User Guide

November 2009

CAT5/5e KVM Extender Range
Standard and Serial Models

Standard Kits

Model SDLink1
Model SDLink2
Model SDLink1/SU
Model SDLink2/SU

Serial Kits

Model SDLink1/S
Model SDLink2/S

Remote Units

Model SDLink/R
Model SDLink/RS
Model SDLink/RSU

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 CAT5/5e link interface (RJ45) to any other products, especially telecommunications or network equipment.**
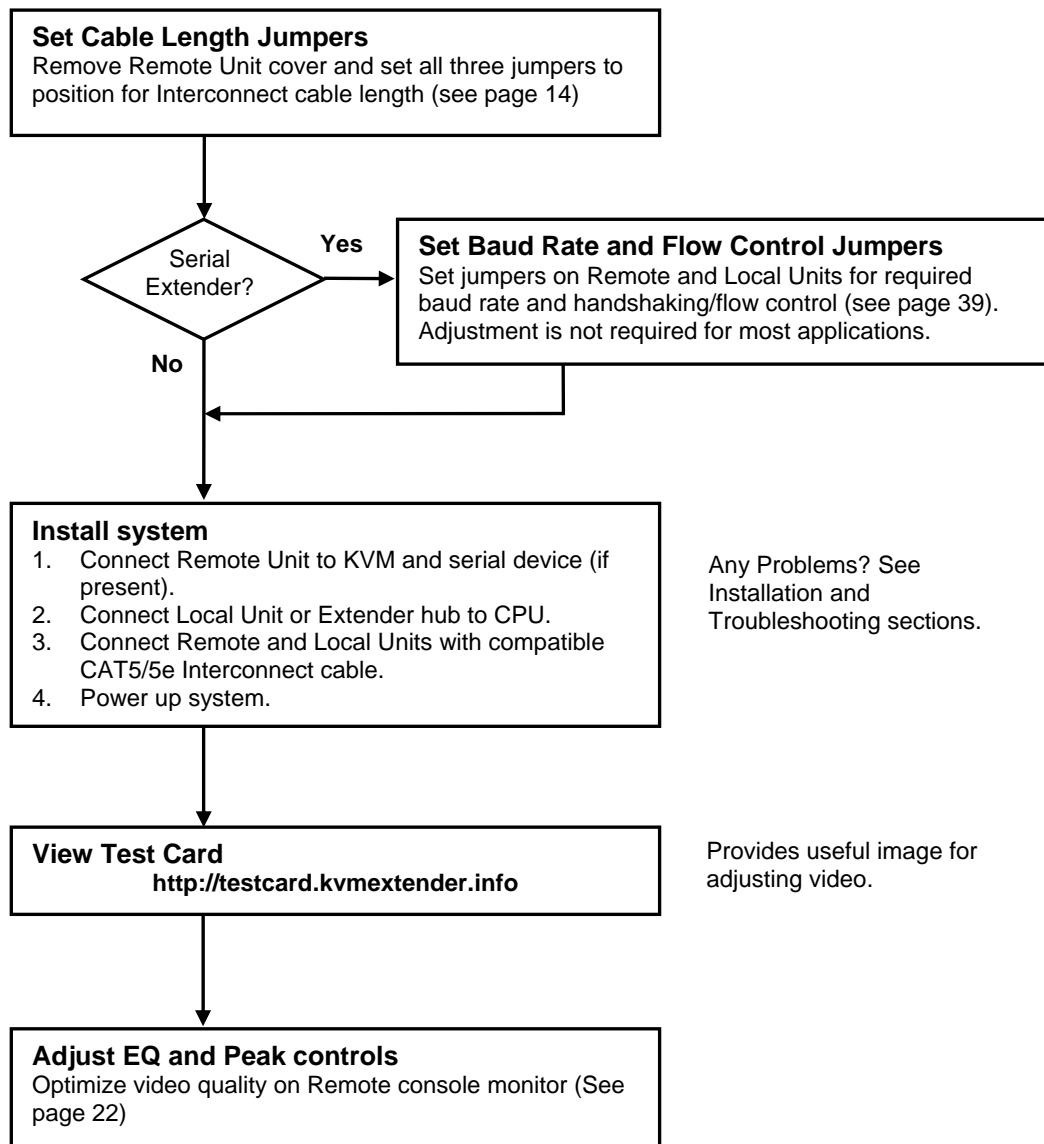
Contents

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.

Set Cable Length Jumpers
Remove Remote Unit cover and set all three jumpers to position for Interconnect cable length (see page 14)

Serial Extender?

Yes

Set Baud Rate and Flow Control Jumpers
Set jumpers on Remote and Local Units for required baud rate and handshaking/flow control (see page 39). Adjustment is not required for most applications.

No

Install system
1. Connect Remote Unit to KVM and serial device (if present).
2. Connect Local Unit or Extender hub to CPU.
3. Connect Remote and Local Units with compatible CAT5/5e Interconnect cable.
4. Power up system.

Any Problems? See Installation and Troubleshooting sections.

View Test Card
     http://testcard.kvmextender.info

Provides useful image for adjusting video.

Adjust EQ and Peak controls
Optimize video quality on Remote console monitor (See page 22)

2. Overview

Introduction

The SDLink products described in this manual enable high-resolution video, PS/2 keyboard and mouse or SUN keyboard, stereo audio, and serial port signals to be communicated up to 300m over over Category 5, 5e or higher 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 CAT5/5e cable (Figure 1).

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

- Serial transmission: serial COM port for asynchronous RS232 devices operating at 1200, 9600 or 19,200 bps (8 data bits, no parity, 1 stop bit).

- Dual access: allowing a second user console at the Local Unit.

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 devices.
Dual Access	A system allowing connection of local and remote user consoles.

Local Access
SDLink2, SDLink2/S and
SDLink2/SU kits only.

LOCAL Unit

KVM extension over CAT5/5e
cables up to 300m.

REMOTE Unit

Serial Transmission
Kits: SDLink1/S, SDLink2/S
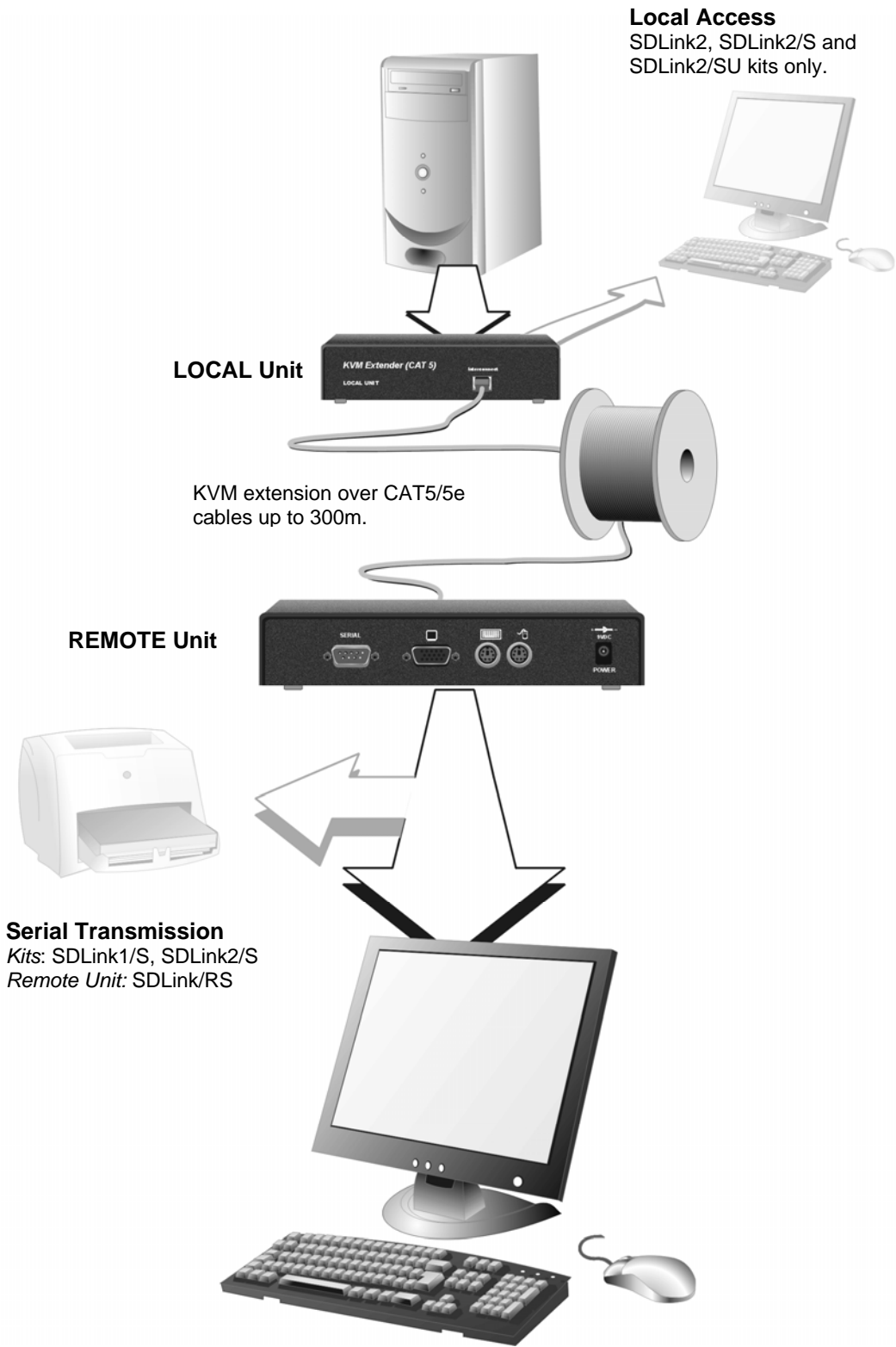*Remote Unit:* SDLink/RS

