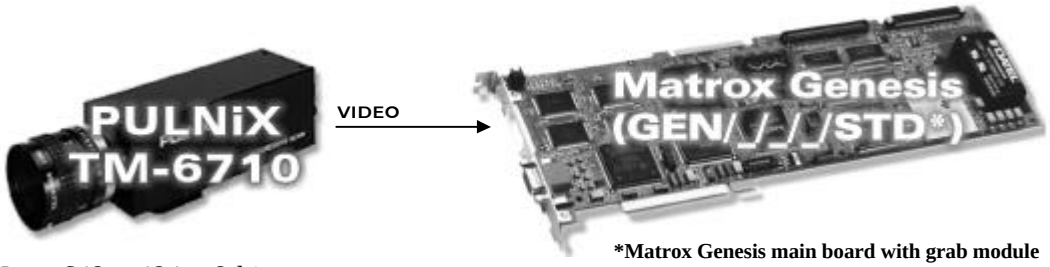
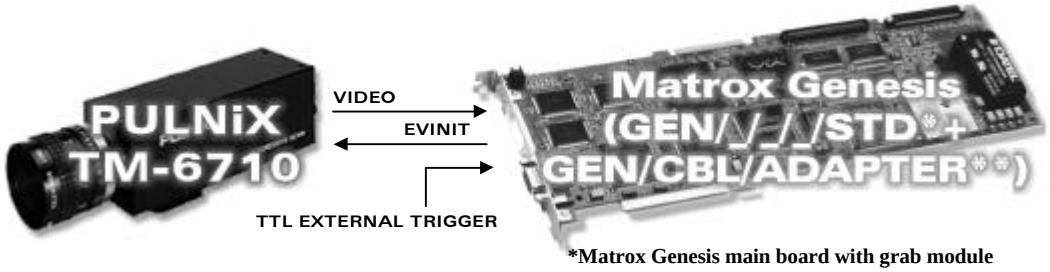
Application Note:
Interfacing non-standard cameras to Matrox Genesis

MATROX GENESIS

PULNiX TM-6710

September 25, 2000

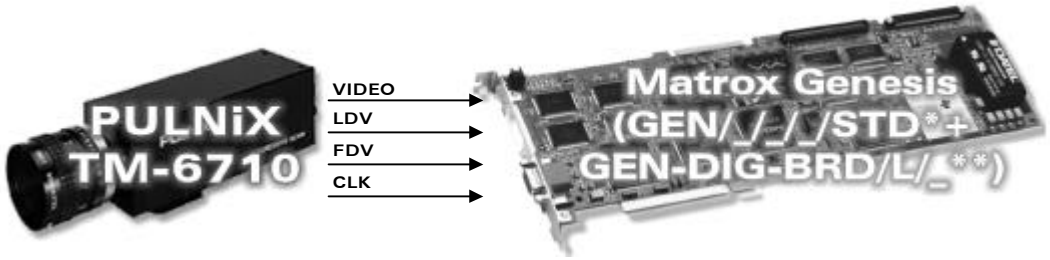
Camera Descriptions	• 648 × 484 × 8-bit @ up to 120 fps. • Single tap analog or dual tap LVDS digital video output. • Progressive scan. • External or internal exposure control. • External sync. • Pixel clock rate: 50.98 MHz (Analog) or 25.49 MHz (Digital).
Interface modes	• Continuous, Asynchronous Reset (external VINIT with controlled pulse width)
Camera Interface Briefs	**Mode 1: Continuous (Analog)**  ***Matrox Genesis main board with grab module** • Up to 648 × 484 × 8-bit. • Single tap analog video. • Progressive scan. • Continuous video. • Matrox Genesis receiving video signals from camera. • DCF used: 6710C1.DCF (648 × 484 × 8-bit @ 120 fps) • DCF used: 6710C2.DCF (Partial scan: 648 × 198 × 8-bit @ 240 fps) • DCF used: 6710C3.DCF (Partial scan: 648 × 98 × 8-bit @ 350 fps) **Mode 2: Asynchronous Reset (Analog / external VINIT with controlled Pulse width)**  ***Matrox Genesis main board with grab module** ****Matrox digital cable adapter board** • Up to 648 × 484 × 8-bit. • Single tap analog video. • Progressive scan. • Matrox Genesis receiving TTL external trigger signal. • Matrox Genesis sending EXPOSURE2 (EVINIT) signal to camera: EXPOSURE2 (EVINIT) signal initiates exposure and controls exposure time. • Matrox Genesis receiving video signals from camera. • DCF used: 6710AE1.DCF (648 × 484) • DCF used: 6710AE2.DCF (Partial scan: 648 × 198) • DCF used: 6710AE3.DCF (Partial scan: 648 × 98)

