CHEETAH V5 DVI/RGBHV Extenders

PESA Switching Systems

July 26, 2005

Manual: 81-9059-0571-0 Revision B

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Cautions and Notes

The following symbols are used in this guide:

CAUTION. This indicates an important operating instruction that should be followed to avoid any potential damage to hardware or property, loss of data, or personal injury.

NOTE. This indicates important information to help you make the best use of this product.

EUROPEAN UNION DECLARATION OF CONFORMITY

This is to certify that, when installed and used according to the instructions in this manual, together with the specified cables and the maximum cable length <3m, the Units are shielded against the generation of radio interferences in accordance with the application of Council Directive 89/336/EEC as well as these standards:

EN 55022:	Fiber+STP	1999	Class B
EN 55022:	UTP	1999	Class A
EN 55024:		1999	
	IEC 61000-4-2:	2001	
	IEC 61000-4-3:	2001	
	IEC 61000-4-4:	2001	
EN 61000-3-2		2001	
EN 61000-3-3		2002	

The device was tested in a typical configuration with PC.

CE

Safety Precautions and Installation Guidelines

To ensure reliable and safe long-term operation, please note the following installation guidelines:

- Only use in dry, indoor environments.
- If the building has 3-phase AC power, try to ensure that equipment connected to the Local and Remote units is on the same phase.
- Ensure that the system connected to the Local unit is connected to power ground.
- Ensure that the monitor connected to the Remote unit is connected to power ground and does not use an isolated power supply.
- The Remote unit, Local unit and any power supplies can get warm. Do not locate them in an enclosed space without any airflow.
- Do not place a power supply directly on top of a unit.
- Do not obstruct a unit's ventilation holes.

To safeguard against personal injury and avoid possible damage to equipment or property, please observe the following:

- **Only use power supplies originally supplied with the product or manufacturer-approved replacements. Do not attempt to dismantle or repair any power supply. Do not use a power supply if it appears to be defective or has a damaged case.**
- **Connect all power supplies to grounded outlets. In each case, ensure that the ground connection is maintained from the outlet socket through to the power supply's AC power input.**
- **Do not attempt to modify or repair this product, or make a connection from the Fiber link interface (LC) to any other products, especially telecommunications or network equipment.**

Optical Models

These are Class 1 Laser products. Singlemode transceivers comply with IEC 60825-1 and FDA 21 CFR 1040.10 and 1040.11. To meet laser safety requirements, the transceivers shall be operated within the absolute maximum ratings.

The use of optical instruments with this product may cause an eye hazard. All adjustments have been made at the factory prior to shipment of the device. No maintenance or alteration to the device is required.

Tampering with or modifying the performance of the device will result in voided product warranty.

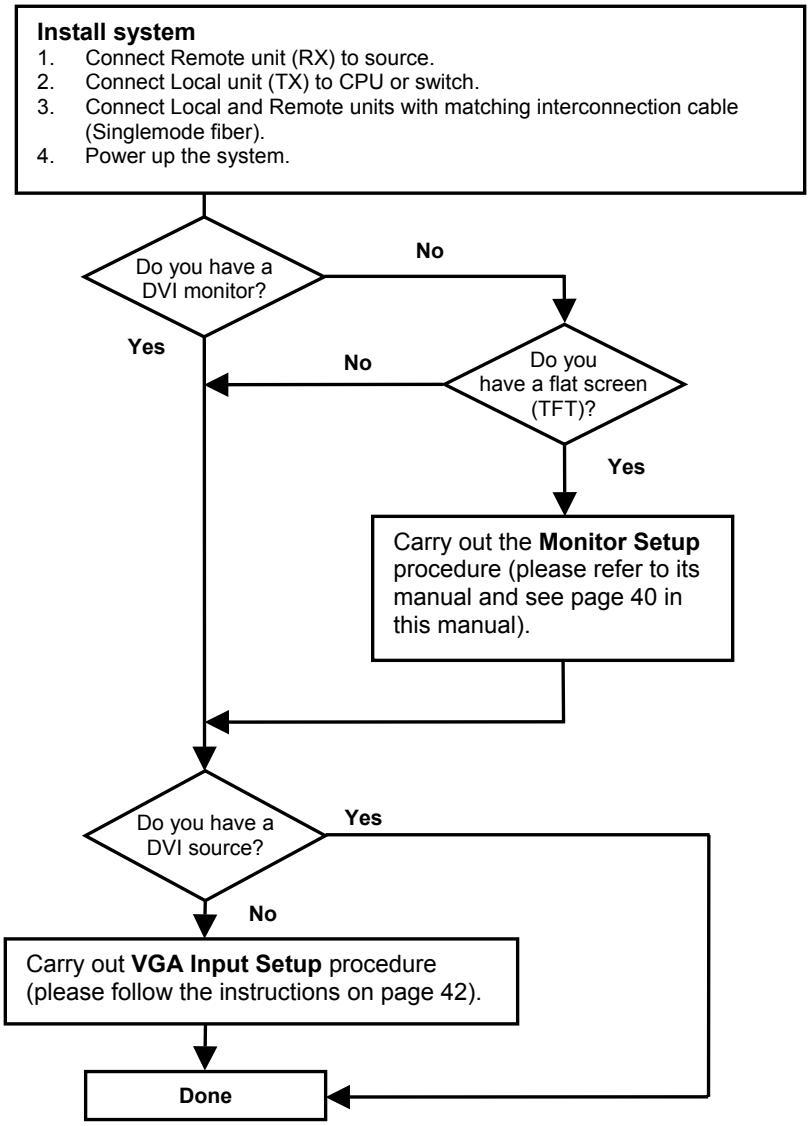
Usage Restrictions

Optical ports must be terminated with an optical connector or with a dust plug. Failure to adhere to the above restrictions could result in a modification that is considered an act of "manufacturing" and will require, under law, recertification of the modified product with the U.S. Food and Drug Administration (ref. 21 CFR 1040.10(i)).

Contents

QUICK SETUP

This section briefly describes how to install your Cheetah V5 system and optimize the video signals. Unless you are an experienced user, we recommend that you follow the full procedures described in the rest of this manual. Refer to the command summary on page 9 when following this procedure.



VIDEO INPUT/OUTPUT

If possible, always use DVI output from your computer's video card and DVI input to a monitor. This provides the optimum video signal. If you use a VGA output from your graphic source, the DVI Local unit must digitize the signal prior to transmission. Similarly, if your remote TFT screen uses a VGA input, it must digitize the signal from the Remote unit. In both cases, the built-in video processors must determine the resolution and pixel phase for an optimized digitization. Your DVI Extender allows you to optimize the video signal manually or automatically using its on-screen utility (see **Chapter 4**). If you are using a VGA input to a TFT monitor, please follow the manufacturer's instructions.

You may have several possible options for video source output/monitor input. If this is the case, for the optimum video quality, please select the highest ranked available combination from the following table:

Video Quality	*Local Unit input*	*Remote Unit output*
1	DVI	DVI
2	DVI	VGA
3	VGA	DVI
4	VGA	VGA

COMMAND SUMMARY

The following table summarizes the 'hot' key command sequences used in system configuration and video tuning on a Remote unit console.

Command	*Keyboard at Remote unit*	*Terminal or Windows Utility program**
Enter OSD	**<Left Control> + <Left Shift> + <I>**	**<O> + <S> + <D> + <Enter>**
Exit OSD	**<ESC>**	**<X>**
Select next position	**<Right Arrow>**	**<R>**
Select previous position	**<Left Arrow>**	**<L>**
Select Submenu	**<Enter>**	**<S>**
Select parameter modification	**<Enter>**	**<S>**
Increase parameter	**<Right Arrow>**	**<R>**
Decrease parameter	**<Left Arrow>**	**<L>**
Accept and store modified parameter	**<Enter>**	**<S>**
Back to the Menu selection		

* Commands are not case-sensitive.

OVERVIEW

INTRODUCTION

A basic Cheetah V5 system comprises a *Local* unit (transmitter) and a *Remote* unit (receiver). The Local unit connects directly to the computer using the supplied cable(s). The user *console* (monitor) attaches to the Remote unit. The Remote and Local units communicate video information along the interconnecting cable (see Figure 1). Local units offer dual access, allowing the connection of a second user console close to the computer. With the optional V5A2 models, you can also use the Cheetah V5 units to communicate stereo audio.

Cheetah V5 modules enable high-resolution video and optional stereo audio to be communicated up to:

- 1200ft (400m) over Multimode fiber cable (50/125µ).
- 600ft (200m) over Multimode fiber cable (62.5/125µ).
- 6¼ miles (10km) over Singlemode fiber cable (9/125µ).

In a digital application (DVI input and output), there is no loss of picture quality irrespective of extension distance and no adjustments are required. The Cheetah V5 modules also support traditional analog VGA as well as digital DVI. All combinations of DVI and VGA (graphics cards and monitors) are supported, allowing equipment to be mixed. In a mixed analog/digital application, some adjustment of the video signal is necessary to optimize the analog-digital signal conversions. Cheetah V5 modules are equipped with various automatic and manual video correction tools in an on screen utility (see page 20).

