

User Guide

November 2009

CAT5/5e KVM Extender Range Audio/Serial and Switching Models

Audio/Serial Kits

Model SDLink1/AU

Model SDLink2/AU

Switching Kit

Model SDLink2/SW

Remote Units

Model SDLink/RA

Model SDLink/RSW

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.*

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Safety Precautions and Installation Guidelines

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

- Do not use to link between buildings.
- 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.
- Try not to route the CATx link cable alongside power cables.
- The use of shielded CATx cable is recommended to maintain compliance.
- 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 and any power supplies can get warm. Do not situate them in an enclosed space without any airflow.
- Do not place the power supply directly on top of the Remote Unit.
- This product is not suitable for use in isolated medical environments.



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 CATx link interface (RJ45) to any other products, especially telecommunications or network equipment.

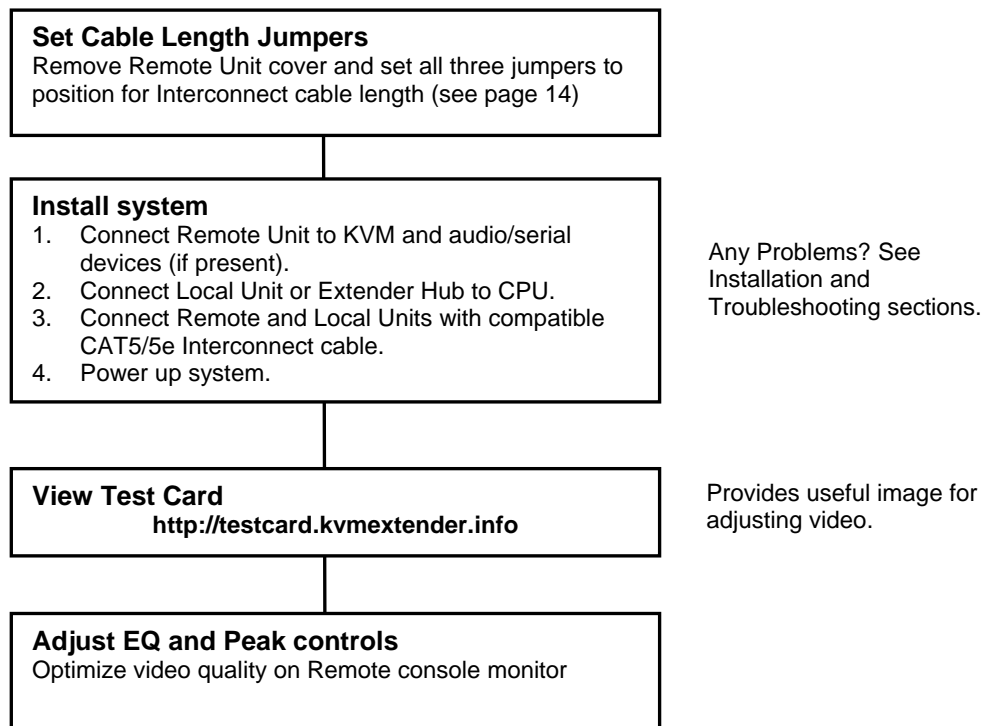
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1. Quick Setup

This section briefly describes how to install your KVM extender 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.



2. Overview

Introduction

The SDLink products described in this manual enable high-resolution video, PS/2 keyboard and mouse, stereo audio, and serial port signals to be communicated up to 300m over Category 5/5e (CATx) cable.

A basic KVM extension system comprises a *Local Unit* (transmitter) and a *Remote Unit* (receiver). The Local Unit connects directly to the computer (or a KVM switch system) using the supplied cable(s). The user *console* (keyboard, mouse and monitor) attaches to the Remote Unit. The Remote and Local Units communicate video and data information along the connecting CATx cable (Figure 1).

Within the product range, models are available with combinations of the following:

- Audio transmission: bi-directional stereo audio (16-bit digitized).
- Serial transmission: transparent serial COM port (to 19.2Kbps).
- Dual access: allowing a second user console at the Local Unit.
- KVM switch allowing additional CPU to be connected to Remote Unit and used as console.

Glossary

The following terms are used in this guide:

CATx	Any Category 5, 5e, 6 or higher cable.
PSU	Power Supply Unit.
KVM	Keyboard, Video and Mouse.
Console	A keyboard, monitor, and mouse, plus optional serial/audio devices.
Dual Access	A system allowing connection of local and remote user consoles.

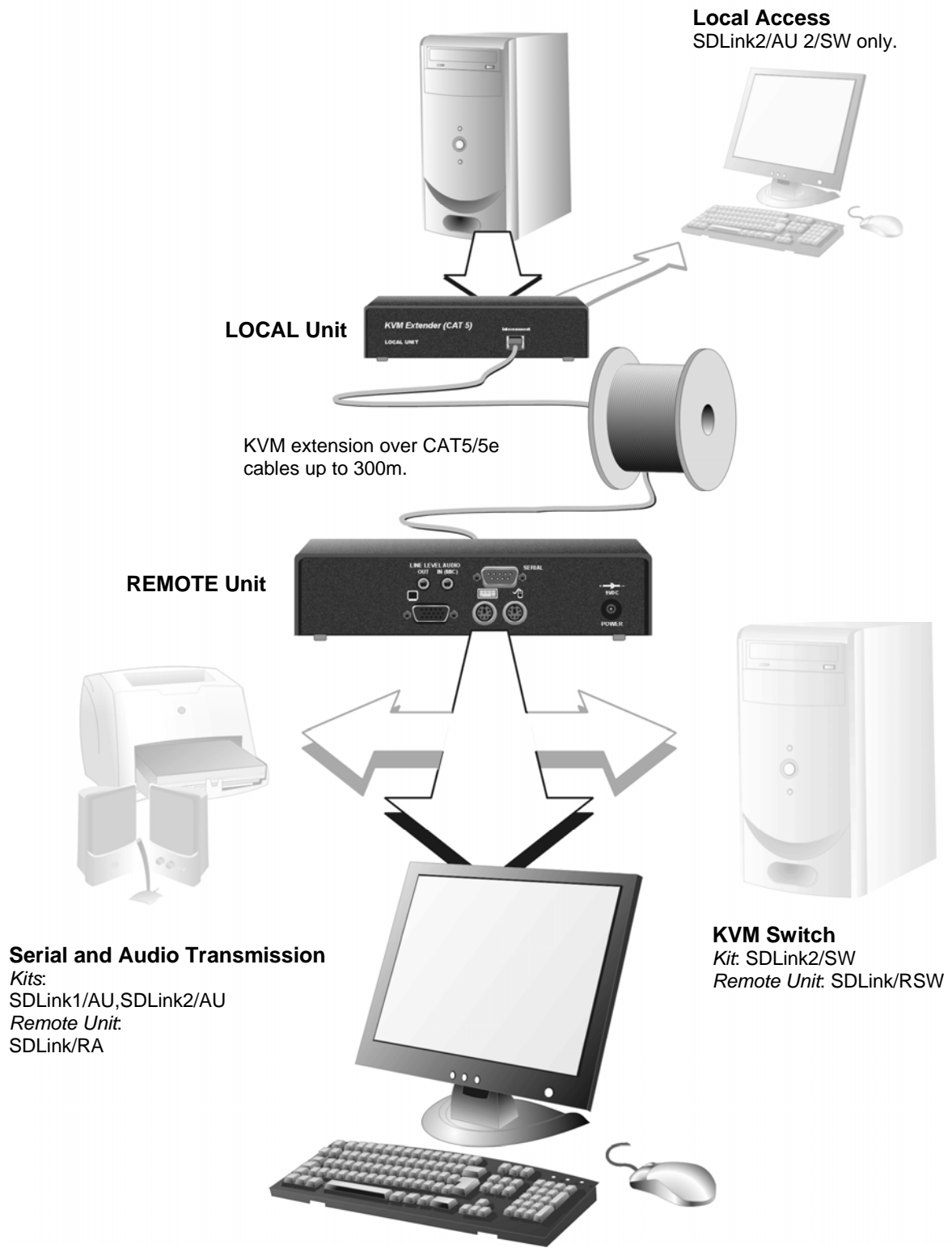


Figure 1 SDLink KVM extender system

Features

All members of the SDLink product family described here offer the following features:

- Support for high video resolution over extended distances:
 - 1600x1200@60Hz up to 65m
 - 1024x768@75Hz up to 300m
 - 1280x1024@75Hz up to 120m
- Fully adjustable video equalization compensates for loss of image quality over extended cable lengths.
- Fully buffered signals to ensure consistent remote operation of your PC.
- DDC emulation in Local Unit ensures compatibility for all standard graphics modes.
- Intelligent PS/2 keyboard and mouse emulation ensures PCs do not lock-up and allows peripherals to be hot-plugged.
- Dual-Access models allow local or remote operation.
- *Audio/serial models only:* Transparent serial port (on certain models) enables any serial device to be extended (up to 19.2K Baud). The serial port may be used to extend one device (requiring handshaking lines), or up to three simple serial devices (no handshaking).
- *Audio/serial models only:* Bi-directional stereo audio (16-bit digitized) support on certain models enables high-quality audio extension.
- *Switching models only:* KVM switch for connecting additional PC to Remote Unit.
- Local Units are normally powered directly by the PC (or switch).
- Private Mode on dual-access models allows user to lock out other console.
- Rack mount options available.
- Surge protection on each RJ45 port.
- SDLink Remote Units are fully compatible with SDRK Local Rack Hubs.
- CPU cables included (certain models).