PULNiX TM-6710

September 25, 2000

Camera Interface Briefs (continued)

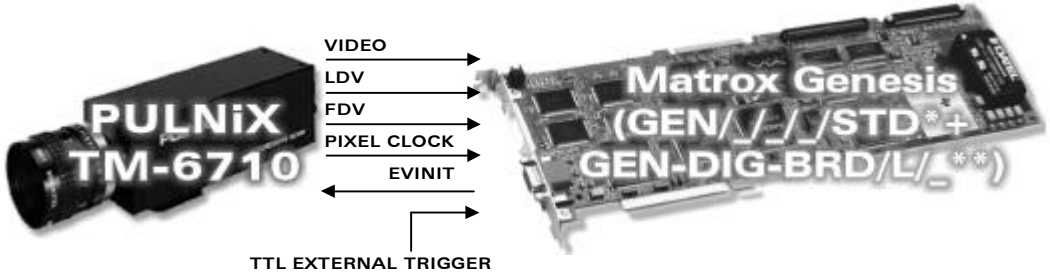
Mode 3: Continuous (Digital)



***Matrox Genesis main board with grab module with PINS # 5246**
****Matrox LVDS digital data input board**

- Up to 648 × 484 × 8-bit.
- Dual tap LVDS digital video.
- Progressive scan.
- Continuous video.
- Matrox Genesis receiving HSYNC (LDV), VSYNC (FDV), PIXEL CLOCK (CLK @ 25.40 MHz) and video signals from camera.
- DCF used: 6710CD1.DCF (648 × 484 × 8-bit @ 120 fps)
- DCF used: 6710CD2.DCF (Partial scan: 648 × 198 × 8-bit @ 240 fps)
- DCF used: 6710CD3.DCF (Partial scan: 648 × 98 × 8-bit @ 350 fps)

Mode 4: Asynchronous Reset (Digital / external VINIT with controlled Pulse width)



****Matrox Genesis main board with grab module with PINS # 5246**
****Matrox LVDS digital data input board**

- Up to 648 × 484 × 8-bit.
- Dual tap LVDS digital video.
- Progressive scan.
- Matrox Genesis receiving TTL external trigger signal.
- Matrox Genesis sending EXPOSURE2 (EVINIT) signal to camera: EXPOSURE2 (EVINIT) signal initiates exposure and controls exposure time.
- Matrox Genesis receiving HSYNC (LDV), VSYNC (FDV), PIXEL CLOCK (CLK @ 25.40 MHz) and video signals from camera.
- DCF used: 6710AED1.DCF (648 × 484)
- DCF used: 6710AED2.DCF (Partial scan: 648 × 198)
- DCF used: 6710AED3.DCF (Partial scan: 648 × 98)

Camera Interface Details

Mode 1: Continuous (Analog)

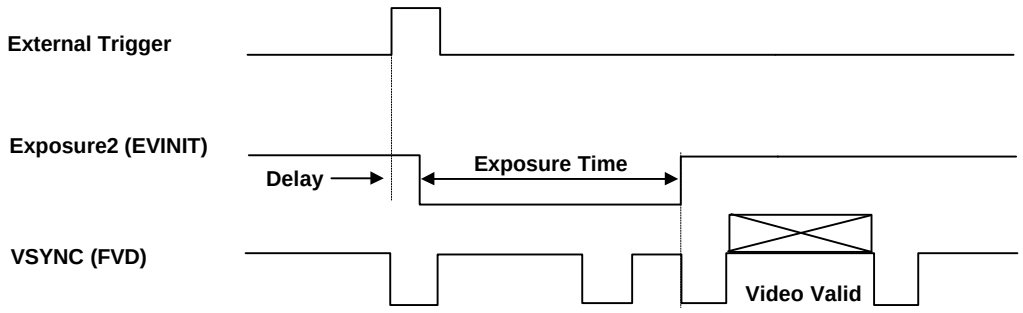
- **Frame rate:** Matrox Genesis receives the continuous video from the camera at a frame rate equal to 120 frames per second (G6710CA1.DCF), 240 frames per second (G6710CA2.DCF), or 350 frames per second (G6710CA3.DCF).
- **Exposure time:** Exposure time is inversely proportionate to the frame rate (no shutter) or determined by the shutter setting. Refer to the camera manual for more information
- **Camera switch settings:** Switches for this mode should be set as follows:

6710C1.DCF		*6710C2.DCF*		*6710C3.DCF*	
Switches	**Settings**	**Switches**	**Settings**	**Switches**	**Settings**
Mode Control	Mode 0	Mode Control	Mode F	Mode Control	Mode E
Up/Down	Toggle Up	Up/Down	Toggle Down	Up/Down	Toggle Up
Shutter	0	Shutter	0	Shutter	0