GLOSSARY

The following terms are used in this guide:

Multimode	Any multimode fiber cable 50/125µ or 62.5/125µ
Singlemode	Any singlemode fiber cable 9/125µ
PSU	The desktop power supply connected to the Local/Remote unit.
Dual Access	A system allowing connection of Local and Remote user consoles.
Single Head	An extender system that supports one monitor.
Coax	Recommended coax is Belden 8281 or equal

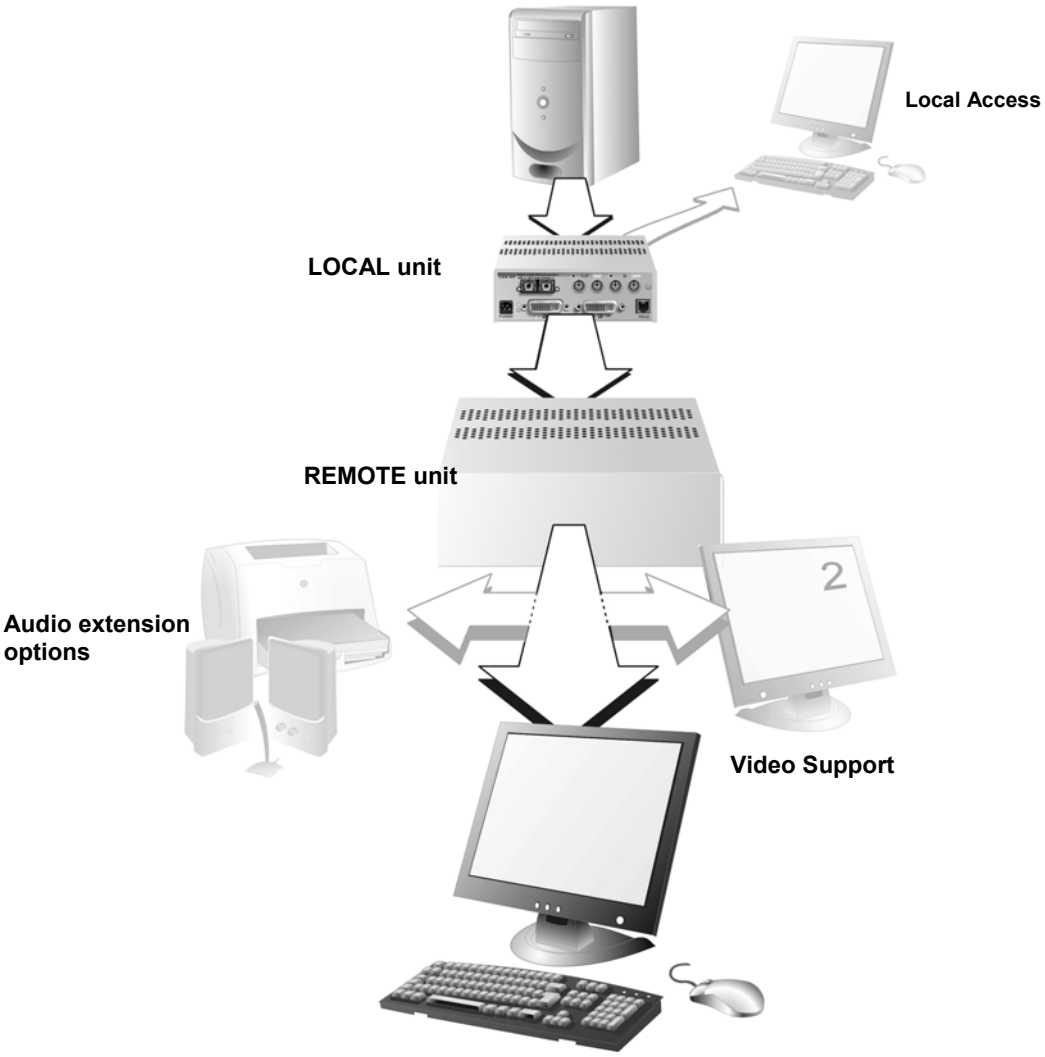
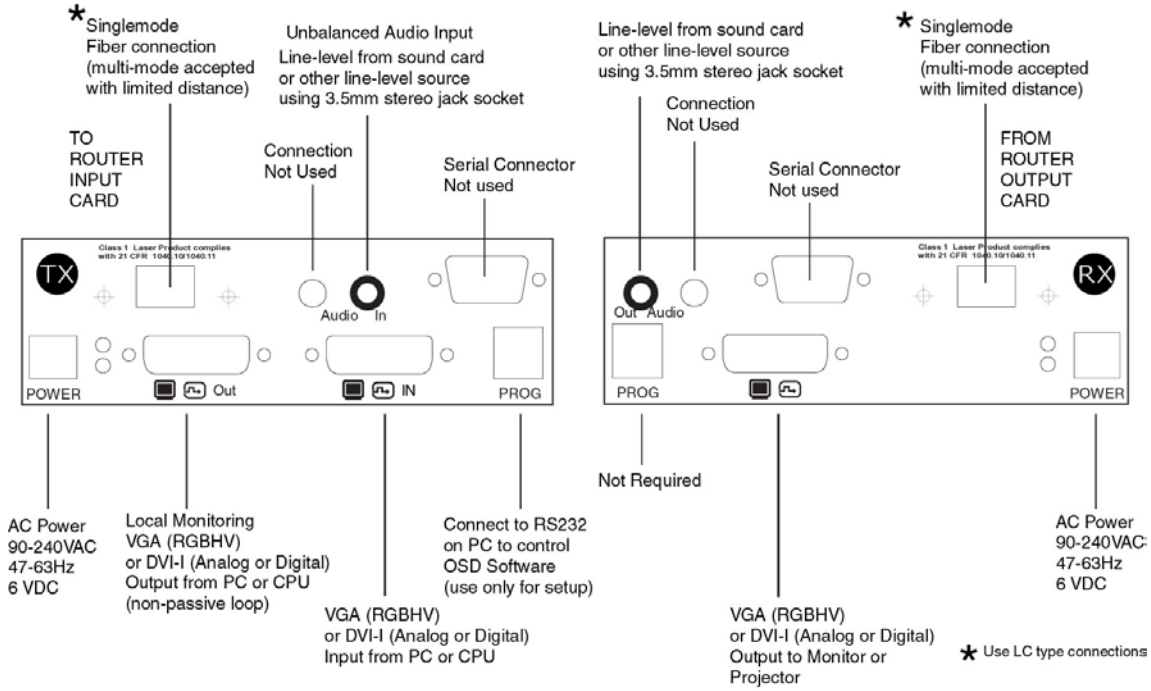


Figure 1 Cheetah V5 System

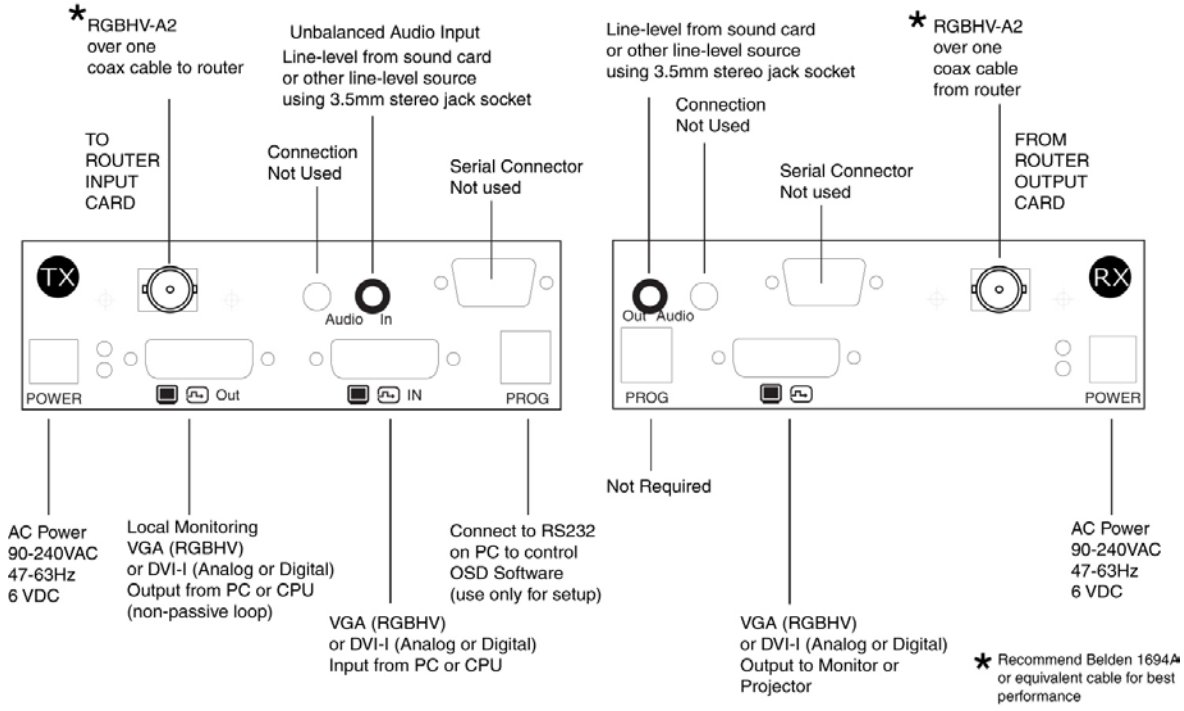
Connection Diagram for Cheetah V5 Modules

(for complete setup instruction, see the Manual)



Connection Diagram for Cheetah V5 Coax Modules

(for complete setup instruction, see the Manual)



FEATURES

The Cheetah V5 Modules offer the following features:

- Support for high video resolution over extended distances:
  1600x1200@60Hz over all allowed distances
  all lower resolutions with refresh rates of at least 75Hz
- All models come with dual access, to allow local or remote operation
  (Local DVI access limited to screen resolutions up to 1280x1024).
- All control and video tuning carried out using an on screen display (OSD) with settings stored in EEPROM memory.
- Local/Remote unit firmware and settings flash upgradeable.
- Stereo audio (16-bit digitized) support on certain models enables high-quality, low-noise audio extension.
- Status indicator LEDs on each device.
- Small footprint chassis.
- Rack mount options available.
- CPU cables + Adapters included.

