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Thank you for purchasing a BLACK BOX® ServSwitch™ Brand KVM-switch accessory! We appreciate your business, and we think you'll appreciate the many ways that your new ServSwitch keyboard/video/mouse switch 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?

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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™ Duo Extender, including how to install, operate, and troubleshoot it. For an introduction to the Extender, see **Chapter 2**. The Extender product codes covered in this manual are:

KV6EXT-R2
KV6EXTB-R2

This manual also includes information about the Extender's Rackmount Kit, whose product code is:

RMK19WX

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- (a) Reorient or relocate the receiving antenna.
- (b) Increase the separation between the equipment and the receiver.
- (c) Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- (d) Consult the supplier or an experienced radio/TV technician for help.

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



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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. Specifications

Cable Required:	Between the Duo and the Extender: Four-pair (eight-wire) Category 5 or higher unshielded twisted-pair (UTP); shielded twisted-pair (STP) can also be used at shorter distances
Compliance:	CE (EN55022 Class A); FCC Part 15 Subpart B Class A, IC Class/classe A
Standards:	VGA, SVGA, XGA, or XGA-2 video
Interfaces:	Video: VGA; Keyboard and mouse: IBM PS/2 compatible; with appropriate adapters, both models can support IBM PC/AT keyboards and the KV6EXT-R2 can support PC/AT keyboard ports and EIA/TIA RS-232 serial mouse ports; Serial (nonfunctional): EIA/TIA RS-232, pinned according to TIA-574, DCE; KV6EXT-R2 only: Audio (nonfunctional): 3.5-mm stereo
Resolution and Refresh Rate:	At Duo-to-Extender distances to 65 m (210 ft.): Up to 1600 x 1280 noninterlaced at up to 85 Hz; At distances to 100 m (325 ft.): Up to 1600 x 1280 noninterlaced at up to 65 Hz; At distances to 200 m (655 ft.): Up to 1024 x 768 noninterlaced at up to 65 Hz
Maximum Distance:	Between the Duo and the Extender: Up to 200 m (655 ft.) of unshielded twisted-pair cable or 100 m (325 ft.) of shielded twisted-pair cable; From Extender to the attached keyboard, monitor, or mouse: 10 m (32 ft.); From Extender to any attached CPU: 20 m (65 ft.)

User Controls:	Keyboard commands; Mouse-click functions; (1) Side-mounted 8-position DIP switch for hotkey selection; Extender users can also access the Duo's on-screen menus
Indicators:	Both models: (2) Top-mounted LEDs: Power (green) and Duo (red); KV6EXT-R2 only: (1) Top-mounted Local CPU (red) LED; Both models also indicate compensation, control-lockout, and password-lockout modes by flashing various patterns on the Num Lock, Caps Lock, and Scroll Lock LEDs of the attached keyboard
Connectors:	All side-mounted; Both models: (1) HD15 female to monitor; (2) 6-pin mini-DIN female: (1) to keyboard, (1) to mouse; (1) Barrel jack for power-supply attachment; (1) DB9 female (nonfunctional); KV6EXT-R2 only: (1) HD15 female to CPU's video port (optional); (2) 6-pin mini-DIN female: (1) to CPU's keyboard port, (1) to CPU's mouse port (both optional); (4) 3.5-mm stereo jacks (nonfunctional)
Maximum Altitude:	10,000 ft. (3048 m)
Temperature Tolerance:	32 to 104°F (0 to 40°C)
Humidity Tolerance:	5 to 60% noncondensing
Enclosure:	Steel and aluminum

Power:	From utility-power (mains) outlet, through detachable power cord and IEC 320 inlet, to external transformer: Input: 100 to 240 VAC at 50 to 60 Hz; Output: 5 VDC at up to 2.5 A from transformer to Extender (Extender normally draws only 1.5 A); Consumption: 7.5 watts typical
Size:	1.3"H x 6.5"W x 5.6"D (3.3 x 16.5 x 14.2 cm)
Weight:	1.1 lb. (0.5 kg)

2. Introduction

The ServSwitch™ Duo Extender is a high-performance IBM® PC compatible keyboard-, monitor-, and mouse-extension device that you can use to connect a distant user station to a ServSwitch™ Duo. The Extender is linked to the Duo with twisted-pair cable, preferably rated Category 5.

