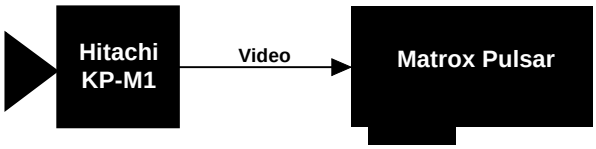
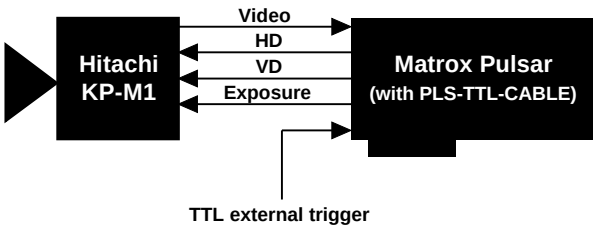
Application Note:
Interfacing non-standard cameras to Matrox Pulsar

Hitachi Denshi KP-M1 **February 23, 1996**

Camera Interface Overview	• 768 x 572 x 8-bit (CCIR) • Analog video output • Interlaced • Internal or external sync • Internal or external exposure control • 2 modes: continuous mode, long exposure mode
Camera Interface Details	**1. Continuous mode** • 768 x 572 x 8-bit (CCIR) @ 25 fps • Analog video output • Internal (composite) sync • Interlaced • Continuous video • DCF used: KPM1.DCF  **2. Long exposure mode** (only with the modified version of the camera; *not* available with the standard version of the KP-M1 camera) • 768 x 572 x 8-bit (CCIR) • Interlaced • Analog video output • External exposure control with times starting at 40ms • Matrox Pulsar sending TTL hsync (HD) and vsync (VD) signals to camera • Matrox Pulsar receiving TTL external trigger • Matrox Pulsar sends TTL exposure signal to camera to initiate exposure; the exposure signal both initiates exposure and controls exposure time • DCF used: KPM1_UK.DCF 

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Cabling Requirements

1. Continuous mode

- IMG-7W2-TO-1BNC required
- Video input BNC of IMG-7W2-TO-1BNC cable should be connected to VIDEO OUT BNC connector of camera
- The SHUTTER ON/OFF switch is set to *OFF* (default exposure time of [1/60]s) and the FIELD/FRAME integration switch is set to *FIELD*; these two switches are located on the rear of the camera. The R/R (restart/reset) switch inside the camera is set to *NORM*

2. Long exposure mode (only with the modified version of the camera; *not* available with the standard version of the KP-M1 camera)

- IMG-7W2-TO-5BNC cable and PLS-TTL-CABLE required
- Video input BNC of IMG-7W2-TO-5BNC cable should be connected to VIDEO OUT BNC connector of camera
- The SHUTTER ON/OFF switch is set to *OFF* and the FIELD/FRAME integration switch is set to *FIELD*; these two switches are located on the rear of the camera. The R/R (restart/reset) switch inside the camera is set to *NORM*
- The connections between the DB-37 connector of the PLS-TTL-CABLE and the 12-pin DC IN/SYNC connector of the camera are as follows:

PLS-TTL-CABLE (DB-37 connector)			**Hitachi Denshi KP-M1 (12-pin DC IN/SYNC connector)**	
Pin name	***Pin no.***		***Pin name***	***Pin no.***
TTL_HSYNC	26	→	HD	6
TTL_VSYNC	11	→	VD	7
TTL_EXPOSURE1	9	→	—	9
GROUND	6&7		GND	1, 3, 5, 10, 12

- TTL external trigger source should be connected to the TTL Trigger Input of the IMG-7W2-TO-5BNC cable

Special Considerations

1. Continuous mode

- The DCF specified (KPM1.DCF) can be used *either* with the modified version of the KP-M1 camera *or* with the standard version for operation in the continuous mode

2. Long exposure mode

- KPM1_UK.DCF can only be used with the modified version of the KP-M1 camera; long exposure mode is not available with the standard version
- The trigger signal must be active high; the trigger pulse must have a width greater than 65µs

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	• Once it has received the external signal to trigger, the Matrox Pulsar sends a TTL exposure signal to the camera. The camera awaits the falling edge of the signal, at which point it initiates exposure. The exposure time is set by the Matrox Pulsar; the camera will expose for as long as the exposure signal is low • Whereas most cameras usually output the same video sequence be it *even-odd* or *odd-even*, the Hitachi Denshi KP-M1 outputs a video sequence that depends on the exposure time. It has been specified in the DCF that the Matrox Pulsar is to receive an *even-odd* video sequence. The exposure time must be set to an integer number of frames (an even number of fields) so that the output is maintained as *even-odd* and is therefore received as expected by the Matrox Pulsar. The DCF must be modified if an *odd-even* video sequence is desired • In the DCF, the exposure time should be set to a value slightly shorter than the actual exposure time desired, which must be an integer number of frames. The camera will determine the lowest integer number of fields that corresponds to this value. A smaller than actual value for the exposure time will ensure that the camera does not overcount by 1 field. The rule of thumb for setting the exposure time in the DCF is the following: Exposure time setting in DCF (in seconds) = (actual exposure time in number of frames x 0.040s) - 0.010s Since the number of frames must be an integer, the exposure time will always be in terms of an even number of fields. • Default exposure time = 6 fields = 3 frames = 120ms; using the above rule of thumb, the exposure time is set to 110ms in the DCF • Minimum exposure time: 2 fields = 1 frame = 40ms, which would be set to 30ms in the DCF • The DCF may be modified using Matrox Intellicam; however, *the manually altered registers must not be overwritten*!

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). 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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