Product Range

This manual describes the following five products from the SDLink range:

KVM, Audio and Serial Extension kits

SDLink1/AU	Single Video Channel, PS/2 KB & Mouse, Serial, Stereo Audio Local Unit (Single Access) + Remote Unit
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SDLink2/AU	Single Video Channel, PS/2 KB & Mouse, Serial, Stereo Audio Local Unit (Dual Access) + Remote Unit
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KVM Extension and Remote KVM Switching kits

SDLink2/SW	Single Video Channel, PS/2 KB & Mouse Local Unit (Dual Access) + Remote Unit Remote Unit incorporates KVM switch
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Remote Units only

SDLink/RA	Single Video Channel, PS/2 KB & Mouse, Serial, Stereo Audio
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SD/Link/RSW	Single Video Channel, PS/2 KB & Mouse, KVM Switch
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Compatibility

Interface Compatibility

- **PS/2 Keyboard:** Compatible with all standard keyboards. Certain keyboards with enhanced features may also be supported with custom firmware.
- **PS/2 Mouse:** Compatible with all standard 2-button, 3-button and wheel mice. To connect to a PC that does not have a PS/2 mouse port, an active serial converter is required - Model: *Mdapt (PS/2)*.
- **Audio:** Input and output are line-level. Amplified speakers are required. A microphone may be directly connected to the Remote Unit (optional pre-amplification).
- **Serial:** Transparent up to 19.2K Baud (38.4K operation may be possible with some devices). The following serial signals are extended: TX, RX, RTS, CTS, DTR, DSR. In rare cases, a wiring adaptor may be required to transfer RI and DCD.
- **Video:** VGA to SXGA. Separate sync, composite sync, or sync-on-green. Maximum resolution and refresh rates depend on cable length and cable type (see **Appendix F: Specifications**, page 44).

Extender Compatibility

You can use SDLink, SDBX, SDMX, and SDRK products belonging to the same family in any combination. However, it is not possible to mix product families within a system (except in certain *video only* applications).

<i>Family</i>	<i>SDLink</i>	<i>SDBX</i>	<i>Mini Extenders</i>	<i>Local Hubs</i>
Standard	SDLink1	SDBX/S1	SDLink/LC	SDRK/6
	SDLink2	SDBX/D1	SDLink/DM	SDRK/6D
	SDLink2/SW	SDBX/S2	SDLink/RLC	SDRK/12
	SDLink/R	SDBX/R1	SDRK/6R	
	SDLink/RSW	SDBX/R2	SDMX/S2	
		SDBX/R4	SDMX/D2	
		SDBX/D2	SDMX/R2	
Audio	SDLink1/AU	SDBX/SA1	SDLink/AM	SDRK/6A
	SDLink2/AU	SDBX/DA1	SDLink/MAR	SDRK/6AD
	SDLink/RA	SDBX/SA2	SDRK/6RA	
		SDBX/RA1	SDMX/SA2	
		SDBX/RA2	SDMX/DA2	
		SDBX/RA4	SDMX/RA2	
		SDBX/DA2		
Serial	SDLink1/S			SDRK/6S
	SDLink2/S			SDRK/6SD
	SDLink/RS			

How to Use This Guide

This guide describes the installation and configuration of the Audio/Serial and remote KVM Switch versions of the SDLink range of KVM extenders.

Although the connection and operation of these systems is relatively straightforward, you should consider the following before getting started:

Connection & Compatibility

If you have purchased an *SDLink Extender kit*, this will contain all the cables required to connect the Local Unit to your PC or KVM switch. The remote console (keyboard, monitor and mouse) and any audio and serial equipment connect directly to the Remote Unit.

If you have purchased an *SDLink Remote Unit*, ensure that it is compatible with your Local Unit or hub (see **Compatibility**, page 10).

For information about connection and installation, see **Installation**, page 12.

Interconnection Cable

You will need CATx cable, terminated with RJ45 plugs, to connect the Local and Remote Units (see **Interconnection Cable Requirements**, page 13).

Adjusting Video

Video signals become distorted when transmitted over CATx cable. To get the best from your extender system, it is *essential* that you adjust the Remote Unit to optimize the video image quality.

- For experienced users, there is a **Quick Setup** section at the start of this guide (see page 5).
- For the full procedure, see **Remote Unit Configuration & Operation**, page 22.
- For further information, refer to **Appendix C: Advanced Cabling Issues (Skew)**, page 39.

3. 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 KVM extender system more conveniently.

Package Contents

You should receive the following items in your extender package. If anything is missing, please refer to **Appendix E: Obtaining Technical Support**, page 43.

- Extender Remote Unit.
- 9V DC universal power supply for Remote Unit.
- Extender Local Unit.
Only included in extender kits.
- KVM CPU combination cable (1.8m) with PS/2 (6-pin mini-DIN male-to-male) keyboard and mouse connectors and VGA video (HD15 male to female) connector.
Models: SDLink1/AU and SDLink2/AU only.
Not included with individual Remote Unit SDLink/RA.
- KVM CPU combination cable (1m) with (Remote Unit end) DB25 male connector and (PC end) PS/2 (6-pin mini-DIN male) keyboard and mouse connectors and VGA video (HD15 male) connectors.
Model: SDLink2/SW only.
- Serial cable (1.8m, DB9 male/female connectors, 1:1 connections).
Models: SDLink1/AU and SDLink2/AU only.
- Dual audio cable (1.8m, 3.5mm stereo plugs)
Models: SDLink1/AU and SDLink2/AU only.
- IEC AC Power Cord.
- Quick Start Guide.

Interconnection Cable Requirements

To connect the Local and Remote Units you will need CATx (any category 5, 5e, 6 or higher) cable terminated with RJ45 plugs. Please note that shielded cable is advised to maintain regulatory EMC compliance.

Interconnect cables must be solid-core type. Stranded patch cable will give poor results over longer distances. The pairing of the cable and pinning of its connectors should normally be in accordance with EIA-568B.

<i>Pin*</i>	<i>Color (EIA-568B)</i>	<i>Signal</i>
1 2	White/Orange Orange/White	Blue Video
3 6	White/Green Green/White	Green Video
4 5	Blue/White White/Blue	Red Video
7 8	White/Brown Brown/White	Data

* Looking into the RJ45 socket on a Remote Unit, Pin 1 is on the right and Pin 8 on the left.



EIA-568A wiring can also be used. Contact Technical Support for details.



*With some cables, video performance may be improved by using a cross-over patch cable at each end or an alternative RJ45 pin-out (see **Appendix C: Advanced Cabling Issues (Skew)**, page 39).*

Setting the Cable Length Jumpers

If your application uses an interconnection cable less than 75m in length, you can continue to the next section.

SDLink Remote Units incorporate video equalization circuitry, allowing you to compensate for the loss in image quality that occurs when video signals are transmitted along lengthy CATx cables. At the factory, Remote Units are configured to optimize the video signals for Interconnect cables up to 100m in length.

If you intend to use cables of 100-300m in length:

1. Unfasten and remove the screws on each side of the Remote Unit.
2. Carefully remove the top plate.
3. Locate the three cable length jumpers on the Remote Unit's main circuit board (see Figure 2).

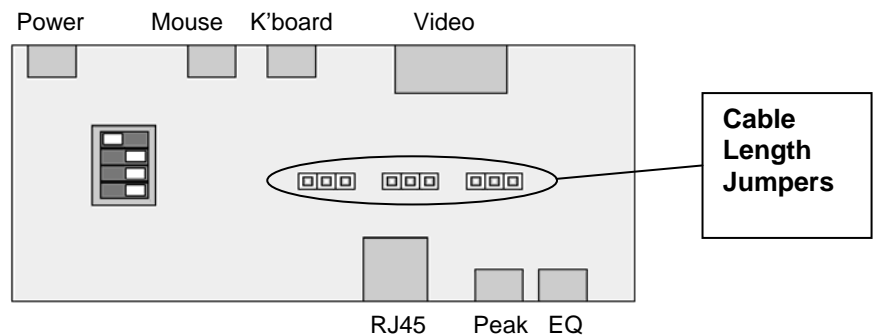













Figure 2 Location of cable length jumpers on Remote Unit's main circuit board

4. Set the three cable length jumpers as follows:

Interconnect Cable Length (m)	Jumper Position (as viewed from front, with RJ45 connector towards you)		
0 – 100	No jumpers (default)		
			
100 – 200			
200 – 300			

-  *If you are at the top end of a cable range, and you are using a high screen resolution (1024x768 or higher), you may achieve better quality video compensation by selecting the next cable length range.*
-  *Ensure that all three jumpers are set to the same position. If you are carrying out a test placement prior to final installation, set the jumpers to the positions appropriate to the test cable's length. When your tests are complete, set the jumpers to the positions appropriate for the CATx cable length used in the full installation.*

While you have the Remote Unit's cover off, you may also want to change the DIP switch option for 'hot' key selection (see page 25).

Connecting the Remote Unit

To install a Remote Unit:

1. Switch off all devices.
2. Connect your keyboard, monitor(s) and mouse to the Remote Unit as shown in Figure 3 (Switching) or Figure 4 (Audio/Serial).



These ports may also be attached to the CPU side of a KVM switch in order to have a remote CPU. However, if you are attempting to use the extender between cascaded KVM switches this may not work. Please contact Technical Support to discuss your application.

3. If appropriate, connect audio equipment and serial devices. Connect the audio cables as follows:

<i>Remote Unit</i>	<i>Audio Device</i>
Audio Out	Speakers
Audio In (MIC)	Microphone

4. Connect the CATx cable to the INTERCONNECT socket on the front of the Remote Unit as shown in Figure 5.
5. Turn the PEAK and EQ controls fully anti-clockwise.
6. Connect the 9V power supply to power the Unit.