Mode 2: Asynchronous Reset (Analog / external VINIT with controlled Pulse width)

- Once it has received the external trigger signal, Matrox Genesis sends the EXPOSURE2 (EVINIT) signal to the camera with a width equal to the desired exposure time.
- **Frame rate**: The frame rate is determined by the frequency of the external trigger signal.
- **Exposure time**: The low level (pulse period) of the EXPOSURE2 (EVINIT) signal is the exposure time. The default exposure time for the DCF is equal to **4.9 ms** (G6710AA1.DCF), and **3.3 ms** (G6710AA2.DCF, G6710AA3.DCF). In order to change the width and deployment time of EXPOSURE2 (EVINIT) use the Exposure Settings menu tab in Matrox Intellicam. Consult the Matrox Intellicam User Guide for more information.
- **Minimum exposure width**: minimum EXPOSURE2 (EVINIT) pulse width is equal to **100 ms.**
- **Camera switch settings:** Switches for this mode should be set as follows:

6710AE1.DCF		*6710AE2.DCF*		*6710AE3.DCF*	
Switches	**Settings**	**Switches**	**Settings**	**Switches**	**Settings**
Step 1		**Step 1**		**Step 1**	
Mode Control	Mode F	Mode Control	Mode F	Mode Control	Mode E
Up/Down	Toggle Up	Up/Down	Toggle Down	Up/Down	Toggle Up
Step 2		**Step 2**		**Step 2**	
Mode Control	Mode 8	Mode Control	Mode 8	Mode Control	Mode 8
Up/Down	Toggle Down	Up/Down	Toggle Down	Up/Down	Toggle Down
Step 3		**Step 3**		**Step 3**	
Shutter	9	Shutter	9	Shutter	9



Camera Interface Details (continued)

Mode 3: Continuous (Digital)

- **Frame rate:** Matrox Genesis receives the continuous video from the camera at a frame rate equal to 120 frames per second (G6710CD1.DCF), 240 frames per second (G6710CD2.DCF), or 350 frames per second (G6710CD3.DCF).
- **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:** Switches for this mode should be set as follows:

6710CD1.DCF		*6710CD2.DCF*		*6710CD3.DCF*	
Switches	**Settings**	**Switches**	**Settings**	**Switches**	**Settings**
Control	Mode F	Control	Mode F	Control	Mode E
Up/Down	Toggle Up	Up/Down	Toggle Down	Up/Down	Toggle Up
Shutter	0	Shutter	0	Shutter	0

Mode 4: Asynchronous Reset (Digital / external VINIT with controlled Pulse width)

- Once it has received the external trigger signal, Matrox Genesis sends the EXPOSURE2 (EVINIT) signal to the camera with a width equal to the desired exposure time.
- **Frame rate**: The frame rate is determined by the frequency of the external trigger signal.
- **Exposure time**: The low level (pulse period) of the EXPOSURE2 (EVINIT) signal is the exposure time. The default exposure time for the DCFs is equal to **26 ms**. In order to change the width and deployment time of EXPOSURE2 (EVINIT) use the Exposure Settings menu tab in Matrox Intellicam. Consult the Matrox Intellicam User Guide for more information.
- **Minimum exposure width**: minimum EXPOSURE2 (EVINIT) pulse width is equal to **100 ms.**
- **Camera switch settings:** Switches for this mode should be set as follows:

6710AED1.DCF		*6710AED2.DCF*		*6710AED3.DCF*	
Switches	**Settings**	**Switches**	**Settings**	**Switches**	**Settings**
Step 1		**Step 1**		**Step 1**	
Mode Control	Mode F	Mode Control	Mode F	Mode Control	Mode E
Up/Down	Toggle Up	Up/Down	Toggle Down	Up/Down	Toggle Up
Step 2		**Step 2**		**Step 2**	
Mode Control	Mode 8	Mode Control	Mode 8	Mode Control	Mode 8
Up/Down	Toggle Down	Up/Down	Toggle Down	Up/Down	Toggle Down
Step 3		**Step 3**		**Step 3**	
Shutter	9	Shutter	9	Shutter	9

Cabling Requirements

Mode 1: Continuous (Analog)

- IMG-7W2-TO-5NC cable required for video input of camera (single input).
- Video input of IMG-7W2-TO-5BNC cable should be connected to video out BNC connector of camera.

