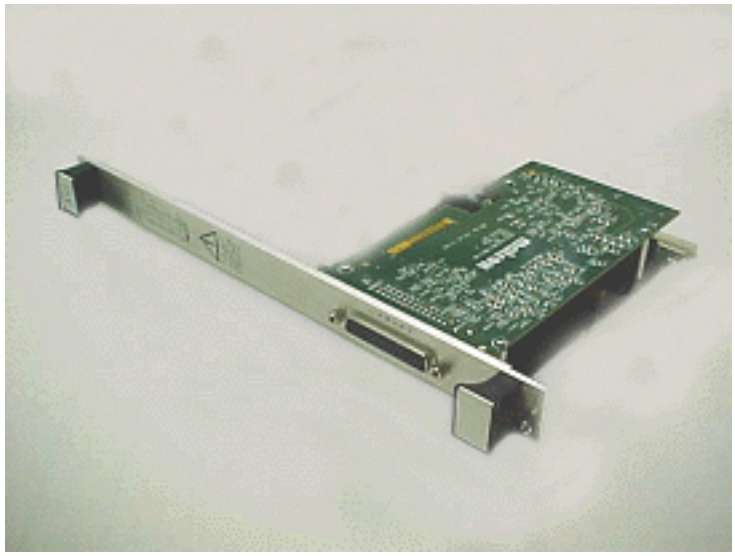
AdeptVision Advanced Vision Interface (AVI)

Addendum to the Adept MV Controller User's Guide

For V+ Version 13.0 or Later



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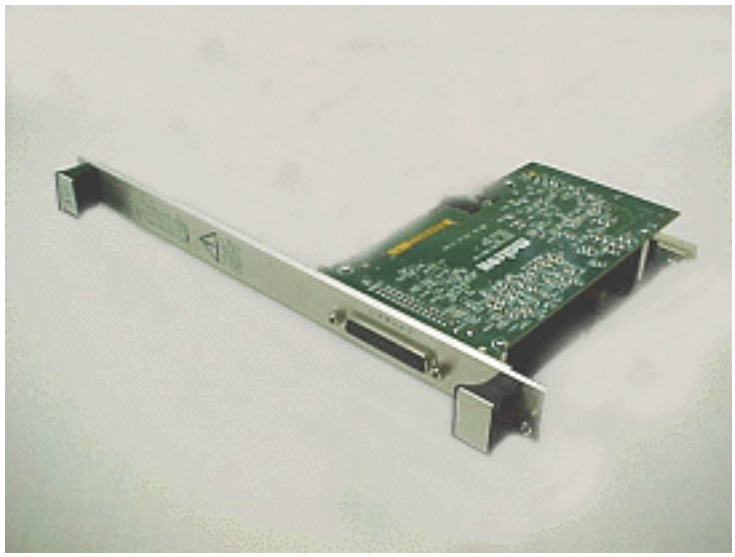

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AdeptVision Advanced Vision Interface (AVI) Board

Introduction

The AdeptVision Advanced Vision Interface (AVI) board is an assembly of two boards in a PMC form factor. The AVI board plugs directly into the AWC-II and serves as both frame grabber and vision processor for the AdeptVision AVI product. For AVI board installation instructions, please refer to the ***AdeptVision AVI Board Installation Instructions*** (P/N 00330-01556) supplied with your AdeptVision AVI board.

The AVI board uses a digital signal processor (DSP) and features four 640x480 frame buffers. Support for 1Kx1K cameras, such as the Pulnix TM-1001, is expected in a later release of software.

Refer to the ***AdeptVision User's Guide*** and the ***AdeptVision Reference Guide*** for complete information on installation, configuration, operations, and programming of your vision system.

Features

All of these features are supported by the AVI board:

- Asynchronous frame reset
- Strobe signals (synchronous and asynchronous)
- External trigger
- Field acquire mode
- Ping-pong mode

System Requirements and Restrictions

The AVI board requires the following software versions:

- AdeptWindows version 3.0 or later
- V+ version 14.0 or later
- AIM version 4.1 or later

The AVI board is *not* compatible with the AWC-II floppy drive option. Therefore, if you have the optional AWC-II floppy drive installed in your system, that device must be removed from your system before installing the AVI board.

Camera Support

The Panasonic GP-MF602 is supported by AdeptVision AVI. The camera acquisition module of the AVI board is designed to support the same cameras supported by AdeptVision VXL including the Pulnix TM-1001. Additionally, you can create software custom camera models to support other camera types.[a]

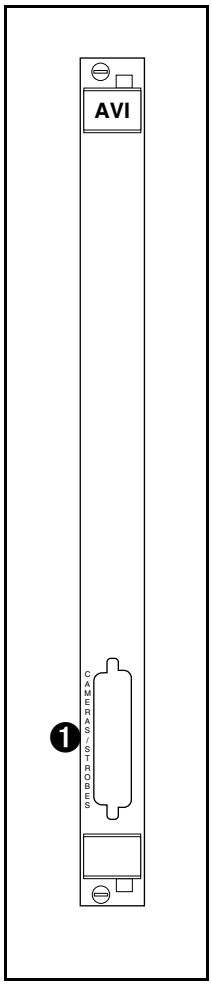
See **"Camera Compatibility" on page 9** for additional information.

[a] This capability will be available in a future release of AdeptVision AVI software.

Pixel Format

AdeptVision AVI uses 8-bit grayscale pixel information. For backwards compatibility with AdeptVision VXL systems, which use a 7-bit approach (reserving the high bit for binary images), AdeptVision AVI supports 7-bit images and computes binary data from the grayscale pixel values, and will in the future support 8-bit images.

Connections and Indicators



❶ **Camera/Strobe** connector — a 44-pin D-sub connector for the four-camera breakout cables.

Hardware Features

The AVI board consists of two hardware sub-components: (1) the AVI processor card and (2) the RS-170 Camera Acquisition Module (CAM). These stack on top of one another, and plug directly into the AWC-II board (through a PMC connector).

The combined AWC board/AVI board assembly takes up either two or three VME slots, depending upon the selected configuration options. The two-slot configuration requires one slot immediately to the right of the AWC-II (see **Figure 1**). The three-slot configuration includes the IEEE 1394 interface card at the bottom of the stackup and requires two slots immediately to the right of the AWC-II board (see **Figure 2**).