The basic version of the Extender (product code KV6EXTB-R2) has only user-station (monitor, keyboard, and mouse) connectors plus a nonfunctional serial connector, and only performs KVM extension. The full version of the Extender (KV6EXT-R2) also has connectors for directly attaching an optional local CPU, and can switch between this CPU and the CPUs in the Duo system. (It has a few nonfunctional audio connectors as well.)

2.1 Features and Benefits of the Extender

Here are some of the useful features of both ServSwitch Duo Extender models and some of the ways those features benefit you:

- Control your ServSwitch Duo system from a remote keyboard, monitor, and mouse up to 200 meters (655 ft.) away.
- Uses a single Category 5 unshielded twisted-pair (UTP) cable to carry all supported signals between the Extender and the Duo.
- Password protection prevents unauthorized use.
- Finely user-adjustable video compensation for the best possible video quality at any supported cable length.
- Video compensation only needs to be done once, at installation time, because the compensation setting is saved in EEPROM memory even when the Extender is powered OFF.
- Supports high-bandwidth monitors at resolutions up to 1600 x 1280 pixels.
- Emulates the presence of a keyboard and mouse, so that any attached computer can boot up automatically at any time.
- Supports keyboard modes 1, 2, and 3, as well as both “prompt” and “stream” mouse modes, for maximum compatibility.
- Support for Microsoft® IntelliMouse® and other common “wheel” mice.

- Automatically restores keyboard and mouse states when you switch between CPUs.
- Keyboard-command hotkey is user-configurable.
- LEDs indicate power status, data activity, and (on the KV6EXT-R2) whether the Duo or the local CPU is selected.
- Flashes keyboard LEDs to indicate compensation, control, and locked modes.
- Robust metal case ensures good shielding and video quality.

The full KV6EXT-R2 Extender has these additional features:

- Control a directly attached PC as well; this can be an IBM PS/2®, PC/AT®, RS/6000®, or compatible computer.
- Switch between Duo and local CPUs with keyboard hotkey sequences or a 3-button or wheel mouse.
- Mouse-restoration functions to enable hot-plugging of certain systems as the local CPU.
- Supports IBM ThinkPad® and its “Y” cables.

2.2 The Complete Extender Package

Along with your ServSwitch Duo Extender, you should have received:

- The Extender’s power supply.
- The power supply’s input cord.
- This manual.

If you didn’t receive everything, or if anything arrived damaged, contact Black Box right away.

2.3 The Extender Illustrated

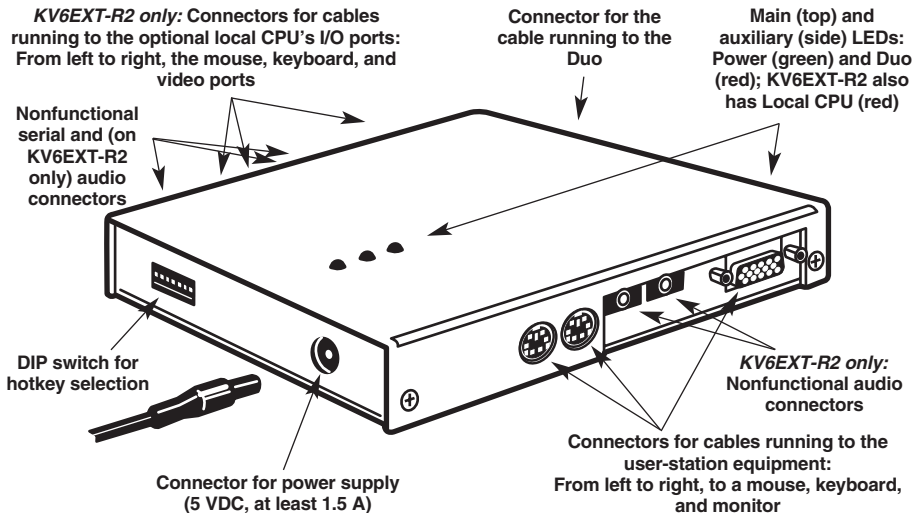


Figure 2-1. The Extender's controls and connectors.

2.4 Safety Concerns

As you prepare to install the ServSwitch Duo Extender, please keep these things in mind:

- The Extender is for use in dry, oil-free indoor environments only.
- **Warning:** The Extender's power supply contains no user-serviceable parts, but it does contain parts capable of delivering hazardous electric shocks. Do not attempt to dismantle it!
- Plug the power supply into a socket outlet close to the Extender.
- Make sure that the rated current draw in amperes of all of the devices plugged into the same outlet or circuit as the Extender does not exceed the outlet's or circuit's rated current in amperes.
- Do not use the Extender's power supply if its case becomes damaged, cracked, or broken, or if you suspect that it is not operating properly.
- If the Extender's power supply stops working, replace it with a manufacturer-approved adapter of the same type only.