PRODUCT RANGE

There are two products in the ranges:

Primary Modules- Video Only	
CH1612TX-V5	DVI/VGA Extender, Singlemode Transmitter
CH1612RX-V5	DVI/VGA Extender, Singlemode, Receiver
CH1612TX-V5C	DVI/VGA Extender, Coax, Transmitter
CH1612RX-V5C	DVI/VGA Extender, Coax, Receiver
CH1612TX-V5R	DVI/VGA Extender, Singlemode, Transmitter, Rackmount
CH1612RX-V5R	DVI/VGA Extender, Singlemode, Receiver, Rackmount
CH1612TX-V5CR	DVI/VGA Extender, Coax, Transmitter, Rackmount
CH1612RX-V5CR	DVI/VGA Extender, Coax, Receiver, Rackmount
Primary Modules-Video and Audio	
CH1612TX-V5A2	DVI/VGA Stereo Audio, Singlemode Transmitter
CH1612RX-V5A2	DVI/VGA Stereo Audio, Singlemode Receiver
CH1612TX-V5A2C	DVI/VGA Stereo Audio Extender, Coax, Transmitter
CH1612RX-V5A2C	DVI/VGA Stereo Audio Extender, Coax, Receiver
CH1612TX-V5A2R	DVI/VGA Stereo Audio Extender, Singlemode, Transmitter, Rackmount
CH1612RX-V5A2R	DVI/VGA Stereo Audio Extender, Singlemode, Receiver, Rackmount
CH1612TX-V5A2CR	DVI/VGA Stereo Audio Extender, Coax, Transmitter, Rackmount
CH1612RX-V5A2CR	DVI/VGA Stereo Audio Extender, Coax, Receiver, Rackmount

Upgrade Kits	
CHV5RMKIT	Rack mount kit for above modules, 1RU, supports up to three modules
CHV5-DVICABLE	Cable DVI
CHV5RMKIT3RU	3RU Frame, allows for up to 9 modules of any “-R” model. Internal power supply and cooling fan.

COMPATIBILITY

Interface Compatibility

- **(OPTION) Audio:** Input and output are line-level. Amplified speakers are required.
- **Analog Video:** VGA to UXGA. Supports RGB, RGsB, RGBHV. Maximum resolution and refresh rates depend on cable length and cable type
- **Digital Video:** DVI single link for resolution up to 1600x1200 at 60Hz. Frame rates and colors depend on device type

HOW TO USE THIS GUIDE

This guide describes the installation and configuration of the Cheetah V5 modules. Although the connection and operation of the system is relatively straightforward, you should consider the following before getting started:

Connection & Compatibility

If you have purchased an *Extender Kit*, this will contain all the cables required to connect the Local unit to your PC. The Remote monitor and any audio connects directly to the Remote unit.

For information about connection and installation, see **Installation**, page 16.

Interconnection Cable

For Cheetah V5 connections, use singlemode or multimode fibers (see **Interconnection Cable Requirements**, page 17.

Adjusting Video

Due to the digital nature of the transmitted signals, there is no distortion of video signals or skew problem.

If you do not have a DVI source and a DVI monitor, you will need to adjust the monitor and/or the Extender to the picture width and the pixel phase. You can do this using the Auto Adjust or Manual Adjust procedures.

- For experienced users there is a **Quick Setup** section at the start of this guide (see page 7).
- For the full procedure, see **Monitor Setup** and/or **Extender Setup**.

INSTALLATION

For first-time users, we recommend that you carry out a test placement, confined to a single room, before commencing full installation. This will allow you to identify and solve any cabling problems, and experiment with the Cheetah V5 system more conveniently.

PACKAGE CONTENTS

You should receive the following items in your extender package (all types):

- Extender Remote unit.
- 6V DC 12W universal power supply for Remote unit.
- Extender Local unit.
- 6V DC 12W universal power supply for Local unit.
- 2x DVI-I to VGA adapter (DVI-I dual link male to HD15 female) connector.
- 1x VGA to DVI-I adapter (HD15 male to DVI-I dual link female) connector.
- Programming cable (DB9 female to RJ11 4p4c).
- User manual.
- 2x US-type power cord.

If anything is missing, please contact Technical Support (see **Appendix E: Calling Technical Support**).

INTERCONNECTION CABLE REQUIREMENTS

To connect the Local and Remote units you will need:

- **Multimode Modules:** single fiber cable 50µm or 62.5µm.
- **Singlemode Modules:** single fiber cable 9µm.
- **Coax Modules:** single coax cable, 8281 Belden or equal type coax.
-
- **Power Supply**

  Connect the supplied 6V/DC power supplies to the ***Plug*** terminal on the rear of both Local and Remote units.

SYSTEM SETUP

To install your Cheetah V5 system:

1. Switch off all devices.
2. Connect your monitor to the Remote unit
3. Connect the interconnect cable to the INTERCONNECT socket(s) as shown
4. Connect the 6V power supply to power the unit.

Only use the power supply originally supplied with this equipment or a manufacturer-approved replacement.

5. Power up the system.

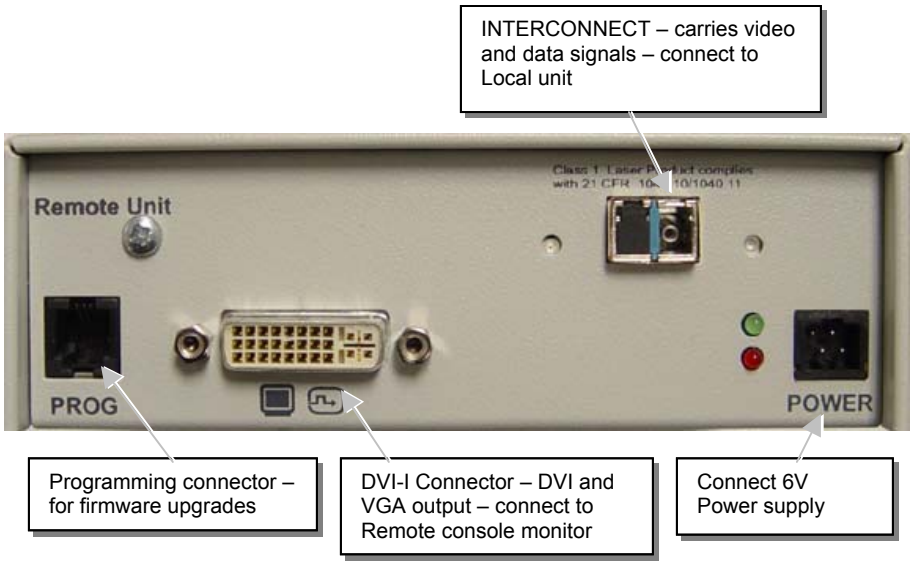


Figure 2 **Cheetah V5 Remote Unit**

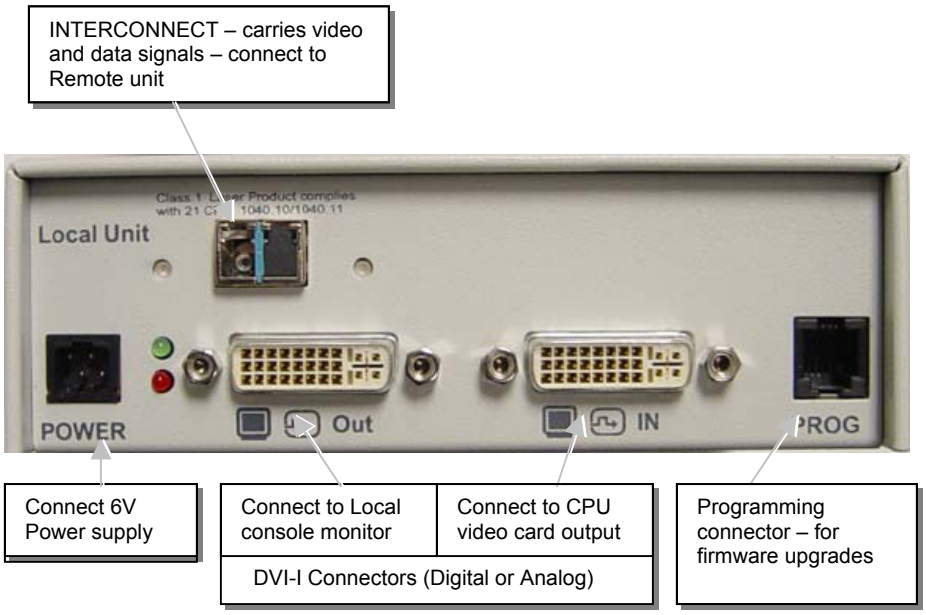


Figure 3 **Cheetah V5 Local Unit**

DIAGNOSTIC LEDS

Each Extender unit is fitted with four indicator LEDs: *Communication Error*, *Link Status*, *Device Ready* and *Video Signal*. The Indicator LEDs are located in the same positions on all models. The *Communication Error* and *Link Status* LEDs are to the left and right, respectively, of the Interconnect sockets. The *Device Ready* and *Video Signal* LEDs are next to the Power socket.