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
  1280x1024@75Hz up to 120m
  1024x768@75Hz up to 300m
- 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 (except SUN models).
- Intelligent PS/2 keyboard and mouse (or SUN keyboard) emulation ensures PCs do not lock-up and allows peripherals to be hot-plugged.
- Dual-Access models allow local or remote operation.
- *Serial versions only*: Serial port enables any serial device to be extended (at 1.2K, 9.6K or 19.2K Baud).
- Local Units are normally powered directly by the PC (or switch).
- Private Mode on dual-access models allows local user to lock out remote.
- *SUN versions only*: Private mode on dual access models also allows remote user to lock out local.
- Rack mount options available.
- Surge protection on each RJ45 port.
- SDLink Remote Units (except SDLink/RSU) are fully compatible with SDRK Rack Hubs.
- CPU cables included (certain models).

Product Range

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

KVM Extension kits	
SDLink1	Single Video Channel, PS/2 KB & Mouse Local Unit (Single Access) + Remote Unit
SDLink2	Single Video Channel, PS/2 KB & Mouse Local Unit (Dual Access) + Remote Unit
SDLink1/SU	Single Video Channel, SUN KB/Mouse Local Unit (Single Access) + Remote Unit
SDLink2/SU	Single Video Channel, SUN KB/Mouse Local Unit (Dual Access) + Remote Unit
KVM and Serial Extension kits	
SDLink1/S	Single Video Channel, PS/2 KB & Mouse, Serial Local Unit (Single Access) + Remote Unit
SDLink2/S	Single Video Channel, PS/2 KB & Mouse, Serial Local Unit (Dual Access) + Remote Unit
Remote Units only	
SDLink/R	Single Video Channel, PS/2 KB & Mouse
SDLink/RS	Single Video Channel, PS/2 KB & Mouse, Serial
SDLink/RSU	Single Video Channel, SUN KB/Mouse

Compatibility

Interface Compatibility

- **PS/2 Keyboard:** PS/2 models are compatible with all standard keyboards. Certain keyboards with enhanced features may also be supported with custom firmware.

- **PS/2 Mouse:** PS/2 models are 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)*.

- **SUN keyboard:** SDLink1/SU, SDLink2/SU and SDLink/RSU only.

- **Serial:** User selectable baud rates: 1.2K, 9.6K or 19.2K.

- **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 43).

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).

Family	*SDLink*	*SDBX*	*Mini Extenders*	*Local Hubs*
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			
SUN	**SDLink1/SU**			
	SDLink2/SU			
	SDLink/RSU			

How to Use This Guide

This guide describes the installation and configuration of Standard and Serial members 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 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 cables. 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 21.

- For further information, refer to **Appendix C: Advanced Cabling Issues (Skew)**, page 37.

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 42.

- Extender Remote Unit.
- 9V DC universal power supply for Remote Unit.
- Extender Local Unit.
  Only included in extender kits.
- *PS/2 versions:* 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.
  Not included with individual Remote Units.
- *SUN versions:* 1.8m VGA (male-to-female) cable and 1.8m MiniDIN 8-pin (male-to-male) cable
  Not included with individual Remote Unit.
- Serial cable (1.8m, DB9 male/female connectors, 1:1 connections).
  Models: SDLink1/S, SDLink2/S 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.

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

* 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 37).*

Remote Unit Configuration

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).
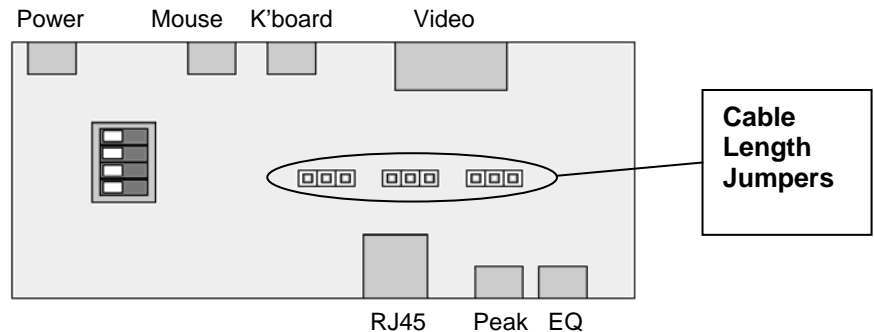

Figure 2   Location of cable length jumpers on Remote Unit's main circuit board

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 some of the other jumper settings or DIP switch options:

Serial Port Setup

If you are installing an SDLink1/S or SDLink2/S extender kit, or SDLink/RS Remote Unit, you may want to configure the unit(s) for serial communication at this point. Please refer to **Appendix D: Serial Port Setup and Operation** on page 39.

Scroll Lock Function

PS/2 versions of the SDLink extenders redefine the function of the Scroll Lock key. If necessary, you can restore the normal Scroll Lock key action. See page 24 for details.

Dual Access Setup

If your Extender system is capable of dual access (SDLink2, SDLink2/S or SDLink2/SU kits), you may want to change some of the default DIP switch settings. See page 27 for details.

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 (Standard), Figure 4 (SUN) or Figure 5 (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 serial devices.

   See **Appendix D: Serial Port Setup and Operation**, page 39 for information about the configuration of extender units for serial communication.

