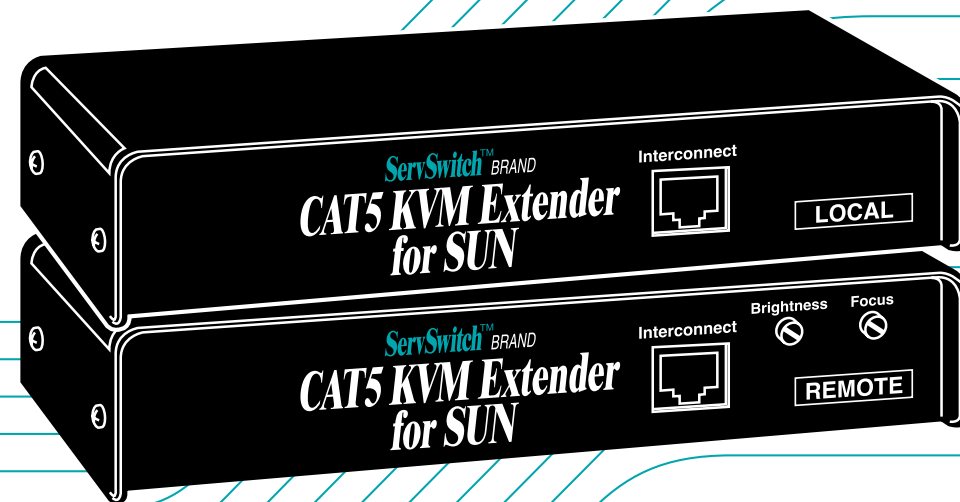


OCTOBER 2003



*ServSwitch*<sup>™</sup> BRAND  
**CAT5 KVM Extender  
for SUN**



ACU1004A  
ACU1005A

SUN-1M2

**Customer Support Information:**

Order **toll-free** in the U.S.: Call **877-877-BBOX** (outside U.S. call **724-746-5500**)  
FREE tech support 24 hours a day, 7 days a week: Call **724-746-5500** or fax **724-746-0746**.  
Mailing address: **Black Box Corporation**, 1000 Park Dr., Lawrence, PA 15055-1018  
Web site: [www.blackbox.com](http://www.blackbox.com) • E-mail: [info@blackbox.com](mailto:info@blackbox.com)  
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# Welcome to the ServSwitch Family!

Thank you for purchasing a BLACK BOX® ServSwitch Brand CAT5 KVM Extender model! We appreciate your business, and we think you'll appreciate the many ways that your enhanced keyboard/video/mouse system will save you money, time, and effort.

That's because our ServSwitch family is all about breaking away from the traditional, expensive model of computer management. You know, the one-size-fits-all-even-if-it-doesn't model that says, "One computer gets one user station, no more, no less." Why not a single user station (monitor, keyboard, and mouse) for multiple computers—even computers of different platforms? Why not a pair of user stations, each of which can control multiple computers? Why not multiple user stations for the same computer?

With our ServSwitch products, there's no reason why not. We carry a broad line of robust solutions for all these applications. Do you have just two PCs, and need an economical alternative to keeping two monitors, keyboards, and mice on your desk? Or do you need to share dozens of computers, including a mix of IBM® PC, RS/6000®, Apple® Macintosh®, Sun Microsystems®, and SGI™ compatibles among multiple users with different access levels? Does your switch have to sit solidly on a worktable and use regular everyday cables? Or does it have to be mounted in an equipment rack and use convenient many-to-one cables? No matter how large or small your setup is, no matter how simple or how complex, we're confident we have a ServSwitch system that's just right for you.

The ServSwitch family from Black Box—the one-stop answer for all your KVM-switching needs!

\*

This manual will tell you all about your new ServSwitch Brand CAT5 KVM Extender for Sun, including how to install, operate, and troubleshoot it. For an introduction to the extender, see **Chapter 3**. The extender product codes covered in this manual are:

**ACU1004A**  
**ACU1005A**

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**FEDERAL COMMUNICATIONS COMMISSION  
AND  
INDUSTRY CANADA  
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This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

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

*This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.*

*Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.*

**EUROPEAN UNION DECLARATION OF CONFORMITY**

**WARNING!**

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

This product complies with the following harmonized standards:

- EN55022 (1994), EN55024 (1998)
- EN61000-3-2 (1995), EN61000-3-3 (1995), EN60950 (2000)

When you use this product in environments that have high levels of electromagnetic interference, you might experience some slight disturbance in its operation. If this occurs, please refer to **Chapter 8** or call technical support.

To maintain compliance, use only cables supplied (or recommended) for use with this product.



**NORMAS OFICIALES MEXICANAS (NOM)****ELECTRICAL SAFETY STATEMENT****INSTRUCCIONES DE SEGURIDAD**

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
  - A: El cable de poder o el contacto ha sido dañado; u
  - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
  - C: El aparato ha sido expuesto a la lluvia; o
  - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
  - E: El aparato ha sido tirado o su cubierta ha sido dañada.

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# 1. Quick Start Guide

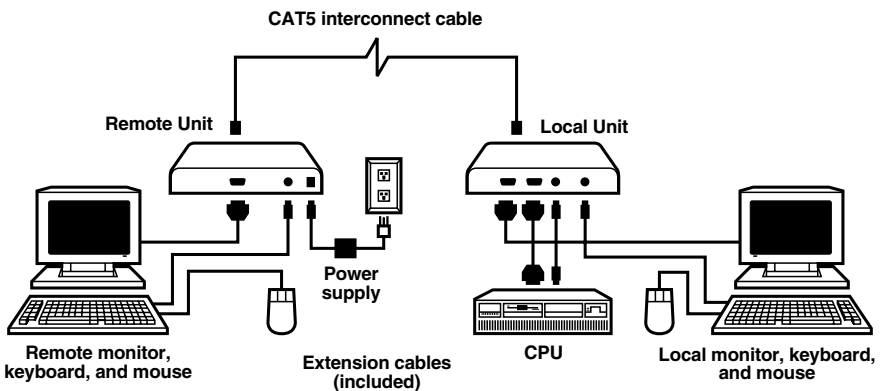
When you *configure* the ServSwitch Brand CAT5 KVM Extender for Sun, you need to answer a question or two:

**How far will the CAT5 cabling run between the extender's Local and Remote Units?** If it will be 330 ft. (91.4 m) or less, you don't need to set anything. If it will be 330 to 655 ft. (91.4 to 199.6 m), install jumpers on the three *right-hand* post pairs in each set of three cable-length jumper posts (JP3 through JP5) in the Remote Unit. If it will be 655 to 1000 ft. (199.6 to 304.8 m), install jumpers on the three *left-hand* post pairs in each of these sets of cable-length jumper posts. See Figure 5-1 in **Section 5.1**.

**Dual-Access model only: How do you want Private Mode to work?** If you don't want Private Mode—in which either user station can temporarily “lock out” the other—to be enabled, set position 1 of DIP-switch SW1 in the Remote Unit to ON. If you want to lengthen the inactivity timeout for automatic Local/Remote switching to 15 seconds, set position 2 to OFF. If you want automatic switching to be triggered by mouse activity as well as keyboard activity, set position 3 to OFF.

To get at the internal controls, open the extender while it is powered off—taking all reasonable precautions against static electricity—by unscrewing the four screws on its case and lifting off the top half of the case. For more information, refer to **Chapter 5**.