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

NEVER CONNECT A REMOTE UNIT'S POWER SUPPLY TO A LOCAL UNIT OR HUB. THIS COULD DAMAGE THE EXTENDER SYSTEM.

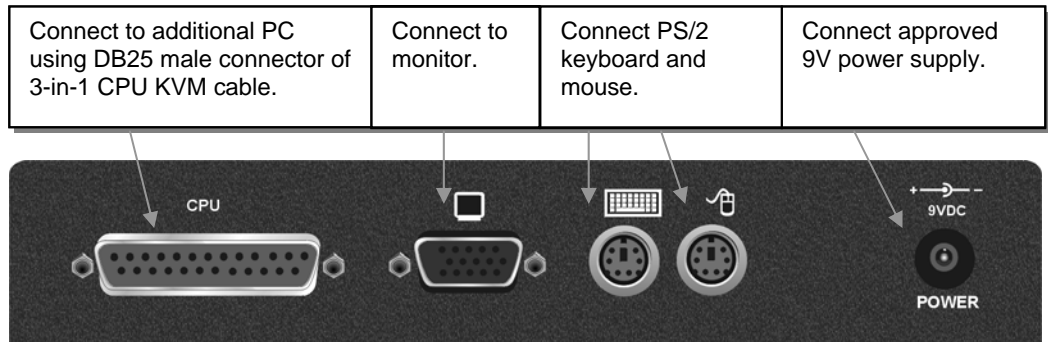


Figure 3 *SDLink Switching Remote Unit (SDLINK/RSW – also supplied with SDLINK2/SW kit) – rear view*

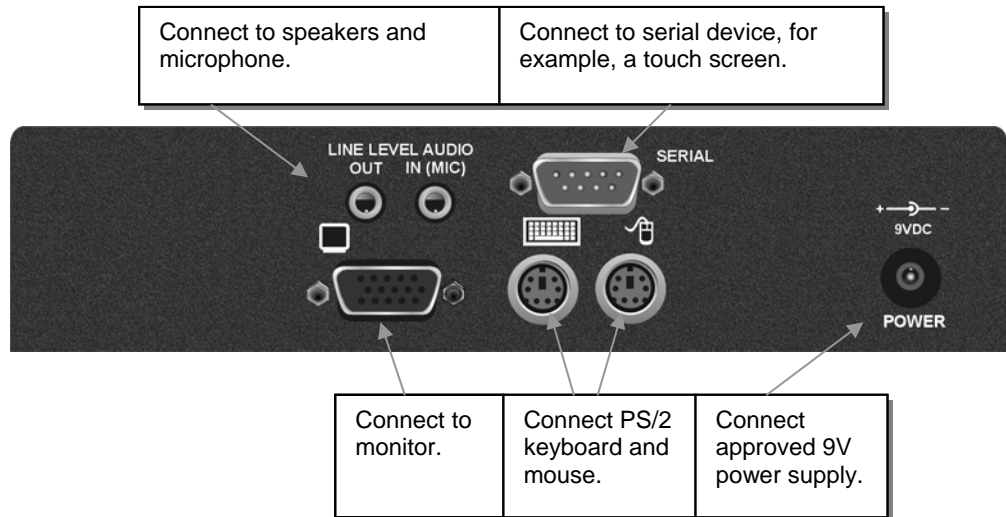


Figure 4 *SDLink Audio Remote Units (SDLINK/RA – also supplied with SDLINK1/AU and SDLINK2/AU kits)– rear view*

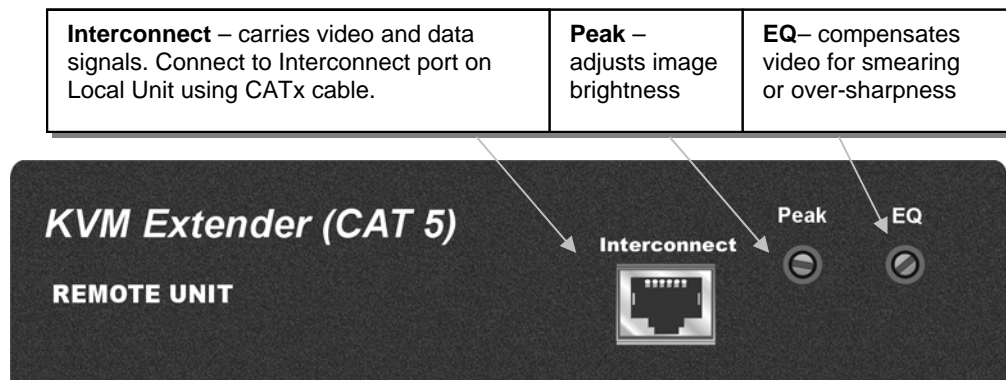


Figure 5 *SDLink Remote Unit - front view*

Local Unit Installation

To install a Local Unit:

1. Switch off the PC and any peripheral devices before connection.
2. Using the supplied CPU KVM cable(s), connect the keyboard, monitor(s) and mouse connectors on the computer (or KVM switch) to the corresponding connectors on the Local Unit as shown in Figure 6.

Ensure that you attach the keyboard and mouse connectors to the correct ports. The keyboard connector is purple; the mouse connector is green.



If your PC does not have a PS/2 mouse port, an active serial converter will be required - Model No: Mdapt (PS/2).

3. If you have a dual access system, connect the keyboard, mouse and monitor for the local console to the appropriate ports on the Local Unit. The ports may also be used to feed into a KVM switch.
4. If you have an audio-enabled unit, connect the audio cables between the computer and Local Unit as follows:

<i>Computer</i>	<i>Local Unit</i>
Audio Out (green)	Audio In
Audio In/Microphone (pink/blue)	Audio Out

5. If you have a serial-enabled unit, connect the supplied serial cable between the serial port on the computer and the Local Unit.
6. Connect the CATx cable to the INTERCONNECT socket on the front of the Local Unit (see Figure 7).
7. Power up the PC.



The Local Unit normally takes power through the PC's keyboard port. In video only applications, this connection is not used and an external PSU is required.

Please contact Technical Support to obtain a suitable power supply.

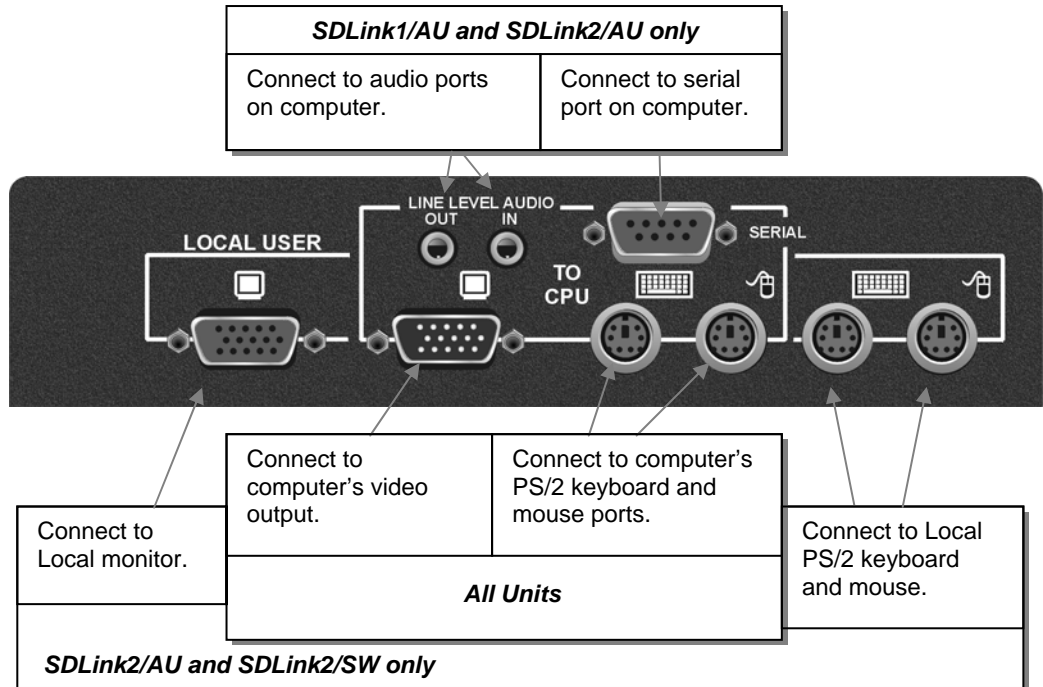


Figure 6 SDLink Local Unit - rear view

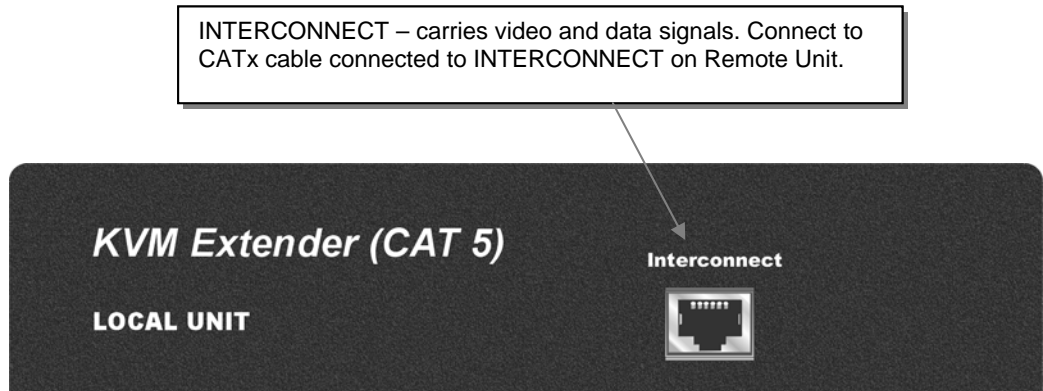


Figure 7 SDLink Local Unit – front view

Connection to Rackmount Hub Local Units

SDLink Remote Units are compatible with SDRK Rackmount Extender Hub Local Units belonging to the same family:

<i>SDLink Remote Units</i>	<i>Compatible Local Rack Hubs</i>
SDLink/RSW	SDRK/6, SDRK/6D, SDRK/12
SDLink1/AU, SDLink2/AU, SDLink/RA	SDRK/6A, SDRK/6AD

A simple example of the use of a rackmount hub Local Unit, in which an SDLink/RA Remote Unit is connected to each hub port, is shown in Figure 8. For more complex examples showing the use of Rack Extender Hubs with SDLink Remote Units in efficient ways, see **Appendix A: Example Applications**, page 34.