3. Installation

3.1 What You Will Need

These things must be in place before you can install your ServSwitch™ Duo Extender:

- Four-pair (eight-wire) twisted-pair cabling rated to at least Category 5. This should be long enough to reach from your Extender to the ServSwitch Duo, up to a maximum of 200 meters (655 feet). Other specifications for this cabling are given in **Appendix A**.
You can make use of any Category 5 structured-cabling systems that might already be in place at your sites, but you should keep the number of cables and connectors involved to a minimum in order to maximize signal quality.
- A monitor with a standard VGA/SVGA (HD15) connector that will work when connected directly to each of your PCs. The Extender supports low- and high-resolution monitors.
- A standard PC/AT or PS/2 style keyboard. If you are using a PC/AT keyboard with a 5-pin DIN connector, you can connect it to the Extender using a standard PC/AT to PS/2 keyboard adapter such as product code FA211.
- A PS/2 style two- or three-button Microsoft or Logitech® compatible mouse or a Microsoft IntelliMouse compatible mouse. If you want to use the mouse to switch CPUs, you will need a three-button mouse or an IntelliMouse. (The Extender supports other “Internet mice” compatible with the IntelliMouse—fitted with a wheel or other scrolling control, and sometimes additional buttons—which are available from several manufacturers.)

Keep in mind that the Extender will operate without a mouse connected if you don’t want to use one.

- A suitable mouse driver for your PCs. Supported types are:
 - PS/2 or RS-232 two-button mouse driver by any manufacturer.
 - Microsoft mouse drivers, including those for the IntelliMouse. (You might be able to use other mouse drivers with IntelliMouse compatible data formats, but these might or might not work—trial-and-error testing might be necessary.)
 - Logitech mouse drivers, including those for two-button, three-button, and wheel mice.

The Extender will automatically configure its mouse output to match the type requested by any supported driver.

- If you're connecting a local CPU to the KV6EXT-R2 Extender, you'll need VGA and PS/2 extension cabling. We recommend our bonded three-to-three extension cable EHN408, which has VGA and PS/2 keyboard and mouse strands all in the same cable. However, you can also use separate VGA and PS/2 extension cables such as EVNPS05 and EVNPS03.

To attach a CPU with a PC/AT keyboard port, you'll need a PS/2 to PC/AT keyboard-port adapter such as product code FA212.

To attach a CPU with a serial mouse port, you'll need a PS/2 to serial mouse-port adapter such as product code FA314.

For assistance figuring out which cables and adapters you'll need, call Black Box Technical Support.

- If you'll be mounting the Extender on a wall or some other non-horizontal flat surface, you'll need adhesive mounting strips—preferably the two-part type made with Velcro® or other hook-and-loop fasteners, so that after it's mounted you can detach and reattach the Extender as necessary.

If you'll be mounting the Extender in a 19" equipment rack, you'll need the RMK19WX Rackmount Kit. Refer to **Appendix B**.

3.2 Placement

The ServSwitch Duo Extender was designed to be set on a desktop or some other flat horizontal surface. To mount it on a non-horizontal surface such as a wall, use a pair of double-sided adhesive strips, preferably the kind that have Velcro® or some other hook-and-loop fastener between the adhesive sides. Peel the backing away from one side of each of the two strips and press the strips firmly onto the bottom of the unit (the wide flat area where there are no connectors and no LEDs). Then peel the backing away from the other side of the strips and press the bottom of the Extender firmly against the surface you want to mount the Extender on.

You can also mount the Extender in a 19" rack using the RMK19WX Rackmount Kit. Refer to **Appendix B** for the details of the rackmounting procedure.

3.3 Connecting Your Devices

First make sure the power supply is unplugged and disconnected from the ServSwitch Duo Extender.

Also make sure that (if possible) all of the devices you want to attach to your Extender system are turned off and unplugged. (If you have to “hot-plug” a powered computer into the Extender, see **Section 5.9.**) You don’t have to connect anything to ports on the Extender that you’re not using. Do *not* attach anything to the Extender’s serial or audio connectors; these might be used in some future implementation of the Extender, but they have no function in the current version.