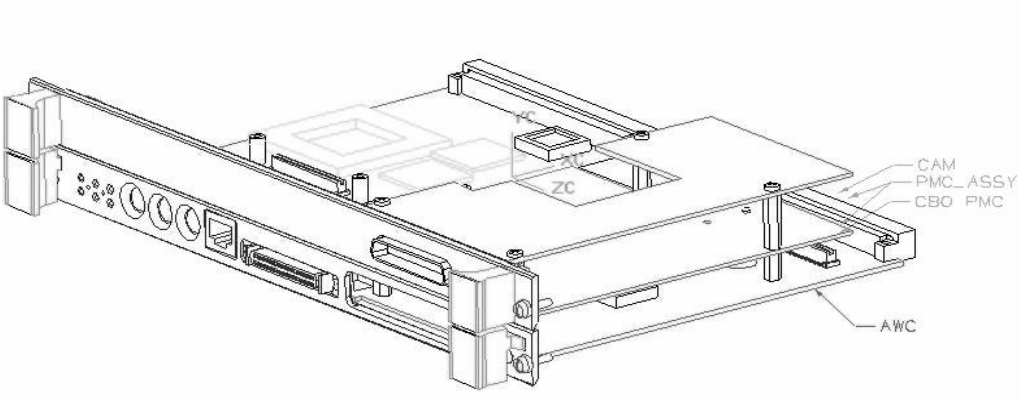


Figure 1. Two Slot AVI Vision System Configuration

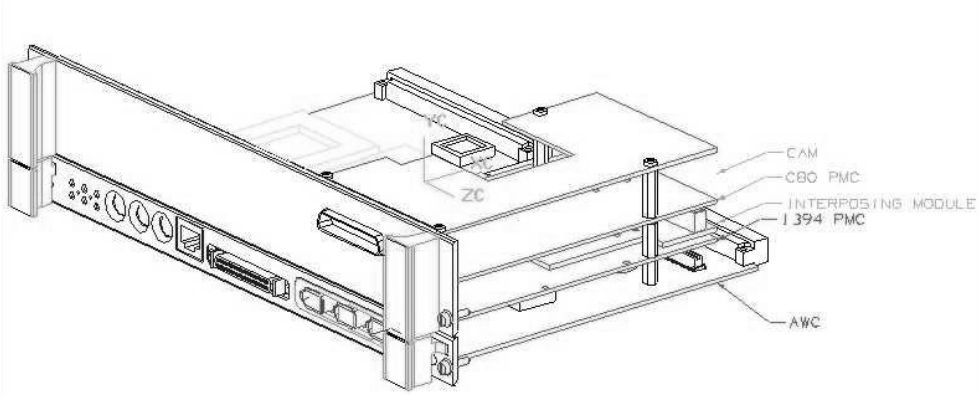


Figure 2. Three Slot AVI Vision System configuration

Camera Compatibility

This section describes the compatibility between the AVI board and standard and high-resolution cameras.

Standard RS-170 Cameras

Compatible cameras can be purchased from Adept. See the ***AdeptVision User's Guide*** for a list of other cameras that can be used with the AdeptVision product. If you have a camera that is not on that list, the following information presents some guidelines for camera compatibility with AdeptVision (minimum requirements):

- RS-170 camera video output (US-style monochrome, 30Hz frame rate [60Hz field rate], 525 lines, interlaced)
- External Hd and Vd sync signals (inputs to camera)[a]
- Connector: Hirose HR10-10S-12P
- Pinout: typical Sony/Panasonic, etc. (See **Table 1** for pinout)—not Pulnix standard pinout (Pulnix cameras maybe special ordered with Sony pinouts).

Use these guidelines to determine camera compatibility. If the camera meets the above requirements, there is a good chance that it will work as a plug and play device.

AdeptVision AVI will work with cameras with a resolution of 500 x 480 or greater. If the camera, lens, etc., are good quality, the actual number of pixels does not affect compatibility, because the interface uses the RS-170-standard analog video-link.

High-Resolution Cameras

The only qualified 1024 x1024 pixel camera is the Pulnix TM-1001.[b] This camera must be ordered from Pulnix with "option 24-2" to correctly configure the pinouts. A maximum of two TM-1001 cameras may be connected to the AVI board. For more details see the ***AdeptVision User's Guide***

[a] For interfacing cameras without external sync, contact Adept Application Support.
[b] High-resolution (1024 x 1024 pixel) support will be available in a future release of AdeptVision AVI software.

Camera Cables

Adept sells a standard four-camera cable that is used for connecting cameras to the AVI board. A custom four-camera version is available for use with the Pulnix TM-1001.

> **NOTE:** The custom cable is only needed when using the Pulnix TM-1001 camera in asynchronous reset mode. See **Which Cable(s) Should I Use With a Pulnix TM-1001 Camera?**, below, for more details.

All camera cables connect to the CAMERAS/STROBES connector on the front of the AVI board. This connector contains support for two strobe connections through a breakout cable. The breakout cable routes the signals away from the chassis—it does not connect directly to the camera. To connect to the cameras, you must use an extension cable. Adept offers a 10-meter cable for this purpose. These cables can also be purchased from Intercon 1. Contact Adept Applications Support for current Intercon 1 part numbers.

You can contact Intercon 1 (division of Nortech Systems) at:

Intercon 1
12136 Crystal Lake Road
Box 1C
Merrifield, MN 56465
Phone: 800-237-9576 or 218-765-3329
Fax: 218-765-2300
Web: http://www.nortechsys.com/Intercon

See Tables **1** to **10** for pin and signal information.

Which Cable(s) Should I Use With a Pulnix TM-1001 Camera?

The Custom Pulnix TM-1001 Four-Camera Breakout Cable (see **page 13**) is required when using the TM-1001 in asynchronous reset mode.[a] For all other applications, it is sufficient to use Adept's standard four-camera breakout cable with the TM-1001.

For single-camera, non-reset, non-strobe applications, the two-camera breakout cable (see **page 11**) is sufficient.

Dual Pulnix TM-1001 applications require a four-camera cable (see **page 12**), since their combined current draw exceeds the AVI board's 1A limit in the absence of external power. An external 12V power supply is required for this application.

Use the flowchart in **Figure 3** to decide which cables are required.

[a] The Pulnix TM-1001 camera will be supported in a future release of AdeptVision AVI software.