As an example, the location of the LEDs is shown below for Remote and Local units:

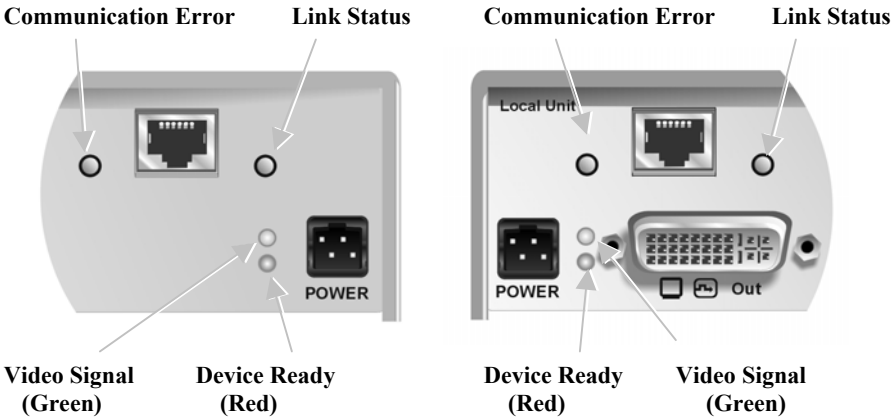


Figure 4 Diagnostic LEDs on Remote (left) and Local (right) units

LED	*Appearance*	*Diagnostics*
Communication Error	Off	No communication error for >60 minutes
	Flashing	Indicates number of communication errors during previous 60 minutes:
	slow	1-2 (Fiber)
	medium	3-10 (Fiber)
	fast	10 (Fiber)
		Error counter cleared automatically 60 minutes after previous communication error.
Link Status	On	Link connection is locked
	Flashing	Interconnection cable not connected or not functioning
Device Ready (Red LED)	Off	Device not ready
	On	Device ready
Video Signal (Green LED)	Off	No video signal or valid mode detected
	On	Attached and valid mode detected

DEVICE CONTROL

If you are using the DVI output from your video card and the DVI input to a TFT monitor, no adjustment should be required. In other cases, when the video signal is converted between analog and digital formats, either by the Local unit and/or the monitor, you may need to optimize the video signal using the Extender's on-screen display (OSD).

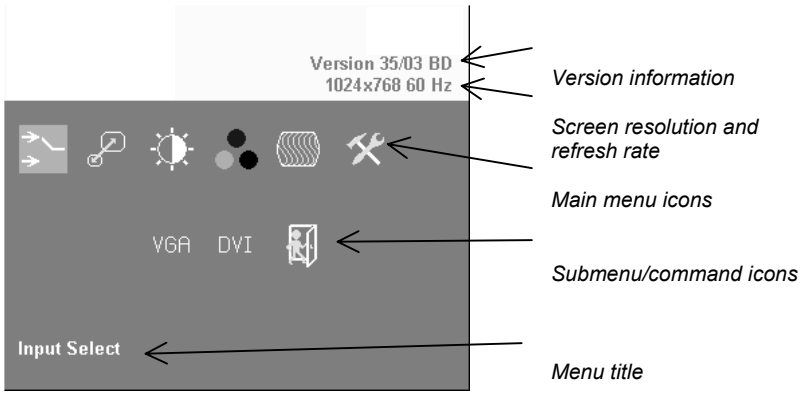


Figure 5 OSD Utility

You can adjust the following properties using the OSD:

- Adaptation to analog signal sources (VGA/RGB) – see also **Monitor Setup**, page 32.
- Color temperature
- Brightness/contrast
- Saturation
- OSD operation, factory reset.

OPENING THE OSD

You can access the OSD in two ways:

- Using a standard terminal program with a serial connection to the programming port.
- Using our small WINDOWS™ program with a serial connection to the programming port.

While the OSD is active, the mouse is locked and only menu keystrokes are allowed at the keyboard. To indicate that the OSD mode is active, the status LEDs (Num Lock, Caps Lock and Scroll Lock) are flashed. There is a summary of OSD commands on page 9.

Using a standard terminal program with a serial connection

On all devices, you can use a terminal (or terminal software) for OSD access:

1. Connect the programming cable to the programming port of the Local (TX) unit.
2. Connect the programming cable to the serial port of a computer running a terminal client.
3. Set up the terminal to 115200 baud with 8 data bits, no parity and 1 stop bit, ASCII-mode.
4. Type in the following key sequence:

   < O > + < S > + < D > followed by **<ENTER>**

5. When the OSD starts, it displays information about the attached device and firmware version, for example:

```
DVI-KVM-12lo
Vers.1.3
03/05/15
```

To navigate within the OSD:

- Use the <L> and <R> keys to highlight a submenu and/or function.
- Press the <S> key to select the highlighted submenu or function.
- Select the Exit icon to go back to the previous menu level.
- Press the <X> key to exit the OSD mode.

Using our WINDOWS™ program

On all devices, you can use our small WINDOWS™ program, running on a WINDOWS™ computer for OSD access:

1. Install the OSD program from the supplied CD or download from our website under the pesa/downloads page
2. Connect the programming cable to the programming port of the Local (TX) unit.
3. Connect the programming cable to the serial port of your computer, where the program is running.
4. Start the program and follow the on-screen instructions.
5. Type in the following key sequence:
   < O > + < S > + < D > followed by **<ENTER>**

When the OSD starts, it displays information about the attached device and firmware version, for example:

```
Modul Name    : DVI-KVM-12lo
Version       : Vers.1.3
Date          : 03/05/15
```

To navigate within the OSD:

- Use the <L> and <R> keys to highlight a submenu and/or function.
- Press the <S> key to select the highlighted submenu or function.
- Select the Exit button to go back to the previous menu level.
- Press the <X> key to exit the OSD mode.

USING THE OSD

The OSD is an icon-based utility. The top line of symbols shows the main menu categories:

Input Select
Specify whether the input is analog (VGA) or digital (DVI)

Scale Mode
Choose whether transmission occurs at the original screen resolution ("transparent") or the Extender imposes a fixed resolution.

Brightness – Contrast
Adjust brightness or contrast or reset to default values.

Color
Adjust color calibration, temperature, flesh/skin tone, hue and saturation.

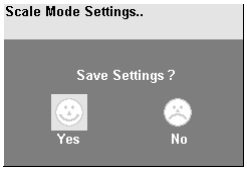
Image
VGA Input source only - Adjust pixel clock and phase.

Tools
Set OSD position and size, fixed scale sharpness, color depth, factory reset.

1. Use the left and right arrow keys (<L> and <R> keys on terminal or in Windows program) to highlight the icon you want. The OSD displays additional icons relating to commands in the selected menu category.
2. Press the Enter key (<S> key on terminal or in Windows program). The OSD highlights the first command icon.
3. Use the Left and Right arrow keys (<L> and <R> keys on terminal or in Windows program) to highlight the command or submenu you want. In the case of the latter, your selection will cause the OSD to display additional command icons (Color Temperature commands, for example).
4. Press the Enter key (<S> key on terminal or in Windows program) to accept a highlighted command. If this requires the increase or decrease of a value (Contrast, for example), the OSD displays a value bar:

5. Use the Left and Right arrow keys (<L> and <R> keys on terminal or in Windows program) to change the value as required.

6. In many cases, after you have chosen a new setting, the OSD displays the following confirmation message:



7. Highlight the *Yes* button and press the Enter key (<S> key on terminal or in Windows program) to confirm your choice. Alternatively, highlight the *No* button and press the Enter key (<S> key on terminal or in Windows program) to discard the new setting and restore the previous value.
8. Select the Exit icon to close a submenu.
9. Press the Esc key (<S> key on terminal or in Windows program) to close the OSD, saving all settings, and restore normal mouse and keyboard functions.

The following table summarizes the keyboard actions and icons used to navigate the OSD utility, and to select and adjust the Extender's parameters:

Key/Icon		***Action***
Remote Keyboard	***Terminal or Windows program***	
Esc	<X>	Close the OSD, restore normal keyboard and mouse functions.
		Return to previous Menu selection.
Enter	<S>	Open the highlighted menu or submenu Accept the highlighted command
Left arrow	<L>	Select the previous menu or command icon Decrease the highlighted parameter
Right arrow	<R>	Select the next menu or command icon Increase the selected parameter

Input Select

Some graphic cards are equipped with both DVI and VGA outputs. On powering up the CPU, the Extender system uses the first detected signal unless you explicitly specify the input type. Use the Input Select menu to specify the type of video signal to be used by the Local unit. The actual graphic source is displayed with a '[' symbol (for example, VGA[).