Individual Rack Hub operation is not covered in this guide. Please refer to the documentation supplied with your Rack Hub Unit.

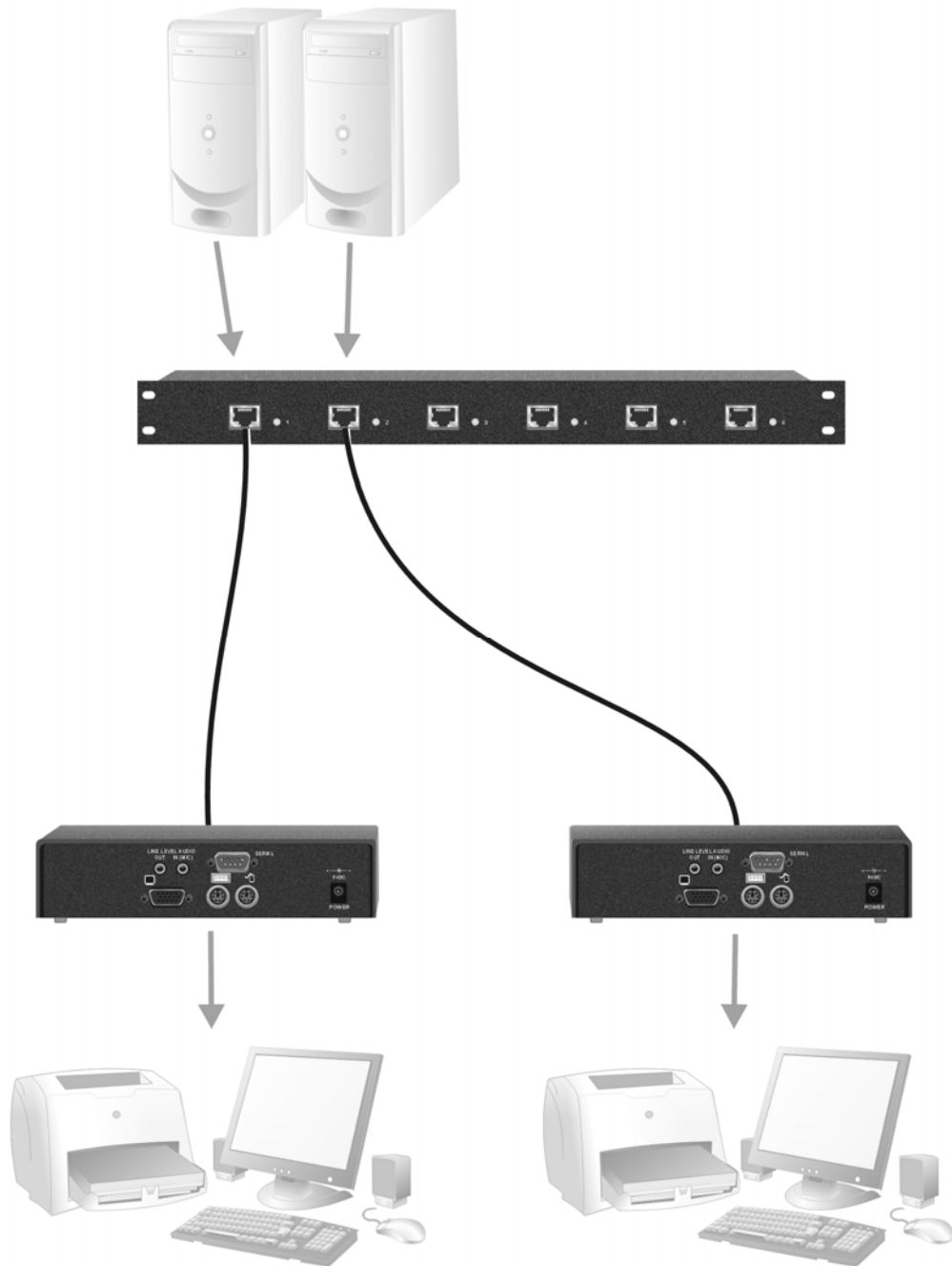


Figure 8 Simple system using SDRK/6A Hub and SDLink/RA Remote Units to extend audio, serial and KVM for up to six PCs

4. Remote Unit Configuration & Operation

Catx cables are specifically designed for networking applications and not for transmitting analog video. Your KVM extender includes, and requires, advanced technology to enable its use at high screen resolutions. This section describes how to optimize the video signal, configure the Extender system and operate the Remote Unit.

Video Configuration Overview

To get the best out of your extender system it is *essential* that you configure it correctly and tune the video signal. Tuning is necessary because of distortions that occur in a video signal when it is transmitted over lengthy CATx cables. Generally, you only need to carry out this procedure after installation.

When you have installed your extender system, run an application that requires a high screen resolution. Examine the video image on the remote console's monitor. You may see some of the following distortion effects:

Smearing



Black smearing at the right edge of large horizontal objects such as title bars.

Loss of Sharpness



Blurring and lack of detail, edges appearing too bright and sharp.

Color Separation or Skew



Displacement of individual colors (caused by timing differences in RGB signal reception).

Brightness



Image appears brighter or darker than the original.

The Remote Unit's **EQ** control allows you to correct smearing and loss of sharpness effects. The **Peak** control adjusts video image brightness.

Skew only tends to be a problem at high screen resolutions using longer interconnect cables. We recommend the use of low skew CATx cable for all applications. Please contact Technical Support for more information.



*With some cables, video performance may be improved by using a cross-over patch cable at each end or an alternative RJ45 pin-out (see **Appendix C: Advanced Cabling Issues (Skew)**, page 39).*

The alternative SDBX range of KVM Extenders has been specifically designed for the extension of high screen resolutions (1600x1200) over long CATx cables (300m). SDBX Extenders have fully integrated skew compensation and independent control of low frequency (LF) and high frequency (HF) cable equalization.

Video Adjustments

SDLink Remote Units feature a number of correction tools to simplify video optimization. This procedure is straightforward and only needs to be carried out once.



Please note that cable equalization cannot be exact – the remote image will never be as sharp as the original. The KVM Extender's equalization system produces good results for short to medium length cables (<150m).

Adjusting Video

Use the following step-by-step procedure to optimize the video image on the remote console:

1. If possible, view the online test card at:

<http://testcard.kvmextender.info>

This is an image (see Figure 9) created and used by the manufacturer for video optimization purposes. It is particularly useful for observing skew. If you are unable to view the test card, display some text in a large font on a white background.



You should also open up other application windows to check the clarity of text in tool bars and icons on the desktop.

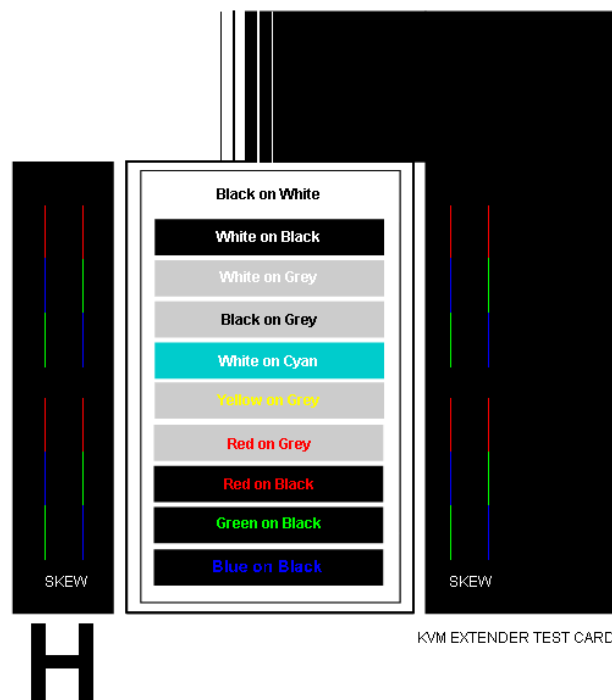


Figure 9 On-line test card available at <http://testcard.kvmextender.info>

2. Turn the PEAK and EQ controls on the Remote Unit fully anti-clockwise. The image quality may be poor at this point.
3. Use the EQ control to adjust video equalization. If the video signal is under-compensated, you will notice black smearing on the right-hand edge of large horizontal objects such as title bars. If it is overcompensated, horizontal edges may become bright and too sharp. Rotate the EQ control clockwise until these effects disappear. The compensation is now adjusted correctly for the length of cable.



If you are at the top end of a cable range, for example, 80m (250ft) and you are using a high screen resolution (1024x768 or higher) you may achieve better quality video compensation by selecting the next cable length range using the cable length jumpers (see page 14).