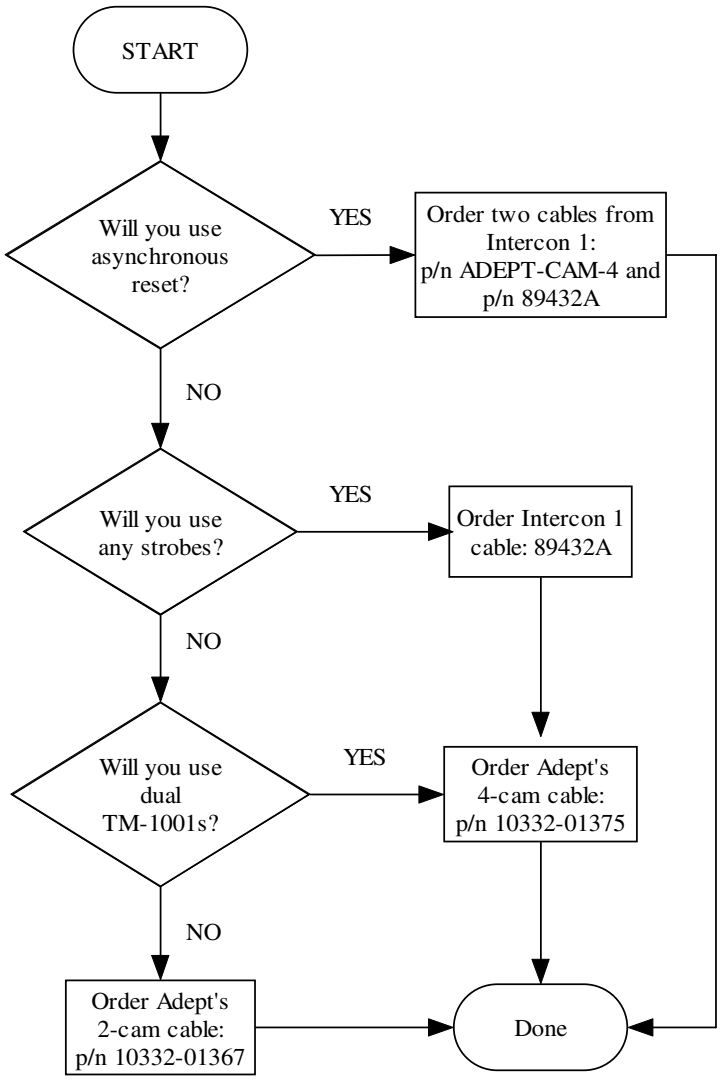


Figure 3. Cable Requirements for the Pulnix TM-1001

Two-Camera Breakout Cable for RS-170 Cameras

This cable, available from Adept (P/N 10332-01367), has a 44-pin D-sub connector on one end, and it breaks out to two 12-pin Hirose- style camera connectors on the other end. The length of the cable is 1.8 meters (70 inches).

The AVI board supplies 12 VDC power for cameras through this cable. The current rating is 500 mA maximum per camera, with a combined maximum of 1 A.

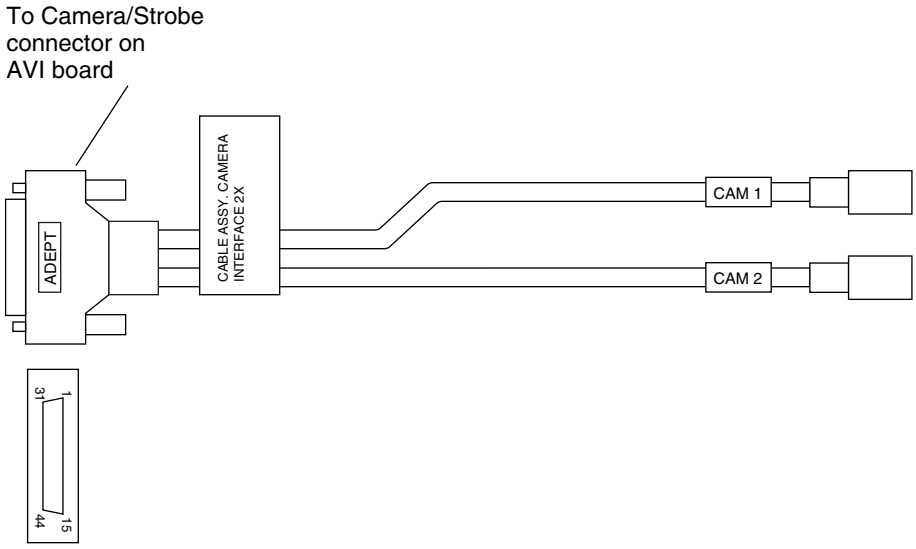


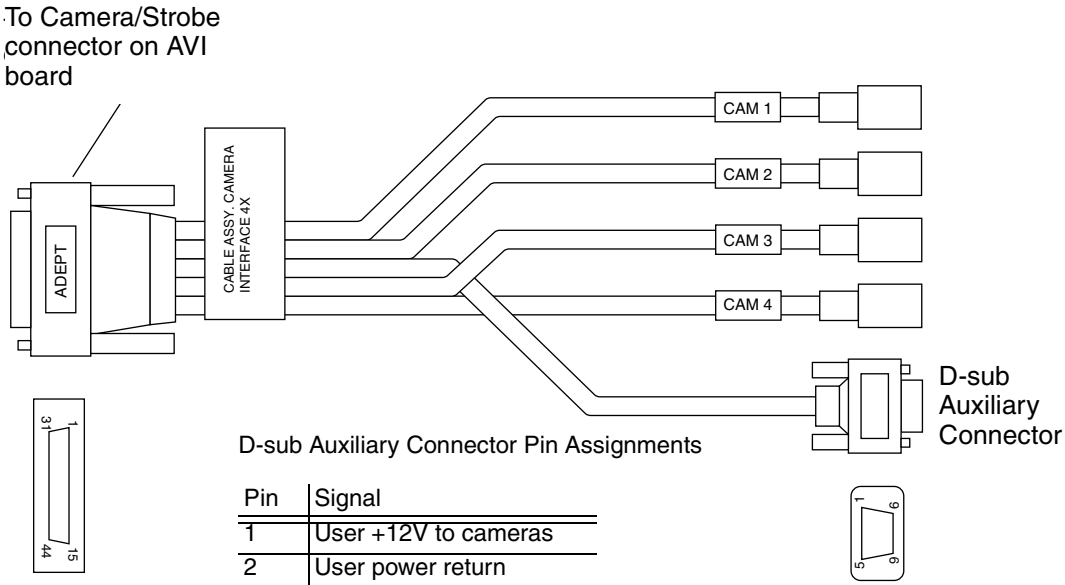
Figure 4. Two-Camera Breakout Cable for RS-170 Cameras

Four-Camera Breakout Cable for RS-170 Cameras

This cable, available from Adept (P/N 10332-01375) has a 44-pin D-sub connector on one end, and it breaks out to four 12-pin Hirose-style camera connectors and one 9-pin D-sub connector on the other end. The length of the cable is 1.8 meters (70 inches).

Due to the current limitation of the VME bus specification, the AVI board cannot supply enough current to operate all four cameras from the four-camera cable. You must supply the external power to operate the cameras when using this cable. This power must be routed through the 9-pin D-sub connector, see **Figure 5** and **Table 3** for pin information.

Connect the power and ground on the breakout cable to a 12V power supply producing 2.0A at 12VDC.



D-sub Auxiliary Connector Pin Assignments

Pin	Signal
1	User +12V to cameras
2	User power return
3	Strobe 1
4	Strobe return
5	Strobe 2
6	Reserved
7	Reserved
8	Reserved
9	Shield (chassis ground)

Figure 5. Four-Camera Breakout Cable For RS-170 Cameras

10-Meter Camera Extension Cables

The 10-meter camera extension cables have a male Hirose connector on one end and a female Hirose connector on the other end. These cables go between the breakout cables and the connectors on the cameras. Each camera requires one of these cables (or an equivalent).