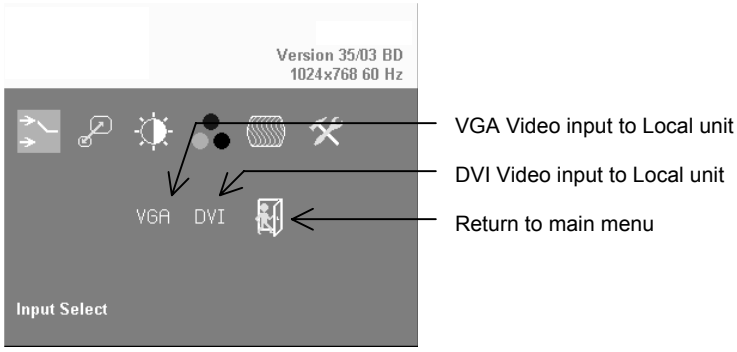


Figure 6 Input Select menu

Scale

Use the Scale menu to specify whether the Extender system changes the resolution of the input video. You can set the device for *transparent* transmission. In this case, the Remote unit generates a screen resolution and refresh rate to match that of the source. You can also specify that the output displays at a fixed screen resolution, regardless of that of the input signal. You might want to use a fixed resolution if your monitor is not able to display the generated resolution or, for example, if you have a server farm with many different CPUs each having a different screen resolution. With a transparent transmission, it could take a long time to regain a picture on the screen each time you switch to a different CPU.

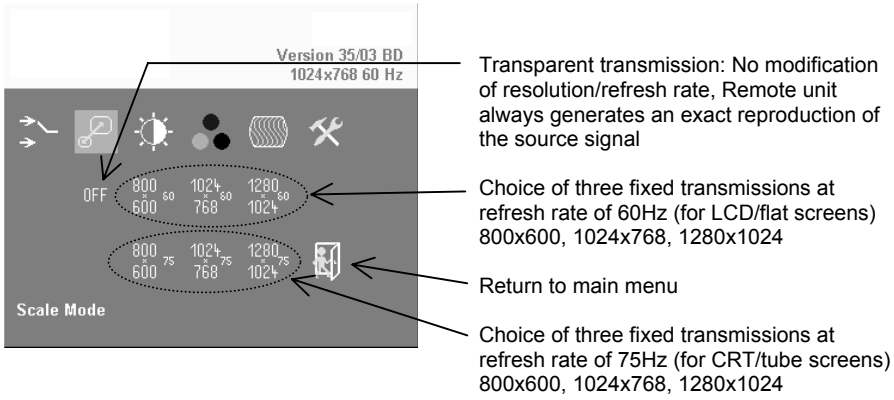


Figure 7 Scale Mode menu

Downscaling is only available with VGA signals. With a DVI input, you can select downscaling but it will not work – only upscaling has an effect.

Brightness/Contrast

Use this menu to adjust the brightness and contrast of the video image, or to adjust the black level of an LCD display.

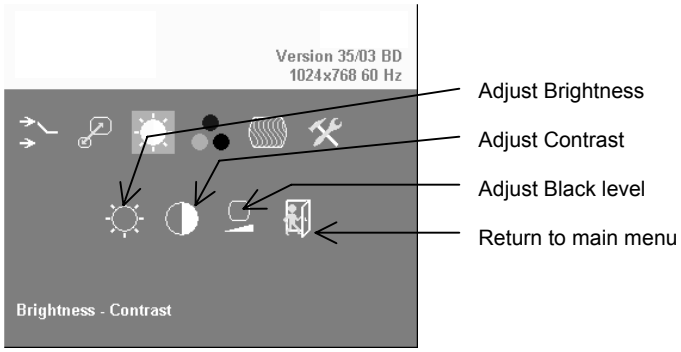


Figure 8 Brightness-Contrast menu

Select Colors and Color Temperatures

Use the Colors menu to adjust the color balance of the video image. The menu provides a number of options including automatic calibration, manual adjustment in RGB or CMY color space, hue and saturation adjustment and the setup of flesh/skin tone.

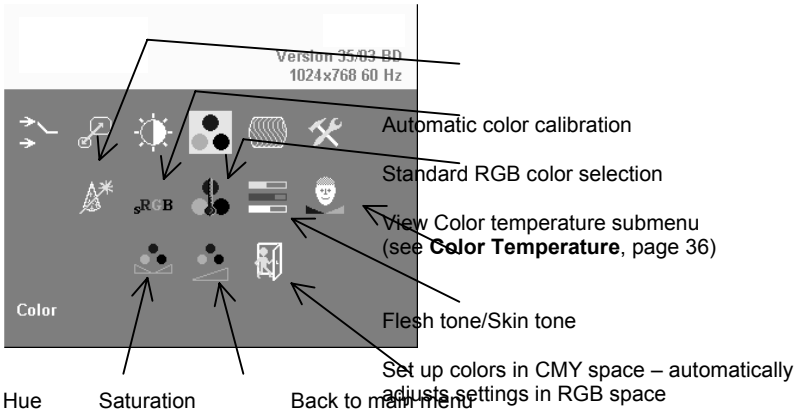


Figure 9 Color menu

Color Temperature

Use the Color Temperature submenu to set up the color profile in RGB color space or by using one of five predefined color temperatures. To view this menu, select the Colors icon from the main menu and then select the Color Temperature icon.

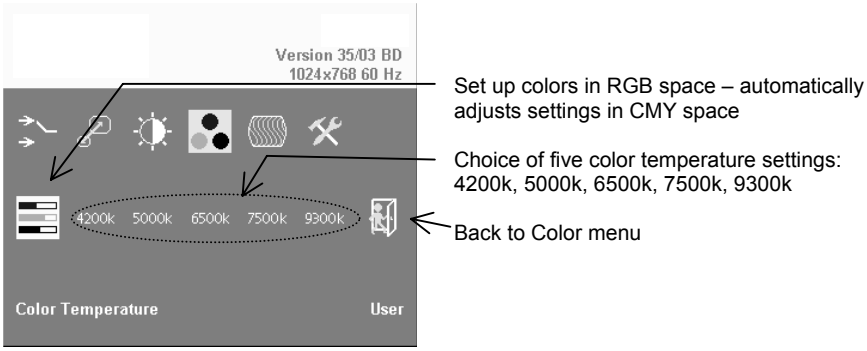


Figure 10 Color Temperature submenu

Image

VGA inputs only

Use the Image menu to adjust the vertical and horizontal screen position and to set the pixel clock and phase.

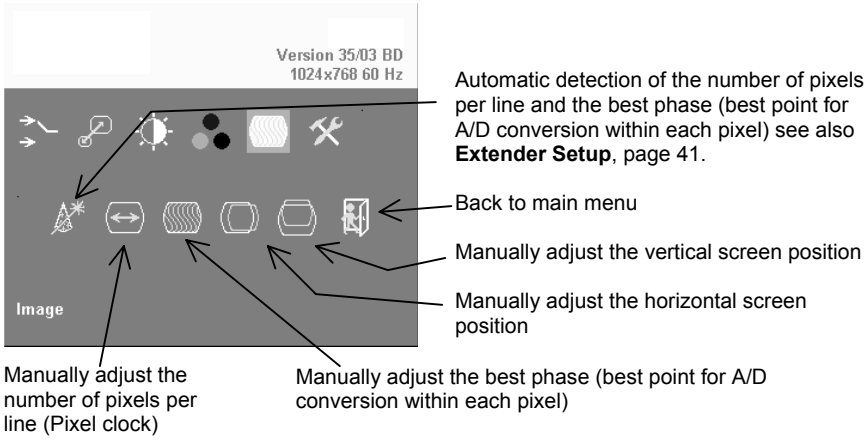
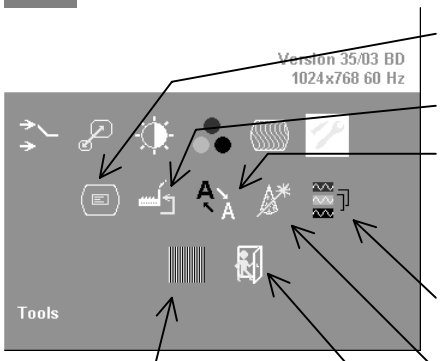


Figure 11 Image menu

Tools

Use the Tools menu to set the position and size of the OSD window, adjust the sharpness for a fixed resolution setting, set the color depth, reset the Extender system to its factory default settings or provide a test pattern.



Set the position of the OSD window (see **OSD**, page 37)

Reset Extender to factory default settings

Adjust sharpness (fixed resolution modes only). When resolution is changed by an imposed fixed resolution, sharpness can be affected. Use this option to switch between three settings for optimum sharpness

Select color depth
(see **Color Depth**, page 39)

Choose whether to automatically adjust pixels per line and pixel phase after a mode change
(see **Auto Configuration**, page 38)

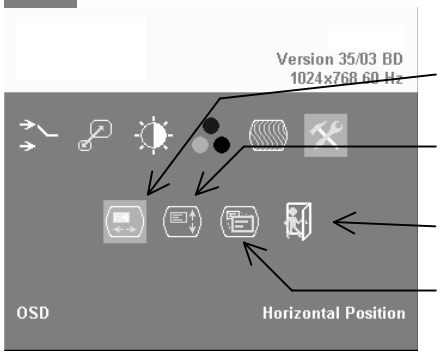
Back to main menu

Display a 'burst' pattern at the remote console for monitor setup
(see **Monitor Setup**, page 42)

Figure 12 Tools menu

OSD

Use the OSD submenu to define the position and size of the OSD window. To view this menu, select the Tools icon from the main menu and then select the OSD icon.