3.3.1 CONNECTING USER EQUIPMENT

Plug a set of shared user equipment (keyboard, PS/2 mouse, and monitor) into the connectors on the Extender marked with the corresponding icons in the “CONTROL STATION” connector group on the Unit’s front panel. Refer to Figure 3-1 on the next page.

3.3.2 CONNECTING A LOCAL CPU (OPTIONAL, KV6EXT-R2 ONLY)

To attach an optional local computer to the KV6EXT-R2 Extender, run extension cabling from the CPU’s keyboard, video, and mouse ports to the connectors on the Extender marked with the corresponding icons in the “LOCAL COMPUTER” group on the Unit’s rear panel. (The type of cabling you’ll use is discussed in the bulleted paragraph at the top of the previous page.) Refer to Figure 3-1 on the next page.

SERVSWITCH™ DUO EXTENDER

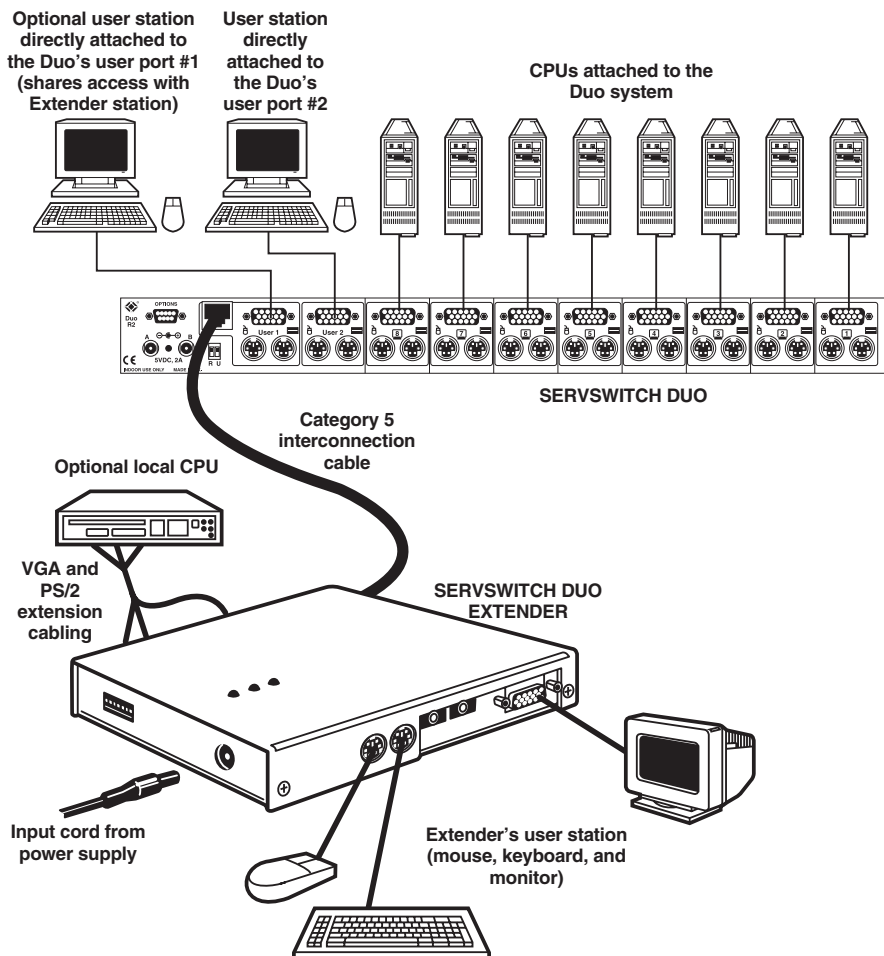


Figure 3-1. A fully installed Extender system, including all optional attachments. (The full KV6EXT-R2 model is shown. For clarity, this illustration uses a single line to show the keyboard, mouse, and video connections to each CPU and station attached to the Duo.)

3.4 Connecting the Extender to the Duo

NOTE

This “-R2” version of ServSwitch Duo Extender can’t be used with the original (non-R2) ServSwitch Duo.

Attach all of your local equipment to the ServSwitch Duo as described in the section titled “Systems with a Single Duo and Directly Attached User Stations” in the Duo’s manual. Leave everything powered off, and make sure the ServSwitch Duo Extender, your remote monitor, and any CPU attached to the Extender are powered off as well.

