

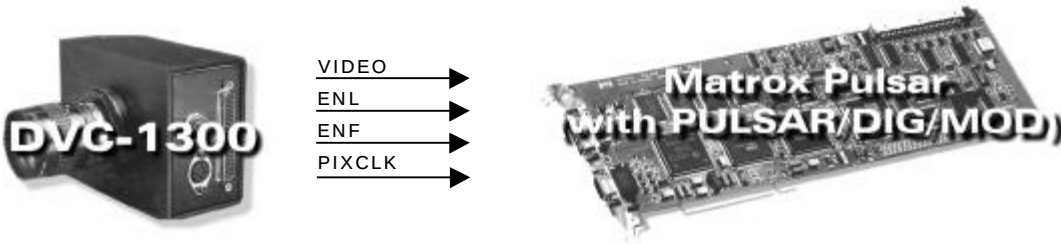
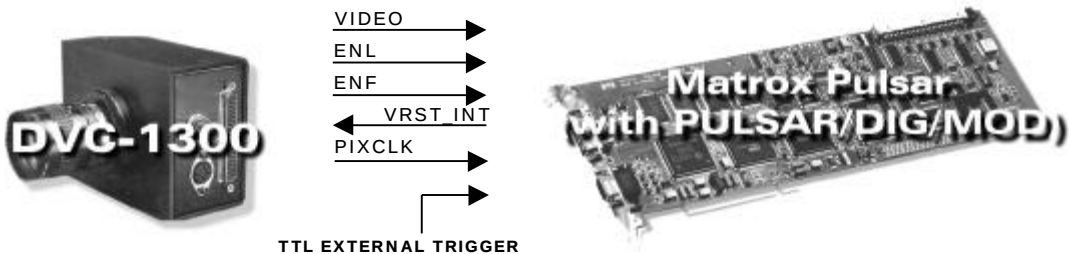
Application Note:

Interfacing non-standard cameras to Matrox Pulsar

MATROX
PULSAR

DVC-1300

January 7, 1999

Camera Descriptions	• 1300 x 1030 x 10-bit. • RS-422 digital or analog video output. • Progressive scan. • External synchronization. • Pixel clock rate: 20.5 MHz
Interface modes	• Pseudo-continuous, asynchronous reset, control, trigger, integration
Camera Interface Briefs	Mode 1: Pseudo-continuous (Normal mode without reset)  • 1300 x 1030 x 10-bit @12 fps / 1300 x 515 x 10-bit @24 fps. • RS-422 digital video output. • Progressive scan. • Continuous video. • Matrox Pulsar receiving HSYNC (ENL), VSYNC (ENF), PIXEL CLOCK (PIXCLK @ 20.5 MHz) and video signals from camera. • DCF used: 1300_7.DCF (1300 x 1030) • DCF used: 1300_7D.DCF (1300 x 515) Mode 2: Asynchronous reset (Normal mode with reset)  • 1300 x 1030 x 10-bit / 1300 x 515 x 10-bit. • RS-422 digital video output. • Progressive scan. • Matrox Pulsar receiving TTL external trigger signal. • Matrox pulsar sending EXPOSURE1 (VRST_INT) signal to camera. • Matrox Pulsar receiving HSYNC (ENL), VSYNC (ENF), PIXEL CLOCK (PIXCLK @ 20.5 MHz) and video signals from camera. • DCF used: 1300_0.DCF (1300 x 1030) • DCF used: 1300_0D.DCF (1300 x 515)

Application Note:

Interfacing non-standard cameras to Matrox Pulsar

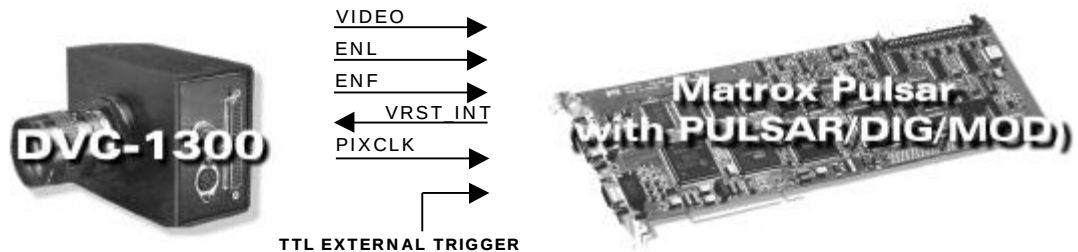
MATROX
PULSAR

DVC-1300

January 7, 1999

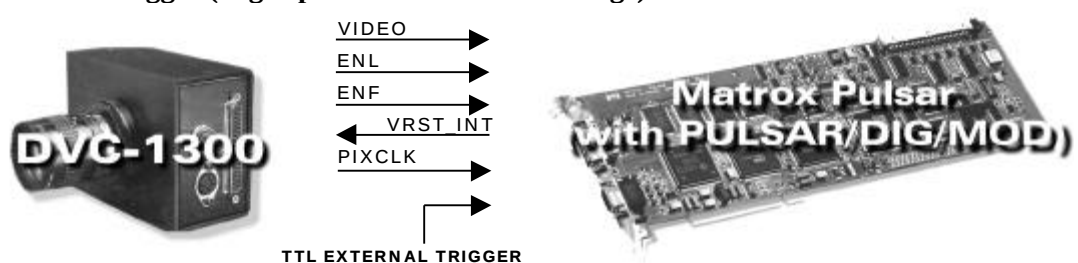
Camera Interface Briefs (continued)

Mode 3: Control (High speed shutter without discharge)



- 1300 x 1030 x 10-bit / 1300 x 515 x 10-bit.
- RS-422 digital video output.
- Progressive scan.
- Matrox Pulsar receiving TTL external trigger signal.
- Matrox pulsar sending EXPOSURE1 (VRST_INT) signal to camera.
- Matrox Pulsar receiving HSYNC (ENL), VSYNC (ENF), PIXEL CLOCK (PIXCLK @ 20.5 MHz) and video signals from camera.
- DCF used: [1300_1.DCF](#) (1300 x 1030, DB 8:1 lower)
- DCF used: [1300_1D.DCF](#) (1300 x 515, DB 8:1 lower)
- DCF used: [1300_2.DCF](#) (1300 x 1030, DB 8:1 higher)
- DCF used: [1300_2D.DCF](#) (1300 x 515, DB 8:1 higher)
- DCF used: [1300_6.DCF](#) (1300 x 1030, DB 8:1 disabled)
- DCF used: [1300_6D.DCF](#) (1300 x 515, DB 8:1 disabled)

Mode 4: Trigger (High speed shutter with discharge)



- 1300 x 1030 x 10-bit / 1300 x 515 x 10-bit.
- RS-422 digital video output.
- Progressive scan.
- Matrox Pulsar receiving TTL external trigger signal.
- Matrox pulsar sending EXPOSURE1 (VRST_INT) signal to camera.
- Matrox Pulsar receiving HSYNC (ENL), VSYNC (ENF), PIXEL CLOCK (PIXCLK @ 20.5 MHz) and video signals from camera.
- DCF used: [1300_3.DCF](#) (1300 x 1030, DB 8:1 lower)
- DCF used: [1300_3D.DCF](#) (1300 x 515, DB 8:1 lower)
- DCF used: [1300_4.DCF](#) (1300 x 1030, DB 8:1 higher)
- DCF used: [1300_4D.DCF](#) (1300 x 515, DB 8:1 higher)

Application Note:

Interfacing non-standard cameras to Matrox Pulsar

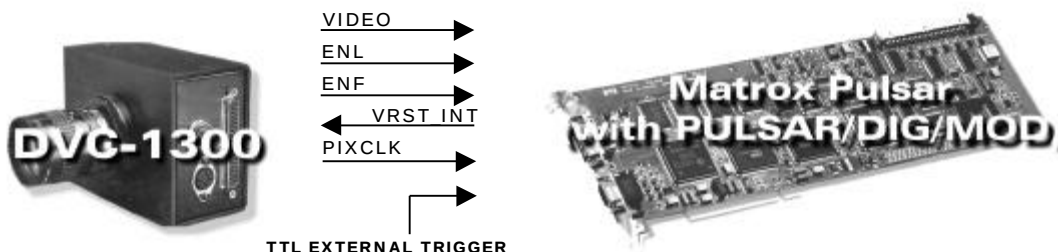
MATROX
PULSAR

DVC-1300

January 7, 1999

Camera Interface Briefs (continued)

Mode 5: Integration ('N' frame integration-low shutter speed)



