# MATROX GENESIS
## CAMERA INTERFACE APPLICATION NOTE
## JAI CV-M40 JANUARY 10, 2002

*Basics about the camera*

### Camera Descriptions

- Effective resolution: 648 × 486 × 8-bit @ 60 fps.
- Single channel analog video output.
- Progressive scan.
- Full and partial frame.
- Internal (composite) or external sync.
- Internal or external exposure control.
- 24.5 MHz pixel clock rate.

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

### Interface Modes

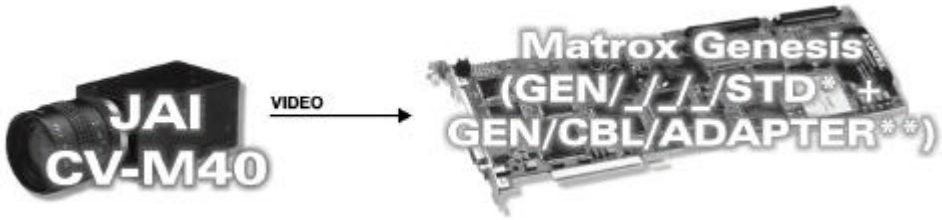
- Continuous (normal/binning readout, partial scan)
- Asynchronous reset (pulse width control mode)

*Basics about the interface modes*

### Camera Interface Briefs

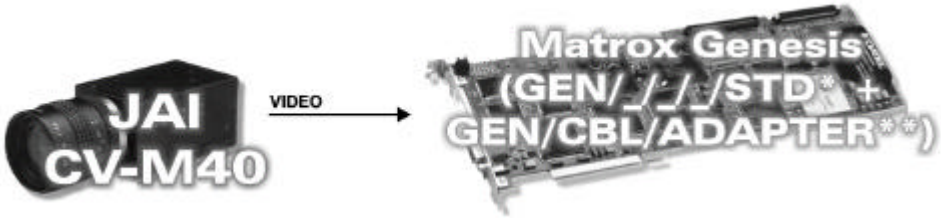
#### *Mode 1: Continuous (normal/binning readout)*

- 648 × 492 × 8-bit @ 60 fps (normal readout).
- 648 × 242 × 8-bit @ 120 fps (binning readout).
- Single channel analog video.
- Progressive scan.
- Matrox Genesis receiving video signals from camera.
- DCF used: GVM40N.DCF (normal readout)
- DCF used: GVM40NBI.DCF (binning readout)




#### *Mode 2: Continuous (partial scan)*

- 648 × up to 240 × 8-bit.
- Single channel analog video.
- Progressive scan.
- Matrox Genesis receiving video signals from camera.
- DCF used: G40NP240.DCF (648 × 240 @ 106 fps)
- DCF used: G40NP120.DCF (648 × 120 @ 156 fps)
- DCF used: G40NP60.DCF (648 × 60 @ 200 fps)
- DCF used: G40NP30.DCF (648 × 30 @ 233 fps)

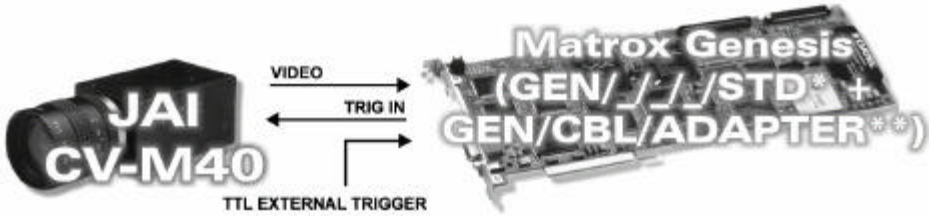


*Basics about the interface modes*

### Camera Interface Briefs (continued)

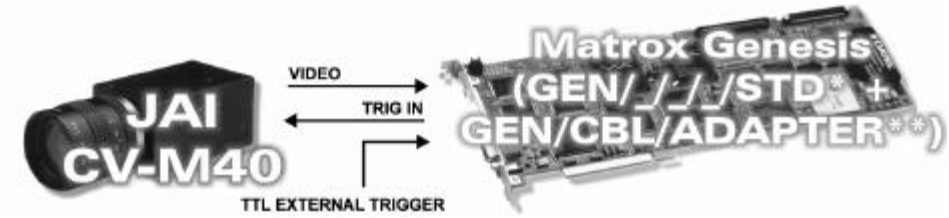
#### *Mode 3: Asynchronous Reset (pulse width control, normal/bin)*

- 648 × 494 × 8-bit (normal readout).
- 648 × 246 × 8-bit (binning readout).
- Single channel analog video.
- Progressive scan.
- Matrox Genesis receiving external trigger signal.
- Matrox Genesis sending EXPOSURE1 (TRIGGER INPUT) signal to camera to initiate and control exposure time.
- Matrox Genesis receiving video signals from camera.
- DCF used: GVM40NAE.DCF (normal readout)
- DCF used: GVM40NAB.DCF (binning readout)




