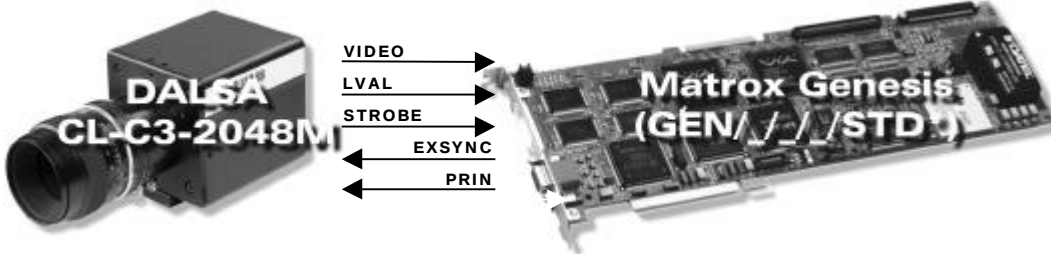
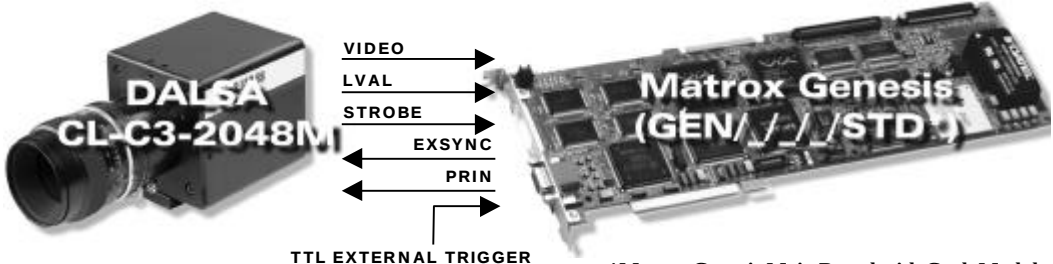


# Application Note:

## Interfacing non-standard cameras to Matrox Genesis

**DALSA CL-C3-2048M**

**January 27, 1999**

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|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Camera Descriptions</b>     | <ul style="list-style-type: none"> <li>• 2048 × 8-bit.</li> <li>• Single channel analog video output.</li> <li>• Maximum data rate: 30 MHz</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Interface mode</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 style="text-align: right;">*Matrox Genesis Main Board with Grab Module</p> <ul style="list-style-type: none"> <li>• 2048 × 8-bit.</li> <li>• Single channel analog video.</li> <li>• DCF configured 512 lines per virtual frame.</li> <li>• Line scan rate is fixed and determined by frequency of the EXSYNC signal.</li> <li>• Matrox Genesis sending RS-422 EXPOSURE1 (EXSYNC) and RS-422 EXPOSURE2 (PRIN) 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="#">CLC3EL.DCF</a></li> </ul> <p><b>Mode 2: Variable line scan rate</b></p>  <p style="text-align: right;">*Matrox Genesis Main Board with Grab Module</p> <ul style="list-style-type: none"> <li>• 2048 × 8-bit.</li> <li>• Single channel analog video.</li> <li>• DCF configured 512 lines per virtual frame.</li> <li>• Line scan rate is variable and determined by frequency of the external trigger signal.</li> <li>• Matrox Genesis receiving TTL external trigger.</li> <li>• Matrox Genesis sending RS-422 EXPOSURE1 (EXSYNC) and RS-422 EXPOSURE2 (PRIN) 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="#">CLC3AEL.DCF</a></li> </ul> |

