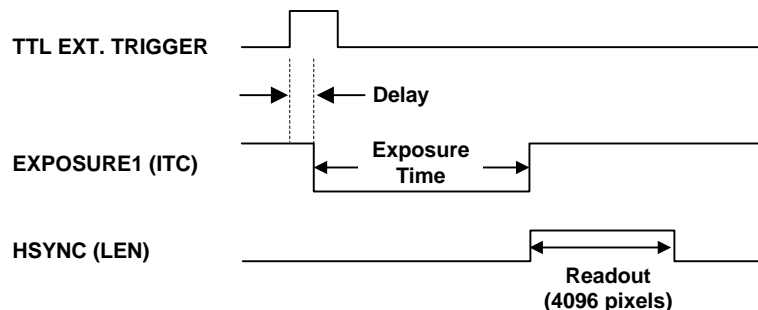
Setting Type	RS232 Command
Timing	T=2
Integration	I=xxx



Mode 4: Variable line scan rate (Triggered mode with integration time set by camera)

- Once it has received the external trigger signal and following a fixed delay, Matrox Genesis sends EXPOSURE1 (ITC) signal to the camera to initiate and control exposure.
- **Line rate:** Line rate is variable and controlled by the frequency of the external trigger signal.
- **Exposure time:** Since the EXPOSURE1 (ITC) signal is controlled by the external trigger signal, the active (pulse) period of the external trigger signal is the exposure time. The default exposure time for this DCF is **15.5 ms**. This value can be modified in the DCF using Matrox Intellicam, Genesis Native Library function **imCamControl()** or with the MIL digitizer control function **MdigControl()**. Refer to the appropriate manual or user guide for additional information.
- **Maximum / minimum exposure time:** The maximum exposure time is equal to the maximum delay between rising edges of the external trigger signal. The minimum exposure time is 4 master clock periods or **0.2 ms**.

Setting Type	RS232 Command
Timing	T=3



Application Note:

Interfacing non-standard cameras to Matrox Genesis

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Cabling Requirements	Mode 1: Fixed line scan rate (Free running mode)			
	<ul style="list-style-type: none">DBHD100-TO-OPEN cable and GEN/DIG/BRD/R/_ board required for digital data, synchronization and control signals.Connections between the 37-pin connectors (ODD DATA/SYNC) of the camera and the 100-pin connector of the GEN-DIG-BRD/R/_ are as follows:			
	GEN-DIG-BRD/R/_ (100-pin connector)		THOMSON TH78CA15 (37-pin connector)	
	Pin name	Pin no.	Pin name	Pin no.
	DATA, INPUT, 0+	01	←	Odd D00+
	DATA, INPUT, 0-	02	←	Odd D00-
	DATA, INPUT, 1+	03	←	Odd D01+
	DATA, INPUT, 1-	04	←	Odd D01-
	DATA, INPUT, 2+	05	←	Odd D02+
	DATA, INPUT, 2-	06	←	Odd D02-
	DATA, INPUT, 3+	07	←	Odd D03+
	DATA, INPUT, 3-	08	←	Odd D03-
	DATA, INPUT, 4+	09	←	Odd D04+
	DATA, INPUT, 4-	10	←	Odd D04-
	DATA, INPUT, 5+	11	←	Odd D05+
	DATA, INPUT, 5-	12	←	Odd D05-
	DATA, INPUT, 6+	13	←	Odd D06+
	DATA, INPUT, 6-	14	←	Odd D06-
	DATA, INPUT, 7+	15	←	Odd D07+
	DATA, INPUT, 7-	16	←	Odd D07-
	DATA, INPUT, 8+	17	←	Odd D08+
	DATA, INPUT, 8-	18	←	Odd D08-
	DATA, INPUT, 9+	19	←	Odd D09+
	DATA, INPUT, 9-	20	←	Odd D09-
	DATA, INPUT, 10+	21	←	Odd D10+
	DATA, INPUT, 10-	22	←	Odd D10-
	DATA, INPUT, 11+	23	←	Odd D11+
DATA, INPUT, 11-	24	←	Odd D11-	
HSYNC, INPUT, +	33	←	LEN+	
HSYNC, INPUT, -	34	←	LEN-	
CLOCK, INPUT, +	39	←	DATA CLOCK+	
CLOCK, INPUT, -	40	←	DATA CLOCK-	
CLOCK, OUTPUT, +	89	→	CLOCKIN+	
CLOCK, OUTPUT, -	90	→	CLOCKIN-	
EXPOSURE1, OUTPUT +	95*	→	ITC IN+	
EXPOSURE1, OUTPUT -	96*	→	ITC IN-	
* These connections are not required for this mode, however allows this cable to be used with all modes.				
continued				

Application Note:

Interfacing non-standard cameras to Matrox Genesis

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**Cabling Requirements
(continued)**

- Connections between the 25-pin connectors (**EVEN DATA**) of the camera and the 100-pin connector of the GEN-DIG-BRD/R/_ are as follows:

GEN-DIG-BRD/R/_ (100-pin connector)			THOMSON TH78CA15 (25-pin connector)	
<i>Pin name</i>	<i>Pin no.</i>		<i>Pin name</i>	<i>Pin no.</i>
DATA, INPUT, 16+	51	←	Even D00+	01
DATA, INPUT, 16-	52	←	Even D00-	14
DATA, INPUT, 17+	53	←	Even D01+	02
DATA, INPUT, 17-	54	←	Even D01-	15
DATA, INPUT, 18+	55	←	Even D02+	03
DATA, INPUT, 18-	56	←	Even D02-	16
DATA, INPUT, 19+	57	←	Even D03+	04
DATA, INPUT, 19-	58	←	Even D03-	17
DATA, INPUT, 20+	59	←	Even D04+	05
DATA, INPUT, 20-	60	←	Even D04-	18
DATA, INPUT, 21+	61	←	Even D05+	06
DATA, INPUT, 21-	62	←	Even D05-	19
DATA, INPUT, 22+	63	←	Even D06+	07
DATA, INPUT, 22-	64	←	Even D06-	20
DATA, INPUT, 23+	65	←	Even D07+	08
DATA, INPUT, 23-	66	←	Even D07-	21
DATA, INPUT, 24+	67	←	Even D08+	09
DATA, INPUT, 25-	68	←	Even D08-	22
DATA, INPUT, 25+	69	←	Even D09+	10
DATA, INPUT, 25-	70	←	Even D09-	23
DATA, INPUT, 26+	71	←	Even D10+	11
DATA, INPUT, 26-	72	←	Even D10-	24
DATA, INPUT, 27+	73	←	Even D11+	12
DATA, INPUT, 27-	74	←	Even D11-	25
GROUND	50	--	GROUND	13

The DCF(s) mentioned in this application note can be found on the MIL and Native Library CD, or our FTP site ([ftp.matrox.com](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.

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