This cable can be used with both RS-170 cameras and the Pulnix TM-1001 camera.

Custom Pulnix TM-1001 Four-Camera Breakout Cable

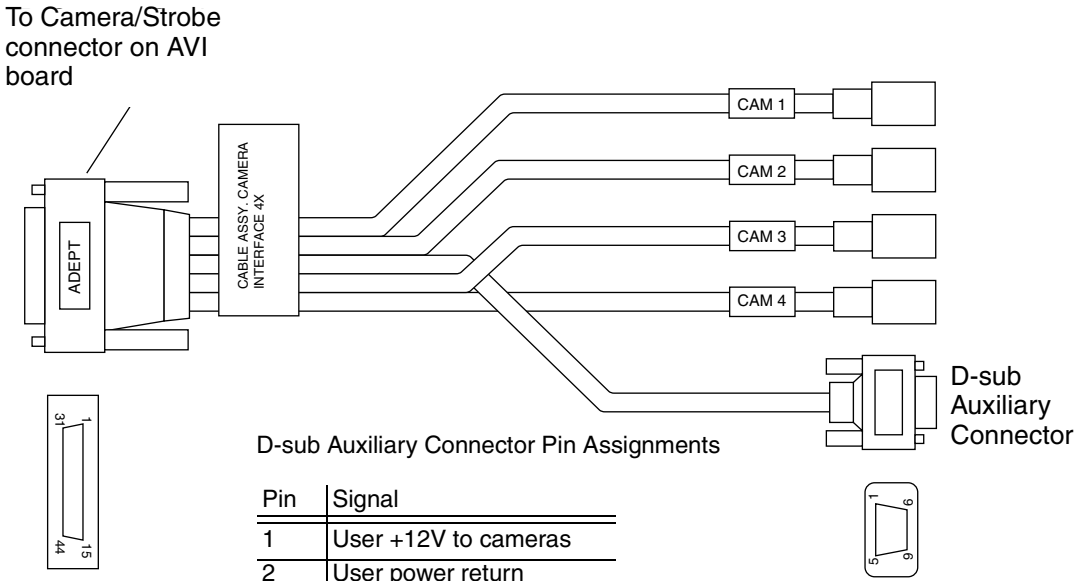
NOTE: This cable is only required when using the Pulnix TM-1001 camera in asynchronous reset mode.[a] For all other modes, use Adept's standard 4-camera cable (see page 12 for details).

This cable, available from Intercon 1 (P/N ADEPT-CAM-4), has a 44-pin D-sub connector on one end and breaks out to four 12-pin Hirose style connectors and one 9-pin D-sub connector on the other end. The length of the cable is 1.8 meters (70 inches). This cable is used with the custom D-sub to BNC adapter breakout cable, described in the next section.

[a] The Pulnix TM-1001 camera will be supported in a future release of AdeptVision AVI software.

Due to the current limitation of the VME bus specification, the AVI board cannot supply enough current to operate the Pulnix TM-1001 cameras. You must supply the external power to operate the cameras when using this cable. This power must be routed through the 9-pin D-sub auxiliary connector using a special breakout cable. See **Figure 6** and **Table 3** for pin information.

Connect the power and ground on the breakout cable to a 12V power supply producing 1.2A at 12VDC



D-sub Auxiliary Connector Pin Assignments

Pin	Signal
1	User +12V to cameras
2	User power return
3	Strobe 1
4	Strobe return
5	Strobe 2
6	Frame Reset 1
7	Frame Reset return
8	Frame Reset 2
9	Shield (chassis ground)

Figure 6. Custom Breakout Cable for Pulnix TM-1001

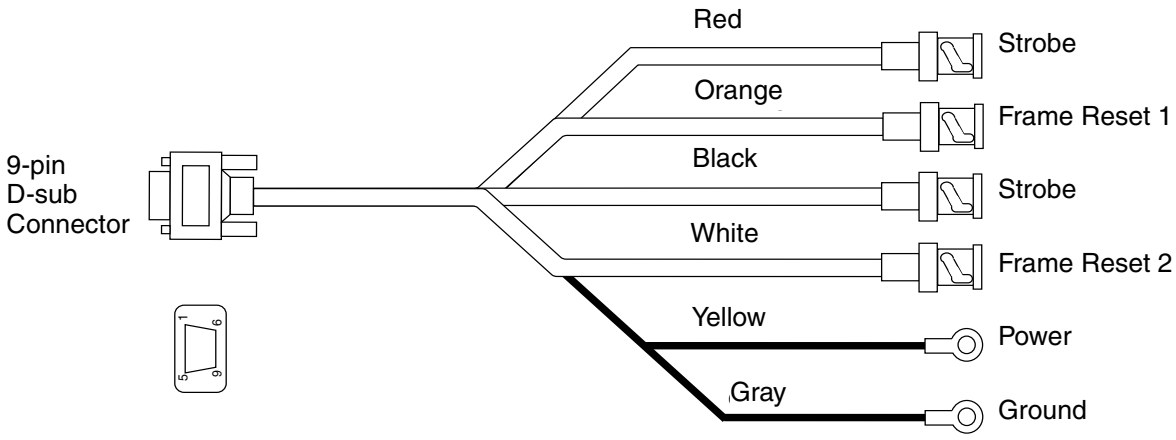
D-sub to BNC Adapter Cable

This cable, available from Intercon 1 (P/N 89432A), has a 9-pin D-sub connector on one end and four Video and Sync BNC connectors and power connectors at the other end. The cable length is 1.54 meters (60 inches).

This cable attaches to either Adept's standard Four-Camera Breakout Cable (see **page 12**) or the Custom Pulnix TM-1001 Four-Camera Breakout Cable (see **page 13**).

This cable can be used for:

- Any strobe applications (Pulnix or other)
- Pulnix TM-1001 asynchronous reset mode applications[a]
- Applications requiring a power/ground breakout



D-sub Auxiliary Connector Pin Assignments

Pin	Signal
1	User +12V to cameras
2	User power return (Gnd)
3	Strobe 1
4	Strobe return (Gnd)
5	Strobe 2
6	Frame reset 1
7	Frame reset return (Gnd)
8	Frame reset 2
9	Shield (chassis ground)

Figure 7. D-sub to BNC Adapter Cable

[a] The Pulnix TM-1001 camera will be supported in a future release of AdeptVision AVI software.

Installing Camera Cables

See the *AdeptVision User's Guide* for information on mounting cameras and strobes in your system. **Figure 8** shows the installation of a typical four-camera RS-170 breakout cable and the associated hardware.

CAUTION: Turn off the controller before installing or removing a camera or cable. Failure to do this may damage the AVI board.

CAUTION: When using the four-camera breakout cable, you must provide 12 VDC power at sufficient current for the type and quantity of cameras you are using. See the documentation supplied with your cameras for information on current requirements.

Connecting the Cables to the RS-170 Standard Camera

This section describes the steps for connecting the cables between the AVI board and the RS-170 Cameras.

