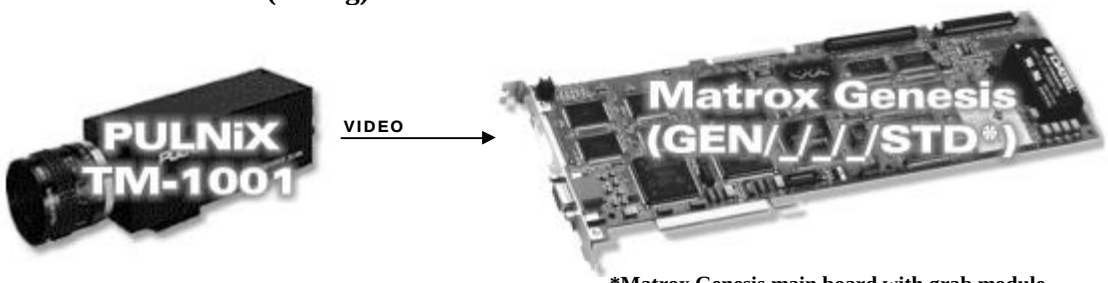
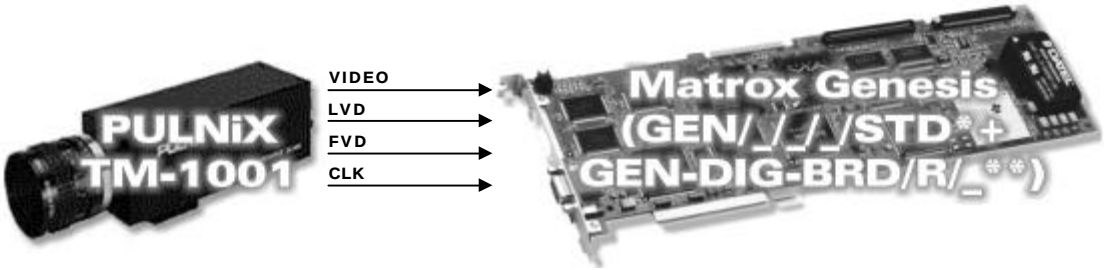
Application Note:
Interfacing non-standard cameras to Matrox Genesis

MATROX GENESIS

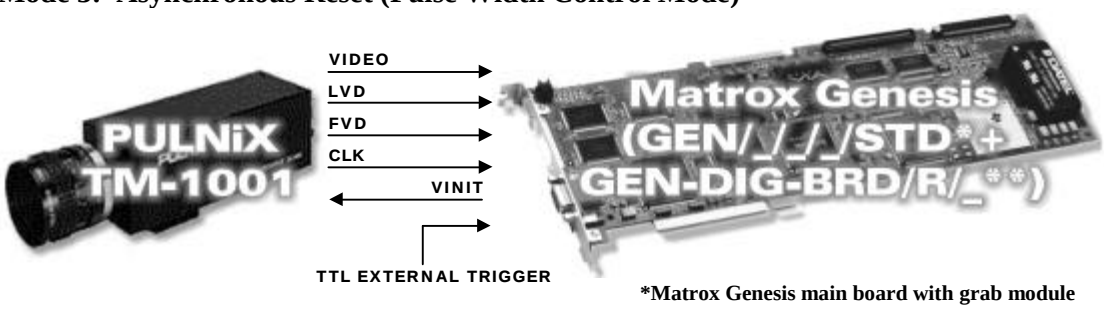
PULNIX TM-1001

February 9, 2001

Camera Descriptions	• 1024 × 1024 × 8-bit @ 15fps. • Single channel RS-422 digital or analog video output. • Progressive scan. • Internal or external exposure control. • Pixel clock rate: 20 MHz
Interface modes	• Continuous, asynchronous reset (pulse width control mode)
Camera Interface Briefs	**Mode 1: Continuous (analog)**  ***Matrox Genesis main board with grab module** • 1008 × 1018 × 8-bit @ 15fps. • Single channel analog video. • Progressive scan. • Continuous video. • Matrox Genesis receiving video signals from camera. • DCF used: TM1001N.DCF **Mode 2: Continuous (digital)**  ***Matrox Genesis main board with grab module** ****** Matrox RS-422 digital data input board • 997 × 1016 × 8-bit. • Single channel RS-422 digital video. • Progressive scan. • Continuous video. • Matrox Genesis receiving HSYNC (LDV), VSYNC (FDV), PIXEL CLOCK (CLK @ 20 MHz) and video signals from camera. • DCF used: TM1001C.DCF

Camera Interface Briefs (continued)

Mode 3: Asynchronous Reset (Pulse Width Control Mode)



***Matrox Genesis main board with grab module**
****** Matrox RS-422 digital data input board**

- 997 × 1016 × 8-bit.
- Single channel RS-422 digital video.
- Progressive scan
- Matrox Genesis receiving TTL external trigger signal.
- Matrox Genesis sending EXPOSURE2 (VINIT) signal to camera: the EXPOSURE2 signal both initiates exposure and controls exposure time.
- Matrox Genesis receiving HSYNC (LDV), VSYNC (FDV), PIXEL CLOCK (CLK @ 20 MHz), and video signals from camera.
- DCF used: TM1001A.DCF