Run eight-wire (four-pair) twisted-pair cabling from the RJ-45 jack in the ServSwitch Duo’s user port #1 to the matching jack on the ServSwitch Duo Extender. (Do *not* attach these jacks to a LAN; you could damage the Duo or Extender and possibly the network as well.) Category 5 twisted pair will give the best results in lengths up to 200 m (655 ft.), but you should be able to use Category 3, 4, or 5e if you keep the distance short (not more than 100 m [325 ft.]). *Avoid* using cabling rated as “Level 6,” “Level 7,” etc., for data rates above 155 Mbps; the large differences between the twist ratios of the wire pairs in these cables cause the video signals from the Duo’s CPUs to get out of sync with each other.

The twisted pair can be a single continuous length of cable if that’s the best option. But this kind of cable is often already installed in buildings and terminated at data-wiring sockets in various locations. If twisted-pair cable is preinstalled at your site, you can run patch cables from the Duo and Duo Extender to these sockets and set up a direct one-to-one connection between them using the patch panels in your wiring closets, which will probably be much more convenient.

A sample system using a single Duo and Duo Extender is shown in Figure 3-1 on the previous page.

CAUTION!

Even though the cabling and connectors might be the same, do *not* connect a ServSwitch Duo or Duo Extender to your LAN. Doing so will damage the Duo/Extender and might damage the network as well.

3.5 Powering the Extender and Attached Devices

Once you hook all of your devices to the ServSwitch Duo and ServSwitch Duo Extender and connect the Extender to the Duo, power up the Duo as described in the “Powering the Duo” section in your Duo manual. Then plug in and turn on your remote monitor and any CPU you’ve attached to the Extender.

VERY IMPORTANT!

The picture on your monitor might look bad at this point. This is because you must fine-tune the Extender’s video compensation before you operate the Extender for the first time. See Section 4.2.2.A.

Now plug the output cord of the Extender’s included power supply into the barrel jack on the side of the Extender. Then plug the power supply’s input cord into the IEC 320 inlet on the supply’s transformer. Finally, plug the power supply’s input cord into a working AC outlet. The Extender will begin operating immediately; it has no ON/OFF switch.

4. Configuration

To configure your ServSwitch™ Duo Extender system, first you'll need to configure any attached PC (if the Extender is a KV6EXT-R2), as directed in **Section 4.1**. Then you'll need to configure the Extender itself, as directed in the rest of this chapter.

IMPORTANT NOTES

Before you operate the Extender for the first time, you *must* fine-tune its video-compensation amplifiers—the picture will look awful unless you do. See Section 4.2.2.A.

Throughout the rest of this manual, the [Enter] designation refers to the main “enter” or “carriage-return” key (often labeled “↵”) on the main section of the keyboard. Do not use the “Enter” key on the numeric keypad or the extra “Enter” key found on the main section of some specialized keyboards.

4.1 Configuring an Attached PC (KV6EXT-R2 Only)

If you've attached a PC to the full KV6EXT-R2 Extender, configure it in the same way that you would if your keyboard, mouse, and monitor were all connected directly to it, but keep these things in mind:

- The Extender emulates Microsoft compatible serial, IntelliMouse, and PS/2 mice, so make sure that your PC software is configured for a Microsoft mouse of the correct type. Refer to the list of supported drivers in **Section 3.1**.
- The Extender supports VGA, SVGA, XGA, and XGA-2 type monitors, but does not support the automatic detection features available with some Plug-and-Play monitors and video cards. If you have this type of video card or monitor, you should select the video mode manually instead of relying on the automatic detection feature.

4.2 Configuring the Extender

The ServSwitch Duo Extender has a large number of configuration options. You'll set different options using one of two different methods:

- Which keyboard-character combination the Extender recognizes as a keyboard command is controlled with the Extender's eight-position DIP switch. See **Section 4.2.1**.
- Video compensation and other advanced options are controlled with keyboard commands after the Extender is placed in "configuration mode." See **Section 4.2.2**.

4.2.1 SETTING THE HOTKEY

You can use positions 6, 7, and 8 of the 8-position DIP switch on the side of the Extender (shown in Figure 4-1 on the next page) to select the Extender's hotkey combination. (The hotkey combination is the combination of keyboard keys that triggers the Extender to look for a keyboard command—see **Section 5.7**.) The available options are [Ctrl] + [Alt] (the factory-default setting), [Ctrl] + [Shift], [Alt] + [Shift], right [Alt] only, left [Alt] + right [Alt], left [Ctrl] + left [Alt], right [Ctrl] + right [Alt], or hotkeys disabled. (While hotkeys are disabled, no hotkey commands can be sent to the Extender, including the command to access configuration mode. In this situation, configuration mode will not be available.)