1. Turn off the Adept MV controller.
2. Connect the camera to a 10m camera cable.
3. Connect the 10m camera cable to the appropriate connection on the camera breakout cable.
4. Connect the power supply and strobe lamps through the 9 pin D-sub connector (see **Table 1** for pin assignments).
5. Connect the camera breakout cable to the camera/strobe connection on the AVI board.

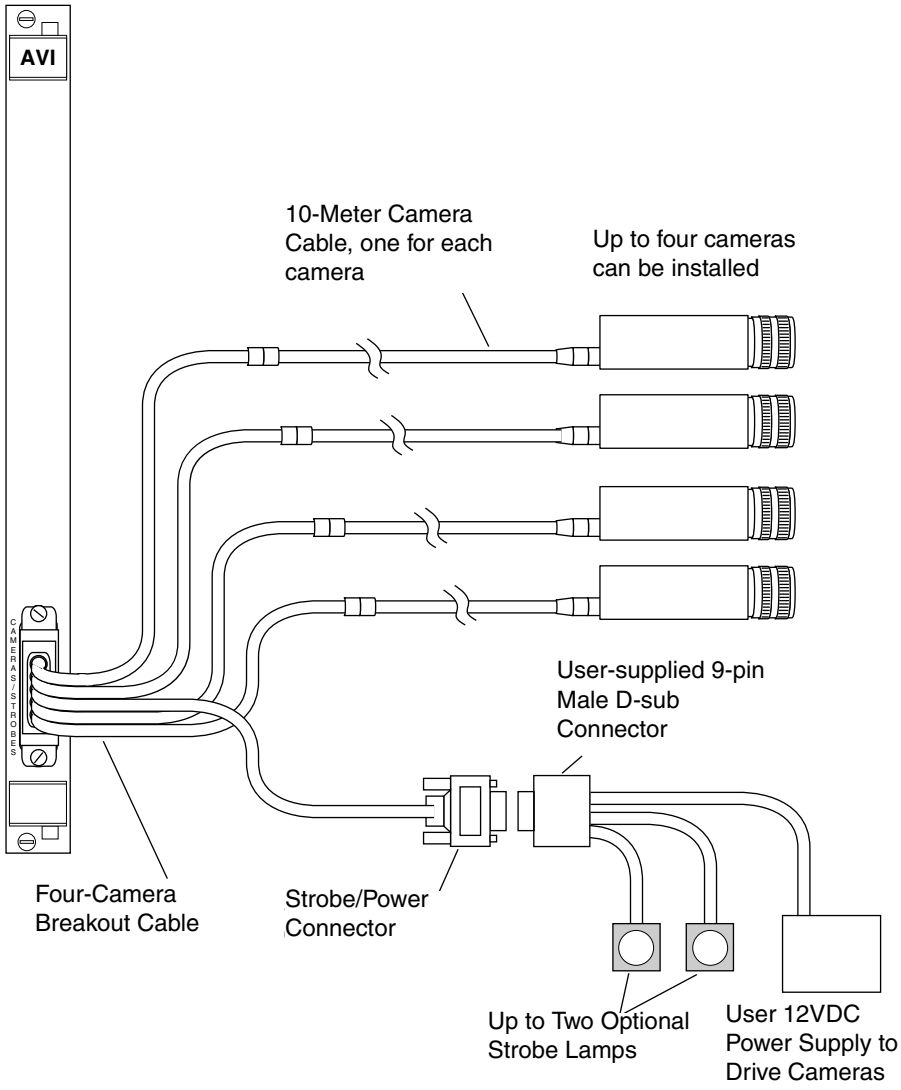


Figure 8. Camera Cable Installation Drawing (RS-170)

Connecting the Cables to the Pulnix TM-1001 Camera

This section describes the steps for connecting the cables between the AVI board and the Pulnix TM-1001 cameras (see **Table 2**).[a] For Pulnix TM-1001 camera switch settings, refer to Appendix I of the ***AdeptVision User's Guide.***

1. Turn off the Adept MV controller.
2. Connect the 10-meter camera extension cable to breakout connector cam1 and the other end of the extension cable to the Hirose connector on the back of the Pulnix camera.

[a] The Pulnix TM-1001 camera will be supported in a future release of AdeptVision AVI software.

3. Connect the BNC adapter cable to the auxiliary connector on the 4-camera cable.
4. Connect the power and ground on the BNC adapter cable to a 12V power supply that provides at least 600mA at 12V.
5. Each Pulnix TM-1001 camera requires 600mA at 12V. Therefore, if you are using two Pulnix TM-1001 cameras, your power supply must be capable of providing 600mA at 12V for each camera.
6. Connect Frame Reset 1 on the BNC adapter cable to the BNC connector on the back of the first Pulnix camera.
7. Connect Strobe 1 on the BNC adapter cable to the first strobe light (optional).

To connect a second Pulnix TM-1001 camera:

1. Connect the 10-meter camera extension cable to breakout connector cam2 and the other end of the extension cable to the Hirose connector on the back of the Pulnix camera.
2. Connect Frame Reset 2 on the BNC adapter cable to the BNC connector on the back of the second Pulnix camera.
3. Connect Strobe 2 on the BNC adapter cable to the second strobe light (optional).

CAUTION: A maximum of two Pulnix TM-1001 cameras may be installed on the AVI board.

NOTE: Do not mix Pulnix TM-1001 and RS-170 cameras on the same AVI Vision board.