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

   SUN Versions only: *During power-up, the CPU seeks a language ID code from the Remote Unit. If the Remote Unit is not connected when you power up the Extender system, the Local Unit reports a US keyboard layout by default. To ensure proper keyboard language selection, connect the keyboard to the Remote Unit; power on the Remote Unit and leave it powered during the rest of the installation procedure.*

   ⚠ **Only use the power supply originally supplied with this equipment or a manufacturer approved replacement.**
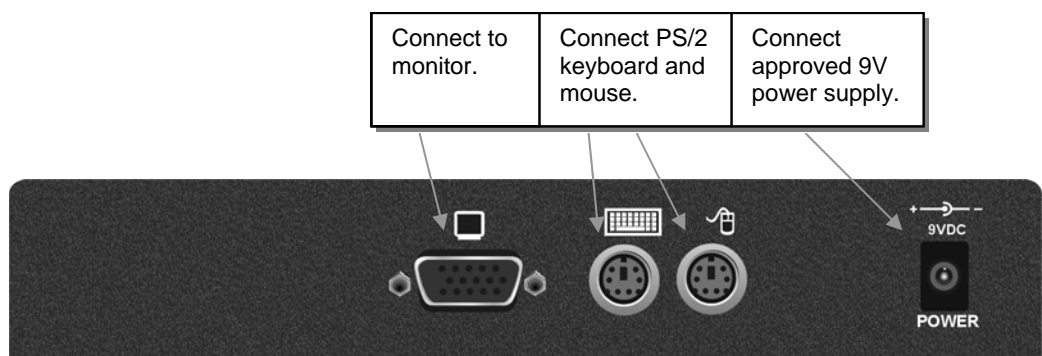
Figure 3   SDLink Standard Remote Unit (SDLink/R - also supplied with SDLink1 and SDLink2 kits) – rear view

Connect to monitor.

Connect to SUN keyboard.

Connect approved 9V power supply.
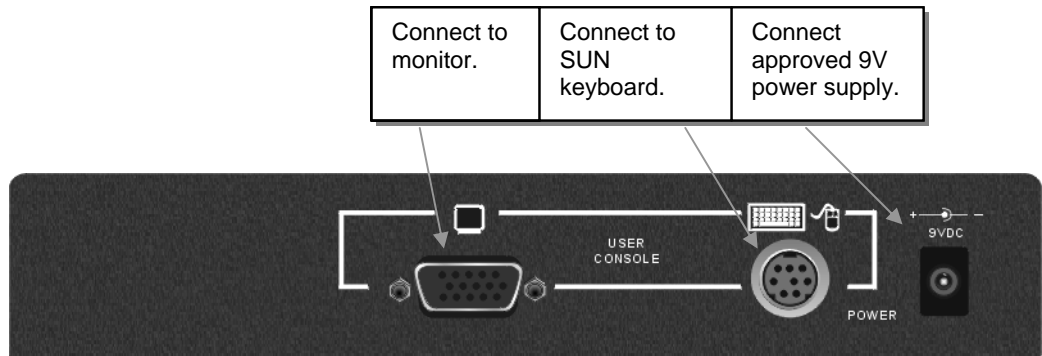
Figure 4   SDLink SUN Remote Unit (SDLink/RSU - also supplied with SDLink1/SU and SDLink2/SU kits) – rear view

Connect to serial device, for example, a touch screen.

Connect to monitor.

Connect PS/2 keyboard and mouse.

Connect approved 9V power supply.
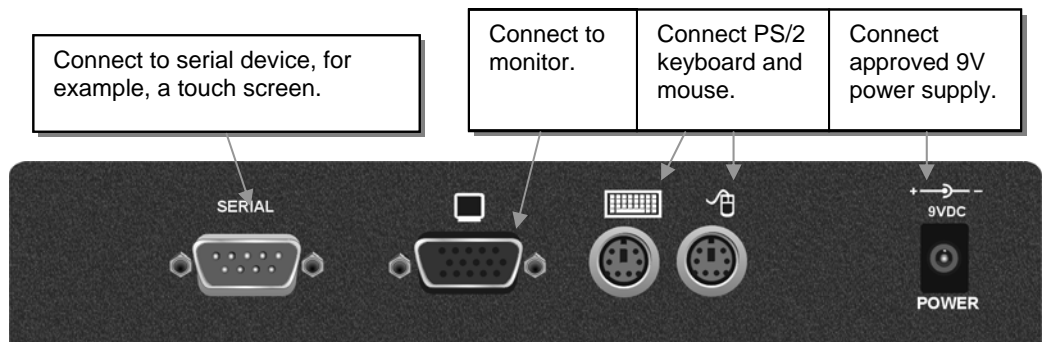
Figure 5   SDLink Serial Remote Unit (SDLink/RS – also supplied with SDLink1/S and SDLink2/S kits) – rear view

Interconnect – carries video and data signals. Connect to Interconnect port on Local Unit using CATx cable.

Peak – adjusts image brightness

EQ– compensates video for smearing or over-sharpness
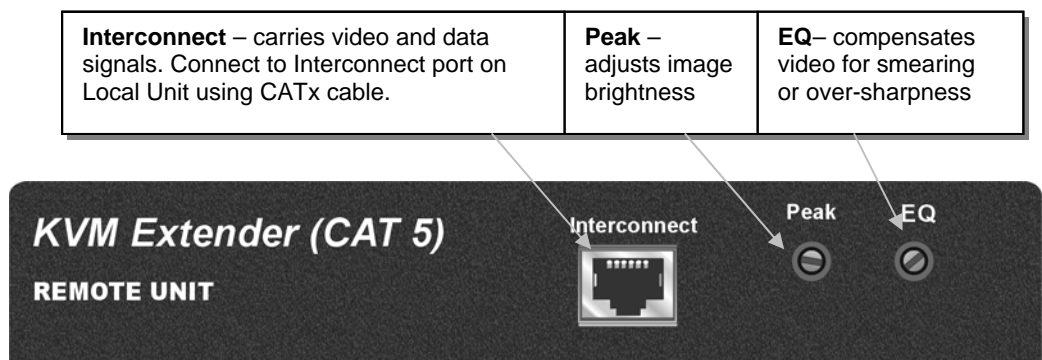
Figure 6   SDLink Remote Unit - front view

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 7 (Standard), Figure 8 (SUN) or Figure 9 (Serial).

   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 a serial-enabled unit, connect the supplied serial cable between the serial port on the computer and the Local Unit.

5. Connect the CATx cable to the INTERCONNECT socket on the front of the Local Unit (see Figure 10).

6. Power up the PC.

   > *The Local Unit normally takes power through the PCs 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.*
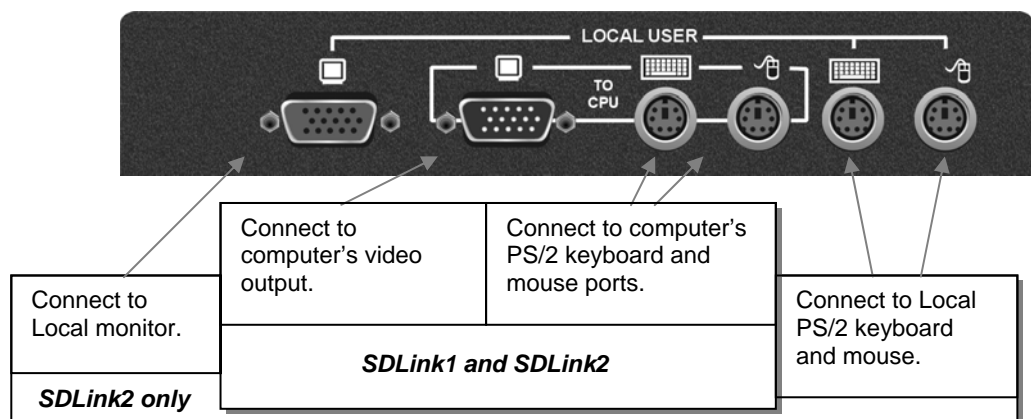
Figure 7   SDLink Standard Local Unit - rear view

Connect to computer's video output.

Connect to computer's SUN keyboard port.

Connect to Local monitor.