To *install* your extender system, refer to the illustration below (a Dual-Access model is shown). Use the included extension cables to attach the CPU to the Local Unit; plug the remote keyboard, monitor, and mouse directly into the Remote Unit; and (on the Dual-Access model) plug the local keyboard, monitor, and mouse directly into the Local Unit. Connect the Local and Remote Units with straight-pinned four-pair CAT5 cable (not included). Power the Remote Unit with its included power supply. For more information, refer to **Chapter 6**.



## 2. Specifications

- Cable Required:** Between Local and Remote Units: Category 5 solid unshielded or shielded twisted pair (UTP or STP), wired to the EIA/TIA-568A or (preferred) -568B standard, terminated with RJ-45 male connectors; for pinning/pairing, see **Appendix A**
- Compliance:** CE Class B, FCC Part 15 Subpart B Class A, IC Class/classe A
- Compatibility:** Video: VGA, SVGA, XGA, XGA-2, or RGsB (sync on green); with adapters, can support older Sun monitors and/or video output from older Sun CPUs (call Black Box for technical support);  
Keyboard and mouse: Sun
- Interfaces:** Video: VGA;  
Keyboard and mouse: Sun
- Video Characteristics:** Bandwidth (to -3 dB):  
Local Unit: 150 MHz;  
Remote Unit: 300 MHz;  
Across 330 feet (100.6 meters) of UTP: 95 MHz (with equalization);  
Resolution:  
Up to 1600 x 1280 noninterlaced at up to 200 ft. (61 m);  
Up to 1280 x 1024 noninterlaced at up to 393.7 ft. (120 m);  
Up to 1152 x 900 noninterlaced (standard Sun resolution) at up to 426.5 ft. (130 m);  
Up to 1024 x 768 noninterlaced at up to 984.3 ft. (300 m);  
I/O signal levels: 0.7 volts peak-to-peak;  
Compensation: 3-stage continuously variable;  
Synchronization: H/V or composite, TTL signal levels; sync polarity is preserved;  
Coupling: DC

**Maximum**

- Distance:** 16 ft. (4.9 m) from the Local Unit to the attached CPU or KVM switch;  
16 ft. (4.9 m) from the Remote Unit to the attached monitor, keyboard, and mouse or KVM switch;  
1000 ft. (304.8 m) between Local and Remote Units;  
Dual-Access (ACU1005A) model only: 16 ft. (4.9 m) from the Local Unit to the attached keyboard and mouse;  
100 ft. (30.5 m) to the attached monitor

**NOTE**

**With high-quality cables, it might be possible to run farther than 16 ft. (4.9 m) from the extender to attached equipment.**

**User Controls:**

- On Remote Unit only:
- (2) Front-mounted dials: Brightness and Focus;
  - (3) Internal video-distance (cable-length) jumpers;
  - (1) Internal 4-position DIP switch for various Private-Mode options (Dual-Access systems only)

**Connectors:**

- On Local Unit:
- (1) Front-mounted RJ-45 female for local/remote interconnection;
- Rear-mounted:
- (1) HD15 male for video input from computer;
  - (1) 8-pin mini-DIN female for keyboard and mouse output to computer;
- Dual-Access (ACU1005A) model only:
- Rear-mounted:
- (1) HD15 female for video output to monitor;
  - (1) 8-pin mini-DIN female for input from keyboard and mouse;
- On Remote Unit:
- (1) Front-mounted RJ-45 female for local/remote interconnection;
- Rear-mounted:
- (1) HD15 female for video output to monitor;
  - (1) 8-pin mini-DIN female for input from keyboard and mouse;
  - (1) 2.5-mm center-positive barrel jack for power

**Indicators:**

None

## SERVSWITCH BRAND CAT5 KVM EXTENDER FOR SUN

### Temperature

**Tolerance:** 32 to 104°F (0 to 40°C)

### Humidity

**Tolerance:** 5 to 90% noncondensing

### Enclosure:

Steel

**Clamping Voltage:** 15 volts (for surge protection on CAT5 local/remote interconnection interface)

### Power:

Local Unit:

5 VDC at up to 120 mA from CPU's keyboard port;

Remote Unit:

From desktop power supply, PSU1002E (certified to the relevant international safety standards):

Input: 100 to 240 VAC at 47 to 63 Hz from utility-power outlet, through detachable power cord and IEC 320 male inlet, to external transformer;

Output (isolated from mains ground): 9 VDC regulated, at up to 1 amp, from transformer to extender

### CAUTION!

**If you ever need to replace the Remote Unit's power supply, the replacement power supply must have identical output characteristics. Using a power supply with different output—even if it's "almost the same"—could damage your Remote Unit and the attached equipment.**

### Size:

Each Unit: 1.4"H x 8.8"W x 4"D (3.6 x 22.4 x 10.2 cm)

### Weight:

Each Unit: 1.1 lb. (0.5 kg)

## 3. Introduction

By using the Local and Remote Units that together make up the ServSwitch Brand CAT5 KVM Extender for Sun, you can place your VGA compatible or multisync monitor and your Sun® keyboard and mouse as far as 1000 ft. (304.8 meters) from the Sun CPU. The Local and Remote Units are interconnected with a single industry-standard Category 5 UTP or STP 4-pair cable. All keyboard, mouse, and video signals are fully buffered to ensure consistent remote operation of your Sun computer.

The Single-Access (ACU1004A) model of the extender is designed to perform KVM extension only. With the Dual-Access (ACU1005A) model, you can attach an additional monitor, keyboard, and mouse to the Local Unit; the Sun computer can then be operated from either the local or remote user station (they share access on a “first-come, first-served” basis—see **Section 7.3**).

The extender is simple to operate and works with all operating-system varieties—no software is required. Once you’ve made sure you have everything you’ll need (see **Chapter 4**) and you’ve configured all of your extenders (see **Chapter 5**), just connect the Local and Remote Units to each other and to your equipment as described in **Sections 6.1** through **6.3**, adjust your video compensation as necessary (see **Section 6.4**), and you’re ready to work!

Because the extender performs complete Sun keyboard and mouse emulation, you can boot the computer without having a keyboard or mouse attached to it. Your Sun will boot even if the extender’s Remote Unit is not powered or if no keyboard or mouse is connected to the Local or Remote Unit.

### 3.1 Compatibility

During development, the KVM Extender for Sun was extensively tested with a wide variety of hardware. However, please note that it is impossible for us to guarantee that the Extender will interoperate correctly with every keyboard, mouse, monitor, and motherboard variant currently on the market; if you suspect that you’re having incompatibility problems, please call Black Box Technical Support.

In general, the extender is compatible with the following types of equipment:

- **CPU:** Sun Microsystems®. These should be desktop machines; laptops and docking stations are not supported.

- **Monitor:** VGA, SVGA, XGA, XGA-2, or RGsB (sync on green). Be aware that a few monitors and CPUs/graphics cards might not work with the extender because they exchange monitor-ID information. Call Black Box Technical Support for help with “ID bit” problems.

The extender can carry old-style Sun video, although you’ll need a video converter or special adapter or cable to get video output from older Sun computers with 13W3 connectors to the extender’s Local Unit, or to get video from the Remote Unit to a Sun monitor with 13W3 connectors. However, many Sun monitors need to see ID bits from the computer, which the extenders don’t pass across their CAT5 link, so certain Sun monitors won’t work with the extender unless you attach them through a converter or adapter that provides those ID bits. Call Black Box Technical Support for assistance with older Sun equipment—using the wrong video-conversion equipment is a sure way to create all kinds of video problems for your extender system.