- 1300 x 1030 x 10-bit @12 fps / 1300 x 515 x 10-bit @24 fps.
- RS-422 digital video output.
- Progressive scan.
- Matrox Pulsar receiving TTL external trigger signal.
- Matrox pulsar sending EXPOSURE1 (VRST_INT) signal to camera.
- Matrox Pulsar receiving HSYNC (ENL), VSYNC (ENF), PIXEL CLOCK (PIXCLK @ 20.5 MHz) and video signals from camera.
- DCF used: [1300_5.DCF](#) (1300 x 1030)
- DCF used: [1300_5D.DCF](#) (1300 x 515)

Camera Interface Details

Mode 1: Pseudo-continuous (Normal mode without reset)

- **Frame rate:** Frame scan rate is pseudo-continuous and fixed. Frame rate is the reciprocal of the exposure time.
- **Exposure time:** The exposure time for this DCF is **83.3 ms** (12 fps) or **41.6 ms** (24 fps). Exposure time is the reciprocal of the frame rate.
- **Switch settings:** Switch settings for this mode are as follows:

Setting / DCF	1300_7.DCF	1300_7D.DCF
DB (8:1)	disabled	disabled
EXT	1	0
MC(2:0)	111	111

Camera switches are located internally for Exposure Control (DB 8:1), EXT and Mode Control (MC 2:0).

Mode 2: Asynchronous reset (Normal mode with reset)

- **Frame rate:** Frame scan rate is determined by the frequency of the TTL external trigger. Once this external trigger is received, the Matrox Pulsar generates a pulse on EXPOSURE1 (RESET), which in turn initiates camera exposure.
- **Exposure time:** Exposure time, using Matrox Intellicam, can be changed by adjusting the period between the falling edge and the rising edge of the EXPOSURE signal.
- **Trigger frequency:** The trigger frequency should not be faster than 12 Hz for 1300 x 1030 or 24 Hz for 1300 x 515.
- **Switch settings:** Switch settings for this mode are as follows:

Setting / DCF	1300_0.DCF	1300_0D.DCF
DB (8:1)	1111 1111	1111 1111
EXT	1	0
MC(2:0)	000	000

Camera switches are located internally for Exposure Control (DB 8:1), EXT and Mode Control (MC 2:0).

Application Note:

Interfacing non-standard cameras to Matrox Pulsar



DVC-1300

January 7, 1999

Camera Interface Details (continued)

Mode 3: Control (High speed shutter without discharge)

- **Frame rate:** Frame scan rate is determined by the frequency of the TTL external trigger. Once this external trigger is received, the Matrox Pulsar generates a pulse on EXPOSURE1 (RESET), which in turn initiates camera exposure.
- **Exposure time:** Exposure time, using Matrox Intellicam, can be changed by adjusting the period between the falling edge and the rising edge of the EXPOSURE signal. For 1300_6.DCF and 1300_6D.DCF, the exposure signal must be a negative-going pulse. The negative edge indicates that start of a pulse, while the width determines the exposure time.
- **Trigger frequency:** The trigger frequency should not be faster than 12 Hz for 1300 x 1030 or 24 Hz for 1300 x 515.
- **Switch settings:** Switch settings for this mode are as follows:

Setting / DCF	1300_1.DCF	1300_1D.DCF	1300_2.DCF*	1300_2D.DCF*
DB (8:1)	1111 1111	1111 1111	1111 1111	1111 1111
EXT	1	0	0	0
MC(2:0)	001	001	010	010

*Note: DB(8:1) align with the higher 8 bits of the 10-bit control word, allowing four-line increments in exposure from 000 to 3FC. For example, with DB(8:1) = 1111 1111, the exposure is equivalent to 1111 1111 00 (binary) lines or 1020 lines.

Setting / DCF	1300_6.DCF	1300_6D.DCF
DB (8:1)	disabled	disabled
EXT	1	0
MC(2:0)	110	110

Camera switches are located internally for Exposure Control (DB 8:1), EXT and Mode Control (MC 2:0).

*Note: Make sure that the trigger frequency is slower than the exposure.

Mode 4: Trigger (High speed shutter with discharge)

- **Frame rate:** Frame scan rate is determined by the frequency of the TTL external trigger. Once this external trigger is received, the Matrox Pulsar generates a pulse on EXPOSURE1 (RESET), which in turn initiates camera exposure.
- **Exposure time:** The default exposure time for this DCF is ?? ms. Exposure time, using Matrox Intellicam, can be changed by adjusting the period between the falling edge and the rising edge of the EXPOSURE signal.
- **Trigger frequency:** The trigger frequency should not be faster than 12 Hz for 1300 x 1030 or 24 Hz for 1300 x 515.
- **Switch settings:** Switch settings for this mode are as follows:

Setting / DCF	1300_3.DCF*	1300_3D.DCF*	1300_4.DCF*	1300_4D.DCF*
DB (8:1)	1111 1111	1111 1111	1111 1111	1111 1111
EXT	1	0	1	0
MC(2:0)	011	011	100	100

*Note: see respective DCF for additional information on DB(8:1) increments in exposure.