SDLink1/SU and SDLink2/SU

Connect to SUN keyboard

SDLink2/SU only
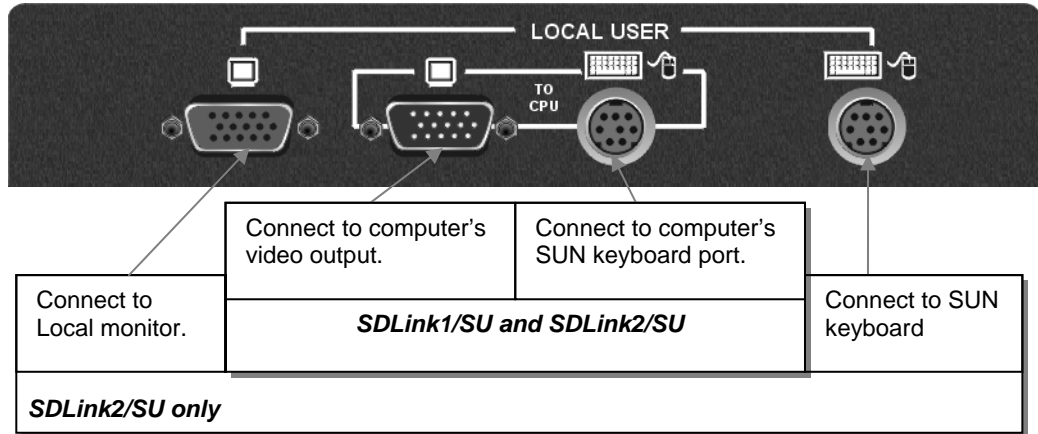
Figure 8   SDLink SUN Local Unit - rear view

Connect to Local monitor.

SDLink2/S only

Connect to Local PS/2 keyboard and mouse.

Connect to serial port on computer.

Connect to computer's primary video, PS/2 keyboard and mouse ports using supplied cable.

SDLink1/S and SDLink2/S
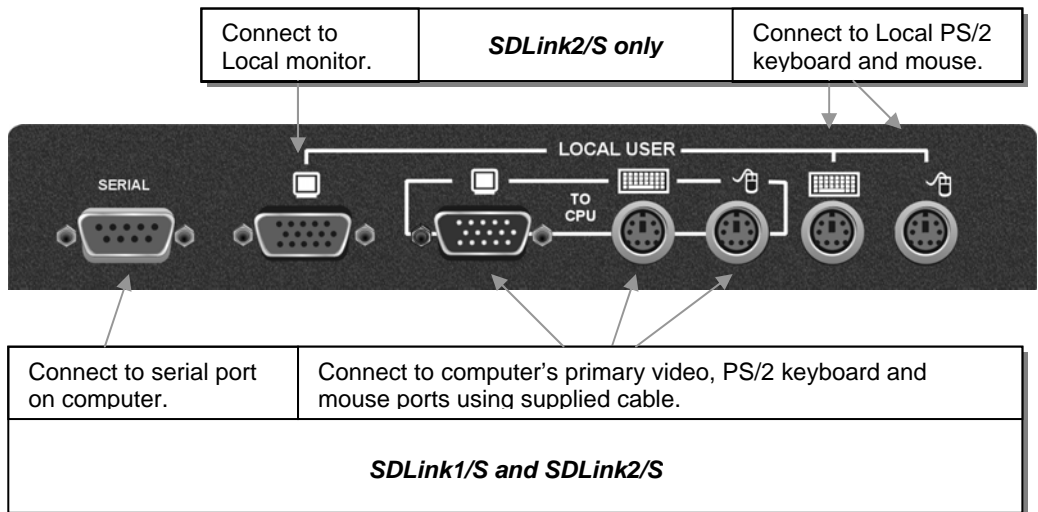
Figure 9   SDLink Serial Local Unit - rear view

INTERCONNECT – carries video and data signals. Connect to CATx cable connected to INTERCONNECT on Remote Unit.
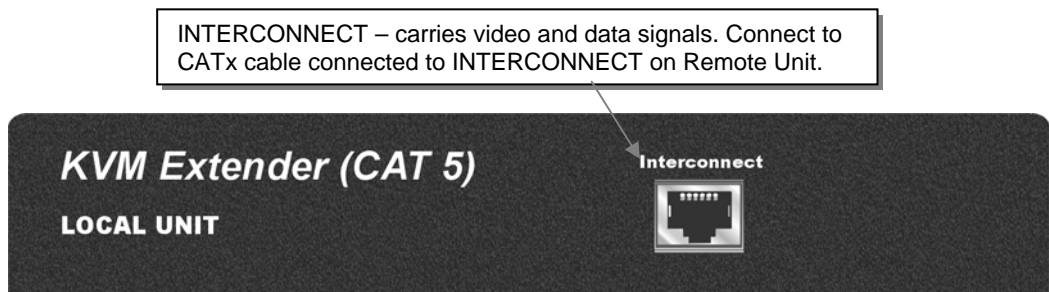
Figure 10   SDLink Local Unit – front view

Connection to Rack Mount Hub Local Units

PS/2 SDLink Remote Units are compatible with SDRK Rackmount Extender Hub Local Units belonging to the same family:

SDLink Remote Units	Compatible Local Rack Hubs
SDLink1, SDLink2, SDLink/R	SDRK/6, SDRK/6D, SDRK/12
SDLink1/S, SDLink2/S, SDLink/RS	SDRK/6S, SDRK/6SD

A simple example of the use of a rackmount hub Local Unit is shown in Figure 11. For more complex examples showing the use of Rack Extender Hubs with SDLink Remote Units in efficient ways, see **Appendix A: Example Applications**, page 33.

Individual Rack Hub operation is not covered in this guide. Please refer to the documentation supplied with your Rack Hub Unit.
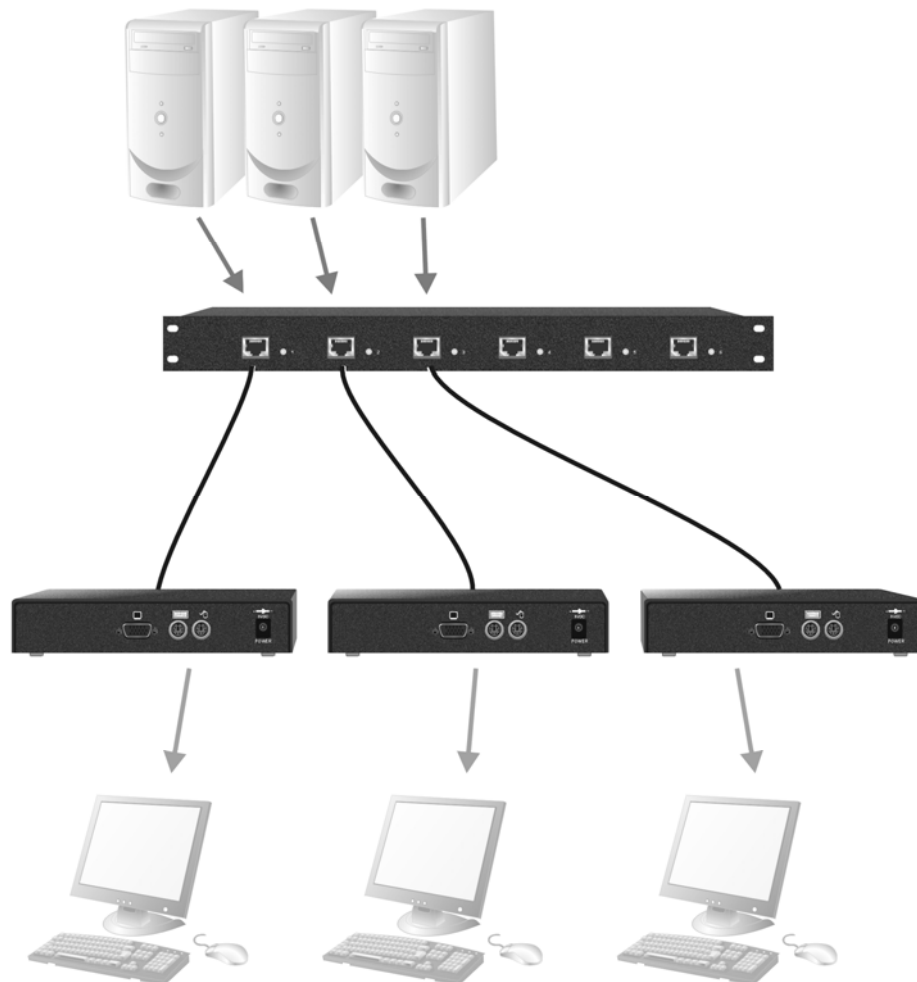
Figure 11   Simple system using SDRK/6 Hub and SDLink/R Remote Units