- **Keyboard and mouse:** Standard Sun type (118-key) keyboard and three-button Sun mouse. If a keyboard or keyboard port you want to use is some other type or has some other type of connector, call Black Box Technical Support.

### 3.2 Key Features

The KVM Extender for Sun has a number of useful features which contribute to the transparent remote operation of your Sun CPU. Some of the more important ones are:

- **Distance up to 1000 ft.**  
Operate your CPU from almost anywhere in the same building.
- **Fully adjustable video equalization**  
Compensates for the loss of image quality caused by the signal passing through such a long run of cable.
- **Fully buffered signals**  
Remote operation of the CPU is consistently smooth and transparent.
- **Intelligent Sun keyboard and mouse emulation**  
With this, the computer boots and operates correctly under most circumstances, and you can freely detach and reconnect the keyboard and mouse as necessary (the extender automatically initializes the keyboard and mouse as soon as it detects that you’ve reattached them).

- **Surge protection on CAT5 side**

The extender resists surges on its CAT5 interface, adding a measure of protection for itself and its attached devices, with an internal clamping voltage of 15 volts.

- **Rackmountable**

You can use our rackmount kit (product code RMK19U-R2) to place extenders in 1U of vertical space in a 19" rack. See **Appendix B**.

- **Dual-Access model also supports a local station**

With the Dual-Access model (ACU1005A), you can operate the computer either locally or remotely (but not both at the same time).

We recommend that you read the remainder of this manual before you install the extender in order to fully familiarize yourself with the product.



## 4. Checklist of System Components

### 4.1 The Complete Package

These items should be included with your ServSwitch Brand CAT5 KVM Extender for Sun package (please contact Black Box right away if any are missing or damaged):

- (1) Extender Local Unit.
- (1) Extender Remote Unit.
- (1) 9-VDC, 1-amp power-supply transformer and output cord.
- (1) Power-supply input cord suitable for your country or region.
- Extension cables that will run from your CPU to the Local Unit:
  - (1) 6-ft. (1.8-m) Sun keyboard/mouse-extension cable with male 8-pin mini-DIN connectors.
  - (1) 5-ft. (1.5-m) VGA video-extension cable with one HD15 male connector and one HD15 female connector.
- This users' manual.

### 4.2 The Cables You'll Need

If you are using the KVM Extender for Sun to get greater distance between a Sun CPU and a compatible monitor, a Sun keyboard, and a Sun mouse, your extender package should have included everything you'll need except for your CAT5 cable, which you'll have to order separately. Read **Sections 4.2.1, 4.2.3, and 4.2.5** carefully, then proceed with **Chapter 5**.

If you are using the extender to get greater distance between a Sun type ServSwitch family KVM switch and either a CPU, a user station, or a compatible switch, you might need to order additional non-included cabling. Read the relevant sections below and on the next page, starting with **Section 4.2.1**.

### NOTE

**When you order any cable listed in this section, you will be asked to specify the length you want. Some cables might be available in a few stock lengths only.**

### 4.2.1 TO CONNECT A CPU TO THE LOCAL UNIT

We've included extension cables with the extender that you can use to connect the extender's Local Unit to the CPU's keyboard, mouse, and video ports.

### 4.2.2 TO CONNECT A KVM SWITCH TO THE CPU PORTS ON THE LOCAL UNIT

To attach a Sun/VGA or multiplatform ServSwitch family KVM switch to the extender's Local Unit instead of a CPU, you'll need the extension cables included with the extender plus a User Cable designed for the KVM switch:

- *ServoSwitch Ultra, ServoSwitch Affinity, or compatible:* Use an EHN225 cable.
- *ServoSwitch Multi or compatible:* Use a KV2800 series cable.

### 4.2.3 TO CONNECT A MONITOR, KEYBOARD, AND MOUSE TO THE REMOTE UNIT OR TO THE DUAL-ACCESS LOCAL UNIT

You can plug the monitor and the keyboard and mouse directly into the corresponding ports on these units.

### 4.2.4 TO CONNECT A KVM SWITCH TO THE REMOTE UNIT OR TO THE USER PORTS ON THE DUAL-ACCESS LOCAL UNIT

To attach a Sun/VGA or multiplatform ServSwitch family KVM switch to the extender's Remote Unit or Dual-Access Local Unit instead of a monitor, keyboard, and mouse, you'll need a CPU cable designed for the KVM switch:

- *ServoSwitch Ultra, ServoSwitch Affinity, or compatible:* Use an EHN515 cable.
- *ServoSwitch Multi or compatible:* Use a KV2400 series cable.

### 4.2.5 TO CONNECT THE LOCAL UNIT TO THE REMOTE UNIT

To interconnect the extender's Local and Remote Units, you'll need industry-standard structured cabling (Category 5 UTP or STP, 4-pair) terminated with RJ-45 plugs. Order CAT5 patch cables such as our product code EYN737MS or CAT5 bulk cable such as our EYN840A. The bulk cable should be terminated with high-quality RJ-45 plugs such as those included in our FM732 25-pack.

### CAUTION!

This cable *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 must be in accordance with EIA/TIA-568A or (preferably) EIA/TIA-568B. (Refer to the wiring chart in Appendix A. Please note that failure to wire the twisted pairs correctly will dramatically impair video quality and possibly prevent correct operation.)

Although most CAT5e cables will work well with the extender, especially for shorter runs and patch cables, some CAT5e cables might distort the video if you use them for local-to-remote runs longer than 393.7 ft. (120 m). And you should *avoid* using “Level 6” or “Level 7” cables, or other types of cable rated for data rates higher than 100 Mbps (bandwidths higher than 100 MHz). This is because the wires in these cables are twisted much more tightly than those in regular CAT5, which is great for high-speed data but *really bad* for analog video signals. Having said that, however, the signal-skew problems caused by tightly twisted pairs in these cables can sometimes be resolved by swapping which pairs are used for which signals or by using an external delay line. Please contact Tech Support if you have problems getting a good picture with CAT5e cable or if you *must* use cables with bandwidths higher than 155 Mbps.

Also, even though your network might use the same type of 4-wire twisted-pair cabling, do *not* connect the extender to 10BASE-T Ethernet devices or any other network equipment. Doing so will virtually destroy the extender’s circuitry and could also damage the attached equipment.

The extender is designed for use up to a maximum cable length of 1000 ft. At this length the video quality should be acceptable even at a screen resolution of 1024 x 768 and a refresh rate of 75 Hz.

Although a single continuous length of interconnect cable is preferable, it’s possible to operate an extender system if the Local and Remote Units are connected through multiple patch panels. However, the more patch panels the cable is routed through, the greater the probability that the video signal will be degraded.

### NOTE

The extender has been tested and found to work, *in certain situations*, with 4-pair Category 3 cable or with four pairs of 25-pair UTP trunk cables instead of 4-pair Category 5 cable. We do not recommend such installations; if you want to experiment with them, do so at your own risk.

## 5. Configuration

The configuration controls for the ServSwitch Brand CAT5 KVM Extender for Sun are inside the Remote Unit, but should only need to be set once. To get at them, first open the unit by unscrewing the four screws on its case and lifting off the top half of the case. When you've finished setting them, close the unit by replacing the top half of the case and screwing the screws back in.

### CAUTION!




**The Remote Unit's circuit boards can be damaged by static electricity, so take every reasonable precaution against it. At the very least, touch a metallic surface before opening the unit; if possible, stand on an anti-static mat and wear a grounding strap or anti-static gloves.**

### 5.1 Setting the Cable-Length Jumpers

The Remote Unit of the KVM Extender for Sun contains video-equalization circuitry which compensates for the loss in image quality that occurs when you drive video across long cables. With cables in the neighborhood of 1000 feet long, this loss is considerable.