4. Use the PEAK control to adjust the brightness of the overall picture. After adjusting this control, you may need to re-adjust the EQ control.
5. **If you are using one or more flat panel monitors in the remote consoles, carry out auto-adjustment as described in the monitor's documentation. Sometimes manual adjustment of clock and/or phase is also required for optimum results and minimization of jitter.**

Other Remote Configuration & Operation Options

Keyboard ‘hot’ keys are used to carry out various functions on both Remote and Local Units.

To enter these commands:

1. Press and release the initial ‘hot’ key.
By default, the initial ‘hot’ key is <Right Control>
2. Press and release the command key.

Changing the Initial Hot Key

The initial ‘hot’ key for both Remote and Local Units may be changed from <Right Control> to <Left Control> using a DIP switch on the Remote Unit’s main circuit board (see Figure 10).

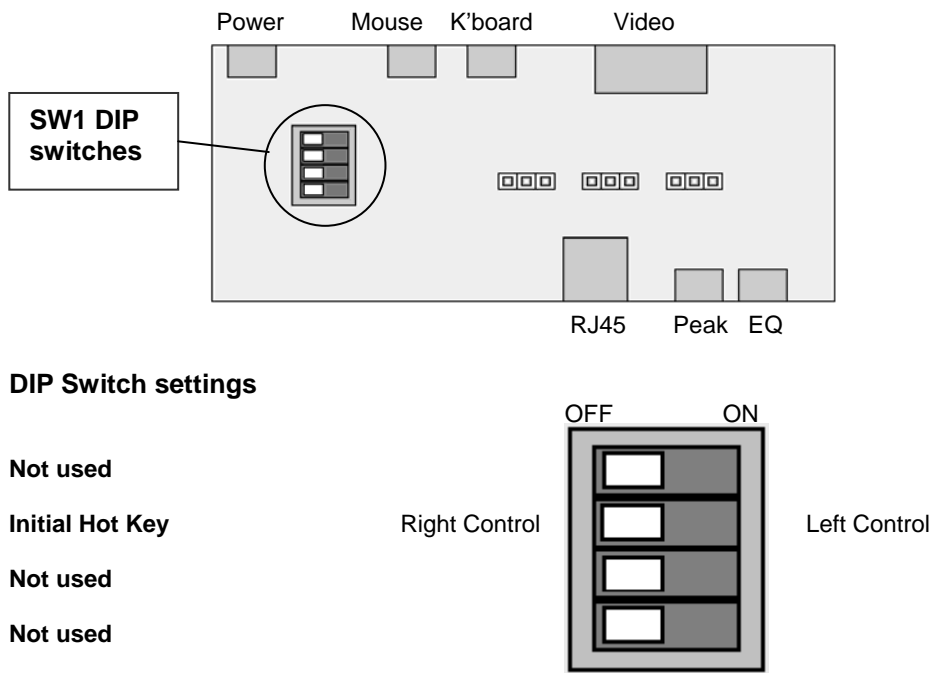


Figure 10 Remote Unit DIP switches on Audio/Serial/Switching CAT5/5e KVM Extenders

Hot Key Commands

After pressing the initial ‘hot’ key on the Remote keyboard, you can issue a number of commands by pressing additional keys. These commands allow you to start a private mode session on the remote console or to reset the keyboard and mouse.

<i>Command</i>	<i>Key Sequence</i>
<p>Private Mode (<i>SDLink2/AU, SDLink2/SW, SDLink/RA, SDLink/RSW only</i>)</p> <p>Audio/Serial Local Units that feature dual access allow the remote user to lock out the local console by triggering a ‘Private Mode’ function. This prevents the local console from being used even if a two second inactivity timeout period expires.</p> <p>During a Private Mode session, the extender system:</p> <ul style="list-style-type: none"> • Flashes the Scroll Lock LED on the remote keyboard. • Illuminates all three LEDs on the local keyboard. • Displays a blank image on the local console’s monitor. • Locks the local console’s keyboard and mouse. 	<Scroll Lock>
<p>Reset Keyboard and Mouse</p> <p>Reset the remote console’s keyboard and mouse. You may need to do this if you have hot-plugged a keyboard or mouse and it has not initialized correctly.</p>	<Num-Pad Up Arrow>
<p>Mouse Recovery</p> <p>Use this command if you experience erratic movement of the mouse pointer or you have lost mouse movement after hot plugging the Local Unit into the CPU. In the case of erratic mouse movement, you may need to enter the command a number of times to re-synchronize the mouse signal. Alternatively, stop moving the mouse for a few seconds and the operating system’s mouse drivers may automatically re-synchronize the signal. If the Local Unit has been hot-plugged, this command will issue a request to the OS to initialize the mouse. <i>Use this command with care.</i></p>	<Num-Pad Left Arrow>
<p>Switch to other PC (<i>SDLink2/SW and SDLink/RSW only</i>)</p> <p>Toggles KVM switch in Remote Unit so that the remote console controls either the second PC (connected directly to the Remote Unit) or the extended PC.</p> <p><i>Note: On power-up, the Remote Unit will switch to the first active CPU.</i></p>	<Num-Pad + >

5. Local Unit Operation

You need to read this section if you have purchased an extender system kit containing both a Local and Remote Unit.

For more information about serial/audio port operation, see **Appendix D: Audio/Serial Ports: Operation & Multi-Port Configuration**, page 41.

Keyboard and Mouse Emulation


Local Units have keyboard and mouse emulation. The attached PC operates normally without requiring a keyboard or mouse to be attached to either the Remote or Local Units (in the case of a dual access system). You can therefore replace any keyboard or mouse attached to the extender system without disrupting the operation of the computer.

Power Requirements

Local Units normally take power from the keyboard connection to the computer. For video only applications, you must apply external power through this port. Use an external 5V PSU with PS/2 connector (Model: SDLink/PSL). Contact Technical Support for further information.

Dual Access

Models SDLink2/AU and SDLink2/SW offer dual access from consoles at both Remote and Local Units. This operates on a first-come, first-served basis. When one console is in use, the system blocks out the other console until there is no keyboard or mouse use at the active console for a set time: the *Inactivity Timeout Period*. This is fixed at two seconds. Thereafter, any keyboard or mouse action at the other console switches console activity.

 *When the PC is booted, the local console is active. When you are activating a console, the first key or mouse press is not passed to the PC.*

SDLink2/AU only: When the local console is in Private Mode, audio transmission to the Remote Unit is stopped but the serial link is maintained

Hot Key Commands

With dual access systems, keyboard hot keys are used to carry out various functions at the local console.

To enter these commands:

1. Press and release the initial 'hot' key.
By default, the initial 'hot' key is **<Right Control>**.
2. Press and release the command key.

With these systems, the Scroll Lock operates as normal unless you have pressed the initial hot key.

Changing the Initial Hot Key

The Local Unit's initial 'hot' key may be changed from <Right Control> to <Left Control> using a DIP switch on the Remote Unit's main circuit board (see Figure 10).

Local Console Commands

After pressing the initial 'hot' key on the local keyboard, you can issue a number of commands by pressing additional keys. These commands allow you to start a private mode session on the local console or to reset the keyboard and mouse.



These commands only apply to Local Units having firmware versions 'S50' and above.

<i>Command</i>	<i>Key Sequence</i>
<i>Private Mode</i> (SDLink2/AU and SDLink2/SW only)	<i><Scroll Lock></i>
Audio/Serial Local Units that feature dual access allow the local user to lock out the remote console by triggering a 'Private Mode' function. This prevents the remote console from being used even if the two second inactivity timeout period expires. During a Private Mode session, the extender system: <ul style="list-style-type: none"> • Flashes the Scroll Lock LED on the local keyboard. • Illuminates all three LEDs on the remote keyboard. • Displays a blank image on the remote console's monitor. • Locks the remote console's keyboard and mouse. • Stops audio transmission. • Switches to remote CPU (SDLink2/SW only). 	
<i>Reset Keyboard and Mouse</i>	<i><Num-Pad Up Arrow></i>
Reset the local console's keyboard and mouse. You may need to do this if you have hot-plugged a keyboard or mouse and it has not initialized correctly.	
<i>Mouse Recovery</i>	<i><Num-Pad Left Arrow></i>
Use this command if you experience erratic movement of the mouse pointer or you have lost mouse movement after hot plugging the Local Unit into the CPU. In the case of erratic mouse movement, you may need to enter the command a number of times to re-synchronize the mouse signal. Alternatively, stop moving the mouse for a few seconds and the operating system's mouse drivers may automatically re-synchronize the signal. If the Local Unit has been hot-plugged, this command will issue a request to the OS to initialize the mouse. <i>Use this command with care.</i>	
	<i>The SDLink2/SW Local Unit allows the local console to operate the local CPU and the remote console to operate the remote CPU at the same time.</i>

6. Troubleshooting

Video

The image is not sharp, or is badly smeared.

Have you adjusted the video equalization? Follow the instructions on page 23.

Check the Interconnect cable between the Remote and Local Units. Is it of the recommended type (see page 13)? Is it intact along its entire length and securely connected at both ends? Is it wired correctly?

Ensure that all video connections throughout the system are attached securely.

Are you using an LCD panel? You need to adjust its clock and/or phase.

Colors appear to be separated and there are colored borders on text and icons.

Check that the compensation jumper setting is correct for the length of your Interconnect cable (see page 14).

Check the Interconnect cable between the Remote and Local Units. Is it of the recommended type (see page 13)? Is it intact along its entire length and securely connected at both ends? Is it wired correctly?

Are you using low-skew cable?

See **Appendix C: Advanced Cabling Issues** (Skew), page 39.

I only need video extension – not keyboard or mouse - but I can't get a picture

Have you powered the Local Unit? The Local Unit gets its power from the CPU through the keyboard connection and it will not operate without it. Use an external 5V PSU as described on page 27.