4. *Remote Unit Configuration & Operation*

Catx cables are specifically designed for networking applications and not for transmitting analog video. Your CATx 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 long 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 37).*

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 12) 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.
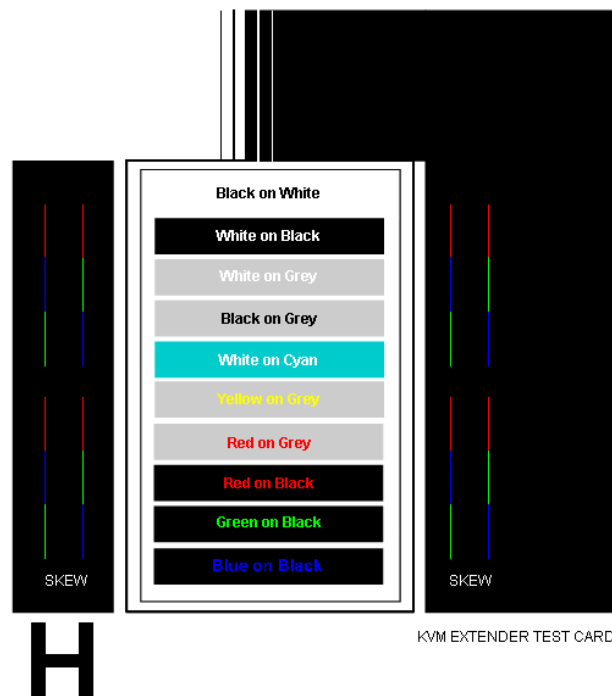
Figure 12   On-line test card available at http://testcard.kvmextender.info

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 a flat panel monitor 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

Scroll Lock Function

Standard and Serial SDLink Remote Units redefine the function of the Scroll Lock key for system commands.

Press the Scroll Lock key to reset the keyboard and mouse. You may need to do this if a hot-plugged keyboard or mouse does not initialize correctly.

You can restore normal Scroll Lock activity by setting switch 4 on the SW1 DIP switch block to OFF (see Figure 13). If you do this, and then need to reset a console's keyboard and mouse, you will need to re-power the Remote Unit. This also disables Private Mode operation in dual access systems (see page 27).
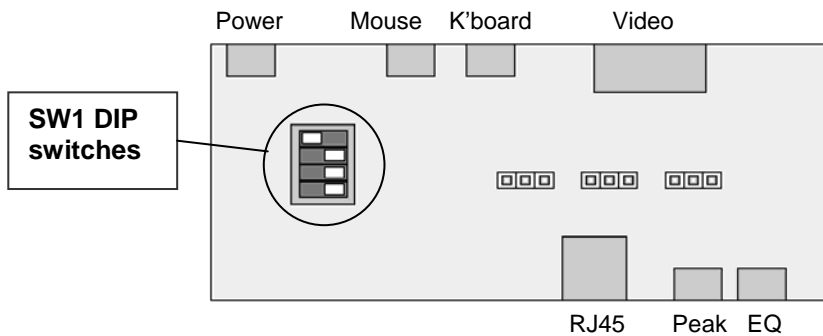
DIP Switch settings

	OFF	ON
Private Mode Video Disable *SUN versions: disables private mode*	YES	NO
Inactivity Timeout Period	15s	2s
Console Switch	Keyboard or Mouse	Keyboard Only
Scroll Lock Function *PS/2 versions only* *SUN versions - not used*	Normal	Private Mode/ K'board/Mouse Reset Mouse Recovery

Figure 13   Remote Unit DIP switches:
Switches 1, 2 and 3 control the implementation of Private mode and dual access functions on the Local Unit (see page 27).

Remote Console Commands

Standard and Serial Remote Units use the Scroll Lock key for system commands. The following table lists the commands available at a remote console:

Command	Key Sequence
Reset Keyboard and Mouse	*PS/2 versions: <Scroll Lock>* *SUN versions: <Right Shift> + <Scroll Lock>*

Reset the remote console's keyboard and mouse. You may need to do this if you have plugged a keyboard or mouse into a powered Remote Unit and it has not initialized correctly.

Command	Key Sequence
Mouse Recovery *PS/2 versions only*	*Hold down **Left and Right Mouse buttons** then* *press and release <Scroll Lock>*

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. *Use this command with care*.

Command	Key Sequence
Activate Console *Dual Access models only*	*Any key or (optionally) mouse action*

Gain control of CPU from local console. Only operates if inactivity timeout period has expired.

Command	Key Sequence
Enter Private Mode *SDLink2/SU only*	*<Left Control> + <Scroll Lock>*

Enter/Exit Private Mode at SUN remote console.

5. *Local Unit Operation*

Overview

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 port operation, see **Appendix D: Serial Port Setup and Operation**, page 39.

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.

Operation of Dual Access Local Units

Models SDLink2, SDLink2/S and SDLink2/SU offer dual access with a second console at the Local Unit. 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*. Thereafter, any keyboard (and, optionally, mouse) action at the other console switches console activity.

Inactivity Timeout Period

You can set the Inactivity Timeout Period to 2 seconds (the default) or 15 seconds using switch 2 on the SW1 DIP switch block on the Remote Unit's main circuit board (see Figure 13).

Console Switching Method

Switch 3 on the same block (see Figure 13) determines the method of switching between consoles. The default method uses any detected keyboard action only. By moving switch 3 to the OFF position, the system will also switch consoles if there is any detected mouse movement at the inactive console.

> *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/S only**: *Serial communication across the Extender system continues even when the local console is active or in a Private Mode session.*

Scroll Lock Function

The Remote Unit supplied with SDLink2 and SDLink2/S systems redefines the function of the Scroll Lock key (on both the local and remote console keyboards) for system use (see page 24).

You can restore normal Scroll Lock activity by setting switch 4 on the SW1 DIP switch block on the Remote Unit's main circuit board to ON (see Figure 13). In Dual Access systems, this will disable Private Mode operation. In addition, if you need to reset/recover a console's keyboard and mouse, you may need to reboot the CPU or repower the Remote Unit.

SUN versions: SDLink2/SU uses key combinations for system commands (see page 25). Switch 4 on the SW1 DIP switch block is not used.

Command Summary

On a dual access system, you can issue the following commands at the local console:

Command	Key Sequence
Activate Console	Any key and (optionally) mouse action

Gain control of CPU from remote console. Only operates if inactivity timeout period has expired.

Command	Key Sequence
Start/End Private Mode	*PS/2 versions: <Scroll Lock>* *SUN versions: <Left Control> + <Scroll Lock>*

Start/End 'Private Mode' at local console. This prevents the remote console from being used even if the inactivity timeout period expires.

During a Private Mode session, the extender system:

- Lights the Scroll Lock LEDs on the local and remote keyboards
  SUN versions: Scroll Lock LED flashes.

- Locks the remote console's keyboard and mouse.

- Displays a blank image on the remote console's monitor. You can disable this feature by setting switch 1 on the SW1 DIP switch block on the Remote Unit's main circuit board to ON. In this case, the remote monitor will continue to show PC activity during a Private mode session.

To end a Private Mode session, repeat the key sequence on the local console. With non-SUN versions, remember that each press of the local console's Scroll Lock key also resets the keyboard and mouse.

Command	Key Sequence
Reset Keyboard and Mouse	*PS/2 versions: <Scroll Lock>* *Press key twice to avoid starting/stopping Private Mode session* *SUN versions: <Right Shift> + <Scroll Lock>*

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.

Command	Key Sequence
Mouse Recovery *PS/2 versions only*	*Hold down **Left and Right Mouse buttons** then press and release <Scroll Lock>*

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. *Use this command with care*.

6. *Troubleshooting*

Video

The image is not sharp, or is badly smeared.

Have you adjusted the video equalization? Follow the instructions on page 21.

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 a low skew cable?