There are three jumpers on the main circuit board of the extender's Remote Unit that you can use to select an equalization-adjustment range appropriate to the length of the interconnect cable you'll be running between the Local and Remote Units. (Figure 5-1 on the next page shows where these jumpers are.) Once you set them, you can alter the compensation level with the two rotary controls on the Remote Unit's front panel while the extender is operating in order to "tune in" the image more precisely (see **Section 6.4**).

The three cable-length jumpers should be set as follows (*all three jumpers must be set the same way*):

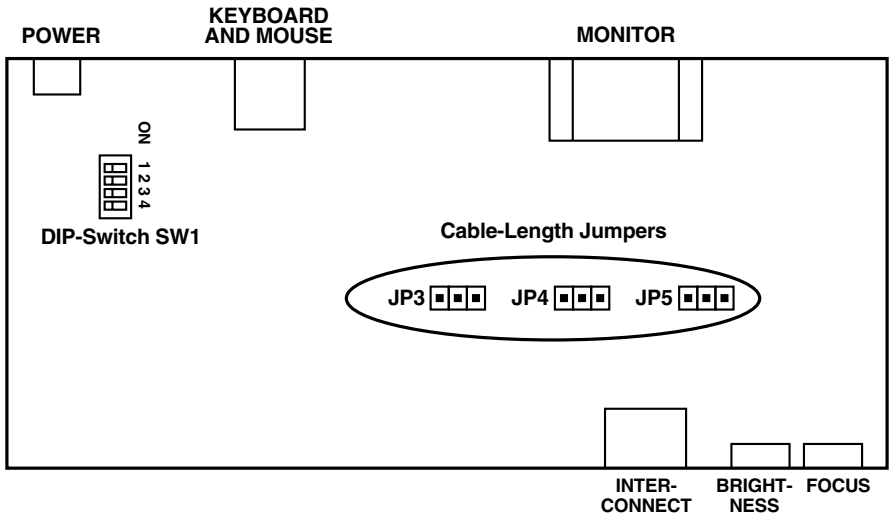
Cable Length in Meters (Feet)	Jumper Position
Up to 100 (328.1)	Off  (factory default)
100 to 200 (328.1 to 656.2)	A 
200 to 300 (656.2 to 984.3)	B 

### NOTE

**If you will be running cable to near the limit of one of these cable-length ranges, say as far as 260 ft. (79.2 m), and you will be using high-resolution (1024 x 768 or higher) video, you might be able to achieve more accurate video compensation (see **Section 6.4**) by selecting the higher cable length range (the 100-to-200-m range in this case).**

## SERVSWITCH BRAND CAT5 KVM EXTENDER FOR SUN

If you are conducting a same-room test prior to your final installation, as we recommend—see **Section 6.1**—set the jumpers as appropriate for the length of the test cable first; then, if the units pass the test, reset the jumpers for your actual installation length.



For cable lengths of up to 330 ft. (100.6 m), set all three to OFF (    ).  
For 330 to 655 ft. (100.6 to 199.6 m), set all three to A (    ).  
For 655 to 1000 ft. (199.6 to 304.8 m), set all three to B (    ).

**Figure 5-1. The Remote Unit's main PCB, showing the cable-length jumpers and DIP switch.**

### NOTE

The default Sun resolution is 1152 x 900. If your CPU is outputting video at this resolution, you should set all the cable-length jumpers to A if your cable is longer than 260 ft. (79.2 m). You might not be able to get good video at all at this resolution if you run cable farther than 430 ft. (131.1 m).

## 5.2 Setting the Private-Mode DIP Switch (Dual-Access Systems Only)

You'll also find a four-position DIP switch labeled SW1 on the main circuit board inside the KVM Extender for Sun's Remote Unit (see Figure 5-1 on the previous page). Do not change the settings of this switch unless you are using the Remote Unit in a Dual-Access system. (For directions on opening and closing the Remote Unit's case, including the static-electricity precautions you should take, see the start of **Chapter 5**.) Each position of this switch controls a Private-Mode configuration setting:

- **Position 1:** When position 1 is in its factory-default OFF setting, Private Mode is enabled. With Private Mode enabled, users at either user station can enter a command to temporarily take exclusive, private control of the CPU (see **Section 7.3**). If you want to disable Private Mode and make this impossible, set position 1 to ON.
- **Position 2:** When position 2 is in its factory-default ON setting, the inactivity timeout (see **Section 7.3**) is set to two seconds: Once the local or remote keyboard and mouse have been idle for two seconds, the user at the other station can take control. If you suspect that the system will be switched too quickly with that setting, move position 2 to OFF to set the timeout to 15 seconds instead.
- **Position 3:** When position 3 is in its factory-default ON setting, users have to press a key on their keyboard to take control of the Extender system when it becomes idle; see **Section 7.3**. If you want users to be able to take control by typing at their keyboard or by moving their mouse, move position 3 to OFF.
- **Position 4:** This position is reserved for future use. Do not change its setting.

## 6. Installation

### 6.1 Test-Placing the Extender (Optional)

We recommend testing your KVM Extender for Sun system with a test setup confined to a single room; that way, if any components are bad, you can find out before you run cable halfway across your campus. If you want to do this, gather your equipment in your test site; otherwise, place the extender's Local and Remote Units, and the equipment you'll be attaching to them, in your desired locations. (If you'd like to rackmount a unit, see **Appendix B**.)

### 6.2 Attaching Devices

#### CAUTION!

Please talk to **Black Box Technical Support** about your equipment and adapters before using any Sun 13W3 type video adapters to attach an older Sun CPU or monitor to your extender system.

#### 6.2.1 ATTACHING A CPU TO THE LOCAL UNIT

Run the included extension cabling from the PC's video, keyboard, mouse, serial, and/or audio ports to the matching connectors of the Local Unit's CPU port. For guidelines on which audio connectors to use on the PC's sound card, see **Section 4.2.1**.

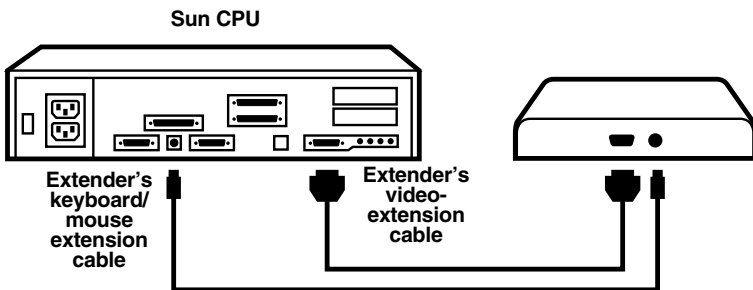
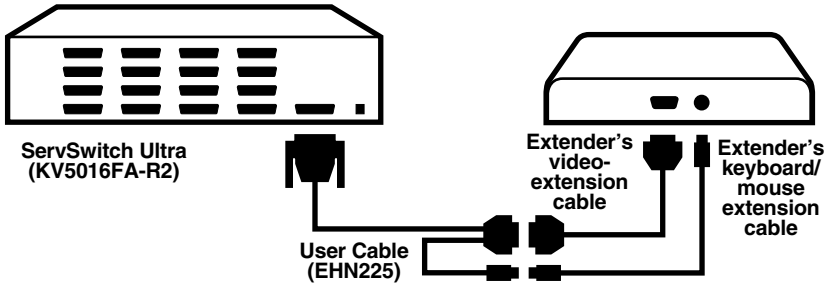


Figure 6-1. Attaching a CPU to the Local Unit (Single-Access model shown).