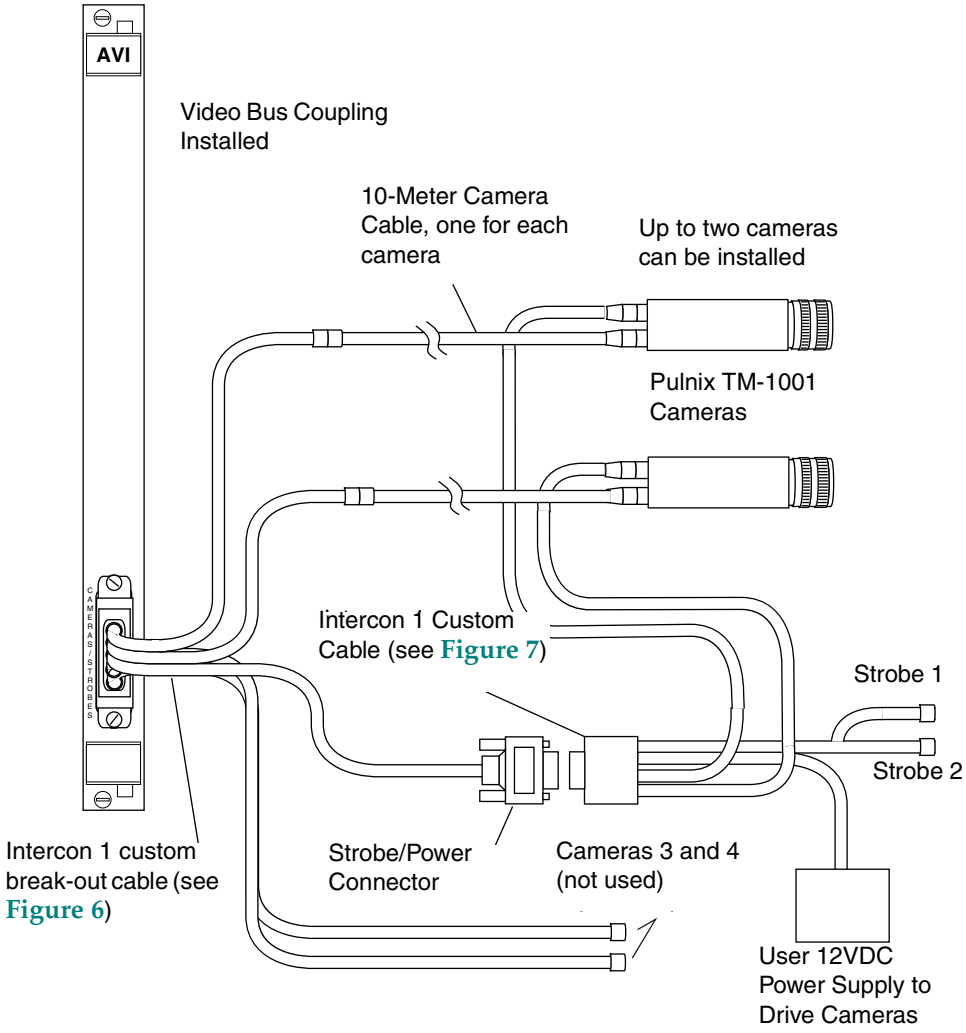


Figure 9. Camera Installation for Dual Pulnix TM-1001 Cameras

Camera Cable Pin and Signal Information

This section provides the pin and signal information for the connectors and cables associated with the AdeptVision product.

- **Table 1** describes the Hirose connector that is used for all cameras except the Pulnix TM-1001 on the camera breakout cables.
- **Table 2** describes the Hirose connector that is used for the Pulnix TM-1001 on any of the camera breakout cables.
- **Table 3** describes the Strobe and Power connector on the standard Four-Camera Breakout Cable.
- **Table 4** describes the Strobe and Power connector on the Custom Pulnix TM-1001 Four-Camera Breakout Cable.
- **Table 5** describes the 10-meter camera extension cable.
- **Table 6** describes signal information between the 44-pin connector and the camera connectors for the two-camera breakout cable.
- **Table 7** describes signal information between the 44-pin connector and the camera and strobe/power connectors for the four-camera breakout cable. The table is organized by camera number.
- **Table 8** describes signal information between the 44-pin connector and the camera and strobe/power connectors for the Pulnix TM-1001 custom four-camera breakout cable. The table is organized by camera number.
- **Table 9** contains information similar to **Table 7**, but it is organized numerically by the 44-pin connector.
- **Table 10** contains information similar to **Table 8**, but it is organized numerically by the 44-pin connector.

Table 1. Breakout Cable Camera Connector Pin Assignments (RS-170)

Pin	Function	Notes
1	Power return	
2	+12V power	to camera
3	Shield (video)	
4	Video	from camera
5	Shield (Hd)	
6	Hd (horizontal drive)	to camera
7	Vd (vertical drive)	to camera
8	Shield (Clock)	to camera (camera 1 & 2 only)
9	Clock	to camera (camera 1 & 2 only)
10	not connected	
11	not connected	
12	Shield (Vd)	
12-Pin Hirose Female Jack, HR10A-10J-12S		
This connector will normally be connected to the camera using the optional 10-meter camera extension cable. For special applications, this connector will mate with a Hirose Male Plug HR10A-10P-12P (user-supplied) or similar plug. See **Figure 10** for pin locations.		

Table 2. Breakout Cable Camera Connector Pin Assignments (for Pulnix TM-1001)

Pin	Function	Notes
1	Power return	
2	+12V power	to camera
3	Shield (video)	
4	Video	from camera
5	Shield (Hd)	
6	Hd (horizontal drive)	from camera to LEN (line enable)
7	Vd (vertical drive)	from camera to FEN (frame enable)
8	Shield (Clock)	
9	Clock	from camera to VSCLOCK (pixel clock)
10	not connected	
11	not connected	
12	Shield (Vd)	
12-Pin Hirose Female Jack, HR10A-10J-12S		

Table 3. Standard Breakout Cable Strobe and Power Connector Pin Assignments

Pin	Function	Notes
1	User +12 VDC to cameras	
2	User power return (Gnd)	
3	Strobe 1	
4	Strobe return (Gnd)	
5	Strobe 2	
6	Reserved	
7	Reserved	
8	Reserved	
9	Shield (chassis ground)	
9-Pin D-Sub Female Receptacle		
Note: this connector will mate with the 9-pin D-Sub male plug on the BNC adapter cable.		

Table 4. Custom Breakout Cable Strobe and Power Connector Pin Assignments (for Pulnix TM-1001 Used in Asynchronous Reset Mode)

Pin	Function	Notes
1	User +12 VDC to cameras	
2	User power return (Gnd)	
3	Strobe 1	
4	Strobe return (Gnd)	
5	Strobe 2	
6	Frame Reset 1	
7	Frame Reset return (Gnd)	
8	Frame Reset 2	
9	Shield (chassis ground)	
9-Pin D-Sub Female Receptacle		
Note: this connector will mate with the 9-pin D-Sub male plug on the BNC adapter cable.		

Table 5. Adept 10-Meter Camera Cable Pin Assignments

Pin # at controller end (male)	Function	Notes	Wire Color (typical)	Pin # at camera end, (female)
1	Power return		gray	1
2	+12V power	to camera	yellow	2
3	Shield (video)		red-shield	3
4	Video	from camera	red-signal	4
5	Shield (Hd)		orange-shield	5
6	Hd (horizontal drive)	to camera	orange-signal	6
7	Vd (vertical drive)	to camera	black-signal	7
8	Shield (Clock)	to camera (cam. 1 & 2 only)	white-shield	8
9	Pixel clock	to camera (cam. 1 & 2 only)	white-signal	9
10	not used	reserved	brown	10
11	not used	reserved	blue	11
12	Shield (Vd)		black-shield	12

- Connector at controller end: 12-Pin Hirose Male, HR10A-10P-12P, with ground terminal lug (shield). See **Figure 10** for pin locations.
- Connector at camera end: 12-Pin Hirose Female, HR10A-10P-12S.
- Cable specifications: 12 conductors, including 4 coax pairs, 4 discrete conductors, and overall shield. At each end the shield is clamped to connector body.