See **Appendix C: Advanced Cabling Issues** (Skew), page 37.

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 26.

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.
>
> Note: DDC emulation is not provided on SUN extender models.

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.

Serial

My serial device does not function.

> Check that the data rates of the device, extender units and PC COM port are all the same.
>
> Check the type of flow control used by the device and CPU. The extender supports various combinations of 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.
>
> Certain serial devices (such as Wacom graphics tablets) dynamically change their baud rates. These products are not generally supported (although you may want to ask the device manufacturer if a fixed rate driver is available). You may also want to consider using a KVM Extender supporting Audio/Serial range as these have a transparent serial port (up to 19.2Kb).

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 (see page 25).
> Issue the Mouse Recovery command up to three times (see page 25).
> 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 (see page 25).

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:

- Simple system using SDRK/6S Hub and SDLink/RS Remote Units to extend serial and KVM for up to six PCs (Figure 14).
- Two remote serial touch screens with local access through a KVM switch (Figure 15) using two SDLink2/S kits.
- Information distribution system sharing a single PC at up to six remote locations (Figure 16).

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

SDRK/6S Extender Hub
Takes primary video, keyboard, mouse and serial signals from each CPU (only two shown).

SDLink/RS
Remote Units connect to KVM console and serial device.
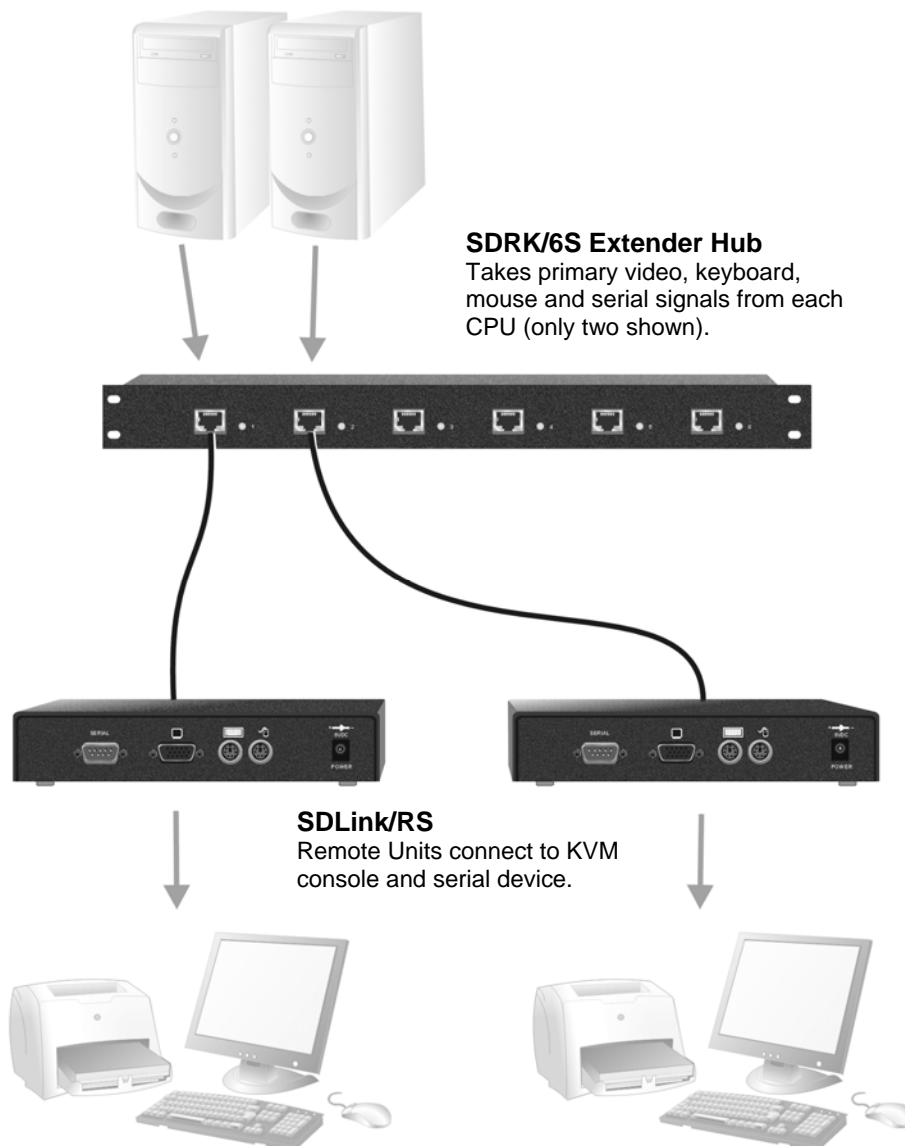
Figure 14   Serial extension for up to six CPUs

Local Units
Take KVM and
serial signals from
two CPUs.

KVM Switch
Local access ports
connect to single
KVM console
through switch.

Two SDLink2/S kits

Remote Units
Connect to touch screens.
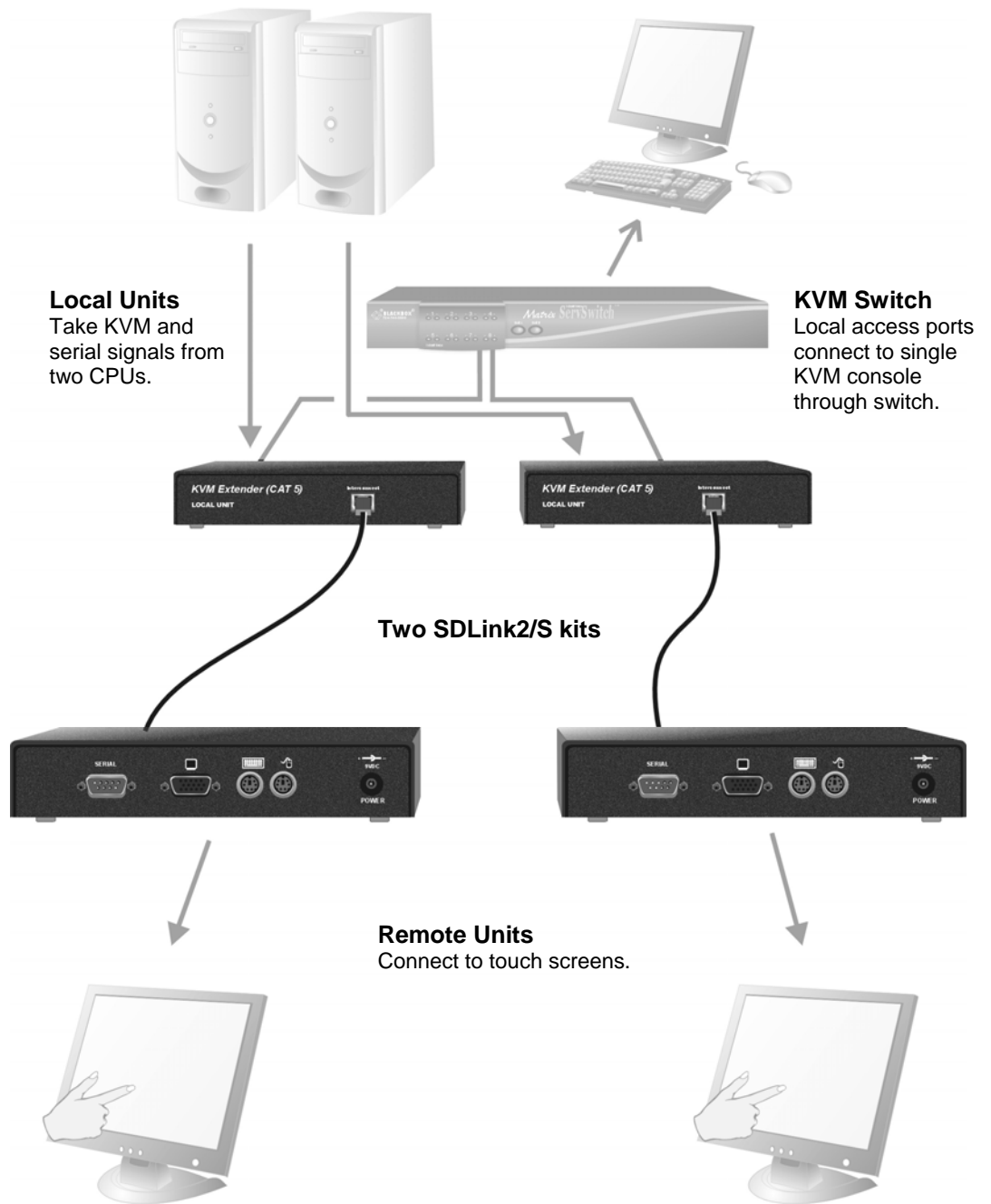
Figure 15   Touch screen network with local access to CPUs through KVM switch

SDRK/6D Extender Hub
CPU connects to Port 1. Local access ports are daisy-chained to allow operation from any console and/or video to be distributed to multiple locations.

