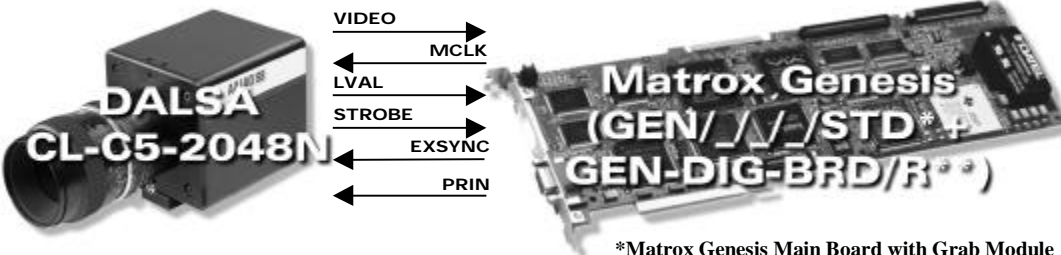
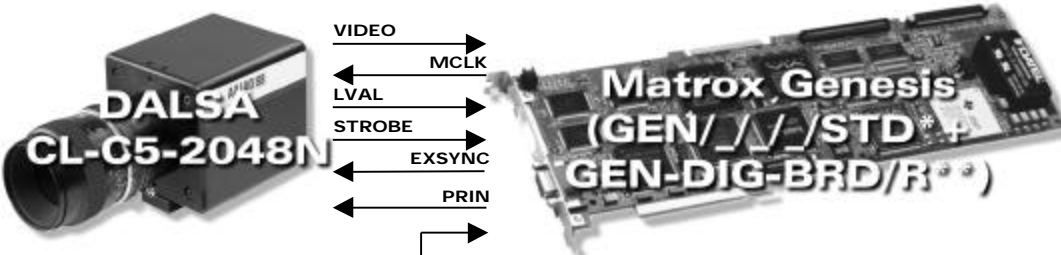


# Application Note:

## Interfacing non-standard cameras to Matrox Genesis

DALSA CL-C5-2048N

January 27, 1999

<b>Camera Descriptions</b>	<ul style="list-style-type: none"> <li>• 2048 × 8-bit.</li> <li>• Single channel RS-422 digital video output.</li> <li>• Maximum data rate: 20 MHz</li> </ul>
<b>Interface modes</b>	<ul style="list-style-type: none"> <li>• Fixed line scan rate, variable line scan rate</li> </ul>
<b>Camera Interface Briefs</b>	<p><b>Mode 1: Fixed line scan rate</b></p>  <p>*Matrox Genesis Main Board with Grab Module  **Matrox RS-422 Digital Data Input Board</p> <ul style="list-style-type: none"> <li>• 2048 × 8-bit.</li> <li>• Single channel RS-422 digital video.</li> <li>• DCF configured for 512 lines per virtual frame.</li> <li>• Line scan rate is fixed and is determined by the frequency of the EXSYNC signal.</li> <li>• Matrox Genesis sending RS-422 EXPOSURE1 (EXSYNC), RS-422 EXPOSURE2 (PRIN) and RS-422 CLOCK OUTPUT (MCLK @ 20 MHz) signals to camera, the EXPOSURE1 (EXSYNC) signal initiates line readout.</li> <li>• Matrox Genesis receiving RS-422 PIXEL CLOCK (STROBE @ 20 MHz), HSYNC (LVAL) and video signals from camera.</li> <li>• DCF used: <a href="#">CLC5DEL.DCF</a></li> </ul> <p><b>Mode 2: Variable line scan rate</b></p>  <p>*Matrox Genesis Main Board with Grab Module  **Matrox RS-422 Digital Data Input Board</p> <ul style="list-style-type: none"> <li>• 2048 × 8-bit.</li> <li>• Single channel RS-422 digital video.</li> <li>• DCF configured for 512 lines per virtual frame.</li> <li>• Line rate is variable and controlled by the frequency of the external trigger signal.</li> <li>• Matrox Genesis receiving TTL external trigger signal.</li> <li>• Matrox Genesis sending RS-422 EXPOSURE1 (EXSYNC), RS-422 EXPOSURE2 (PRIN) and RS-422 CLOCK OUTPUT (MCLK @ 20 MHz) signals to camera, the EXPOSURE1 (EXSYNC) signal initiates line readout.</li> <li>• Matrox Genesis receiving RS-422 PIXEL CLOCK (STROBE @ 20 MHz), RS-422 HSYNC (LVAL) and video signals from camera.</li> <li>• DCF used: <a href="#">CLC5DAEL.DCF</a></li> </ul>