The monitor sometimes goes blank for a second or two.

Check that the interconnect cable is not routed near power lines or other sources of electrical interference. Use shielded STP/FTP cable instead of UTP cable ensuring that the shield connection is maintained between the extender units.

Check system grounding. If your remote monitor has an external PSU you may need to consider grounding the Remote Unit chassis (to power ground)..

If this is a persistent problem, contact Technical Support.

The PC won't boot into the correct graphics mode

The extender includes DDC emulation for all standard resolutions and there should not normally be any issues.

For non-standard resolutions, you will need to explicitly set the resolution in your operating system configuration ignoring the DDC data read from the Local Unit.

Contact Technical Support if you have problems selecting your required graphics mode.

Jitter is evident on video

Adjust the clock and/or phase on your flat-panel. Contact Technical Support if this fails to improve the situation.

Are you testing a system using a coiled drum of CATx cable? Try uncoiling the cable. If this solves the video jitter, you should not have a problem after full installation.

Can the extender be used with RGB video?

Yes.

Audio

The audio is very quiet.

The audio I/O is line-level and requires amplified speakers and connection to devices providing line-level I/O.

The audio is loud but distorted.

Check that the audio input is not greater than line level (4V peak-to-peak). The KVM extender accepts line-level audio input only.

The microphone output is barely audible.

See **Appendix D: Audio/Serial Ports: Operation & Multi-Port Configuration**, page 41.

Serial

My serial device does not function.

The extender supports serial devices at data rates not exceeding 19.2K Baud (although 38.4K operation might be possible with certain equipment).

Check the type of flow control used by the device and CPU. The extender supports RTS, CTS, DTR, and DSR. Some systems may require a wiring adapter to transfer RI and DCD.

Attach the device directly to the serial port on the PC and test whether the problem is a PC or extender problem.

Some serial devices cannot be hot-plugged. Try connecting the device to a powered Remote Unit prior to booting the system.

Keyboard & Mouse

When I am typing, I get wrong or missing characters on the screen.

Your keyboard may be in the wrong mode. Use the appropriate commands to reset the keyboard and mouse as described in the sections covering local and remote operation.

The PC comes up with 'keyboard error'.

Press <F1> or <ESC>. If the keyboard now operates correctly, you need to adjust the BIOS setup to disable keyboard testing during booting.

The system does not detect a PS/2 mouse.

If connecting the Local Unit to a live system, connect the mouse cable to the CPU *before* keyboard connection to ensure the mouse is enabled correctly. Try issuing the Mouse Recovery command.

Check that the mouse cable is connected properly and securely. Reboot the system.

The mouse pointer moves erratically.

Reset the keyboard and mouse.

Issue the Mouse Recovery command up to three times.

Ensure that you have the latest driver for your mouse.

If you are using the extender with a KVM switch, command the switch to reset the mouse.

Quit and restart the application. Reboot the PC.

When I 'hot-plug' the Local Unit, the mouse no longer moves.

When connecting the Local Unit to a live system, connect the mouse cable to the CPU before keyboard connection to ensure the mouse is enabled.

Try issuing the Mouse Recovery command.

Some of the mouse buttons don't work.

The Extenders support standard 2/3-button mice (with or without a wheel). Additional buttons will not operate.

I have an enhanced keyboard with extra keys and indicators. Everything works apart from these additional features.

The extender emulates a generic PS/2 keyboard. To support other keyboards (or cascaded KVM switches), special firmware offering a *transparent mode* may be required. Please contact Technical Support to discuss your application.

General Questions

Is it possible to use a cable longer than 300m?

It might be possible to use a cable of up to 500m at lower resolutions. However, we do not recommend this and cannot guarantee that it will work.

Can the extender be daisy chained?

In certain circumstances, it is possible to cascade extenders, though we do not recommend doing so. Careful consideration needs to be given to extender setup, and the electrical environment. If you plan to cascade extenders, please contact Technical Support.

Which interconnection cable is best?

The extender will operate with either shielded (STP/FTP) or unshielded (UTP) CATx cable. However, correctly installed shielded cable is preferred, especially in electrically noisy environments, because it resists interference more strongly, limits ground potential differences, and reduces emissions. To benefit from shielded cable the shield connection *must* be maintained from end to end through any intervening patch cables, panels and RJ45 connectors.

Please note that shielded cable is advised in order to maintain regulatory EMC compliance.

Can the extender system be used between buildings?

No. Ground loops could damage the extender system and attached equipment.

Can multiple Local/Remote Units be used by swapping the interconnection cable?

Local Units provide full keyboard and mouse emulation, so it is possible to swap or switch the local-remote interconnection to create a KVM matrix-switch system. Sometimes you may need to reset the keyboard and mouse (by entering the appropriate command) after a swap or switch. Please call Technical Support before deploying such a system.

Can the extender be connected into our network?

Absolutely not. Regardless of the cable similarities, the data signals and voltages used by the extender are different from those used by Ethernet and other types of networks. Connecting the extender to a LAN hub, switch, repeater, or other network device, or exposing it to the signal levels present on network data lines may damage the extender and other devices.

Appendix A: Example Applications

This section illustrates three specific applications using SDLink extender units:

- Six remote serial touch screens with local access through a KVM switch (Figure 11).
- Information distribution system sharing a single PC at up to six remote locations (Figure 12).
- SDLink2/SW extender kit allows remote user to switch between remote and local CPUs (Figure 13).

For more information about these, or any other complex applications, please discuss suitable extension architecture with Technical Support.