Manually adjust the horizontal position of the OSD window

Manually adjust the vertical position of the OSD window

Back to Tools menu

Toggle the size of the OSD window between single and double size

Figure 13 OSD submenu

Auto Configuration

Use the Auto Configuration submenu to define whether the Local unit carries out automatic detection of the number of pixels per line and the best phase after a mode change (a change of screen resolution and/or refresh rate at the graphic source). Using automatic detection (while displaying an appropriate test pattern) ensures an optimized image but the procedure introduces a delay in the picture appearing on the remote console screen. If you want the picture to appear as fast as possible, and can tolerate a non-optimized image, you may want to disable this feature. Please note that Auto Configuration is disabled in the default factory settings.

To view the Auto Configuration menu, select the Tools icon from the main menu and then select the Auto Configuration icon.

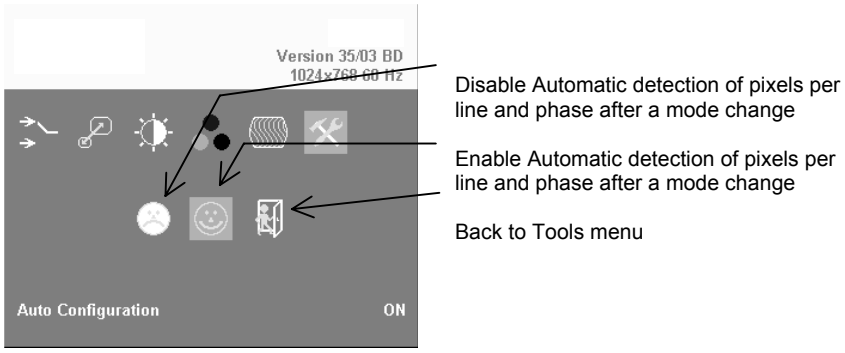


Figure 14 Auto-Configuration submenu

Color Depth

Use the Color Depth submenu to select the color depth of the transmitted screen picture. Transmissions can be in high color mode or low color mode. High color mode produces a better quality image but results in a lower frame rate (fps). Use low color mode if you require fast screen changes, for example video applications. Use high color mode if you need precise images, for example, medical applications. Please see **Appendix C: Video Modes and Frame Rates** (page 41) for more information about frame rates and supported screen resolutions.

	Color Depth
Color Mode	***Fiber***
Low	6 bits/color 18 bits total 262144 colors
High	8 bits/color 24bits total 16.78M colors

To view this menu, select the Tools icon from the main menu and then select the Color Depth icon.

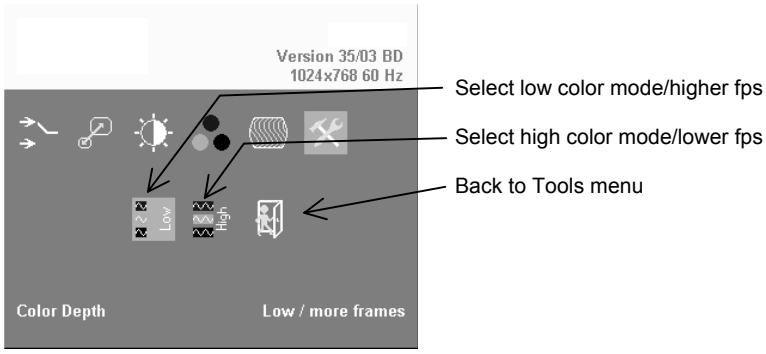


Figure 15 Color Depth submenu

MONITOR SETUP

This procedure is designed to correct for discrepancies in the video signal due to analog/digital video conversion by the Monitor. You do not need to follow this procedure if you have:

- A CRT monitor connected to the Remote unit through the VGA input
- A TFT monitor connected to the Remote unit through the DVI input

In these cases, there is no need to adjust the monitor because the video format is not converted.

Please make sure that you carry out this procedure before Extender Setup (page 33). If you are using a TFT monitor at the remote console with a VGA cable, both the Extender AND the TFT monitor digitize the video data stream and affect video quality. By setting up the TFT monitor first, you ensure that you are correcting discrepancies due solely to the Extender system in the Extender Setup procedure.

1. Connect the Extender system and display the regular desktop in the desired screen resolution. Monitor setup may vary depending on screen resolution and/or refresh rate.
2. Display the OSD utility (see page 22).
3. Select the Tools menu option (see page 30).
4. Select the 'burst' pattern option. Your TFT should show fine, 1 pixel wide, black and white vertical stripes over the entire screen. The OSD will stay visible in the middle of the screen.
5. Depending on the type of TFT, press the 'AUTO' Button on the monitor control panel or select *Auto Adjust* in the TFT Setup Menu. Refer to the manual supplied with your monitor for more information.
6. If the vertical stripes are sharp and without jitter or smearing, the adjustment has been successful. Go to step 8.

7. If the picture quality is not acceptable after the automatic adjustment, you will have to manually adjust the pixel clock and pixel phase (in this order). Please follow the instructions in your monitor's user manual.
8. Press any key to exit the test pattern display.
9. Exit the OSD.

EXTENDER SETUP

OVERVIEW

You need to optimize the video signal across your Extender system if it undergoes one or more conversions between analog and digital formats. The exact procedure depends on your Extender setup:

Graphics card	*Monitor type*	*Monitor Input used*	*Video Optimization Procedure(s)*
VGA	TFT	VGA	TFT adjustment (see **Monitor Setup**, page 32) Optimization using OSD (see **Setup Instructions for VGA Input**, page 34)
VGA	CRT	VGA	Optimization using OSD (see **Setup Instructions for VGA Input**, page 34)
VGA	TFT	DVI	Optimization using OSD (see **Setup Instructions for VGA Input**, page 34)
DVI	TFT	VGA	TFT adjustment only (see **Monitor Setup**, page 32)
DVI	CRT	VGA	No setup required
DVI	TFT	DVI	No setup required

SETUP INSTRUCTIONS FOR VGA INPUT

This procedure is designed to correct for discrepancies in the video signal due to analog/digital video conversion by the Extender system. You do not need to follow this procedure if you have a DVI graphics card connected to the Local unit. In this case, the video signal remains in a digital format through the Extender system.

If you are using a TFT monitor at the remote console with a VGA cable, you should carry out the Monitor Setup procedure first (see page 32). In this configuration, both the Extender AND the TFT digitize the video data stream and affect video quality. By setting up the TFT monitor, you ensure that you are correcting discrepancies due solely to the Extender system in this procedure. Alternatively, you could replace the TFT monitor with a CRT monitor while you carry out this procedure. You can then reconnect the TFT monitor and optimize its video image afterwards.

1. Download the test pattern from our web server:

   This is a 'burst-pattern' (see Figure 20) - a picture with alternating, 1 pixel wide black and white, vertical stripes.

   If you are unable to view the test card, display some black text on a white background. For example, you could open Notepad, maximize it to full screen, and fill the page with letter 'I's in a 12pt font. Proceed with step 3.

2. Select the burst-pattern graphic as desktop background for the PC:
   From the Start menu, choose **Settings | Control Panel | Display | Backgrounds**.
   Search for the downloaded burst file, using 'Search for'.
   Select the tiled display option.
   Your desktop should show fine black and white vertical stripes over the entire desktop.

3. Display the OSD (see page 22).

4. Select the Image menu option:

5. Select the first command icon:
   Automatic detection of number of pixels per line and the best phase.

6. Assess the desktop test pattern. If the vertical stripes are sharp and without jitter or smearing, the adjustment has been successful. Go to step 10.

7. If the picture quality is not acceptable after the automatic adjustment, you will have to manually adjust the pixel clock and pixel phase (in this order).

8. With a poorly adjusted pixel clock you may see one or more vertical areas, where the lines are smeared (see Figure 16a):
    a. Return to the OSD utility and select the menu command:
    Manually adjust the number of pixels per line (Pixelclock)
    from the Image menu.
    b. Adjust the pixel clock value until all stripes have disappeared.
    c. Confirm the setting.
9. Problems with the pixel phase will cause horizontal noise, horizontal wave-formed lines, flicker or smearing with zebra-pattern (see Figure 16b):
    a. From the OSD's Image menu, select the menu command:
    Manually adjust the best phase (best point for A/D conversion within each pixel).
    b. Modify the phase until all distortions have disappeared.
    c. Confirm the setting.
10. If appropriate, reattach your TFT monitor and adjust its image according to the manufacturer's instructions.
11. Reinstall your preferred desktop background picture.

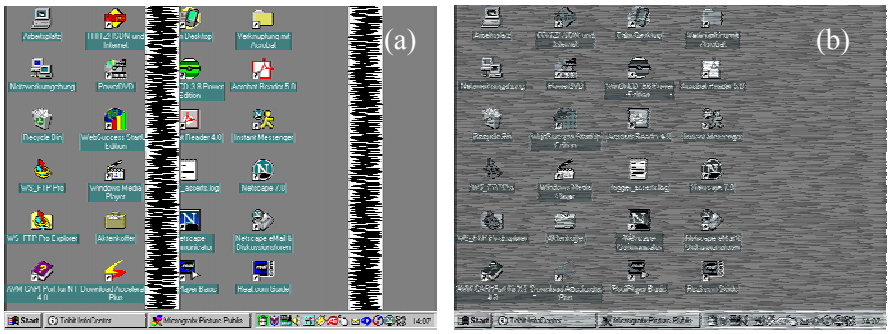


Figure 16 Burst test pattern applied to desktop showing problems with (a) pixel clock setting, (b) pixel phase setting.

TROUBLESHOOTING

VIDEO

There isn't a picture.

Check the power supply connection at the Local unit. Is the *Device Ready* (Red LED) at the Local unit illuminated (see page 20)? If not, the internal power-supply may be damaged or there may be an internal error.