# Application Note:

## Interfacing non-standard cameras to Matrox Genesis

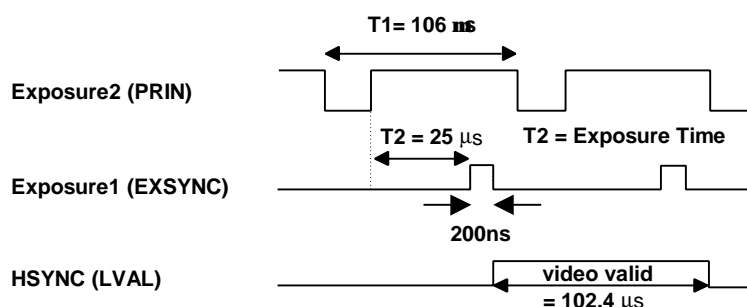
DALSA CL-C5-2048N

January 27, 1999

### Camera Interface Details

#### Mode 1: Fixed line scan rate

- Matrox Genesis sends the EXPOSURE1 (EXSYNC) and EXPOSURE2 (PRIN) signals to the camera; the camera awaits the rising edge of the EXPOSURE1 (EXSYNC) signal and after a short (constant) delay initiates line readout.
- **Line rate:** The EXPOSURE2 (PRIN) period in the DCF specifies the line rate of the camera. The EXPOSURE2 (PRIN) period is currently set to **2120** clock pulses, and has an absolute maximum rate of **9.5 kHz**. With a **20 MHz** pixel clock rate, this translates to a **9.43 kHz** line rate.
- **Exposure time:** The time between the rising edge of the EXPOSURE1 (EXSYNC) and EXPOSURE2 (PRIN) signals is the exposure time. The default exposure time for this DCF is **25  $\mu$ s**. In order to select the exposure time, the width and deployment time of each EXPOSURE1 (EXSYNC) and EXPOSURE2 (PRIN) must be set in Matrox Intellicam. The exposure time of the camera 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:** Since the Matrox Genesis timer is 16-bit wide, the maximum exposure time is calculated to be  $(65536)/20 \text{ MHz} = \mathbf{3.28 \text{ ms}}$ . For proper operation, exposure signal must remain inactive for a minimum of 6 clock periods before being asserted. Therefore the minimum exposure time is **300ns**.
- **Smallest exposure time increment:** The pixel clock is the reference clock that the exposure time is being set by. The smallest increment of the exposure time is **50ns**.



#### Mode 2 : Variable line scan rate

- Once it has received the external signal to trigger, Matrox Genesis sends the EXPOSURE2 (PRIN) signal to the camera to initiate exposure. Matrox Genesis will send the EXPOSURE1 (EXSYNC) signal to the camera following a delay that is equal to the desired exposure time. A short (variable) delay will follow after receiving the EXPOSURE1 (EXSYNC), followed by the camera sending the HSYNC (LVAL) signal to the Matrox Genesis to initiate line readout.
- **Line rate:** The Line rate is variable and controlled by the frequency of the external trigger signal.
- **Minimum/maximum exposure time, Smallest exposure time increment:** are the same as for Mode 1: *Fixed line scan rate*