5V PSU

SDLink/R
Remote Units connect to KVM consoles.
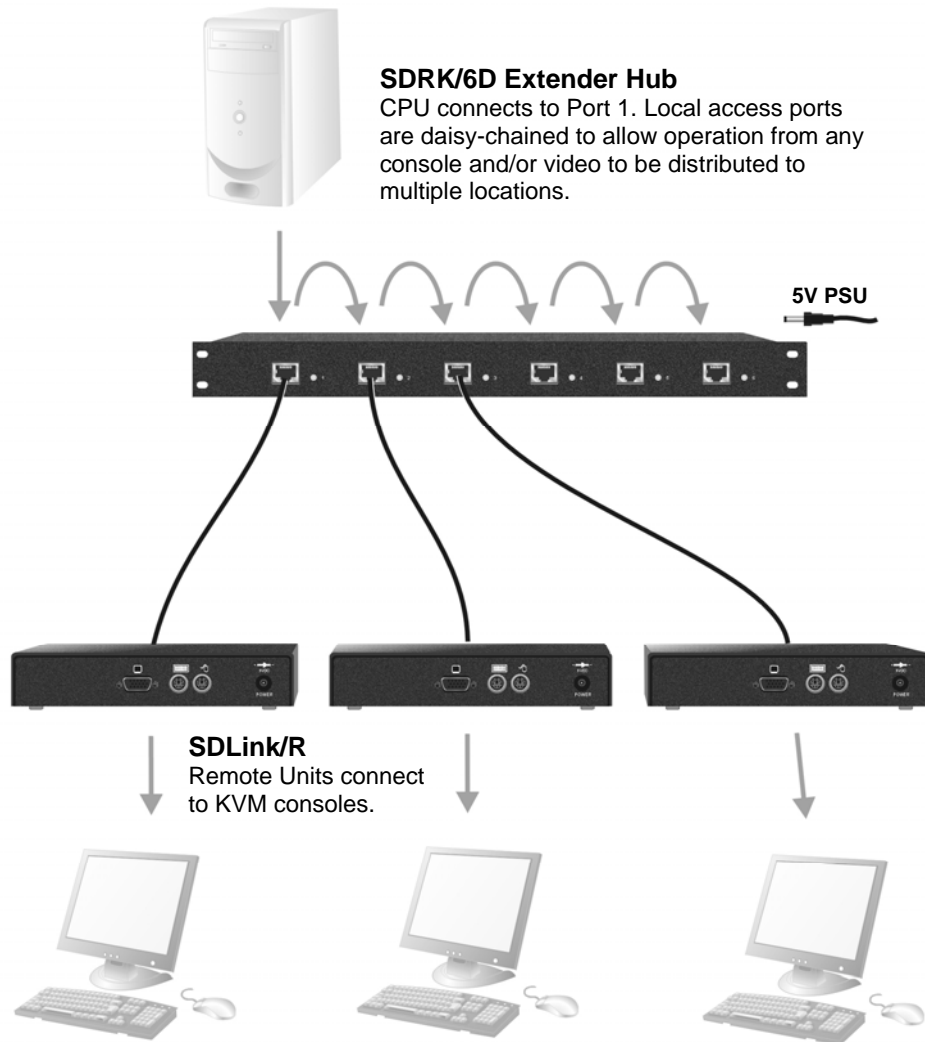
Figure 16   Information distribution system sharing a single PC

Appendix B: Rack Mount Options

Extender units can be mounted in a 19" rack using the mounting kits:

- SDBR1
- SDBR2 (for Local Units supplied with SDLink2/S only)

Each 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 17   SDBR1/2 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.
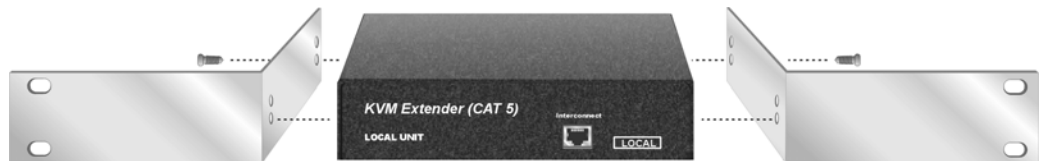
Certain CATx cables can show noticeable skew when operating at high video resolutions over longer lengths of cable (see page 21). Skew problems are best avoided by using 'low skew' cable. This is CATx cable with closely matched twist rates. Please contact Technical Support for recommendations.

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 22. 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:

Pins	Pair	Signal
7 & 8	Shortest Pair (Fastest)	Data
1 & 2	3rd Longest Pair	Blue Video
4 & 5	2nd 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 the 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: Serial Port Setup and Operation
Applies to SDLink1/S, SDLink2/S and SDLink/RS only

The default settings for serial extension (9600bps, 8 data bits, no parity, 1 stop bit, RTS/CTS and DTR/DSR loopback) are suitable for the majority of applications. This appendix describes how you can adjust the baud rate and hardware flow control for specialist applications.

Serial Interface Setup and Operation

You can configure the baud rate and flow control protocol using jumpers on the serial daughter board (see Figure 18) in the Remote and/or Local Units.

1. Disconnect the unit's power supply.
2. Open the unit by unscrewing the two screws on each side of the case.
3. Locate the serial daughter board.

The following sections describe how to adjust the baud rate and hardware flow control protocol. When you have finished, replace the unit covers.
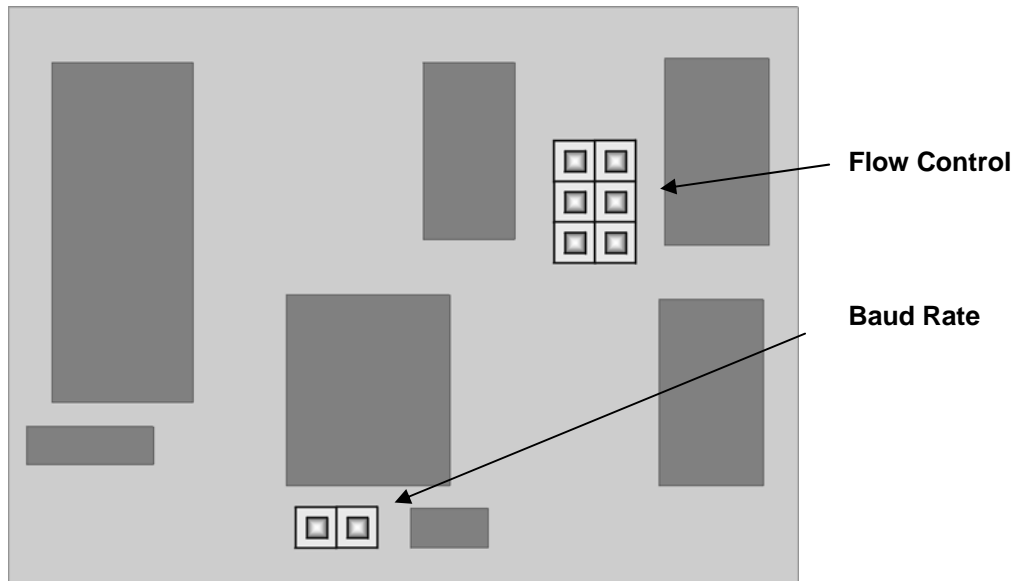

Figure 18   Position of Baud Rate and Flow Control jumper blocks on Serial Daughter Board

⚠️ **The circuit board has several jumper blocks in addition to those shown in Figure 18. Do not adjust any of these settings as you will cause the extender to operate incorrectly.**

Baud Rate

You can set the baud rate for serial communication across the extender system at 19200, 9600 (the default) or 1200 baud. All Local Units are supplied to accept a baud rate of either 9600 or 19200. No configuration of the Local Unit is required unless you want to operate at 1200 baud (see below).