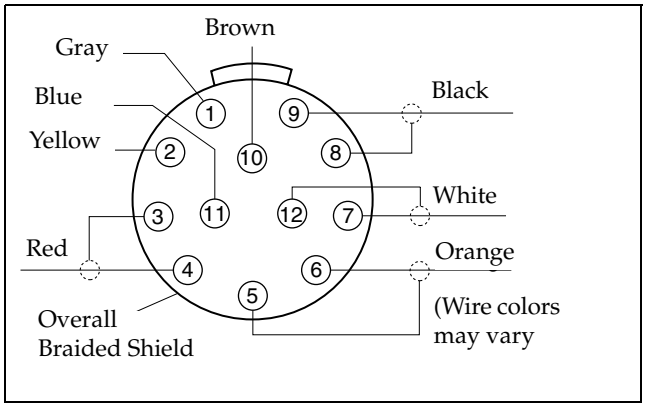


Figure 10. Pin Locations for Camera Cable Connector (12-Pin Hirose Male)

Table 6. Two-Camera Breakout Cable Pin Assignments

From:	Pin	To:	Pin	Function
AVI	8	CAM1	1	Power return
AVI	7	CAM1	2	+12V power
AVI	12	CAM1	3	Shield (video)
AVI	42	CAM1	4	Video
AVI	38	CAM1	5	Shield (Hd)
AVI	36	CAM1	6	Hd (horizontal drive)
AVI	37	CAM1	7	Vd (vertical drive)
AVI	38	CAM1	8	Shield (Clock)
AVI	22	CAM1	9	Clock
--	--	CAM1	10	not connected
--	--	CAM1	11	not connected
AVI	38	CAM1	12	Shield (Vd)
AVI	6	CAM2	1	Power return
AVI	5	CAM2	2	+12V power
AVI	43	CAM2	3	Shield (video)
AVI	29	CAM2	4	Video
AVI	35	CAM2	5	Shield (Hd)
AVI	34	CAM2	6	Hd (horizontal drive)
AVI	19	CAM2	7	Vd (vertical drive)
AVI	35	CAM2	8	Shield (Clock)
AVI	20	CAM2	9	Clock
--	--	CAM2	10	not connected
--	--	CAM2	11	not connected
AVI	35	CAM2	12	Shield (Vd)

Also note that this cable provides 12VDC (fused 1A max) to the cameras from the Adept controller. The fuse is not user replaceable. **If the total current required by the two cameras exceeds 1A, this cable should not be used.**

Table 7. Four-Camera Breakout Cable Pin Assignments

From:	Pin	To:	Pin	Function
Str/Pwr	2	CAM1	1	Power return
Str/Pwr	1	CAM1	2	+12V power
AVI	12	CAM1	3	Shield (video)
AVI	42	CAM1	4	Video
AVI	38	CAM1	5	Shield (Hd)

Table 7. Four-Camera Breakout Cable Pin Assignments (Continued)

From:	Pin	To:	Pin	Function
AVI	36	CAM1	6	Hd (horizontal drive)
AVI	37	CAM1	7	Vd (vertical drive)
AVI	38	CAM1	8	Shield (Clock)
AVI	22	CAM1	9	Clock
--	--	CAM1	10	not connected
--	--	CAM1	11	not connected
AVI	38	CAM1	12	Shield (Vd)
Str/Pwr	2	CAM2	1	Power return
Str/Pwr	1	CAM2	2	+12V power
AVI	43	CAM2	3	Shield (video)
AVI	29	CAM2	4	Video
AVI	35	CAM2	5	Shield (Hd)
AVI	34	CAM2	6	Hd (horizontal drive)
AVI	19	CAM2	7	Vd (vertical drive)
AVI	35	CAM2	8	Shield (Clock)
AVI	20	CAM2	9	Clock
--	--	CAM2	10	not connected
--	--	CAM2	11	not connected
AVI	35	CAM2	12	Shield (Vd)
Str/Pwr	2	CAM3	1	Power return
Str/Pwr	1	CAM3	2	+12V power
AVI	14	CAM3	3	Shield (video)
AVI	44	CAM3	4	Video
AVI	33	CAM3	5	Shield (Hd)
AVI	32	CAM3	6	Hd (horizontal drive)
AVI	18	CAM3	7	Vd (vertical drive)
--	--	CAM3	8	not connected
--	--	CAM3	9	not connected
--	--	CAM3	10	not connected
--	--	CAM3	11	not connected
AVI	33	CAM3	12	Shield (Vd)
Str/Pwr	2	CAM4	1	Power return
Str/Pwr	1	CAM4	2	+12V power
AVI	12	CAM4	3	Shield (video)
AVI	42	CAM4	4	Video
AVI	38	CAM4	5	Shield (Hd)
AVI	36	CAM4	6	Hd (horizontal drive)
AVI	37	CAM4	7	Vd (vertical drive)
--	38	CAM4	8	not connected
--	22	CAM4	9	not connected

Table 7. Four-Camera Breakout Cable Pin Assignments (Continued)

From:	Pin	To:	Pin	Function
--	--	CAM4	10	not connected
--	--	CAM4	11	not connected
AVI	17	CAM4	12	Shield (Vd)
--	--	Str/Pwr	1	User +12 V to cameras
--	--	Str/Pwr	2	User power return
AVI	26	Str/Pwr	3	Strobe 1
AVI	11	Str/Pwr	4	Strobe return
AVI	39	Str/Pwr	5	Strobe 2
AVI	11	Str/Pwr	6	Reserved
AVI	40	Str/Pwr	7	Reserved
AVI	11	Str/Pwr	8	Reserved
AVI	--	Str/Pwr	9	Shield (chassis ground)
Note that this cable provides user-supplied 12VDC to the cameras obtained from the Strobe and Power connector.				

Table 8. Pulnix TM-1001 Breakout Cable Pin Assignments

From:	Pin	To:	Pin	Function
CAM2	1	CAM 1	1	PWR GND
CAM3	1	CAM1	1	PWR GND
CAM4	1	CAM1	1	PWR GND
STROBE	2	CAM1	1	PWR GND
CAM2	2	CAM1	2	+12V power
CAM3	2	CAM1	2	+12V power
CAM4	2	CAM1	2	+12V power
STROBE	1	CAM1	2	+12V power
AVI	12	CAM1	3	Analog GND
AVI	42	CAM1	4	Video
AVI	38	CAM1	5	Digital GND
AVI	36	CAM1	6	Hd
AVI	37	CAM1	7	Vd
AVI	38	CAM1	8	Digital GND
AVI	22	CAM1	9	Clock 1
AVI	38	CAM1	12	Digital GND
AVI	SHIELD	CAM1	SHIELD	
AVI	43	CAM2	3	Analog GND
AVI	29	CAM2	4	Video
AVI	35	CAM2	5	Digital GND
AVI	34	CAM2	6	Hd

Table 8. Pulnix TM-1001 Breakout Cable Pin Assignments (Continued)