Positions 1 through 5 of this DIP switch are reserved for future use and must remain set to OFF.

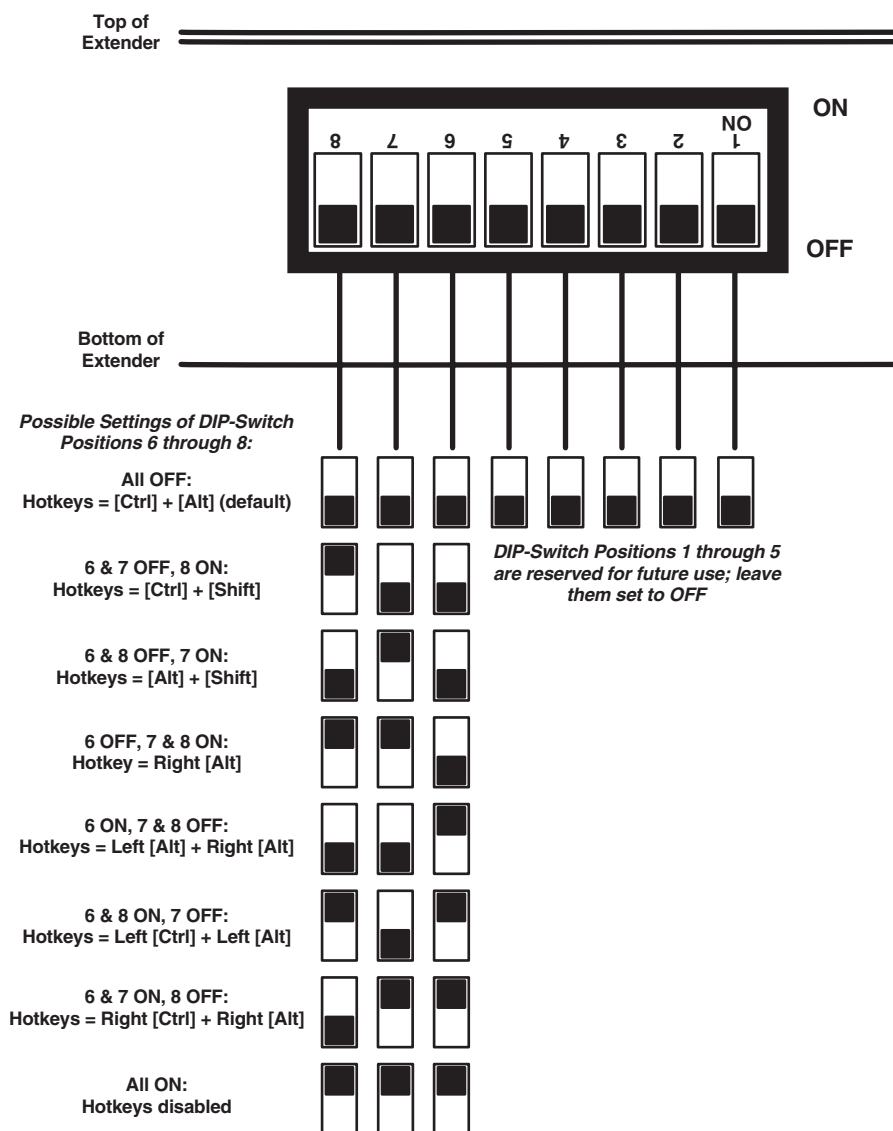


Figure 4-1. The Extender's DIP switch.

4.2.2 USING CONFIGURATION MODE

If hotkeys are currently enabled (see **Section 4.2.1**), you can put the Extender in configuration mode by pressing the currently selected hotkeys along with the [Enter] key. For example, if the currently selected hotkey combination is the default pairing of [Ctrl] and [Alt], press [Ctrl] + [Alt] + [Enter] to activate configuration mode. Once you do this, you will see the Num Lock, Caps Lock, and Scroll Lock LEDs on your keyboard begin to flash one after another in a cycling pattern, like this:

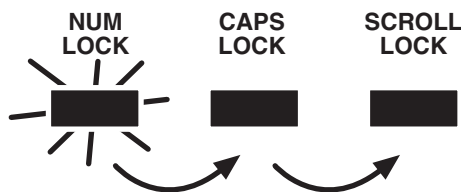


Figure 4-2. The configuration-mode LED pattern.