Changing the Baud Rate to 19200/9600

All Remote Units are supplied with the baud rate preset at 9600. Use this procedure if you want to change the baud rate to 19200, or reset it to 9600 after operating at another setting.

1. Locate the Baud Rate jumper block in the **Remote** Unit.
2. Set the jumper to the required setting as shown in Figure 19.
3. If the extender system has been operating at 1200, locate the Baud Rate jumper block in the Local Unit and remove the jumper as shown in Figure 20.

Baud Rate: ☐☐ 9600   ■ 19200

Figure 19   Baud Rate Jumper Settings in Remote Unit (see Figure 18 for location of jumper block)

Changing the Baud Rate to 1200

If you want to use the serial extension for a mouse device such as an industrial trackball you may want to change the baud rate to 1200. To do this:

1. Locate the Baud Rate jumper block in the **Local** Unit.
2. Place the jumper over the posts as shown in Figure 20.
3. Set the hardware flow control jumpers in both Local and Remote Units to *RTS/CTS Flow Control Across CAT5 Link* as described on the next page. This mode will support most, but not all, serial mouse and trackball devices.

Baud Rate: ☐☐ 9600/19200   ■ 1200
                              (as set in
                              Remote Unit)

Figure 20   Baud Rate Jumper Settings in Local Unit (see Figure 18 for location of jumper block)

In most cases, we recommend that you use PS/2 mouse devices with an SDLink extender system. If you have a PC that does not have a PS/2 mouse port:

* Plug a PS/2 mouse into the Remote Unit.

* Use an Mdapt (PS/2) Serial Mouse Converter to connect the PC to your Local Unit.

The drivers supplied with certain Wacom Graphics Tablets dynamically alter the baud rate and cannot be used with an SDLink Extender system. There is a version of the driver available with a fixed baud rate. Please contact Technical Support for more information.

Hardware Flow Control

The daughterboards in both Local and Remote Units have a series of jumpers which allow the selection of alternative hardware flow control schemes across the CAT5 link. Most applications will not require hardware flow control across the link, and therefore the flow control jumpers are set to loopback by default and should not need adjustment.

The following diagrams show how the jumpers may be set for various flow control schemes. Please contact Technical Support if you are unsure about serial port handshaking methods.

No hardware handshaking	*RTS/CTS and DTR/DSR loopback - default*	*DTR/DSR Flow Control Across CAT5 Link*

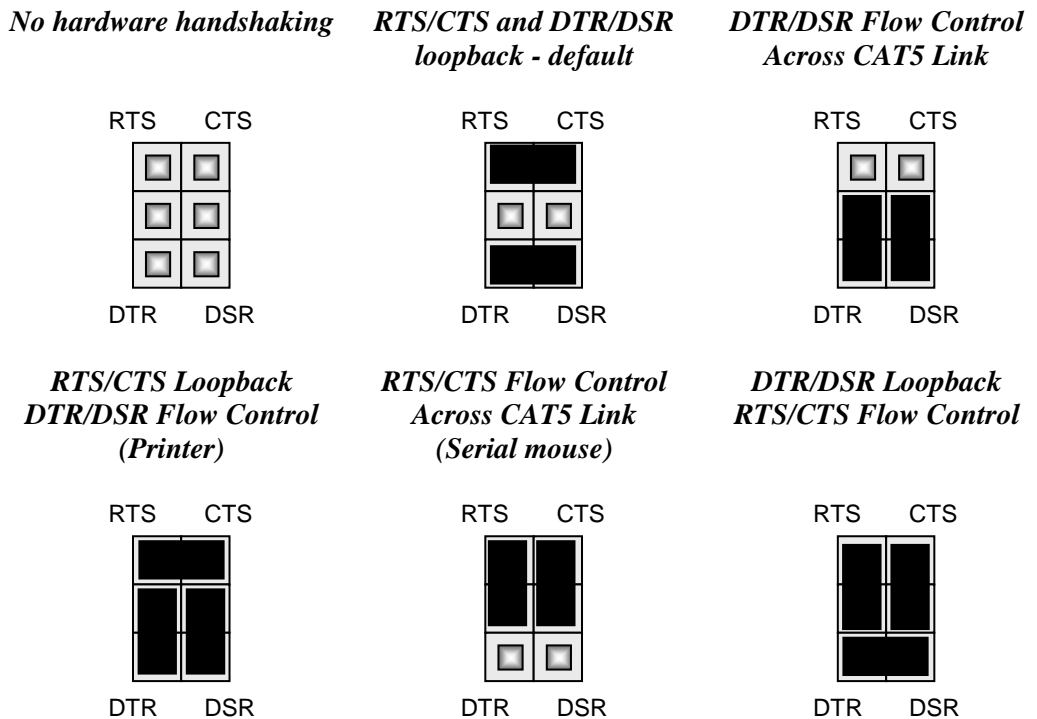| *RTS/CTS Loopback DTR/DSR Flow Control (Printer)*	*RTS/CTS Flow Control Across CAT5 Link (Serial mouse)*	*DTR/DSR Loopback RTS/CTS Flow Control*

Figure 21   Jumper Settings on Flow Control block for various serial port flow control and handshaking configurations (see Figure 18 for location of jumper block)

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)
Video Output Connectors	HD15 (Female)

Keyboard and Mouse

KB Compatibility	PC/AT, PS/2; or SUN
Mouse Compatibility	Standard PS/2 two/three button Standard wheel mice Logitech 3-button PS/2
KB/Mouse Connectors (CPU)	6-Pin MiniDIN Socket (PS/2 versions) 8-Pin MiniDIN Socket (SUN versions)
KB/Mouse Connectors (Device)	6-Pin MiniDIN Socket (PS/2 versions) 8-Pin MiniDIN Socket (SUN versions)

Serial Interface

Baud Rates Supported	1200, 9600 or 19200 Baud (user-selectable)
Serial Data Format	8 data bits, no parity, 1 stop bit
Flow Control	Hardware: Either RTS/CTS passed through or looped back DTR/DSR passed through or looped back or none (user-selectable)
	Software: Transparent to software flow control
Local Unit Connector	DB9 Female (DCE)
Remote Unit Connector	DB9 Male (DTE)

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

SDLink/RS *SDLink/RSU*	Remote Unit: 202x100x36mm Shipping Weight: 1.03 Kg
SDLink/RS	Remote Unit: 202x100x36mm Shipping Weight: 1.08 Kg
SDLink1 *SDLink1/SU*	Local Unit: 202x100x36mm Remote Unit: 202x100x36mm Shipping Weight: 2.10 Kg
SDLink2 *SDLink2/SU*	Local Unit: 202x100x36mm Remote Unit: 202x100x36mm Shipping Weight: 2.15 Kg
SDLink1/S	Local Unit: 202x100x36mm Remote Unit: 202x100x36mm Shipping Weight: 2.34 Kg
SDLink2/S	Local Unit: 218x100x36mm Remote Unit: 202x100x36mm Shipping Weight: 2.39 Kg

Environmental

Operating Temperature	0 to 40 °C
Storage Temperature	-30 to 65 °C
Relative Humidity	5-90% non-condensing
Chassis Construction	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.

$$\mathsf{CE}$$

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.