### 6.2.2 ATTACHING A KVM SWITCH TO THE LOCAL UNIT'S CPU PORTS

Making sure that the KVM switch is powered OFF, attach a Sun/VGA type User Cable (see **Section 4.2.2** for product codes) to one of the switch's user ports. Run the extension cables included with the extender from the User Cable's video and keyboard/mouse connectors to the matching ports on the Local Unit, as shown in Figure 6-2. On the Dual-Access model, make sure you don't connect the switch's user port to the ports on the Local Unit that the local user station plugs into.



**Figure 6-2. Attaching a KVM switch to the Local Unit's CPU ports (Single-Access model shown).**

### 6.2.3 ATTACHING A MONITOR, KEYBOARD, AND MOUSE OR A KVM SWITCH TO THE DUAL-ACCESS LOCAL UNIT'S USER PORTS

Follow the directions in **Section 6.2.4** for a keyboard, monitor, and mouse, or the directions in **Section 6.2.5** for a KVM switch. Just make sure you don't connect the equipment to the Local Unit's CPU ports instead of its user-station ports.

### 6.2.4 ATTACHING A MONITOR, KEYBOARD, AND MOUSE TO THE REMOTE UNIT

Making sure that the monitor is powered OFF, plug the mouse into the keyboard, then plug the monitor and keyboard into the matching ports on the Remote Unit, as shown in Figure 6-3.



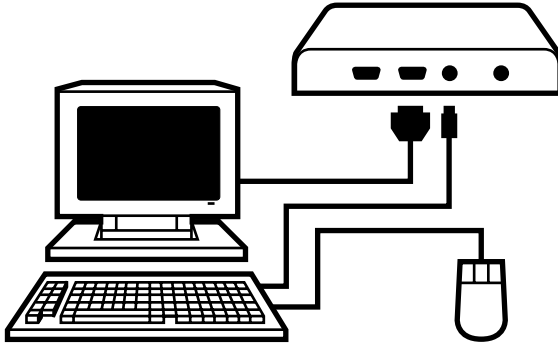


Figure 6-3. Attaching a monitor, keyboard, and mouse to the Remote Unit.

#### 6.2.5 ATTACHING A KVM SWITCH TO THE REMOTE UNIT

Making sure that the KVM switch is powered OFF, attach a Sun/VGA type CPU Cable (see **Section 4.2.4** for product codes) from one of the switch's CPU ports to the matching ports on the Remote Unit, as shown in Figure 6-4.

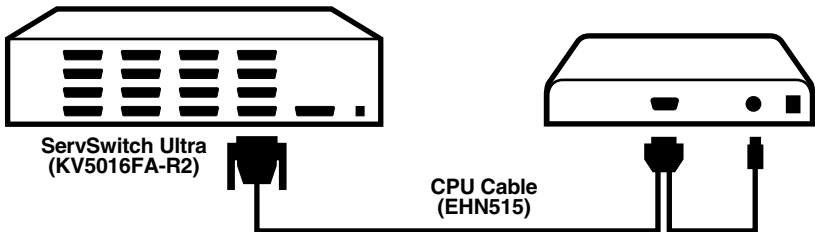


Figure 6-4. Attaching a KVM switch to the Remote Unit.

## 6.3 Finishing Your Installation

To finish installing a KVM Extender for Sun after attaching devices to it as described in **Section 6.2**, take these steps:

1. Interconnect the Remote Unit and the Local Unit by running CAT5 cable between their front-panel modular jacks. See **Section 4.2.5** for specifications for this cable.
2. Turn the Brightness and Focus dials on the Remote Unit counterclockwise, by hand or with a screwdriver, as far as they will go.

- Attach the output cord of the Remote Unit's power supply to the power jack on the front of the unit; then plug the IEC 320 end of the power supply's input cord into the IEC 320 inlet on the power supply's transformer; then plug the other end of the input cord into a utility (mains) power outlet. The Remote Unit should power up immediately; it has no ON/OFF switch. (If the Remote Unit is in the location you want it to be, you can leave it plugged in and powered up more or less indefinitely.)

### CAUTION!

If you ever need to replace the power supply of the Remote Unit, the replacement power supply must have identical output characteristics (see the "Power" specification in Chapter 2). Using a power supply with different output—even if it's "almost the same"—could damage your equipment.

- Power ON the Sun CPU and the monitor(s); make sure that the remote keyboard functions and that you're getting video at the remote site. (Be aware that even though equipment attached to the Local Unit is usually powered and enabled right away, the remote monitor, keyboard, and mouse might take up to fifteen seconds to be properly initialized; see **Section 7.3**. Note also that the video quality might be poor at this point if your interconnect cable is longer than 80 ft. [24.4 m].)
- Make sure that the remote mouse functions.

If everything works in your test setup, repeat the procedures in **Section 6.2** and **6.3** for your actual installation. (For information about rackmounting a Remote Unit, see **Appendix B**.) If everything works in the actual installation, you can proceed to adjust the remote site's video (see **Section 6.4**). For illustrations, see Figures 6-5 through 6-7.

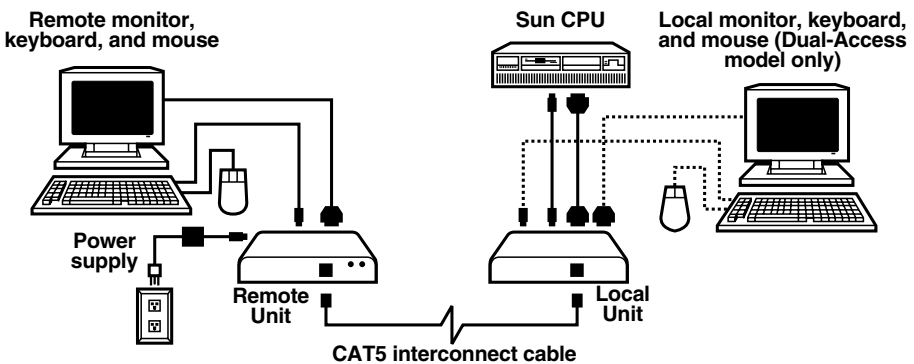
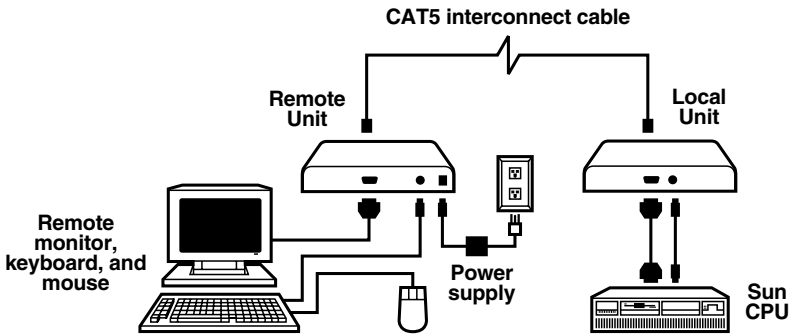
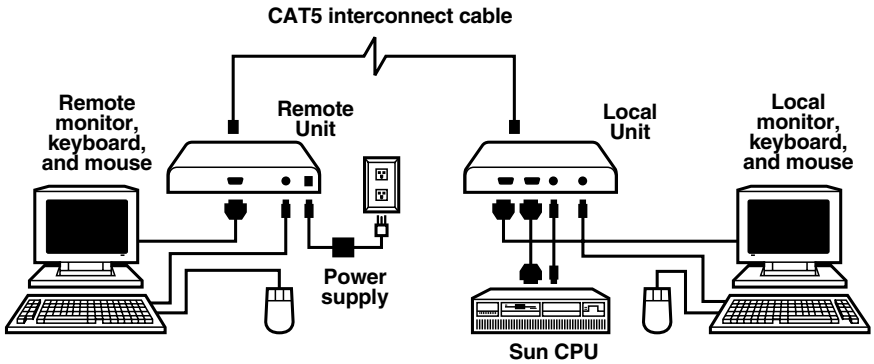


Figure 6-5. An extender-system installation, front view.