# Application Note:

## Interfacing non-standard cameras to Matrox Genesis

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Camera Interface Details</b> | <p><b>Mode 1: Fixed line scan rate</b></p> <ul style="list-style-type: none"> <li>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.</li> <li><b>Line rate:</b> The EXPOSURE2 (PRIN) period in the DCF specifies the line rate of the camera and has a minimum period of <b>104.8 <math>\mu</math>s</b>. The EXPOSURE2 (PRIN) period is currently set to <b>2096 clock pulses</b>, and has an absolute maximum rate of <b>14.3 kHz</b>. With a <b>20 MHz</b> pixel clock rate, this translates to <b>9.54 kHz</b> line rate.</li> <li><b>Exposure time:</b> 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 <b>25 <math>\mu</math>s</b>. 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 <b>imCamControl()</b> or with the MIL digitizer control function <b>MdigControl()</b>. Refer to the appropriate manual or user guide for additional information.</li> <li><b>Maximum / minimum exposure time:</b> Since the Matrox Genesis timers can count up to 65536, the maximum exposure time is calculated to be <math>(65536-8)/20 \text{ MHz} = \mathbf{3.27 \text{ ms}}</math>. For proper operation, exposure signal must remain inactive for a minimum of 6 clock periods before being asserted. Therefore the minimum exposure time is <b>300ns</b>.</li> <li><b>Smallest exposure time increment:</b> The pixel clock is the reference clock that the exposure time is being set by. The smallest increment of the exposure time is <b>50ns</b>.</li> </ul> <p><b>Mode 2 : Variable line scan rate</b></p> <ul style="list-style-type: none"> <li>Once it has received the external signal to trigger, Matrox Genesis sends the RS-422 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.</li> <li><b>Line rate:</b> The Line rate is variable and controlled by the frequency of the external trigger signal.</li> <li><b>Minimum/maximum exposure time, Smallest exposure time increment:</b> are the same as for Mode 1: <i>Fixed line scan rate</i></li> </ul> |
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# Application Note:

## Interfacing non-standard cameras to Matrox Genesis

DALSA CL-C3-2048M

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### Cabling Requirements (continued)

#### Mode 1 : Fixed line scan rate

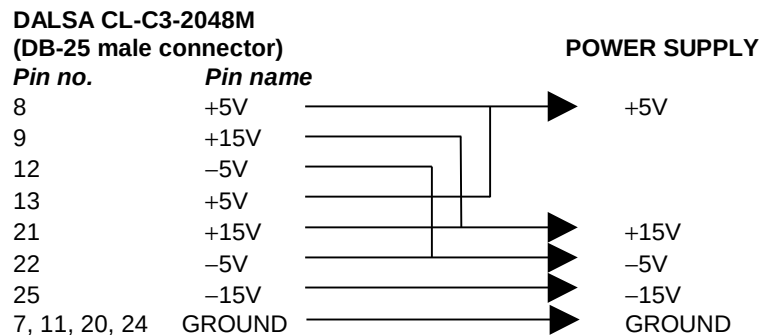
- IMG-7W2-TO-5BNC cable required for analog video data, DBHD68-TO-OPEN cable and digital cable adapter board required for control signals in RS-422 format.
- Video input BNC of IMG-7W2-TO-5BNC cable should be connected to OS1 BNC connector of camera.
- Connections between the DB-25 connector on the rear panel of the camera and the 68-pin connector of the digital cable adapter board are as follows:

#### DALSA CL-C3-2048M (DB-25 male connector)

#### Digital Cable Adapter Board (68-pin connector)

| <i>Pin name</i> | <i>Pin no.</i> |   | <i>Pin name</i>         | <i>Pin no.</i> |
|-----------------|----------------|---|-------------------------|----------------|
| LVAL            | 02             | → | HSYNC, INPUT, 422+      | 16             |
| LVALB           | 15             | → | HSYNC, INPUT, 422-      | 50             |
| PVAL            | 16             | → | CLOCK, INPUT, 422+      | 13             |
| PVALB           | 03             | → | CLOCK, INPUT, 422-      | 47             |
| EXSYNC          | 17             | ← | EXPOSURE1, OUTPUT, 422+ | 03             |
| EXSYNCB         | 04             | ← | EXPOSURE1, OUTPUT, 422- | 37             |
| PRIN            | 05             | ← | EXPOSURE2, OUTPUT, 422+ | 02             |
| PRINB           | 18             | ← | EXPOSURE2, OUTPUT, 422- | 36             |
| GROUND          | 07             | - | GROUND                  | 19             |
| GROUND          | 11             | - | GROUND                  | 22             |
| GROUND          | 20             | - | GROUND                  | 25             |
| GROUND          | 24             | - | GROUND                  | 28             |

- 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.

# Application Note:

## Interfacing non-standard cameras to Matrox Genesis

**DALSA CL-C3-2048M**

**January 27, 1999**

|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Cabling Requirements (continued)</b> | <p><b>Mode 2: Variable line scan rate</b></p> <ul style="list-style-type: none"> <li>• IMG-7W2-TO-5BNC and DBHD68-TO-OPEN cable required for TTL external trigger source and control signals in RS-422 format.</li> <li>• TTL external trigger source should be connected to the TTL trigger input of IMG-7W2-TO-5BNC cable.</li> <li>• All other connections are as in Mode 1: <i>Fixed line scan rate</i></li> </ul> |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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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