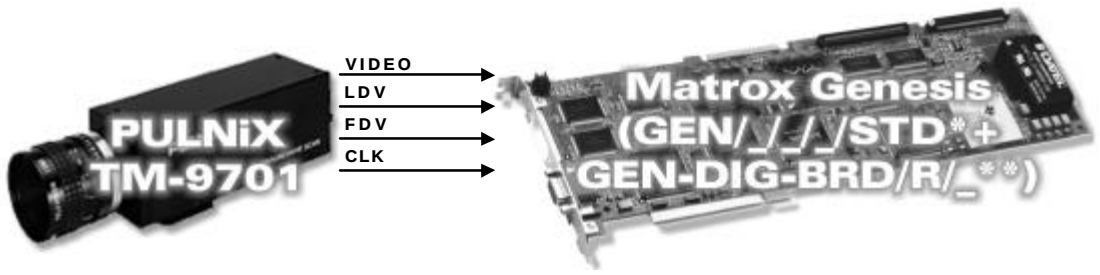
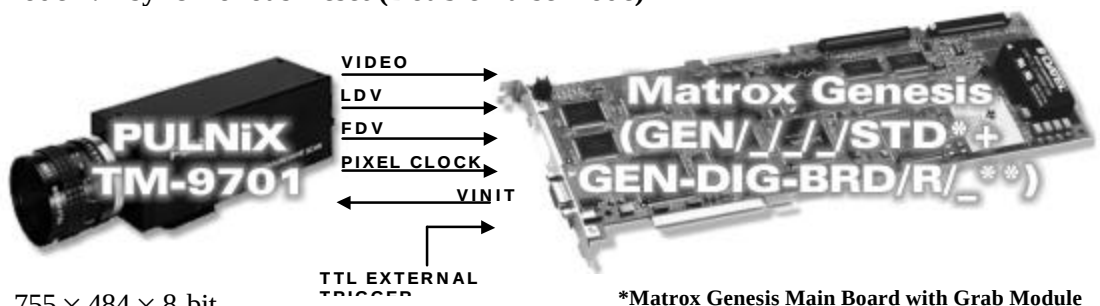
Application Note:
Interfacing non-standard cameras to Matrox Genesis

MATROX GENESIS

PULNiX TM-9701

December 6, 2000

Camera Descriptions	• 768 × 484 × 8-bit @ up to 60 fps. • Single channel analog or RS-422 digital video output. • Interlaced or Progressive scan. • External or internal exposure control. • External sync. • Pixel clock rate: 14.3182 MHz.
Interface modes	• Continuous, Asynchronous Reset (Double Pulse mode)
Camera Interface Briefs	**Mode 1: Continuous**  ***Matrox Genesis Main Board with Grab Module** **** Matrox RS-422 Digital Data Input Board** • 755 × 484 × 8-bit @ 30 fps. • Single channel RS-422 digital video. • Progressive scan. • Continuous video. • Matrox Genesis receiving HSYNC (LDV), VSYNC (FDV), PIXEL CLOCK (CLK @ 14.3182 MHz) and video signals from camera. • DCF used: TM9701C.DCF **Mode 2: Asynchronous Reset (Double Pulse mode)**  ***Matrox Genesis Main Board with Grab Module** **** Matrox RS-422 Digital Data Input Board** • 755 × 484 × 8-bit. • Single channel RS-422 digital video. • Progressive scan. • Matrox Genesis receiving TTL external trigger signal. • Matrox Genesis sending EXPOSURE1 (VINIT) signal to camera: the EXPOSURE1 signal both initiates exposure and controls exposure time. • Matrox Genesis receiving HSYNC (LDV), VSYNC (FDV), PIXEL CLOCK (CLK @ 14.3182 MHz) and video signals from camera. • DCF used: TM9701A.DCF

Camera Interface Details

Mode 1 : Continuous

- **Frame rate:** Matrox Genesis receives the continuous video from the camera at 30 frames per second (progressive scan).
- **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:

Switches	*Settings*
Shutter (Speed)	As desired
NRM / ASY	NRM
INT / NON	NON

Mode 2: Asynchronous Reset (Double Pulse mode)

- Once it has received the external trigger signal, Matrox Genesis sends the EXPOSURE1 (VINIT) 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 double pulse signal is created using a combined Timer 1 and Timer 2 signal, output as a single EXPOSURE1 (VINIT) signal. The default exposure time is equal to **20.34 ms**. In order to change the width and deployment time of Timer 1 and Timer 2, use the Exposure Settings menu tab in Matrox Intellicam. Consult the Matrox Intellicam User Guide for more information
- **Minimum exposure width**: minimum EXPOSURE1 (VINIT) pulse width is equal to **10 H** or **635µs.**
- **Camera switch settings:** Switches for this mode should be set as follows:

Switches	*Settings*
Shutter (Speed)	9
NRM / ASY	ASY
INT / NON	NON

Cabling Requirements

Mode 1: Continuous

- 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-9701 (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	23
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
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.

Cabling Requirements (continued)

Mode 2: Asynchronous Reset (Double Pulse mode)

- DBHD100-TO-OPEN and IMG-7W2-TO-5BNC cables, and GEN/DIG/BRD/R/_ 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.
- Connections between the 31-pin connector of the camera and the 100-pin connector of the GEN-DIG-BRD/R/_ are as in *Mode 1: Continuous* with the exception of the following additional connection:

GEN-DIG-BRD/R/_ (100-pin connector)			**PULNiX TM-9701 (31-pin connector)**	
Pin name	***Pin no.***		***Pin name***	***Pin no.***
EXPOSURE2, OUTPUT, TTL	88	→	VINIT	20

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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