**Figure 6-6. A Single-Access Extender-system installation, rear view.**



**Figure 6-7. A Dual-Access Extender-system installation, rear view.**

## 6.4 Adjusting the Video Compensation

You should only need to take the steps in this section if the interconnect cable between your Local and Remote Units is longer than 80 ft. (24.4 m). If it isn't that long, but the video at the remote site still looks awful, first try adjusting the Remote Unit's Brightness and Focus dials. If the video looks bad no matter how you set these dials, the problem is almost certainly being caused by bad wiring in your interconnect cable. Compare its pinning and pairing with those shown in **Appendix A**.

### NOTES

**For all practical purposes, cable equalization cannot be exact: The remote video image will never be as sharp as the original. The Remote Unit's equalization system is designed to produce very good results on short or medium-length cables and acceptable quality across very long cables (those over 500 ft. [152.4 m] in length).**

**At any cable range, you can see how the video would appear without any compensation at all by turning the Focus dial counterclockwise as far as it will go.**

1. Run an application you intend to use that requires a high screen resolution, such as an art or design program, a word processor or desktop-publishing package, or even a graphics-intensive game.
2. If the video reaching the remote monitor is "undercompensated," you will notice black smearing on the right-hand edge of large horizontal objects such as title bars. The degradation becomes more noticeable as cable length increases.
3. Keep your eyes on a part of the image where the smearing is evident. Now, turn the Remote Unit's Focus dial clockwise, by hand or with a screwdriver, until the smearing disappears and the edge becomes very bright and too sharp. At this point and beyond the video is "overcompensated."
4. Turn the Focus dial back slightly until you reach a point where the edge looks as it should be (no smearing or over-sharpness). The compensation is now adjusted correctly for the length of interconnection cable used. (If you can't seem to get the compensation close enough, and you're running high-res video to near the limits of the cable length that the Remote Unit is configured for, see the Notes in **Section 5.1**.)
5. Use the Brightness dial to adjust the brightness of the overall picture. After you do so, you might need to make a further slight adjustment with the Focus dial.

Once you've finished polishing up the video, your extender system should be ready for continuous operation.

# 7. Operation

## 7.1 Keyboard and Mouse Emulation

The ServSwitch Brand CAT5 KVM Extender for Sun uses a microprocessor to emulate the presence of a directly connected keyboard and mouse for the attached Sun CPU. This means that you don't have to connect a keyboard or mouse to the CPU in order for it to boot; in fact, the CPU will boot with only the Local Unit connected.

This feature makes several other things possible:

- Your CPU can operate continuously regardless of whether or not the extender's Remote Unit is powered, connected, or even present.
- You can "hot-plug" or "hot-swap" the remote or local keyboard and mouse at any time; that is, you can unplug and replug the keyboard and mouse without disrupting the operation of the CPU.
- You can connect different Local Units to different Remote Units at different times in order to create a "switched" KVM-extension system with multiple user stations. You can do this by moving cable between patch-panel ports or directly between units, although you should do this as infrequently as possible to avoid wearing out the connectors on your cable and devices. Or you can use a CAT5 switch, but the switch must carry all eight wires (maintaining the twists between the wire pairs) and must have enough bandwidth to support your system's video demands. Please call Black Box Technical Support to discuss your application before installing such a system.

## 7.2 The Scroll-Lock Reset

In an extender system, you can reinitialize the keyboard and the associated mouse after you detach and reconnect either of them, or if either of them ever lock up. Do this (at either the local or remote station) by pressing and holding the right [Shift] key, pressing and releasing [Scroll Lock], and releasing right [Shift]. (Note that the extender will automatically reinitialize the keyboard and mouse whenever you attach them.) If a Scroll-Lock reset doesn't help your remote keyboard or mouse, try cycling power to the Remote Unit.

### 7.3 Shared User Access (Dual-Access Model Only): The Inactivity Timeout and Private Mode

Because two user stations (one local, one remote) can be attached to it, the Dual-Access model of the KVM Extender for Sun has these “shared access” features:

- The two stations normally contend for access. When there has been no keyboard or mouse activity on one station for the duration of the “inactivity timeout” period, the extender will switch to the first station from which it detects a keyboard keypress (or mouse movement, if DIP-switch position 3 is set to OFF—see **Section 5.2**).

The “inactivity timeout” prevents a user at the other station from interrupting work in progress at the active station. The timeout is factory-preset to two seconds; if you would rather set it to 15 seconds, set DIP-switch position 2 to OFF (see **Section 5.2**). Depending on how long the timeout is set for, when the extender system boots up, the Local Unit gives control (and its total attention) to the local station for at least the first two or fifteen seconds; this means that the remote monitor might be blank, and the remote keyboard and mouse inactive, for up to fifteen seconds.

- For applications in which either station is not in a secure location, or must be temporarily kept from accessing the Sun CPU, users at either station can trigger the extender’s “Private Mode,” which disables the other monitor, keyboard, and mouse.

Here’s how it works: A user station is activated by pressing a key on its keyboard, or (if DIP-switch position 3 is set to OFF—see **Section 5.2**) by moving the mouse. This first keypress, or the first packet of mouse data, is absorbed by the extender and is not passed on to the CPU. The extender “latches onto” this user station; users at the other station can see what’s happening on their monitor, but can’t control the CPU with their keyboard or mouse while the active station is in use. Once the active station’s keyboard or mouse is idle for more than fifteen seconds, the extender “lets go” of that station, and will switch to whichever station it next detects keyboard input from.

When they have control of the extender, users at either station can force the extender into Private Mode by pressing and holding the left [Ctrl] key on their keyboard, pressing and releasing [Scroll Lock], and releasing left [Ctrl]. While the extender's in Private Mode, the triggering user will have exclusive control—locking out the other station—and the Scroll Lock LED will flash on both the local and remote keyboards. Other than this indication, the locked-out station is almost completely disabled: The monitor goes blank and the keyboard and mouse stop working. Private-Mode users must press and hold left [Ctrl], press and release [Scroll Lock], and release left [Ctrl] again to exit Private Mode and re-enable the other user station; when this is done, the extender also reinitializes the keyboard and mouse at the station that was in Private Mode. (To reset the local keyboard and mouse without going into Private Mode, use the keystroke sequence described in **Section 7.2.**)

# 8. Troubleshooting

## 8.1 Common Problems

This section discusses difficulties that people sometimes have with the ServSwitch Brand CAT5 KVM Extender for Sun, and suggests possible remedies. If the recommended actions don't help, if you don't see your problem here, or if your problem keeps recurring, call Black Box Technical Support as directed in **Section 8.3**.