Check the power supply connection at the remote unit. Is the *Device Ready* (Red LED) at the Remote unit illuminated (see page 20)? If not, the internal power-supply may be damaged or there may be an internal error.

Check that the Interconnection cable is connected at the Local Unit and the Remote Unit. Is the *Link Status* LED illuminated (see page 20)? If not, there may be a problem with the Interconnection cable:

- **Fiber types:** Check that the fiber optical cable is correctly connected. The strand connected to the Local Unit's TX (left-hand connector) must run to the Remote Unit's RX (right-hand connector) and vice versa.
- **Fiber types:** There may be one or more broken fibers. Do NOT look into a fiber's end directly while it is connected to a Local or Remote unit! Are the *Link Status* LEDs at the Local Unit AND at the Remote Unit illuminated? If they are flashing, check for broken fibers using a flashlight.
- **Fiber types:** Are the cables of the recommended fiber type? If you used your own fiber optical cable (not supplied by Black Box), please ensure that you have used 50µ or 62.5µ fiber with a multimode device or a 9µ fiber with a singlemode device. Other fiber-types and poly-fibers are not supported.

Check that you are using a supported video mode (see **Appendix C: Video Modes and Frame Rates**). At the Remote Unit, is the *Video Signal* LED illuminated (see page 20)?

Check your total system configuration. Local units digitize incoming VGA signals and must receive perfect SYNC signals: no glitches, spikes or deformed signals are allowed. Long/wrong or bad cables, or additional components like Splitters or KVM Switches may deform the SYNC signals.

Also check that the signals (level and signal form) match the VESA Standard requirements.

There is horizontal jitter on the picture.

The pixel clock and/or phase is misaligned: Refer to page 34.

Characters are smeared.

The phase is misaligned: Refer to page 34.

Thin vertical lines are missing.

The phase is misaligned: Refer to page 34.

Colored areas of the screen look like an oil film.

In some circumstances, the Extender's internal video processor may lose its firmware. In this case, it is necessary to reset the unit. A power cycle is NOT sufficient! Please use the OSD to make a ***Factory Reset*** (see page 30).

APPENDIX A: RACK MOUNT OPTIONS

Extender units can be mounted in a 19” rack using the mounting kit:
CHV5RMKIT-Rackmount Kit

This contains the following parts:

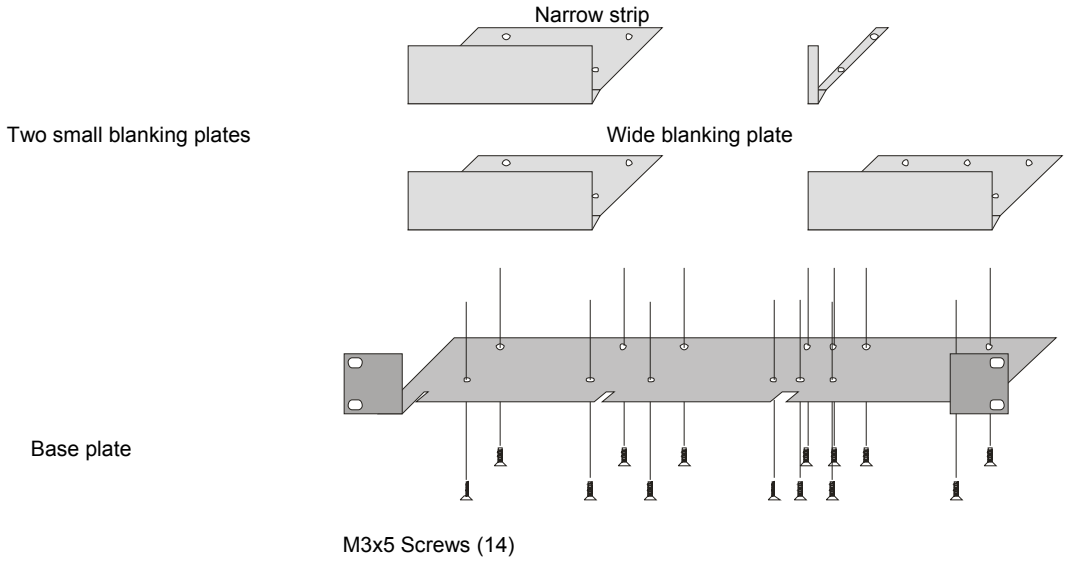


Figure 17 Rack Mounting Kit

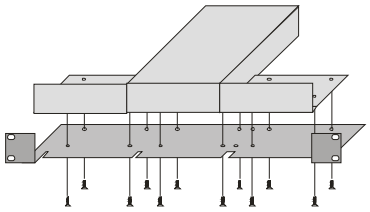
To mount a unit:

1. Align the holes on the base plate with the vacant screw holes on the base of the extender unit.
2. Fasten the base of the unit to the plate of the mounting kit using the supplied screws.
3. Close the remaining gaps with blanking plates.

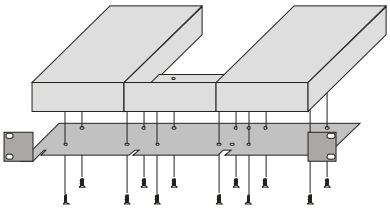
NOTES

The kit allows you to mount various combinations of regular and double width housings:

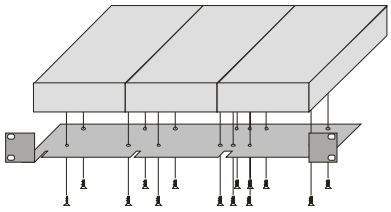
1. One regular unit (using two small plates)



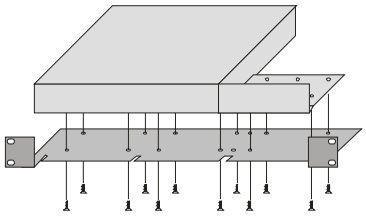
2. Two regular units (using one small plate)



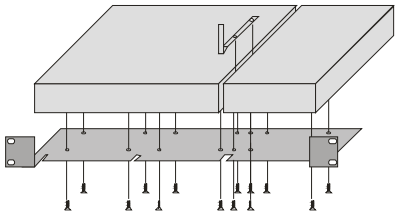
3. Mounting of three regular units



4. Mounting of one double width unit (using wide plate)



5. Mounting of double width and regular units (using narrow strip)



APPENDIX B: SYSTEM UPGRADE

System Update / Onboard Programming

It is occasionally necessary to update the firmware of the system. Normally, this procedure is carried out in the factory. If you want to update the firmware yourself, contact Technical Support. You will need a programming cable and software to carry out the update. Please follow the supplied instructions carefully.

APPENDIX C: VIDEO MODES AND FRAME RATES

The following table shows the video modes supported by the Cheetah V5 modules and the expected frame rates over fiber interconnects or coax interconnects. The Extenders are able to synchronize video modes that do not differ by more than 10% from those listed below.

Name	Horiz Pixels	Vert Lines	Horiz kHz	Vert Hz	Dot Clk MHz
DOS graphic Mode	640	350	31.43	70	25.14
Vesa Standard	640	350	37.83	85	31.47
VGA	640	400	24.64	56	20.89
VGA	640	400	31.43	70	25.14
Vesa Standard	640	400	37.86	85	31.50
Vesa Standard	640	480	31.47	60	25.18
Mac Mode	640	480	35.18	67	31.52
Vesa Standard	640	480	37.44	72	31.15
Vesa Standard	640	480	37.50	75	31.50
Vesa Standard	640	480	43.27	85	36.00
DOS Text Mode	720	400	31.43	70	28.29
Vesa Standard	720	400	37.93	85	35.50
NTSC progressive	720	480	31.50	60	27.03
PAL progressive	720	576	31.25	50	27.00
Vesa Standard	800	600	35.16	56	36.00
Vesa Standard	800	600	37.88	60	40.00
Vesa Standard	800	600	48.08	72	50.00
Vesa Standard	800	600	46.88	75	49.50
Vesa Standard	800	600	53.67	85	56.25
Mac Mode	832	624	49.50	75	55.44
Vesa Standard	1024	768	48.36	60	65.00
Vesa Standard	1024	768	56.48	70	75.00
SUN Mode	1024	768	58.03	72	75.21
Vesa Standard	1024	768	60.02	75	78.75
Vesa Standard	1024	768	68.68	85	94.50
DMT1185	1152	864	63.49	70	100.06
Mode	1152	864	63.84	70	94.48
Vesa Standard	1152	864	67.50	75	108.00
SUN Mode	1152	900	61.84	66	94.49
VESA	1280	768	48.12	60	81.23
Vesa Standard	1280	960	60.00	60	108.00
DMT127A	1280	960	75.00	75	126.00
Vesa Standard	1280	960	85.94	85	148.50
Vesa Standard	1280	1024	63.98	60	108.00
SUN mode	1280	1024	70.95	66	115.79
SGI	1280	1024	76.68	72	128.82
HP Workstation B123L	1280	1024	78.12	72	135.00
Vesa Standard	1280	1024	79.98	75	135.00
Vesa Standard	1280	1024	91.15	85	157.50
TV	1400	1050	64.92	60	122.05
SGI	1600	1024	77.62	72	158.34
Vesa Standard	1600	1200	75.00	60	162.00
TV Mode 16:9	1920	1080	66.59	59.934	138.50
WUXGA	1920	1200	74.04	59.95	154.00

Frame Rates (FPS)

The Cheetah V5 is not capable of transferring every frame generated by a graphics card because the net data rate of a Single Link DVI-Interface with 3.9Gbit is much higher than the available transfer rate of the Extenders.

