

# Application Note:

## Interfacing non-standard cameras to Matrox Genesis

**BASLER-MVC A101**

**September 1, 1999**

|                                |  |
|--------------------------------|--|
| <b>Camera Descriptions</b>     | <ul style="list-style-type: none"> <li>• 1300 x 1030 x 8-bit @ 12 fps.</li> <li>• Single channel LVDS digital video output.</li> <li>• Progressive scan.</li> <li>• External sync.</li> <li>• Internal exposure control.</li> <li>• Pixel clock: 18 MHz</li> </ul>   |
| <b>Interface modes</b>         | <ul style="list-style-type: none"> <li>• Pseudo-continuous, asynchronous reset (binning, non-binning)</li> </ul>   |
| <b>Camera Interface Briefs</b> | <p><b>Mode 1: Pseudo-continuous</b></p> <div data-bbox="454 693 1477 882"> </div> <ul style="list-style-type: none"> <li>• 1300 x 1030 x 8-bit @ 10 fps.</li> <li>• Single channel LVDS digital video.</li> <li>• Progressive scan.</li> <li>• Matrox Genesis receiving video signals from camera.</li> <li>• DCF used: <a href="#">A113PC.DCF</a> (non-binning)</li> <li>• DCF used: <a href="#">A113PBC.DCF</a> (binning)</li> </ul> <p><b>Mode 2: Asynchronous Reset</b></p> <div data-bbox="454 1197 1477 1470"> </div> <ul style="list-style-type: none"> <li>• 1300 x 1030 x 8-bit.</li> <li>• Single channel LVDS digital video.</li> <li>• Progressive scan.</li> <li>• Matrox Genesis receiving external trigger.</li> <li>• Matrox Genesis sending EXPOSURE1 (EXSYNC) signal to camera.</li> <li>• Matrox Genesis receiving HSYNC (LVAL), VSYNC (FVAL), PIXEL CLOCK (PCLK), and video signals from camera.</li> <li>• DCF used: <a href="#">A113PAR.DCF</a> (non-binning)</li> <li>• DCF used: <a href="#">A113PBAR.DCF</a> (binning)</li> </ul> <p><small>*Matrox Genesis Main Board with Grab Module<br/>** Matrox LVDS Digital Data Input Board</small></p> |