# Application Note:

## Interfacing non-standard cameras to Matrox Genesis

**DALSA CL-C5-2048N**

**January 27, 1999**

Cabling Requirements	Mode 1: Fixed line scan rate				
	<ul style="list-style-type: none"><li>Matrox cable kit (GEN-TO-DALSA/16) is available for this mode as an alternative to custom cable development based on the pin-outs listing below.</li><li>DBHD100-TO-OPEN cable and GEN/DIG/BRD/R board required for digital data, synchronization and control signals in RS-422 format.</li><li>Connections between the 20-pin dual row connector (labeled OS1) of the camera and the 100-pin connector of the GEN-DIG-BRD/R are as follows:</li></ul>				
	DALSA CL-C5-2048N		GEN-DIG-BRD/R		
	(20-pin dual row connector - OS1)		(GEN/CBL/OPEN connector)		
	Pin name	Pin no.		Pin name	Pin no.
	D7	01	→	DATA, INPUT, 7+	15
	D7B	02	→	DATA, INPUT, 7-	16
	D6	03	→	DATA, INPUT, 6+	13
	D6B	04	→	DATA, INPUT, 6-	14
	D5	05	→	DATA, INPUT, 5+	11
	D5B	06	→	DATA, INPUT, 5-	12
	D4	07	→	DATA, INPUT, 4+	09
	D4B	08	→	DATA, INPUT, 4-	10
	D3	09	→	DATA, INPUT, 3+	07
	D3B	10	→	DATA, INPUT, 3-	08
	D2	11	→	DATA, INPUT, 2+	05
	D2B	12	→	DATA, INPUT, 2-	06
	D1	13	→	DATA, INPUT, 1+	03
	D1B	14	→	DATA, INPUT, 1-	04
	D0	15	→	DATA, INPUT, 0+	01
	D0B	16	→	DATA, INPUT, 0-	02
	STROBE	17	→	CLOCK, INPUT, -	40
	STROBEB	18	→	CLOCK, INPUT, +	39
	LVAL	19	→	HSYNC, INPUT, +	33
	LVALB	20		HSYNC, INPUT, -	34
	<ul style="list-style-type: none"><li>Connections between the DB-25 connector on the rear panel of the camera and the 100-pin connector of the GEN-DIG-BRD/R are as follows:</li></ul>				
	DALSA CL-C5-2048N		GEN-DIG-BRD/R		
	(DB-25 male connector)		(GEN/CBL/OPEN connector)		
	Pin name	Pin no.		Pin name	Pin no.
	EXSYNC	17	←	EXPOSURE, OUTPUT, 1+	95
	EXSYNCB	04	←	EXPOSURE, OUTPUT, 1-	96
	PRIN	05	←	EXPOSURE, OUTPUT, 2+	97
	PRINB	18	←	EXPOSURE, OUTPUT, 2-	98
	MCLK	06	←	CLOCK, OUTPUT, +	89
	MCLKB	19	←	CLOCK, OUTPUT, -	90
	GROUND	07	-	GROUND	37*
	GROUND	11	-	GROUND	38*
	GROUND	20	-	GROUND	50*
	GROUND	24	-	GROUND	50*

\* Any pin can be used at any position; all GROUNDS are connected on the GEN-DIG-BRD/R

# Application Note:

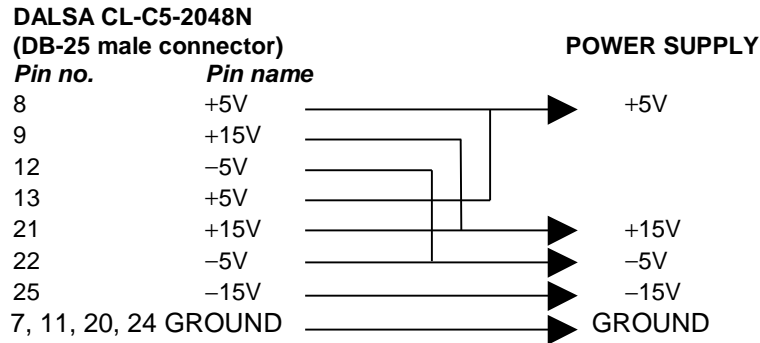
## Interfacing non-standard cameras to Matrox Genesis

DALSA CL-C5-2048N

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### Cabling Requirements (continued)

- Connections between the DB-25 connector on the rear panel of the camera and the power supply are as follows:



**NOTE:** it is very important that all the GROUNDs of the camera be connected together to the POWER SUPPLY GROUND, and to the GROUND of the Matrox Genesis. Do not use the cable shield as a ground, instead always use the ground pin of the power supply.

#### Mode 2: Variable line scan rate

- Matrox cable kit (GEN-TO-DALSA/16) is available for this mode as an alternative to custom cable development based on the pin-outs listing below.
- IMG-7W2-TO-5BNC and DBHD100-TO-OPEN cables required for TTL external trigger source and GEN/DIG/BRD/R required for digital data, synchronization and control signals in RS-422 format.
- TTL external trigger source should be connected to the TTL trigger input of IMG-7W2-TO-5BNC cable.
- All other connections are as in Mode 1: *Fixed line scan rate*

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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