Once the Extender is in configuration mode, you can change its video compensation (see **Section 4.2.2.A**) or set various other options (see **Section 4.2.2.B**).

4.2.2.A Setting the Video Compensation

The Extender contains video-compensation equalizers that maximize the picture quality for your system even though the video signal is being sent across twisted-pair cable. But when you first plug in the Extender, you might notice that the picture appears distorted or blurred or doesn't appear at all. To fix this, take these steps:

1. Go into configuration mode as described at the top of this page. Observe *how fast* the Num Lock, Caps Lock, and Scroll Lock LEDs on your keyboard are flashing; this indicates the level of compensation currently being applied. If they're flashing slowly (to a minimum of one cycle per second for zero distance), the Extender is compensating at a low level suitable for shorter runs of twisted-pair cable. If they're flashing quickly (to a maximum at which the cycling can no longer be distinguished and it looks like all the LEDs are "half on" for 200 m [655 ft.]), the Extender is compensating at a high level suitable for longer runs of twisted-pair cable.
2. Press the keyboard's [Home] key to set video compensation to "none." The picture on the monitor will probably become fuzzy.

3. Use any of these keys to “tune” the Extender’s video compensation:

[Home] sets video compensation to zero.

[Pg Up] increases the video compensation coarsely (in large increments).

[↑] (up-arrow) increases the video compensation finely (in small increments).

[Pg Dn] decreases the video compensation coarsely (in large increments).

[↓] (down-arrow) decreases the video compensation finely (in small increments).

As you change the video-compensation setting, you’ll see the sharpness of the picture change (the Extender automatically recalculates the required matching brightness). Adjust the video compensation until you get the best picture. The longer your twisted-pair cable, the more compensation you’ll need, but if you add too much compensation you might wash out the picture altogether. (If this happens, just reduce your compensation, and the picture will reappear.)

This might be the best technique for quickly finding the best compensation setting: First, press [Pg Up] until you see white trailing edges on the right-hand side of black text or graphics, as shown in Figure 4-3. Then press and release [↓] until the trailing edges disappear. At that point, compensation should be about as close to ideal as you can make it.

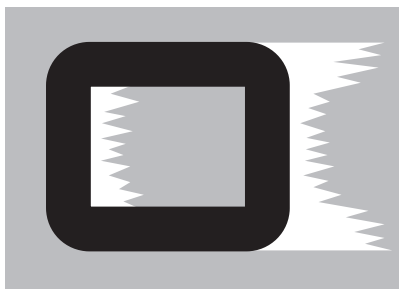


Figure 4-3. “Bleed” due to overcompensation.

4. When you find the best possible picture—and finish entering any other configuration commands (see **Section 4.2.2.B**)—press [Enter] to save the configuration setting and exit configuration mode. The compensation setting is saved in EEPROM, so it will persist even if the Extender is powered off. For this reason, unless you change your twisted-pair cabling, you shouldn’t need to adjust this setting again.

4.2.2.B Issuing Other Configuration-Mode Keyboard Commands

While the Extender is in configuration mode, it is also possible to enter a number of other keyboard commands that you can use to configure advanced options on the Extender. (There are also commands for such functions as displaying the Extender's firmware revision, restoring a disconnected mouse port, and resetting all of the keyboard-controlled configuration options to their factory-default states.)

Most of these commands consist of pressing a letter key, then a number, then [Enter]. For example, to turn on mouse switching, type in [M], then [2], then [Enter]. When you do this, the flashing Num Lock, Caps Lock, and Scroll Lock LEDs on your keyboard—which normally flash in sequence during configuration mode—will be affected this way:

1. After you press the first key of a command sequence, the Num Lock, Caps Lock, and Scroll Lock LEDs will all be steadily lit. Any invalid character will be ignored.
2. After you press the second key of the sequence, the Num Lock and Caps Lock LEDs will remain lit and the Scroll Lock LED will go dark. Any invalid character will be ignored.
3. After you press [Enter] to end the sequence, the command will be executed (or rejected as incomplete if the second character was never entered) and the LEDs will go back to flashing in sequence.

Here are the keyboard commands you can give the Extender in configuration mode. (Letter keys are shown in uppercase, but the commands are not case sensitive.) The settings are explained in greater detail in the indicated sections of this manual.