From:	Pin	To:	Pin	Function
AVI	19	CAM2	7	Vd
AVI	35	CAM2	8	Digital GND
AVI	20	CAM2	9	Clock 2
AVI	35	CAM2	12	Digital GND
AVI	SHIELD	CAM2	SHIELD	
AVI	14	CAM3	3	Analog GND
AVI	44	CAM3	4	Video
AVI	33	CAM3	5	Digital GND
AVI	32	CAM3	6	Hd
AVI	18	CAM3	7	Vd
AVI	33	CAM3	12	Digital GND
AVI	SHIELD	CAM3	SHIELD	
AVI	30	CAM4	3	Analog GND
AVI	15	CAM4	4	Video
AVI	17	CAM4	5	Digital GND
AVI	16	CAM4	6	Hd
AVI	31	CAM4	7	Vd
AVI	17	CAM4	12	Digital GND
AVI	SHIELD	CAM4	SHIELD	
AVI	26	STROBE	3	Strobe 1
AVI	11	STROBE	4	Digital GND
AVI	39	STROBE	5	Strobe 2
AVI	23	STROBE	6	Frame Reset 1
AVI	11	STROBE	7	GND (FR Return)
AVI	21	STROBE	8	Frame Reset 2
AVI	SHIELD	STROBE	9	

Table 9. Four-Camera Breakout Cable Pin Assignments

From:	Pin	To:	Pin	Function
Str/Pwr	1	CAM1	2	+12V power
Str/Pwr	1	CAM2	2	+12V power
Str/Pwr	1	CAM3	2	+12V power
Str/Pwr	1	CAM4	2	+12V power
Str/Pwr	2	CAM1	1	Power return
Str/Pwr	2	CAM2	1	Power return
Str/Pwr	2	CAM3	1	Power return
Str/Pwr	2	CAM4	1	Power return
AVI	--	Str/Pwr	9	Shield (chassis ground)
AVI	11	Str/Pwr	4	Strobe return
AVI	11	Str/Pwr	6	Reserved
AVI	11	Str/Pwr	8	Reserved
AVI	12	CAM1	3	Shield (video)
AVI	14	CAM3	3	Shield (video)
AVI	15	CAM4	4	Video
AVI	16	CAM4	6	Hd (horizontal drive)
AVI	17	CAM4	5	Shield (Hd)
AVI	17	CAM4	12	Shield (Vd)
AVI	18	CAM3	7	Vd (vertical drive)
AVI	19	CAM2	7	Vd (vertical drive)
AVI	20	CAM2	9	Clock
AVI	22	CAM1	9	Clock
AVI	26	Str/Pwr	3	Strobe 1
AVI	29	CAM2	4	Video
AVI	30	CAM4	3	Shield (video)
AVI	31	CAM4	7	Vd (vertical drive)
AVI	32	CAM3	6	Hd (horizontal drive)
AVI	33	CAM3	5	Shield (Hd)
AVI	33	CAM3	12	Shield (Vd)
AVI	34	CAM2	6	Hd (horizontal drive)
AVI	35	CAM2	5	Shield (Hd)
AVI	35	CAM2	8	Shield (Clock)
AVI	35	CAM2	12	Shield (Vd)

Table 9. Four-Camera Breakout Cable Pin Assignments (Continued)

From:	Pin	To:	Pin	Function
AVI	36	CAM1	6	Hd (horizontal drive)
AVI	37	CAM1	7	Vd (vertical drive)
AVI	38	CAM1	5	Shield (Hd)
AVI	38	CAM1	8	Shield (Clock)
AVI	38	CAM1	12	Shield (Vd)
AVI	39	Str/Pwr	5	Strobe 2
AVI	40	Str/Pwr	7	Reserved
AVI	42	CAM1	4	Video
AVI	43	CAM2	3	Shield (video)
AVI	44	CAM3	4	Video
Note that this cable provides user-supplied 12V dc to the cameras obtained from the Strobe and Power connector, not from the Adept controller.				

Table 10. Pulnix TM-1001 Breakout Cable Pin Assignments

From:	Pin	To:	Pin	Function
CAM2	1	CAM 1	1	PWR GND
CAM3	1	CAM1	1	PWR GND
CAM4	1	CAM1	1	PWR GND
STROBE	1	CAM1	2	+12V power
CAM2	2	CAM1	2	+12V power
CAM3	2	CAM1	2	+12V power
CAM4	2	CAM1	2	+12V power
STROBE	2	CAM1	1	PWR GND
AVI	SHIELD	CAM1	SHIELD	
AVI	SHIELD	CAM2	SHIELD	
AVI	SHIELD	CAM3	SHIELD	
AVI	SHIELD	CAM4	SHIELD	
AVI	SHIELD	STROBE	9	
AVI	11	STROBE	4	Digital GND
AVI	11	STROBE	7	GND (FR Return)
AVI	12	CAM1	3	Analog GND
AVI	14	CAM3	3	Analog GND
AVI	15	CAM4	4	Video
AVI	16	CAM4	6	Hd
AVI	17	CAM4	5	Digital GND
AVI	17	CAM4	12	Digital GND
AVI	18	CAM3	7	Vd
AVI	19	CAM2	7	Vd
AVI	20	CAM2	9	Clock 2

Table 10. Pulnix TM-1001 Breakout Cable Pin Assignments (Continued)

From:	Pin	To:	Pin	Function
AVI	21	STROBE	8	Frame Reset 2
AVI	22	CAM1	9	Clock 1
AVI	23	STROBE	6	Frame Reset 1
AVI	26	STROBE	3	Strobe 1
AVI	29	CAM2	4	Video
AVI	30	CAM4	3	Analog GND
AVI	31	CAM4	7	Vd
AVI	32	CAM3	6	Hd
AVI	33	CAM3	5	Digital GND
AVI	33	CAM3	12	Digital GND
AVI	34	CAM2	6	Hd
AVI	35	CAM2	8	Digital GND
AVI	35	CAM2	12	Digital GND
AVI	35	CAM2	5	Digital GND
AVI	36	CAM1	6	Hd
AVI	37	CAM1	7	Vd
AVI	38	CAM1	5	Digital GND
AVI	38	CAM1	8	Digital GND
AVI	38	CAM1	12	Digital GND
AVI	39	STROBE	5	Strobe 2
AVI	42	CAM1	4	Video
AVI	43	CAM2	3	Analog GND
AVI	44	CAM3	4	Video

AVI Board Specifications

Table 11. Technical Specifications[a]

Electrical Power Consumption					
	Voltage	**Avg Current (A)**	**Avg Power (W)**	**Max Current (A)**	**Max Power (W)**
	+3.3 V	0	0	0	0
	+5V	1.4	7	2.0	10
	+12 V	0.08*	1.0*	0.11*	1.3*
	-12 V	0.06	0.7	0.09	1.1
	*assumes no current drawn from +12 V pins of DB44 connector				
Width	Occupies 1 or 2 backplane slots, depending on configuration.				

[a] Specifications subject to change.

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