### 8.1.1 KEYBOARD

*The CPU boots correctly with no error messages, but the keyboard does not work at all.*

1. Check the keyboard cable and (if necessary) the keyboard portion of the extension cabling to your CPU or KVM switch; if it's loose, or if you have the keyboard and mouse cabling reversed (plugged into each other's extender-port connectors), plug the cabling in properly and reset the keyboard as described in **Section 7.2**.
2. Check the interconnect cable between the extender's Local and Remote Units. Is it intact along its length and securely connected at both ends? And is it wired correctly? (Compare its wiring with that shown in **Appendix A**.)
3. Try a different model of keyboard. If the new keyboard works, the original one might be incompatible (some older autosensing keyboards don't work with the extender).

*Connecting a keyboard to the Remote Unit has an adverse effect on the remote video.*

Try using a newer keyboard. (Some older keyboards require too high a current for the Remote Unit to properly drive the video signal.)

*When I don't use a keyboard, the extender doesn't work at all.*

See **Section 8.1.5**.

### 8.1.2 MOUSE

*There is a mouse cursor on the screen, but the mouse does not work.*

1. Reset the mouse as described in **Section 7.2**.
2. Check the mouse cable and (if necessary) the mouse portion of the extension cabling to your CPU or KVM switch; if it's loose, or if you have the keyboard and mouse cabling reversed (plugged into each other's extender-port connectors), plug the cabling in properly and reset the mouse as described in **Section 7.2**.



3. Check the interconnect cable between the extender's Local and Remote Units. Is it intact along its length and securely connected at both ends? And is it wired correctly? (Compare its wiring with that shown in **Appendix A**.)
4. Try powering the Remote Unit OFF and then ON again.

*The mouse is behaving erratically.*

1. Reset the mouse as described in **Section 7.2**.
2. Quit and restart the application.
3. Reboot the Sun CPU.

### 8.1.3 BOTH KEYBOARD AND MOUSE

*Neither the keyboard nor the mouse operates, or both have locked up.*

1. If they have both locked up, first try resetting the keyboard and mouse as described in **Section 7.2**.
2. Reset the CPU and try again.
3. If the problem is happening at the remote station, cycle power to the Remote Unit.

### 8.1.4 VIDEO

*I'm having problems using an older Sun monitor and/or CPU with 13W3 connectors.*

Are you using third-party Sun 13W3 video adapters? If these don't emulate the video "ID bits" properly, the system might not work correctly. Please call Black Box Technical Support.

*The picture is not sharp, or is badly smeared.*

1. If your Sun CPU is outputting video at the standard Sun resolution (1152 x 900), and you've run CAT5 cable farther than 430 ft. (131.1 m) between your Local and Remote Units, your video will be degraded. Either reduce the distance or reduce the resolution. If you've run the CAT5 cable farther than 260 ft. (79.2 m) at this resolution, the Remote Unit's cable-length jumpers should be in the "A" setting—see **Section 5.1**.
2. The video compensation might not be set correctly. See **Section 6.4**.
3. Check the interconnect cable between the extender's Local and Remote Units. Is it solid-core cable, rated as Category 5? (It might be possible to use CAT5e at distances up to 400 ft. [121.9 m], but video might degrade if it's run across lengths of CAT5e greater than that.) Is the cable intact along its length and securely connected at both ends? And is it wired correctly? (Compare the cable's specs with those listed in **Section 4.2.4** and its wiring with that shown in **Appendix A**.)

4. Check the video-extension cabling, patch-panel video connections, and other video connections in the system. Make sure everything is properly and securely attached.
5. Are you using an LCD panel? You might need to reduce the refresh rate of your graphics card's output.

*Each character has separated into overlapping sets of red, green, and blue pixels; the effect is like trying to watch a 3-D movie without 3-D glasses.*

1. Check the interconnect cable between the extender's Local and Remote Units. Is it solid-core CAT5 cable? (Do not use stranded cable or cables rated "Level 6" or higher. We don't recommend using CAT5e cable for runs longer than 400 ft. [121.9 m].) Is the cable intact along its length and securely connected at both ends? And is it wired correctly? (Compare the cable's specs with those listed in **Section 4.2.4** and its wiring with that shown in **Appendix A**.)
2. Check the video-extension cabling, patch-panel video connections, and other video connections in the system. Make sure everything is properly and securely attached.
3. The video compensation might not be set correctly. See **Section 6.4**.
4. Check the settings of the Remote Unit's distance jumpers; you might need to try a higher setting. See **Section 5.1**.

*The monitor sometimes loses sync, causing it to go blank for a second or two.*

This could happen if your electrical power system is very noisy (particularly on the ground lead). Also, don't route your interconnect cable anywhere near power lines or other powerful sources of interference such as generators, motors, or fluorescent lights. If this is a persistent problem, please discuss it with Black Box Technical Support.

*I only need video—not keyboard/mouse control—but I can't get a picture.*

Even if you are only using the extender for video extension (to drive video to a remote monitor), the extender's Local Unit must still be attached to the keyboard port of a Sun CPU or KVM switch, because that's where it gets its power. If your application makes it impossible to connect the extender to a keyboard port, call Black Box Technical Support about getting an alternative power supply for the Local Unit.

*I get a constant vertical wobble down the screen. What is the cause of this interference?*

1. The interconnection cable could be located too close to a source of very strong electrical-power interference; reroute the cable if possible.
2. If the wobble forms a standing “beat pattern,” the extender is probably being affected by a very strong signal from a nearby broadcast transmitter. The solution in this case is to change the vertical refresh rate slightly (for example, from 60 Hz to 70 Hz or vice versa).
3. You might require an alternative power supply for the Remote Unit. Call Black Box Technical Support.

*Connecting a keyboard to the Remote Unit has an adverse effect on the remote video.*

Try using a newer keyboard. (Some older keyboards require too high a current for the Remote Unit to properly drive the video signal.)

*The Extender doesn't seem to work correctly with my LCD panel.*

Try reducing the refresh rate of the video signal that your graphics card is outputting. (The maximum refresh rates supported by most LCD panels are less than those supported by most monitors.)

### 8.1.5 POWER

*I don't need to use a keyboard in my application, but the extender doesn't work at all unless I have a keyboard line running from the Local Unit to the Sun CPU or KVM switch.*

The extender's Local Unit normally operates using the 5 volts of DC power that the attached CPU or KVM switch supplies on its keyboard port. Even if you're not using a keyboard at either the local or remote user station, you should run a cable from the Local Unit's CPU-port keyboard connector to the keyboard port of the CPU or KVM switch in order to power the Local Unit. If this is not possible, please call Black Box Technical Support to discuss your application; you might need a keyboard-port power supply for the Local Unit.

## 8.2 General Questions About the Extender

*Is it possible to use an interconnection cable longer than 1000 feet (304.8 meters)?*

The extender has been designed to produce acceptable results with SVGA resolutions at the maximum cable length of 1000 ft. Therefore, it *might* be possible for you to run as far as 1640 ft. (499.9 m) at the standard VGA resolution of 640 x 480.

However, we do *not* recommend doing this and *cannot* guarantee that it will work.

*Can extenders be daisy-chained to allow operation across a distance greater than 1000 ft. (304.8 meters)?*

Though we do not recommend doing so, you can chain two extenders in order to operate over longer distances. Using cascaded extenders (CPU→Local Unit 1→Remote Unit 1→Local Unit 2→Remote Unit 2→monitor, keyboard, and mouse), SVGA operation over 1640 ft. (499.9 m) and standard VGA operation over 2000 ft. (609.6 m) is theoretically possible, though not guaranteed. In general, the first CAT5 cable segment (the one between the first Extender's Local and Remote Units) should be approximately 655 ft. (200 m) long and the remaining distance should be covered by the second segment (the one between the second extender's Local and Remote Units). Such applications require careful setup of the video equalizers. If you plan to cascade extenders, please contact Black Box Technical Support to discuss your application.