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| <b>Camera Interface Details</b>                | <p><b>Modes 1 : Pseudo-continuous</b></p> <ul style="list-style-type: none"><li>• <b>Frame rate:</b> Matrox Genesis receives the pseudo-continuous video from the camera at a frame rate equal to 10 frames per second.</li><li>• <b>Exposure time:</b> 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.</li></ul> <p><b>Mode 2: Asynchronous Reset (Pulse Width Control Mode)</b></p> <ul style="list-style-type: none"><li>• Once it has received the external trigger signal, Matrox Genesis sends the EXPOSURE1 (EXSYNC) signal to the camera with a width equal to the desired exposure.</li><li>• <b>Frame rate:</b> The frame rate is determined by the frequency of the external trigger signal.</li><li>• <b>Exposure time:</b> The active and inactive periods of the EXPOSURE1 (EXSYNC) signal is the exposure time. The default exposure time for this DCF is equal to <b>3.82 ms</b>. In order to change the width and deployment time of the EXPOSURE1 (EXSYNC) use the Exposure Settings menu tab in Matrox Intellicam. Consult the Matrox Intellicam User Guide for more information.</li></ul> <p><b>Modes 1 and 2</b></p> <ul style="list-style-type: none"><li>• <b>Camera configuration:</b> Camera configuration tool and drivers for this camera are available from the BASLER web site (<a href="http://www.baslerweb.com/">http://www.baslerweb.com/</a>).</li></ul> |  |   |                |   |  |                 |                |  |                 |                |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |
|--|--|--|---|----------------|---|--|-----------------|----------------|--|-----------------|----------------|-----------------|----|---|--------|----|-----------------|----|---|--------|----|-----------------|----|---|--------|----|-----------------|----|---|--------|----|-----------------|----|---|--------|----|-----------------|----|---|--------|----|-----------------|----|---|--------|----|-----------------|----|---|--------|----|-----------------|----|---|--------|----|-----------------|----|---|--------|----|
| <b>Cabling Requirements</b>                    | <p><b>Mode 1: Pseudo-continuous</b></p> <ul style="list-style-type: none"><li>• DBHD100-TO-OPEN cable and GEN/DIG/BRD/L/_ board required for digital data, synchronization and control signals.</li><li>• Connections between the 44-pin connector of the camera and the 100-pin connector of the GEN-DIG-BRD/L/_ are as follows:</li></ul> <table><tr><th colspan="2"><b>GEN-DIG-BRD/L/_<br/>(100-pin connector)</b></th><th></th><th colspan="2"><b>BASLER A101<br/>(44-pin connector)</b></th></tr><tr><th><i>Pin name</i></th><th><i>Pin no.</i></th><th></th><th><i>Pin name</i></th><th><i>Pin no.</i></th></tr><tr><td>DATA, INPUT, 0+</td><td>01</td><td>←</td><td>DOUT0+</td><td>01</td></tr><tr><td>DATA, INPUT, 0-</td><td>02</td><td>←</td><td>DOUT0-</td><td>16</td></tr><tr><td>DATA, INPUT, 1+</td><td>03</td><td>←</td><td>DOUT1+</td><td>02</td></tr><tr><td>DATA, INPUT, 1-</td><td>04</td><td>←</td><td>DOUT1-</td><td>17</td></tr><tr><td>DATA, INPUT, 2+</td><td>05</td><td>←</td><td>DOUT2+</td><td>03</td></tr><tr><td>DATA, INPUT, 2-</td><td>06</td><td>←</td><td>DOUT2-</td><td>18</td></tr><tr><td>DATA, INPUT, 3+</td><td>07</td><td>←</td><td>DOUT3+</td><td>04</td></tr><tr><td>DATA, INPUT, 3-</td><td>08</td><td>←</td><td>DOUT3-</td><td>19</td></tr><tr><td>DATA, INPUT, 4+</td><td>09</td><td>←</td><td>DOUT4+</td><td>05</td></tr><tr><td>DATA, INPUT, 4-</td><td>10</td><td>←</td><td>DOUT4-</td><td>20</td></tr></table> <p>continued</p>                            | <b>GEN-DIG-BRD/L/_<br/>(100-pin connector)</b> |   |                | <b>BASLER A101<br/>(44-pin connector)</b> |  | <i>Pin name</i> | <i>Pin no.</i> |  | <i>Pin name</i> | <i>Pin no.</i> | DATA, INPUT, 0+ | 01 | ← | DOUT0+ | 01 | DATA, INPUT, 0- | 02 | ← | DOUT0- | 16 | DATA, INPUT, 1+ | 03 | ← | DOUT1+ | 02 | DATA, INPUT, 1- | 04 | ← | DOUT1- | 17 | DATA, INPUT, 2+ | 05 | ← | DOUT2+ | 03 | DATA, INPUT, 2- | 06 | ← | DOUT2- | 18 | DATA, INPUT, 3+ | 07 | ← | DOUT3+ | 04 | DATA, INPUT, 3- | 08 | ← | DOUT3- | 19 | DATA, INPUT, 4+ | 09 | ← | DOUT4+ | 05 | DATA, INPUT, 4- | 10 | ← | DOUT4- | 20 |
| <b>GEN-DIG-BRD/L/_<br/>(100-pin connector)</b> |  |  | <b>BASLER A101<br/>(44-pin connector)</b> |                |   |  |                 |                |  |                 |                |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |
| <i>Pin name</i>                                | <i>Pin no.</i>   |  | <i>Pin name</i>                           | <i>Pin no.</i> |   |  |                 |                |  |                 |                |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |
| DATA, INPUT, 0+                                | 01   | ←  | DOUT0+                                    | 01             |   |  |                 |                |  |                 |                |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |
| DATA, INPUT, 0-                                | 02   | ←  | DOUT0-                                    | 16             |   |  |                 |                |  |                 |                |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |
| DATA, INPUT, 1+                                | 03   | ←  | DOUT1+                                    | 02             |   |  |                 |                |  |                 |                |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |
| DATA, INPUT, 1-                                | 04   | ←  | DOUT1-                                    | 17             |   |  |                 |                |  |                 |                |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |
| DATA, INPUT, 2+                                | 05   | ←  | DOUT2+                                    | 03             |   |  |                 |                |  |                 |                |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |
| DATA, INPUT, 2-                                | 06   | ←  | DOUT2-                                    | 18             |   |  |                 |                |  |                 |                |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |
| DATA, INPUT, 3+                                | 07   | ←  | DOUT3+                                    | 04             |   |  |                 |                |  |                 |                |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |
| DATA, INPUT, 3-                                | 08   | ←  | DOUT3-                                    | 19             |   |  |                 |                |  |                 |                |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |
| DATA, INPUT, 4+                                | 09   | ←  | DOUT4+                                    | 05             |   |  |                 |                |  |                 |                |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |
| DATA, INPUT, 4-                                | 10   | ←  | DOUT4-                                    | 20             |   |  |                 |                |  |                 |                |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |                 |    |   |        |    |