Mode 2: Asynchronous Reset (Analog / external VINIT with controlled Pulse width)

- IMG-7W2-TO-5NC and DBH68-TO-OPEN cables required for video input of camera and TTL external trigger source.
- TTL external trigger source should be connected to the TTL external trigger input of the IMG-7W2-TO-5BNC cable (Gray BNC wire).
- Video input of IMG-7W2-TO-5BNC cable should be connected to video out BNC connector of camera.
- The connections between the 68-pin connector of the Matrox Genesis, the 12-pin connector of the camera and the power supply are as follows:

GEN/CBL/ADAPTER (68-pin connector)			**PULNiX TM-6710 (12-pin connector)**	
Pin name	***Pin no.***		***Pin name***	***Pin no.***
EXPOSURE2, OUTPUT, TTL	58	→	VINIT in	06
GROUND	68		GND	01, 03, or 05
+12V			+12V DC	02

Mode 3: Continuous (Digital)

- DBHD100-TO-OPEN cable and GEN/DIG/BRD/L/_ board required for digital data, synchronization and control signals.
- Connections between the 51-pin connector of the camera and the 100-pin connector of the GEN-DIG-BRD/L/_ are as follows:

GEN-DIG-BRD/L/_ (100-pin connector)			**PULNiX TM-6710 (51-pin connector)**	
Pin name	***Pin no.***		***Pin name***	***Pin no.***
CLOCK, INPUT, +	39	←	CLK+	18
CLOCK, INPUT, -	40	←	CLK-	35
HSYNC, INPUT, +	33	←	LVD+	48
HSYNC, INPUT, -	34	←	LVD-	47
VSYNC, INPUT, +	35	←	FVD+	50
VSYNC, INPUT, -	36	←	FVD-	49
GROUND	50	--	GND	17
GROUND	37	--	GND	51
DATA, INPUT, 0+	01	←	B0+	02
DATA, INPUT, 0-	02	←	B0-	20
DATA, INPUT, 1+	03	←	B1+	04
DATA, INPUT, 1-	04	←	B1-	22
DATA, INPUT, 2+	05	←	B2+	06
DATA, INPUT, 2-	06	←	B2-	24

continued

Cabling Requirements (continuous)

GEN-DIG-BRD/L/_ (100-pin connector)			PULNiX TM-6710 (51-pin connector)	
Pin name	***Pin no.***		***Pin name***	***Pin no.***
DATA, INPUT, 3+	07	←	B3+	08
DATA, INPUT, 3-	08	←	B3-	26
DATA, INPUT, 4+	09	←	B4+	10
DATA, INPUT, 4-	10	←	B4-	28
DATA, INPUT, 5+	11	←	B5+	12
DATA, INPUT, 5-	12	←	B5-	30
DATA, INPUT, 6+	13	←	B6+	14
DATA, INPUT, 6-	14	←	B6-	32
DATA, INPUT, 7+	15	←	B7+	16
DATA, INPUT, 7-	16	←	B7-	34
EXPOSURE2, OUTPUT, TTL	88*	→	EVINIT	43*
DATA, INPUT, 8+	17	←	A0+	01
DATA, INPUT, 8-	18	←	A0-	19
DATA, INPUT, 9+	19	←	A1+	03
DATA, INPUT, 9-	20	←	A1-	21
DATA, INPUT, 10+	21	←	A2+	05
DATA, INPUT, 10-	22	←	A2-	23
DATA, INPUT, 11+	23	←	A3+	07
DATA, INPUT, 11-	24	←	A3-	25
DATA, INPUT, 12+	25	←	A4+	09
DATA, INPUT, 12-	26	←	A4-	27
DATA, INPUT, 13+	27	←	A5+	11
DATA, INPUT, 13-	28	←	A5-	29
DATA, INPUT, 14+	29	←	A6+	13
DATA, INPUT, 14-	30	←	A6-	31
DATA, INPUT, 15+	31	←	A7+	15
DATA, INPUT, 15-	32	←	A7-	33

* This connection is not required for this mode, however allows this cable to be used with both digital modes.

Application Note:
Interfacing non-standard cameras to Matrox Genesis

MATROX GENESIS

PULNiX TM-6710

September 25, 2000

Cabling Requirements (continuous)	**Mode 4: Asynchronous Reset (Digital / external VINIT with controlled Pulse width)** • DBHD100-TO-OPEN and IMG-7W2-TO-5BNC cables, and GEN/DIG/BRD/L/_ board required for external trigger, digital data, synchronization, and control signals. • TTL external trigger source should be connected to the TTL trigger input of the IMG-7W2-TO-5BNC cable (Gray BNC wire). • Connections between the 51-pin connector of the camera and the 100-pin connector of the GEN-DIG-BRD/L/_ are as in *Mode 3: Continuous* (Digital).

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). 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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