Camera Interface Details

Modes 1 and 2: Continuous (analog, digital)

- **Frame rate:** Matrox Genesis receives the continuous video from the camera at 15 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. Switches for this mode should be set as follows:

Modes 1 and 2: Continuous

Switches	*Settings*
Shutter (Speed)	Any except 9
NRM / ASY	NRM
DSP / NSP	NSP

Mode 3: Asynchronous Reset (Pulse Width Control Mode)

- Once it has received the external trigger signal, Matrox Genesis sends the EXPOSURE2 (VINIT) signal to the camera with a width equal to the desired exposure.
- **Frame rate**: The frame rate is determined by the frequency of the external trigger signal.
- **Exposure time:** The active and inactive periods of the EXPOSURE2 (VINIT) signal is the exposure time. The default exposure time for this DCF is equal to **31.93 ms**. In order to change the width and deployment time of EXPOSURE2 (VINIT) use the Exposure Settings menu tab in Matrox Intellicam. Consult the Matrox Intellicam User Guide for more information.

Camera Interface Details (continued)

- **Camera switch settings:** Refer to the camera manual for additional information. Switches for this mode should be set as follows:

Mode 3: Asynchronous Reset

Switches	*Settings*
Shutter (Speed)	9
NRM / ASY	ASY
DSP / NSP	NSP

Cabling Requirements

Mode 1: Continuous (analog)

- IMG-7W2-TO-5BNC cable required for video output of camera.
- Video input BNC of IMG-7W2-TO-5BNC cable should be connected to VIDEO OUT BNC connector of camera.

Mode 2: Continuous (digital)

- DBHD100-TO-OPEN cable and GEN/DIG/BRD/R/_ board required for digital data, synchronization and control signals.
- Connections between the 31-pin connector of the camera and the 100-pin connector of the GEN-DIG-BRD/R/_ are as follows:

GEN-DIG-BRD/R/_ (100-pin connector)			**PULNiX TM-1001 (31-pin connector)**	
Pin name	***Pin no.***		***Pin name***	***Pin no.***
CLOCK, INPUT, +	39	←	CLK+	01
CLOCK, INPUT, -	40	←	CLK-	17
HSYNC, INPUT, +	33	←	LVD+	02
HSYNC, INPUT, -	34	←	LVD-	18
VSYNC, INPUT, +	35	←	FVD+	03
VSYNC, INPUT, -	36	←	FVD-	19
GROUND	50		GND	04
GROUND	37		GND	16
DATA, INPUT, 0+	01	←	D0+	08
DATA, INPUT, 0-	02	←	D0-	24
DATA, INPUT, 1+	03	←	D1+	09
DATA, INPUT, 1-	04	←	D1-	25
DATA, INPUT, 2+	05	←	D2+	10
DATA, INPUT, 2-	06	←	D2-	26
DATA, INPUT, 3+	07	←	D3+	11
DATA, INPUT, 3-	08	←	D3-	27
DATA, INPUT, 4+	09	←	D4+	12
DATA, INPUT, 4-	10	←	D4-	28

continued

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Cabling Requirements (continued)

GEN-DIG-BRD/R/_ (100-pin connector) *Pin name*	*Pin no.*		PULNiX TM-1001 (31-pin connector) *Pin name*	*Pin no.*
DATA, INPUT, 5+	11	←	D5+	13
DATA, INPUT, 5-	12	←	D5-	29
DATA, INPUT, 6+	13	←	D6+	14
DATA, INPUT, 6-	14	←	D6-	30
DATA, INPUT, 7+	15	←	D7+	15
DATA, INPUT, 7-	16	←	D7-	31
EXPOSURE2, OUTPUT, TTL	88*	→	VINIT	20*

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

Mode 3: Asynchronous Reset (Pulse Width Control Mode)

- DBHD100-TO-OPEN cable and GEN/DIG/BRD/R/_ board required for digital data, synchronization and control signals.
- The connections between the 100-pin connector of the GEN-DIG-BRD/R/_ and the 31-pin connector of the camera are as in Mode 2: *Continuous mode (digital)* with the exception of the following additional connection:

GEN-DIG-BRD/R/_ (100-pin connector) **Pin name**	**Pin no.**		PULNiX TM-1001 (31-pin DC connector) **Pin name**	**Pin no.**
EXPOSURE2, OUTPUT, TTL	88	→	VINIT	20

- TTL external trigger source should be connected to the TTL Trigger Input of the IMG-7W2-TO-5BNC cable.
- To use an RS-422 external trigger input, modify the DCF using Matrox Intellicam (refer to the Matrox Intellicam User Guide for more information), and add the following connections between the 100-pin connector of the GEN-DIG-BRD/R/_ and the external trigger source:

GEN-DIG-BRD/R/_ (100-pin connector) **Pin name**	**Pin no.**		**External trigger source** **Pin name**
TRIGGER, INPUT, +	47	←	“RS-422 TRIGGER+”
TRIGGER, INPUT, -	48	←	“RS-422 TRIGGER-”

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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