Transmission follows the following scheme:

- Starting with a recognized VS-Signal, the first frame is digitized (on VGA) and temporarily stored (DVI+VGA) by the Local unit.
- The data are transmitted, using the available net data rate, to the Remote unit. During this time, frames generated by the graphic card are discarded without any recognition (frame dropping).
- When data transfer is complete, the Extender system waits for the next VS-Signal.

Depending on the data volume (affected by the selected screen resolution/refresh rate), the type of transmission module and the correspondence between the duration of the data transfer and a multiple of the refresh rate, you should get frame rates in a range of approximately 15 fps up to the actual refresh rate of the graphic card.

The frame rate counts the number of different pictures that are displayed in one second. The monitor is always driven with the same refresh rate as generated by the graphics card or selected in the OSD.

The human eye is not able to discern more than 15 fps as single pictures. Your Cheetah V5 modules are therefore suitable for displaying streaming video in the highest resolution. To gain a higher frame rate, reduce the screen resolution - video normally does not require higher resolutions.

APPENDIX D: AUDIO OPTION

The Audio option consists of daughter boards that allows for stereo audio to be sent across the regular interconnection cable in addition to VGA/DVI video.

To set up the extender's audio, please follow all of the instructions detailed in this appendix. If you have any questions, contact Technical Support.

Optional Audio Interface - Set Up and Operation

The audio interface is line-level and is designed to take the output from a sound card (or other line-level) source and be connected to a set of powered speakers at the other end of the link. Stereo audio may be transmitted over the same fiber link as the video. No set up is required to the remote unit.

Connect up the extender as follows:

Take the line-level output from your sound card (green connector) and connect to ‘Line In’ on the extender.

A set of powered speakers may be connected directly to ‘Line Out’ at the opposite end of the link.

APPENDIX E: CALLING TECHNICAL SUPPORT

If you determine that your Cheetah V5 modules are malfunctioning, ***do not attempt to alter or repair it***. It contains no user-serviceable parts. Contact Technical Support

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- The firmware-revision level printed on the bottom of the Extender (very important);
- The nature and duration of the problem.
- When the problem occurs.
- The components involved in the problem—that is, what type of computers, what type of keyboard, brand of mouse, make and model of monitor, type and make of cable, etc.
- Any particular application that, when used, appears to create the problem or make it worse.
- The results of any testing you've already done.

To solve some problems, it might be necessary to upgrade the Extender's firmware. If this turns out to be the case for your difficulty, our Technical Support technicians will arrange for you to receive the new firmware and will tell you how to install it.

Shipping and Packaging

If you need to transport or ship your Cheetah V5 modules:

- Package it carefully. We recommend that you use the original container.
- If you are shipping it for repair, please include the Unit's external power supplies. If you are returning it, please include everything you received with it. Before you ship the Extender back to your dealer for repair or return, contact him to get a Return Authorization (RA) number.

Power Requirements

Voltage	PSU: 90..240VAC-0.5A-47..63Hz/6VDC-2000 mA
Power required	Local Unit: approx. 8W Remote Unit approx. 8W
Voltage	PSU: 90..240VAC-0.5A-47..63Hz/5VDC-2400 mA
Power required	approx. 10W

Interface

(Depending on type of device)

Monitor	VGA (res.: 1600x1200@60Hz, plug&play supported) all lower resolutions at least with 75Hz DVI (res.: 1600x1200@60Hz, plug&play supported)
Local Access	max. resolution VGA: 1600x1200, DVI: 1280x1024 output depends on input type VGA or DVI

Maximum Length of Interconnection Cable

(Without reboost)

62.5µm/50µm Multimode	650ft (200m) @62,5µ 1300ft (400m) @50µ
9µm Singlemode	6 ¼ miles (10km)

Optical Elements – Singlemode

Center Wavelength	1300nm
Total Output Power	<2000µW (as defined by IEC: 50mm aperture at 10cm distance) <180µW (as defined by FDA: 7mm aperture at 20cm distance)
Beam Divergence	4°
Required Labels	FDA: Complies with 21 CFR 1040.10 and 1040.11 IEC: 60825-1 Class 1 Laser Product
Transmitter Electro-Optical Characteristics (typical)	
Launched power (Average) into singlemode fiber 9µm diameter	-3 dBm (-11dBm minimum)
Receiver Electro-Optical Characteristics (typical)	
Sensitivity (Average Power)	-22dBm (-20dBm maximum)
Optical budget total	-18dBm (-8dBm minimum)

Audio Interface

(Available with Audio modules only)

Description	stereo audio link
Transmission Method	Digitized virtually CD quality audio (16-bit, 38.4KHz)
Signal Levels	Line-Level (5 Volts P-P maximum)
Input Impedance	47K
Local Unit Connectors	3.5mm stereo jack socket (Line In & Line Out)
Remote Unit Connectors	3.5mm stereo jack socket (Line Out)

Size and Shipping Weight

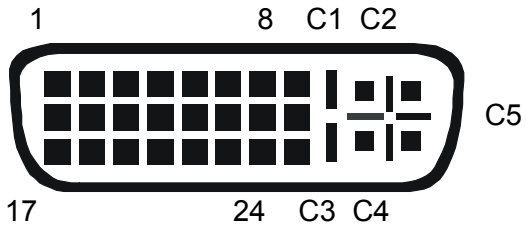
Remote and Local Unit	Remote/Local Unit: 6.7”x5.2”x1.7” (170x133x44mm) Weight: 2.2lb (1.0kg) each
Shipping box	Shipping Box: 18.1”x9.8”x4.7” (460x250x120mm) Weight: 9.5lb (4.3kg)

Environmental

Operating Temperature	50 to 113°F (10 to 45 °C)
Storage Temperature	23 to 131°F (-5 to 55 °C)
Relative Humidity	max. 80% non-condensing

Extender Connector Pinouts

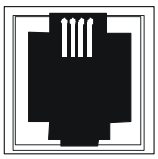
DVI-I Female connector (on all units)



Pin	*Signal*	*Pin*	*Signal*	*Pin*	*Signal*
1	T.M.D.S data 2-	9	T.M.D.S data 1-	17	T.M.D.S data 0-
2	T.M.D.S data 2+	10	T.M.D.S data 1+	18	T.M.D.S data 0+
3	T.M.D.S data 2 GND	11	T.M.D.S data 1 GND	19	T.M.D.S data 0 GND
4	n.c.	12	n.c.	20	n.c.
5	n.c.	13	n.c.	21	n.c.
6	DDC Input (SCL)	14	+5V Power	22	T.M.D.S clock GND
7	DDC Output(SDA)	15	GND	23	T.M.D.S clock +
8	Analog VSYNC	16	Hot Plug recognition	24	T.M.D.S clock -
C1	Analog Red			C3	Analog Blue
C2	Analog Green	C5	Analog GND	C4	Analog HYSNC

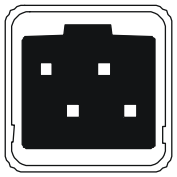
NOTES

Programming



Pin	*Signal*
1	TxD (to PC RxD)
2	RxD (from PC TxD)
3	DTR from PC
4	GND

Power

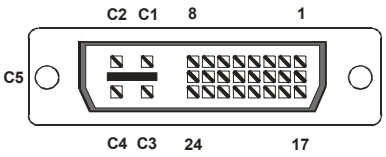


Pin	*Signal*
1	GND
2	Earth
3	n.c.
4	+6VDC
Housing	Shield

Adapter Cables

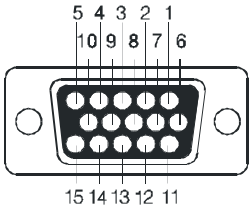
DVI/VGA Adapter

Remote/Local Unit: DVI-I male connector



Pin	*Signal*
6	DDC Input (SCL)
7	DDC Output(SDA)
8	Analog VSYNC
C1	Analog Red
C2	Analog Green
C3	Analog Blue
C4	Analog HYSNC
C5	Analog GND

Monitor: HD15 female connector

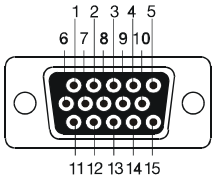


Pin	*Signal*
15	DDC Input (SCL)
12	DDC Output (SDA)
14	Analog VSYNC
1	Analog Red
2	Analog Green
3	Analog Blue
13	Analog HSYNC
6,7,8	Analog GND

NOTES

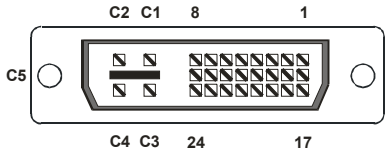
Local unit VGA/DVI Adapter

CPU Graphics card: HD15 male connector



Pin	*Signal*
15	DDC Input (SCL)
12	DDC Output (SDA)
14	Analog VSYNC
1	Analog Red
2	Analog Green
3	Analog Blue
13	Analog HSYNC
6,7,8	Analog GND

Local Unit: DVI-I male connector



Pin	*Signal*
6	DDC Input (SCL)
7	DDC Output(SDA)
8	Analog VSYNC
C1	Analog Red
C2	Analog Green
C3	Analog Blue
C4	Analog HYSNC
C5	Analog GND