#### *Mode 4: Asynchronous Reset (pulse width control, partial)*

- 648 × up to 240 × 8-bit (partial scan).
- Single channel analog video.
- Progressive scan.
- Matrox Genesis receiving external trigger signal.
- Matrox Genesis sending EXPOSURE1 (TRIGGER INPUT) signal to camera to initiate and control exposure time.
- Matrox Genesis receiving video signals from camera.
- DCF used: G40NAP24.DCF (648 × 240)
- DCF used: G40NAP12.DCF (648 × 120)
- DCF used: G40NAP60.DCF (648 × 60)
- DCF used: G40NAP30.DCF (648 × 30)



*Specifics about the interface modes*

## Camera Interface Details

### *Mode 1: Continuous (normal/binning readout)*

- **Frame Rate:** Matrox Genesis receives the continuous video from the camera at 60/120 frames per second (normal/binning readout).
- **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 switch settings:** Refer to the camera manual for additional information. All internal jumper settings should be set as default. External SW1 switches for this mode should be set as follows:

| SW1 Switches | GVM40N.DCF | GVM40NBI.DCF |
|---|---|---|
| 1: Shutter speed | * | * |
| 2: Shutter speed | * | * |
| 3: Shutter speed | * | * |
| 4: Binning mode | OFF | **ON** |
| 5: External trigger | OFF | OFF |
| 6: Readout mode | OFF | OFF |
| 7: partial scan mode | OFF | OFF |
| 8: RS232C Interface | OFF | OFF |

* switches 1-3 can be set to user desired shutter speed setting, refer to camera manual for details

### *Mode 2: Continuous (partial scan)*

- **Frame Rate:** Matrox Genesis receives the continuous video from the camera at up to 233 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 switch settings:** Refer to the camera manual for additional information. External SW1 switches for this mode (all DCFs) should be set as follows:

| SW1 Switches | G40NPxxx.DCF |
|---|---|
| 1: Shutter speed | * |
| 2: Shutter speed | * |
| 3: Shutter speed | * |
| 4: Binning mode | OFF |
| 5: External trigger | OFF |
| 6: Readout mode | OFF |
| 7: partial scan mode | **ON** |
| 8: RS232C Interface | OFF |

* Set to desired shutter speed setting, refer to camera manual for details

*Specifics about the interface modes*

## Camera Interface Details (continued)

### *Mode 2: Continuous (partial scan)*

- **Camera switch settings:** Refer to the camera manual for additional information. Internal jumpers for this mode (all DCFs) should be set as follows:

| Internal Jumpers settings on PK873B board** | | | | |
|---|---|---|---|---|
| | 240 | 120 | 60 | 30 |
| JP-14 | **Open** | **Open** | **Open** | **Short** |
| JP-15 | **Open** | **Open** | **Short** | **Open** |
| JP-16 | **Open** | **Short** | **Open** | **Open** |
| JP-17 | **Short** | **Open** | **Open** | **Open** |

** All other internal jumper settings should be set to default.

### *Mode 3: Asynchronous Reset (pulse width control, normal/bin)*

- **Frame rate**: The frame rate is determined by the frequency of the external trigger signal.
- **Exposure time:** The external trigger source initiates the EXPOSURE1 (TRIGGER INPUT) signal. The width (falling edge to rising edge) of EXPOSURE1 (TRIGGER INPUT) signal is the exposure time. A delay of up to **82 ms** is present before the valid video. The exposure time can be modified in the DCF using Matrox Intellicam, Genesis Native Library (GNL) imCamControl() or with the MIL MdigControl() function. Consult the respective manual for more information.
- **Camera switch settings:** Refer to the camera manual for additional information. External SW1 switches for this mode should be set as follows:

| SW1 Switches | GVM40NAE.DCF | GVM40NAB.DCF |
|---|---|---|
| 1: Shutter speed | * | * |
| 2: Shutter speed | * | * |
| 3: Shutter speed | * | * |
| 4: Binning mode | OFF | **ON** |
| 5: External trigger | OFF | OFF |
| 6: Readout mode | **ON** | **ON** |
| 7: partial scan mode | OFF | OFF |
| 8: RS232C Interface | OFF | OFF |

Set to desired shutter speed setting, refer to camera manual for details

| Internal Jumper settings on PK873B board** | | |
|---|---|---|
| JP5 | TRIGGER IN | **Short** |

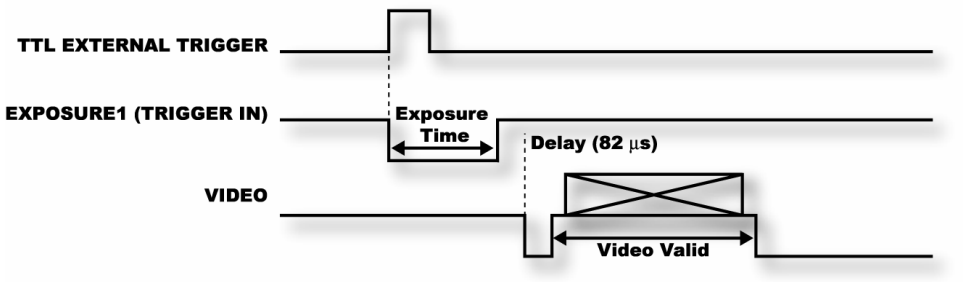
** All other internal jumper settings should be set to default.