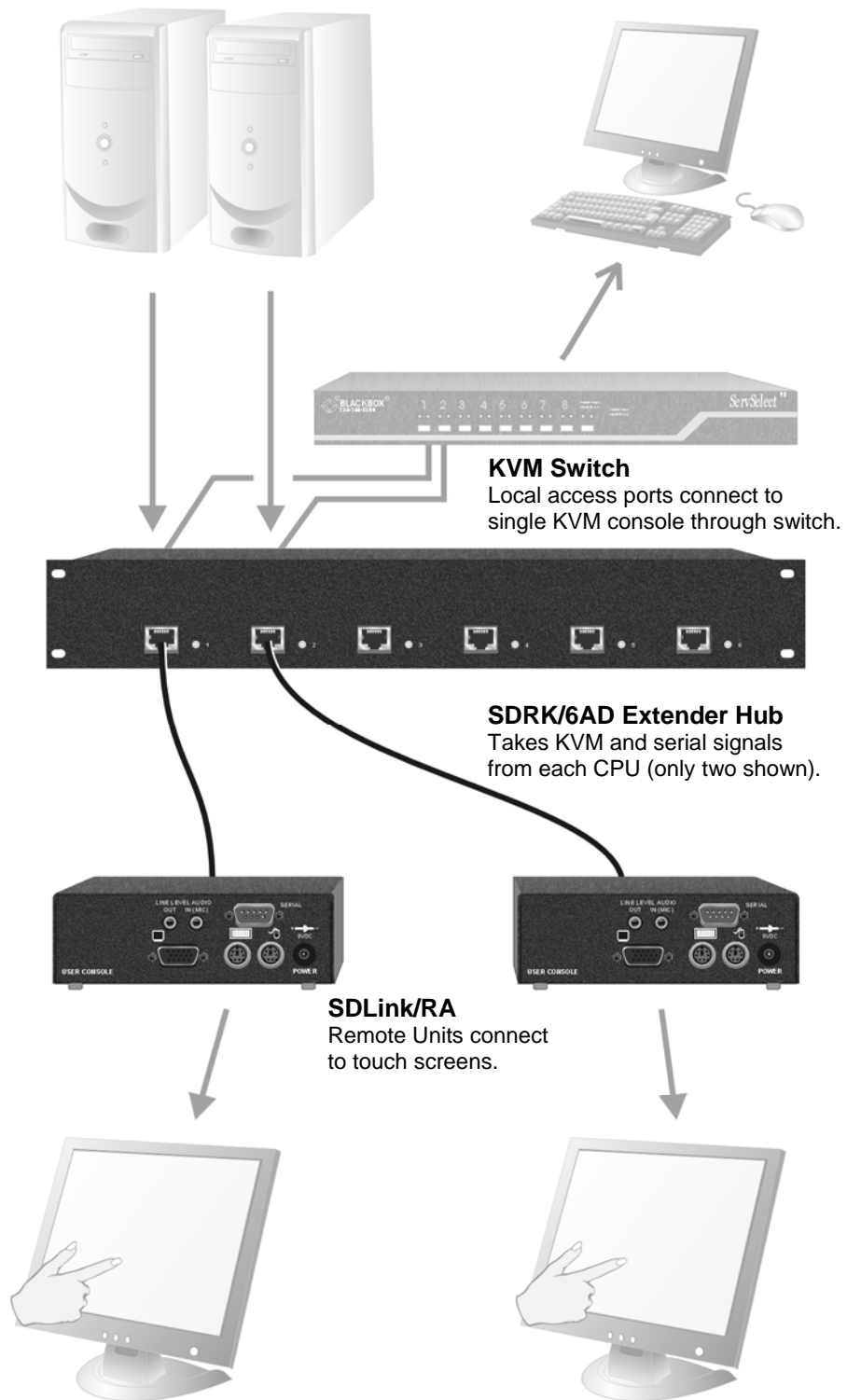


Figure 11 Touch screen network with local access to CPUs through KVM switch

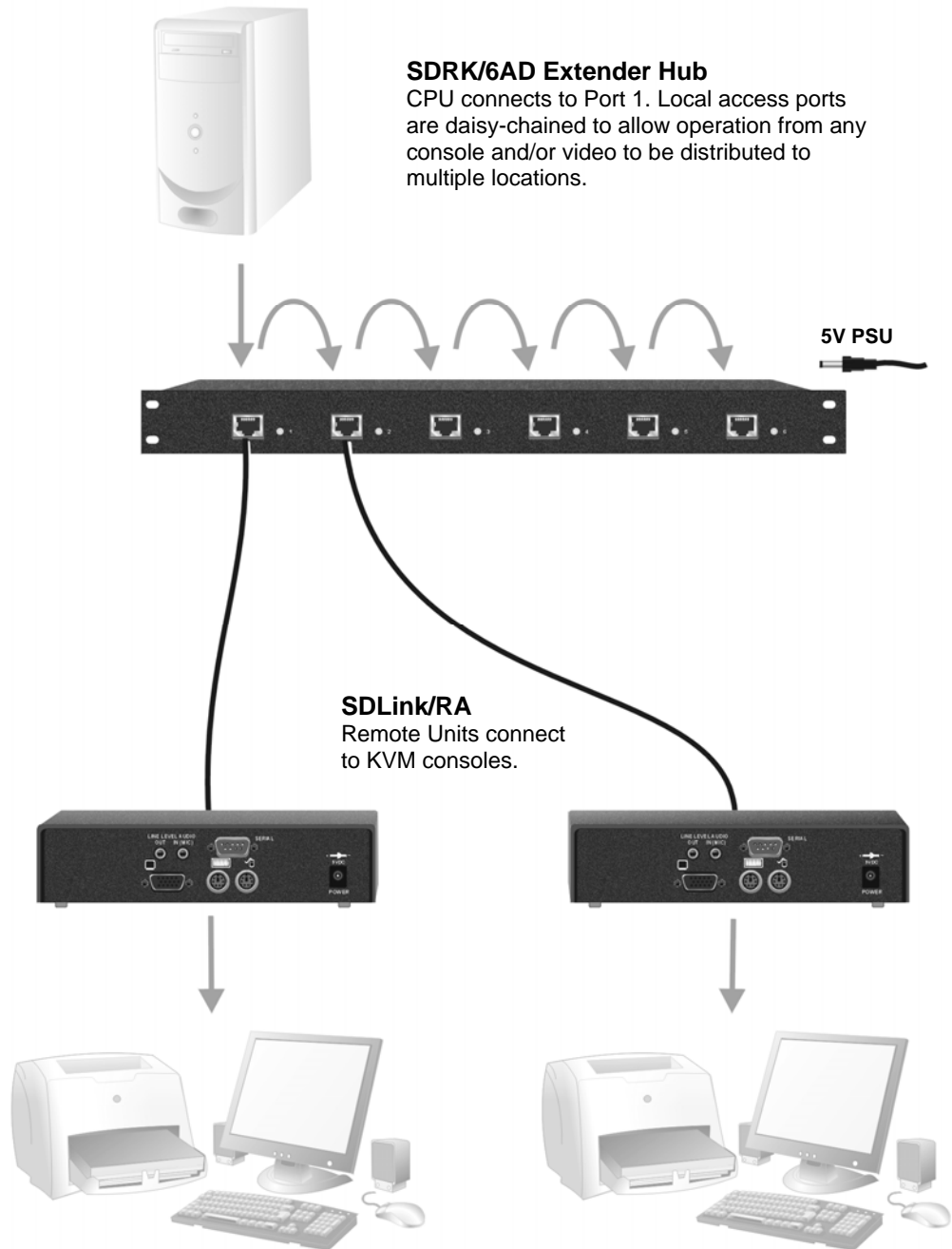


Figure 12 Information distribution system sharing a single PC

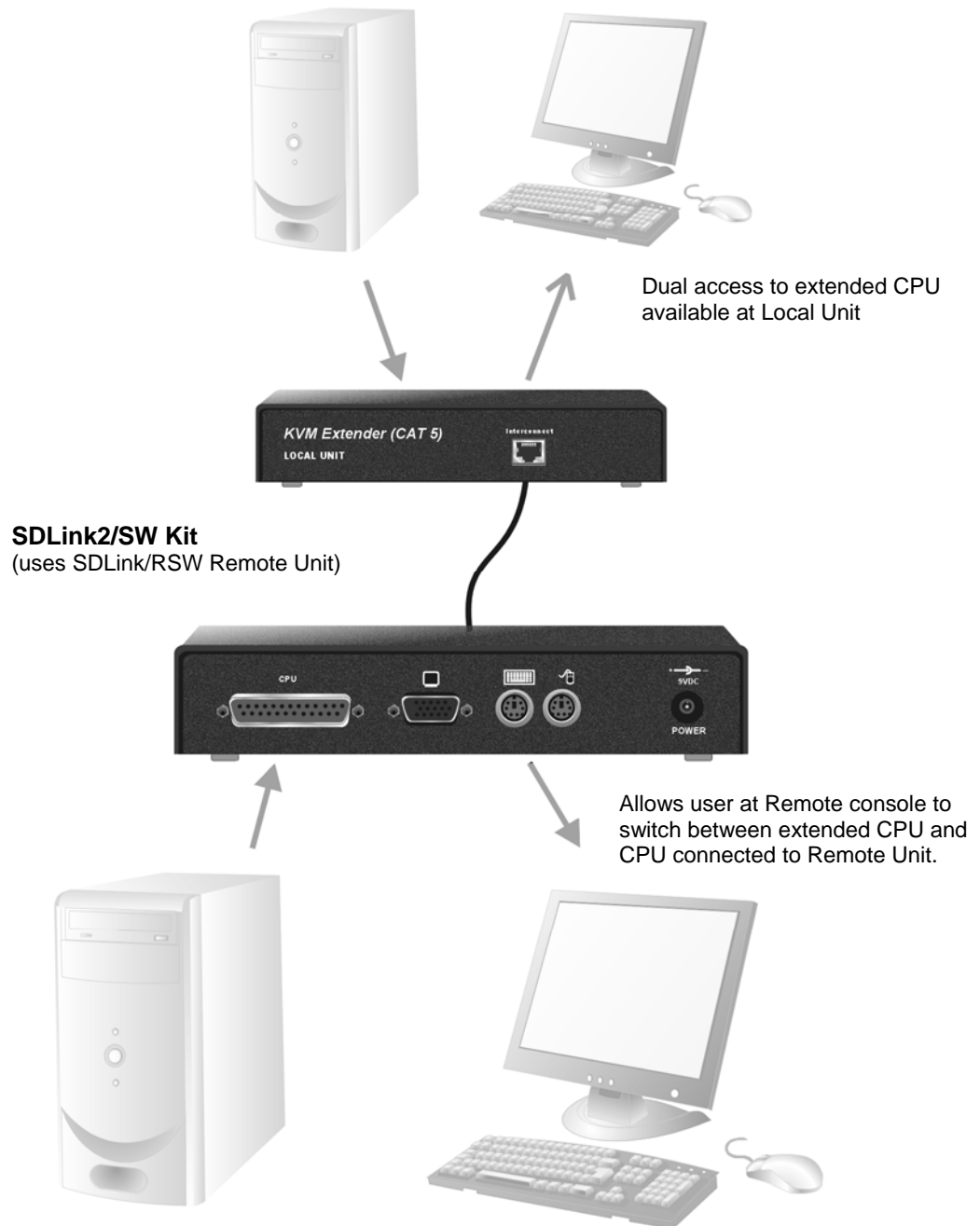


Figure 13 SDLink2/SW kit with switching Remote Unit

Appendix B: Rack Mount Options

Extender units can be mounted in a 19" rack using the mounting kit: SDBR1. The kit consists of two angled brackets.

To mount a unit:

1. Remove the two screws from one side of the unit.
2. Match up the lower pair of holes on a bracket with the vacant screw holes on the side of the unit.
3. Using the original screws, fasten the mounting brackets to the side of the unit.
4. Repeat this procedure on the other side of the unit.
5. Fasten the assembly to the rack unit.



Figure 14 SDBR1 Mounting Kit

Appendix C: Advanced Cabling Issues (Skew)

This section discusses skew and how to minimize its effects.

What is Skew?

Each color in the RGB (Red, Green, Blue) video signal is sent down a separate pair of wires in the Interconnect cable. On many cables, the twist rates differ and this leads to each color arriving at a slightly different time and therefore spreading out on the screen.

Certain CATx cables can show noticeable skew when operating at high video resolutions over longer lengths of cable (see page 22). Skew problems are best avoided by using 'low skew' cable. This is CATx cable with closely matched twist rates manufactured specially for audio/video applications. Please contact Technical Support for more information.

Correcting Skew

If a change in cable is not possible, or if you still observe color separation when using low skew cable, you could try one of the techniques described in this section:

- Optimizing pairs (to match pairs for RGB video)
- Patch cables (to minimize visible distortion)
- Extender with Skew Compensation (to delay fastest signals)

You can check the relative delays in the color signals using the test card, as described on page 23. Skew causes the color bars in the test pattern to be displayed at slightly different horizontal positions on the screen. To fully correct skew, the two color bars furthest to the left require delaying until they align with the color bar on the right (slowest).

Optimizing Pairs

This technique is a general solution for optimizing video transmission along a CATx cable. The aim is to arrange the color and data signals as shown in the following table:

<i>Pins</i>	<i>Pair</i>	<i>Signal</i>
7 & 8	Shortest Pair (Fastest)	Data
1 & 2	3 rd Longest Pair	Blue Video
4 & 5	2 nd Longest Pair	Red Video
3 & 6	Longest Pair (Slowest)	Green Video

You can measure pair lengths with a LAN cabling tester (TDR) or view pairs by stripping back a small piece of cable and viewing how tightly pairs are twisted. The most tightly twisted pair is the slowest (longest) and the loosest pair the fastest (shortest). You can also observe relative delays using the test card.