*Can the extender be used between buildings?*

No. Ground loops could destroy the extender and attached equipment.

*Can I use multiple Local or Remote Units by swapping interconnect cables or switching the interconnect link?*

Because the extender performs full keyboard and mouse emulation, it is possible to swap or switch the Local-Remote interconnection to create, in effect, a KVM matrix-switch system; you would just have to remember to always reset the active Remote Unit (and, if it's a Dual-Access model, the Local Unit; see **Section 7.2**) after each such swap or switch. Please call Black Box Technical Support to discuss your application before deploying such a system.

*Can the extender be used with RGB video or video with separate composite sync?*

As long as the video has sync on green (the composite sync signal superimposed on the green color signal), there should be no problem. The extender natively supports composite sync.

*Which cable type is better: UTP (unshielded twisted pair) or STP (shielded twisted pair)?*

In electrically quiet environments, UTP cable will give the best quality video over long distances because it has less capacitance per unit length. However, STP is usually better in electrically noisy environments, because it resists interference more strongly.

*When using UTP, what's the best way to make sure that the system does not suffer from any interference?*

The extender is designed to withstand high levels of interference while driving signals over long stretches of UTP. To further reduce the potential for interference, consider taking these actions:

- a) Make sure that the extender's Remote Unit, the remote monitor or KVM switch, and the local Sun CPU or KVM switch are all connected to the same utility-power (mains) phase.
- b) Make sure that the AC voltage across the utility-power (mains) grounds (at both the local CPU and remote monitor) is less than 2V.
- c) Use a "clean earth" or "clean grounding" system (if your site has one installed).
- d) Route the interconnection cable away from generators, motors, compressors, fluorescent lights, and other cables.
- e) Try STP cable if you think noise could be a problem.

*This interconnect cable is exactly like the cable I use on my LAN. Can I connect the extender to my network?*

Absolutely not. Regardless of the cable similarities, the data signals and voltages used by the extender are totally 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, is a sure way to blow out the extender, and could damage other devices attached to the extender as well.

*Can I rackmount the extender?*

Yes, using rackmount kits that are available separately. See **Appendix B**.

### 8.3 Calling Black Box

If you determine that your CAT5 KVM Extender for Sun is malfunctioning, *do not attempt to alter or repair it*. It contains no user-serviceable parts. Contact Black Box Technical Support at 724-746-5500.

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

- the firmware-revision level printed on the bottom of the extender (very important, especially for keyboard and mouse problems);
- the nature and duration of the problem;

- when the problem occurs;
- the components involved in the problem—that is, what type of computers, what type of keyboard, brand of mouse, make and model of monitor, type and make of CAT5 cable, etc.;
- any particular application that, when used, appears to create the problem or make it worse; and
- the results of any testing you've already done.

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

## **8.4 Shipping and Packaging**

If you need to transport or ship your extender:

- Package it carefully. We recommend that you use the original container.
- If you are shipping it for repair, please include all parts of the Remote Unit's external power supply. If you are returning it, please include everything you received with it. Before you ship the extender back to Black Box for repair or return, contact us to get a Return Authorization (RA) number.

# Appendix A: Twisted-Pair Cable Pinning/Pairing

The cable you will use to interconnect the Local and Remote Units of your ServSwitch Brand CAT5 KVM Extender for Sun should be terminated with RJ-45 plugs and should be wired according to the EIA/TIA-568 standard (preferably 568B rather than 568A). See **Section 4.2.5** for a more complete set of cable recommendations.

Looking into the interconnect socket on either extender, or looking at the cable plug from behind, pin 1 should be on the left and pin 8 on the right, and the wires should be arranged this way:

<b>Pin</b>	<b>Color</b>	<b>Function, Pair</b>
1	White/Orange	TX, Pair 2
2	Orange/White	RX, Pair 2
3	White/Green	TX, Pair 3
4	Blue/White	RX, Pair 1
5	White/Blue	TX, Pair 1
6	Green/White	RX, Pair 3
7	White/Brown	TX, Pair 4
8	Brown/White	RX, Pair 4

### NOTES

In runs of our EHN840 cable over 655 ft. (199.6 m) long, you might get much better video quality if, at both ends of the cable, you swap the green and brown pairs so that White/Green is on pin 7, Green/White on pin 8, White/Brown on pin 3, and Brown/White on pin 6.

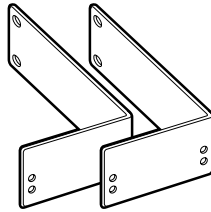
The extender has been tested with all major makes of CAT5 cable including Black Box, Berk-Tek™, Mohawk®, and AT&T®. The extender has also been tested and found to work, *in certain situations*, with 4-pair Category 3 cable or with four pairs of 25-pair UTP trunk cables instead of 4-pair Category 5 cable. But we do *not* recommend such installations.

We don't normally recommend using CAT5e cable (rated for up to 155 Mbps) for runs longer than 400 ft. (121.9 m), although our EYN795MS cable has performed well in testing in runs up to the full 1000 ft. (304.8 m). *Avoid* using cables rated "Level 6," "Level 7," etc. If you have problems getting a good picture with CAT5e cable, or if you *must* use cables with bandwidths higher than 155 Mbps, please contact Tech Support; the signal-skew problems caused by tightly twisted pairs in these cables can sometimes be resolved by swapping which pairs are used for which signals or by using an external delay line.



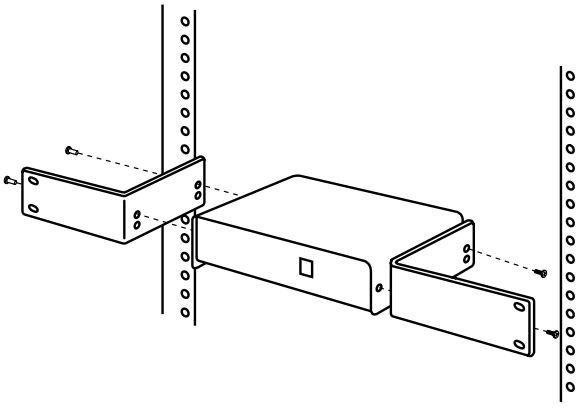
## Appendix B: Rackmounting

If you'd like to mount any of your ServSwitch Brand CAT5 KVM Extender for Sun system's Local or Remote Units in a 19" rack, use a two-bracket rackmount kit like the one shown below (product code RMK19U-R2).



To use a kit to mount an extender, take these steps, referring to the illustration below:

1. Unscrew and keep the two screws on each side of the unit's case.
2. Match up the two holes in the "unit end" of each kit bracket with the two now-vacant screwholes on each side of the unit, then fasten the brackets to the unit with the screws you removed in step 1.
3. Once you've attached both brackets, match the holes in the "rack end" of each bracket to an appropriate set of matching holes on your equipment rack. Screw the unit assembly to the rack using your own screws, bolts, or cage nuts (not included).



**DISCLAIMERS**

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. They reserve 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 other circumstances outside the manufacturer's control. And the manufacturer will not be responsible for any loss, damage, or injury arising directly or indirectly from the use of this product.