Application Note:

Interfacing non-standard cameras to Matrox Pulsar



DVC-1300

January 7, 1999

Camera Interface Details (continued)

Cabling Requirements

Mode 5: Integration (‘N’ frame integration-low shutter speed)

- **Frame rate:** Frame scan rate is determined by the frequency of the TTL external trigger. Once this external trigger is received, the Matrox Pulsar generates a pulse on EXPOSURE1 (RESET), which in turn initiates camera exposure.
- **Exposure time:** The default exposure time for this DCF is ?? ms. However, exposure time is determined by the DB (8:1) switch.
- **Trigger frequency:** The trigger frequency should not be faster than 12 Hz for 1300 x 1030 or 24 Hz for 1300 x 515.
- **Switch settings:** Switch settings for this mode are as follows:

Setting / DCF	1300_5.DCF	1300_5D.DCF
DB (8:1)	see note	see note
EXT	1	0
MC(2:0)	101	101

Note: The value of N (max. of 120) is the number of frames for which the camera integrates before sending the active video. It can be set through the DB(8:1).

Camera switches are located internally for Exposure Control (DB 8:1), EXT and Mode Control (MC 2:0).

Mode 1: Pseudo-continuous

- DBHD68-TO-OPEN cable required for synchronization, control signals and video output of camera.
- Connections between the 44-pin DB-44F connector of the camera and the 68-pin connector of the Matrox Pulsar (PULSAR/DIG/MOD) are as follows:

DVC-1300
(44-pin connector-DB-44F)

Pin Name	Pin no.
PIXCLK-	16
PIXCLK-	01
GND	17
GND	02
D9- (MSB)	19
D9+(MSB)	04
INOUT1+	34
D8-	20
D8+	05
INOUT1-	35
D7-	21
D7+	06
MC2	36
D6-	22
D6+	07
MC1	37
D5-	23
D5+	08

PIULSAR/DIG/MOD (DBHD68-TO-OPEN)
(68-pin digital interface connector)

Pin Name	Pin no.
CLKIN-	63
CLKIN+	29
GROUND	68
GROUND	01
DATA9-	42
DATA9+	08
EXPOSURE1+	30
DATA8-	43
DATA8+	09
EXPOSURE1-	64
DATA7-	44
DATA7+	10
TTL_USER2	33
DATA6-	45
DATA6+	11
TTL_USER1	32
DATA5-	47
DATA5+	13

continued

Application Note:

Interfacing non-standard cameras to Matrox Pulsar



DVC-1300

January 7, 1999

Cabling Requirements					
<i>Pin Name</i>	<i>Pin no.</i>		<i>Pin Name</i>	<i>Pin no.</i>	
MC0	38	←	TTL_USER0	31	
D4-	24	→	DATA4-	48	
D4+	09	→	DATA4+	14	
VRST_INT	39	←	TTL_EXPOSURE1	66	
D3-	25	→	DATA3-	49	
D3+	10	→	DATA3+	15	
D2-	26	→	DATA2-	50	
D2+	11	→	DATA2+	16	
GND	41	-	GROUND	01	
D1-	27	→	DATA1-	53	
D1+	12	→	DATA1+	19	
D0- (LSB)	28	→	DATA0- (LSB)	54	
D0+ (LSB)	13	→	DATA0+ (LSB)	20	
GND	43	-	GROUND	68	
ENF-	29	→	VSYNC-	59	
ENF+	14	→	VSYNC+	25	
ENL-	30	→	HSYNC-	60	
ENL+	15	→	HSYNC+	26	
Mode: 2 - 6					
• DBHD68-TO-OPEN cable required for TTL external trigger signal, synchronization and control signals, and video output of camera. • TTL external trigger source should be connected to the TTL trigger input of the DBHD68-TO-OPEN cable. • Connections between the 44-pin DB-44F connector of the camera and the 68-pin connector of the Matrox Pulsar (PULSAR/DIG/MOD) are same as in <i>Mode 1: Pseudo-continuous</i>.					

The DCF(s) mentioned in this application note can be found on the MIL and MIL-Lite 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