Some cables have a '3+1' construction where three pairs closely match. The fourth pair should be used for data and the other pairs sorted as in the above table. Other cables have a '2+2' construction where there are two sets of dissimilar pairs. Put red and green on one set (tightest) and blue & data on the other.

A suitable pair-swapping scheme is easily made using custom wired patch cables at each end of the Interconnect cable.

Extender with Skew Compensation

In more extreme cases, you should consider using an alternative extender with an in-built Skew Compensation feature such as the SDBX series. This allows you to set independent delay values of up to 42nS on each color signal. Contact Technical Support for details.

Patch Cable

To obtain optimal video performance with your existing setup, it is desirable to have the green signal as the reference (slowest). This is because the human eye is extremely sensitive to additional green distortion (introduced by delays).

If your system requires a large delay on the green signal, try using a crossover patch cable at each end of the link (instead of straight patch cables to connect to wall outlets). In many cases, the crossover should transfer the delay requirement to the blue signal rather than green. The human eye is much less sensitive to blue distortion and so video quality appears to be improved. The main cable should be wired according to EIA-568B as shown on page 13. Using a crossover cable (at each end) will put the green video on the orange colored pair and the blue video on the green colored pair.



EIA-568A wiring can also be used to the same effect. Contact Technical Support for details.



The alternative SDBX range of KVM Extenders has been specifically designed for the extension of high screen resolutions (1600x1200) over long CATx cables (300m). SDBX Extenders have fully integrated skew compensation and independent control of low frequency (LF) and high frequency (HF) cable equalization.

Appendix D: Audio/Serial Ports: Operation & Multi-Port Configuration

This appendix describes audio & serial interface operation for:

- SDLink1/AU
- SDLink2/AU
- SDLink/RA

These extender products contain daughter boards that allow bi-directional stereo audio and a full-duplex serial data link to be sent across the CAT5/5e interconnection cable in addition to PS/2 keyboard, mouse and video.



When a dual access Local Unit is in a Private Mode session, audio transmission to the Remote Unit are stopped but the serial link remains active.

Set up and Operation

No setting up or user adjustments are required.

The Remote Unit's serial port is wired as DTE - the same as that on a PC. To connect a serial printer or other DTE (rather than DCE device) to the Remote Unit, you will need a Null-Modem crossover cable between the Remote Unit and the printer. Select Xon/Xoff software flow control on the printer and PC.

A serial touch screen may be plugged directly into the Remote Unit.

Please note that on dual access Local Units, the serial link is always active.

Handling Multiple Serial Devices

The extender's serial interface transmits/receives six signals (3 signals in each direction).

Normally, four of these signals are used for hardware handshaking (in addition to TX & RX). However, because each handshaking line can support signals up to 19,200 Baud it is possible to configure the serial interface to handle up to three simple 2-wire (Tx/Rx only) serial links.

To do this, you will need to construct a custom breakout cable. Please contact Technical Support for further information.

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 either way across the link (simultaneously).

No setup is required unless a microphone is connected to the Remote Unit.

Connect the extender as follows:

- Take the line-level output from your sound card (green connector) and connect to 'Line In' on the Local Unit.
- Connect 'Line Out' on the Remote Unit to a set of powered speakers.

There is no output on the Local Unit to connect a set of speakers. If you require a set of speakers at the Local console, use a 3.5mm stereo socket doubler on the audio input to the extender.

Using a Microphone

A microphone may be plugged into the 'Line In' connector on the Remote Unit.

There are two ways of setting up a microphone:

- The Local Unit's 'Line Out' connection should normally be wired to the microphone input (Pink) on your sound card. The sound card should then be set up to provide additional amplification (+17dB). This is the preferred connection method.
- Alternatively, the Remote Unit itself can provide microphone amplification. To set this, open up the Remote Unit and locate the jumper labeled 'MIC' on the daughter board. Connect this jumper across the pins. The Local Unit's 'Line Out' connection should then be wired to 'Line In' (Blue) on your sound card.

If your microphone is already amplified, follow the second method but DO NOT install the amplification jumper in the Remote Unit.

Appendix E: Obtaining Technical Support

If you have any problems or questions, contact your dealer for technical support.

To enable us to provide efficient and effective support, please make a note of the following information before you call:

- The KVM extender's firmware revision level. This is printed on the base of both the Local and Remote Units:

Version Number Format: *xxSyy/zz*

xx is the hardware revision number

yy is the firmware revision number

zz is the auxiliary revision number

- The nature and duration of the problem and when it occurs.
- The components involved in the problem including manufacturer and model numbers.
- Results from any testing you have done.

If you need to return a unit for repair, please package carefully, preferably using the original box. Include everything you received with the unit. Before returning, contact Technical Support to get a Return Authorization (RA) number.



Do not attempt to repair the units. The KVM extender set contains no user-serviceable parts.

Appendix F: Specifications

Video

Maximum Resolution	1600x1280@60Hz up to 65m 1280x1024@75Hz up to 120m 1024x768@75Hz up to 300m Operation at higher resolutions/refresh rates may be possible at shorter distances
Video Compatibility	VGA to UXGA, RGB
Video I/O	0.7V P-P
Video Compensation	3-stage continuously variable.
Video Coupling	DC
Sync I/O	H/V or composite TTL signal levels Sync Polarity is preserved
Video Input Connectors	HD15 (Male) DB25 Female (<i>SDLINK/RSW - CPU</i>)
Video Output Connectors	HD15 (Female)

Keyboard and Mouse

KB Compatibility	PC/AT, PS/2
Mouse Compatibility	Standard PS/2 two/three button Standard wheel mice Logitech 3-button PS/2
KB/Mouse Connectors (CPU)	6-Pin MiniDIN Socket DB25 Female (<i>SDLINK/RSW - CPU</i>)
KB/Mouse Connectors (Device)	6-Pin MiniDIN Socket

Serial Interface

Max Baud Rate Supported	19.2K Baud
Serial Data Format	Transparent
Signals Transferred	TX, RX, RTS, CTS, DTR, DSR
Local Unit Connector	DB9 Female (DCE)
Remote Unit Connector	DB9 Male (DTE)

Audio Interface

Description	Bi-directional stereo audio link
Transmission method	Digitized virtually CD quality audio (16-bit, 38.4kHz)
Signal levels	Line level (4 Volts Pk-Pk maximum)
Input Impedance	47k Ω
Local Unit Connectors	2x3.5mm stereo jack socket (Line In & Line Out)
Remote Unit connectors	2x3.5mm stereo jack socket (Line/Mic In & Line Out)
Microphone Support	Microphone may be connected to Remote Unit Pullup resistor provides bias for condenser microphone Option to set microphone amplification to +17dB

Power Requirements

Local Unit	5V at up to 200mA supplied by PCs PS/2 keyboard port. External PSU may also be connected through keyboard port
Remote Power Supply	9V, 2A (18W) Regulated (certified to all relevant safety standards) Universal IEC Input Isolated Output 2.5mm DC Jack (Center Positive)

Size and Shipping Weight

<i>SDLink/RSW</i>	Remote Unit: 202x100x36mm Shipping Weight: 1.08 Kg
<i>SDLink/RA</i>	Remote Unit: 202x100x44mm (1U) Shipping Weight: 1.14 Kg
<i>SDLink1/AU</i>	Local Unit: 202x100x44mm (1U) Remote Unit: 202x100x44mm (1U) Shipping Weight: 2.53 Kg
<i>SDLink2/AU</i>	Local Unit: 202x100x44mm (1U) Remote Unit: 202x100x44mm (1U) Shipping Weight: 2.58 Kg
<i>SDLink2/SW</i>	Local Unit: 202x100x36mm Remote Unit: 202x100x36mm Shipping Weight: 2.48 Kg

Environmental

<i>Operating Temperature</i>	0 to 40 °C
<i>Storage Temperature</i>	-30 to 65 °C
<i>Relative Humidity</i>	5-90% non-condensing
<i>Chassis Construction</i>	Fully shielded. Black painted steel

Appendix G: EU Regulatory Compliance

Warning

This is a class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

This product complies with the following harmonized standards for Information Technology Equipment: EN55022:2006 (Class A), EN55024:1998 + A1:2001 + A2:2003.

To maintain compliance the use of correctly installed shielded (STP/FTP) interconnection cable is advised. Only use CPU cables and power supplies provided (or recommended) for use with this product.

When used in environments that have high levels of electromagnetic interference or excessive power ground noise, you may experience disturbances to video and/or data transmission. If this is the case, please refer to the Troubleshooting section of the User Guide for further information, or contact Technical Support. In electrically noisy environments, the use of shielded (STP/FTP) rather than unshielded (UTP) interconnection cable is recommended.



Appendix H: North American Regulatory Compliance

This equipment has been found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Shielded cables must be used with this equipment to maintain compliance with radio frequency energy emission regulations and ensure a suitably high level of immunity to electromagnetic disturbances.

All power supplies are certified to the relevant major international safety standards.

Appendix I: Disclaimer

While every precaution has been taken in the preparation of this manual, the manufacturer assumes no responsibility for errors or omissions. Neither does the manufacturer assume any liability for damages resulting from the use of the information contained herein. The manufacturer reserves the right to change the specifications, functions, or circuitry of the product without notice.

The manufacturer cannot accept liability for damage due to misuse of the product or due to any other circumstances outside the manufacturer's control (whether environmental or installation related). The manufacturer shall not be responsible for any loss, damage, or injury arising directly, indirectly, or consequently from the use of this product.