*Specifics about the interface modes*

## Camera Interface Details (continued)

### *Mode 3: Asynchronous Reset (pulse width control, normal/bin)*

- **Timing diagram**:




### *Mode 4: Asynchronous Reset (pulse width control, partial)*

- **Frame rate**: The frame rate is determined by the frequency of the external trigger signal.
- **Exposure time:** The external trigger source initiates the EXPOSURE1 (TRIGGER INPUT) signal. The width (falling edge to rising edge) of EXPOSURE1 (TRIGGER INPUT) signal is the exposure time. A delay of up to **82 ms** can be present before the valid video. 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.
- **Camera switch settings:** Refer to the camera manual for additional information. External SW1 switches and internal jumpers for this mode (all DCFs) should be set as follows:

| SW1 Switches | G40NAPxxx.DCF |
|---|---|
| 1: Shutter speed | * |
| 2: Shutter speed | * |
| 3: Shutter speed | * |
| 4: Binning mode | OFF |
| 5: External trigger | OFF |
| 6: Readout mode | **ON** |
| 7: partial scan mode | **ON** |
| 8: RS232C Interface | OFF |

* Can be set to user desired shutter speed setting, refer to camera manual for details.

| **Internal Jumpers settings on PK873B board**** | | | | |
|---|---|---|---|---|
| | 240 | 120 | 60 | 30 |
| JP-14 | **Open** | **Open** | **Open** | **Short** |
| JP-15 | **Open** | **Open** | **Short** | **Open** |
| JP-16 | **Open** | **Short** | **Open** | **Open** |
| JP-17 | **Short** | **Open** | **Open** | **Open** |

# MATROX GENESIS
## CAMERA INTERFACE APPLICATION NOTE
## JAI CV-M40 JANUARY 10, 2002

*Specifics about the interface modes*

## Camera Interface Details (continued)

### *Mode 4: Asynchronous Reset (pulse width control, partial)*

| Internal Jumper settings on PK873B board** | | |
|---|---|---|
| JP5 | TRIGGER IN | **Short** |

** All other internal jumper settings should be set to default.

- **Timing diagram**: Same as in Mode 3: *Asynchronous Reset*.

*Cabling details for the interface modes*

## Cabling Requirements

### *Modes 1-2: Continuous*

- **Cable:** IMG-7W2-TO-5BNC cable required for video, synchronization and control signals. BNC-TO-6/12-pin junction box (e.g. JU-F1) required for synchronization and exposures signals.
- **Connection:** Connections between the 12-pin connector (via BNC-TO-6/12-pin junction box) of the camera and the 7-pin connector of the Matrox Genesis are as follows:

| **MATROX GENESIS (BNC connector)** | | | **JAI CV-A11 (12-pin connector)** | |
|---|---|---|---|---|
| ***Pin name*** | ***Pin no.*** | | ***Pin name*** | ***Pin no.*** |
| RED BNC | 01 | ← | VIDEO1 OUTPUT | 04 |
| RED BNC (GND) | 02 | -- | GROUND | 05 |

### *Modes 3-4: Asynchronous Reset*

- **Cable:** IMG-7W2-TO-5BNC and DBHD68-TO-OPEN (open ended) cable required for video, synchronization and control signals. BNC-TO-6/12-pin junction box (e.g. JU-F1) required for synchronization and exposures signals.
- **External trigger:** External trigger source should be connected to TTL trigger input (Gray BNC or pins 1 and 3 on Video Input connector).
- **Connection:** Connections between the 12-pin connector (via BNC-TO-6/12-pin junction box) of the camera and the 7/68-pin connectors of the Matrox Genesis are as Mode 1-2: Continuous, including the following:

| **CABLE ADAPTER BOARD (68-pin connector)** | | | **JAI CV-A11 (12-pin connector)** | |
|---|---|---|---|---|
| ***Pin name*** | ***Pin no.*** | | ***Pin name*** | ***Pin no.*** |
| EXPOSURE2, OUTPUT, TTL | 58 | ← | TRIG IN | 11 |
| GROUND | 25 | -- | GND | 12 |
| **MATROX GENESIS (BNC connector)** | | | **EXTERNAL TRIGGER SOURCE** | |
| ***Pin name*** | ***Pin no.*** | | ***Pin name*** | ***Pin no.*** |
| GRAY BNC | 01 | ← | SIGNAL | -- |
| GRAY BNC (GND) | 03 | -- | SIGNAL GROUND | -- |

The DCF(s) mentioned in this application note can be found on the MIL 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 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 H9P 2T4
Canada
Tel: (514) 685-2630
Fax: (514) 822-6273



MATROX IMAGING