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| Cabling Requirements<br>(continued) | GEN-DIG-BRD/L/_<br>(100-pin connector) |         | BASLER A101<br>(44-pin connector) |         |     |
|-------------------------------------|--|---------|-----------------------------------|---------|-----|
|                                     | Pin name                               | Pin no. | Pin name                          | Pin no. |     |
|                                     | DATA, INPUT, 5+                        | 11      | ←                                 | DOUT5+  | 06  |
|                                     | DATA, INPUT, 5-                        | 12      | ←                                 | DOUT5-  | 21  |
|                                     | DATA, INPUT, 6+                        | 13      | ←                                 | DOUT6+  | 07  |
|                                     | DATA, INPUT, 6-                        | 14      | ←                                 | DOUT6-  | 22  |
|                                     | DATA, INPUT, 7+                        | 15      | ←                                 | DOUT7+  | 08  |
|                                     | DATA, INPUT, 7-                        | 16      | ←                                 | DOUT7-  | 23  |
|                                     | DATA, INPUT, 8+                        | 17      | ←                                 | DOUT8+  | 09  |
|                                     | DATA, INPUT, 8-                        | 18      | ←                                 | DOUT8-  | 24  |
|                                     | DATA, INPUT, 9+                        | 19      | ←                                 | DOUT9+  | 10  |
|                                     | DATA, INPUT, 9-                        | 20      | ←                                 | DOUT9-  | 25  |
|                                     | DATA, INPUT, 10+                       | 21      | ←                                 | DOUT10+ | 11  |
|                                     | DATA, INPUT, 10-                       | 22      | ←                                 | DOUT10- | 26  |
|                                     | DATA, INPUT, 11+                       | 23      | ←                                 | DOUT11+ | 12  |
|                                     | DATA, INPUT, 11-                       | 24      | ←                                 | DOUT11- | 27  |
|                                     | DATA, INPUT, 12+                       | 25      | ←                                 | DOUT12+ | 13  |
|                                     | DATA, INPUT, 12-                       | 26      | ←                                 | DOUT12- | 28  |
|                                     | DATA, INPUT, 13+                       | 27      | ←                                 | DOUT13+ | 14  |
|                                     | DATA, INPUT, 13-                       | 28      | ←                                 | DOUT13- | 29  |
|                                     | DATA, INPUT, 14+                       | 29      | ←                                 | DOUT14+ | 15  |
|                                     | DATA, INPUT, 14-                       | 30      | ←                                 | DOUT14- | 30  |
|                                     | DATA, INPUT, 15+                       | 31      | ←                                 | DOUT15+ | 31  |
|                                     | DATA, INPUT, 15-                       | 32      | ←                                 | DOUT15- | 32  |
|                                     | HSYNC, INPUT, +                        | 33      | ←                                 | LVAL+   | 33  |
|                                     | HSYNC, INPUT, -                        | 34      | ←                                 | LVAL-   | 34  |
|                                     | VSYNC, INPUT, +                        | 35      | ←                                 | FVAL+   | 39  |
|                                     | VSYNC, INPUT, -                        | 36      | ←                                 | FVAL-   | 40  |
|                                     | GROUND                                 | 37      |                                   | GND     | 43  |
|                                     | GROUND                                 | 38      |                                   | GND     | 44  |
|                                     | CLOCK, INPUT, +                        | 39      | ←                                 | PCLK+   | 35  |
|                                     | CLOCK, INPUT, -                        | 40      | ←                                 | PCLK-   | 36  |
|                                     | EXPOSURE1, OUTPUT, +                   | 95*     | →                                 | EXSYNC+ | 37* |
|                                     | EXPOSURE1, OUTPUT, -                   | 96*     | →                                 | EXSYNC- | 38* |

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

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### Cabling Requirements (continued)

#### Mode 2: Asynchronous Reset

- DBHD100-TO-OPEN and IMG-7W2-TO-5BNC cables, and GEN/DIG/BRD/L/\_ board required for digital data, synchronization and control signals.
- External trigger source should be connected to the trigger input (GRAY BNC) of the IMG-7W2-TO-5BNC cable.
- All other connections are as in Mode 1: *Pseudo-continuous*

#### Modes 1-2

- Connections between the 2-pin subminiature round connector on the rear panel of the camera and the power supply are as follows:

#### Power Supply

#### BASLER A101 (2-pin connector)

| <i>Pin name</i> | <i>Pin no.</i> | <i>Pin name</i> | <i>Pin no.</i> |
|-----------------|----------------|-----------------|----------------|
| +24V            | 03             | GND             | 01             |
| +24V            | 04             | GND             | 02             |

- Connections between the DB-9 connector on the rear panel of the camera and the system (RS-232 interface) are as follows:

| Pin              | Signal        |
|------------------|---------------|
| 2                | RxD           |
| 3                | TxD           |
| 5                | GND           |
| 1, 4, 6, 7, 8, 9 | NOT CONNECTED |

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.

**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

**Sales Offices:**  
U.K.  
**Matrox (UK) Ltd.**  
Sefton Park, Stoke Poges  
Buckinghamshire  
U.K. SL2 4JS  
Tel: +44 (0) 1753 665500  
Fax: +44 (0) 1753 665599

**France**  
**Matrox France SARL**  
2, rue de la Couture,  
Silic 225  
94528 Rungis Cedex  
Tel: (0) 1 45-60-62-00  
Fax: (0) 1 45-60-62-05

**Germany**  
**Matrox GmbH**  
Inselkammerstr.8  
D-82008 Unterhaching  
Germany  
Tel: 089/614 4740  
Fax: 089/614 9743

**Asia Pacific**  
**Matrox Asia Liaison Office**  
Rm. 1901, 19/F, Workington  
Tower,  
78 Bonham Strand E.,  
Sheung Wan, Hong Kong.  
Tel: 852.2877.5387  
Fax: 852.2537.9530