- **Enable/disable mouse switching** (see **Section 5.8**):

[M] [1] [Enter] = Switching between CPUs with a 3-button mouse or IntelliMouse is *not* supported (default)

[M] [2] [Enter] = You can switch between CPUs with a 3-button mouse or IntelliMouse

- **Restore mouse** (see **Section 5.9**):

[M] [6] [Enter] = Restore regular mouse

[M] [7] [Enter] = Restore IntelliMouse

- **Set/clear password** (see **Section 4.3**):

[P] [Enter] (password) [Enter] = Sets the Extender's password

[P] [Enter] [Enter] = Clears the Extender's password

- [F] [1] [Enter] = **Display firmware version** (see Section 6.4)
- [F] [8] [Enter] = **Reset to factory defaults** (see Section 6.3)

When you finish entering configuration commands and/or adjusting the Extender's video compensation (see **Section 4.2.2.A**), press [Enter] to quit configuration mode and return to normal operation. The Num Lock, Caps Lock, and Scroll Lock LEDs on your keyboard will stop flashing and will return to the states they were in before.

4.3 Setting a Password for the Extender

There are many situations where access to corporate file servers or sensitive information needs to be controlled. In such circumstances, the ServSwitch Duo and the attached CPUs can be locked away in a secure room or cabinet and controlled from the user station attached to the Extender.

The Extender also has a password that you can set to prevent unauthorized use. After setting a password, you can “lock” (disable) the Extender at any time by typing the hotkey sequence together with the letter “L” at the keyboard: [Ctrl] + [Alt] + [L] if the hotkey sequence is set to its default value, for example. While the Extender is locked, it doesn't output video to the monitor or accept input from the keyboard or mouse. The Unit indicates that it's locked by alternately flashing the Num Lock/Scroll Lock LED pair and the Caps Lock LED on the keyboard. It can only be unlocked if a user types in the password followed by [Enter] at the keyboard.

The password is not case-sensitive and can be any combination of keystrokes, including function keys but excluding [Ctrl], [Alt], [Shift], and [Enter]. (For example, the password [F4] [F] [R] [E] [D] [Home] would be valid.) The length of the password can be from 1 to 40 characters, although for better security we recommend that the password be at least four characters long.

To set the password, first get into configuration mode by typing in the current hotkey sequence followed by [Enter] at the Extender's keyboard: [Ctrl] + [Alt] + [Enter] if the hotkey sequence is set to its default value, for example. Then type [P], followed by [Enter], followed by the password characters, followed by another [Enter] to save the password to nonvolatile memory. (This type of memory does not depend on active power or even a battery backup, so it can persist indefinitely.) For instance, to set the password to “open sesame”, you would type in [P] [Enter] [O] [P] [E] [N] [Space] [S] [E] [S] [A] [M] [E] [Enter].

Don't worry if you type the password incorrectly; you can always re-enter it, even if you've exited and re-entered configuration mode. If you discover that you messed up entering the password or that you can't remember what the password is only after someone locks the Extender, you can erase it by selecting "Clear UTP Extender Password" in the Duo's FUNCTIONS menu, as described in **Section 6.2**. (You can erase the password *and* set all of the Extender's keyboard-controlled configuration options back to their factory defaults by issuing the [F] [8] [Enter] command while the Extender's in configuration mode, as described in **Section 6.3**.)

If you want to remove the password after setting one, get into configuration mode, type the letter "P", and press the [Enter] key as before, but then press [Enter] again without typing in any other characters. (If you try to lock the Switch before you've set a password, or after you've removed the password, the Switch will still blank the video, but it won't prevent someone from selecting another CPU.)

5. Operation

This chapter explains the general operation of the ServSwitch™ Duo Extender. We recommend that you read this chapter carefully before starting to use the Extender; also make very sure you have read the important notes at the start of **Chapter 4**.

5.1 Power-Up Status

Under normal circumstances, the ServSwitch Duo Extender is ready for use as soon as it and the Duo are both powered up. How the Extender behaves at bootup when both it and the Duo are properly powered will depend on whether you've set a password for the Extender or not (see **Section 4.3**):

- If you haven't set a password for the Extender, it will establish a connection to the Duo and will light both its Power and Duo LEDs.
- If you *have* set a password for the Extender, it will light its Power LEDs only and will not display any video. It will show that it's expecting you to enter the password by alternately flashing the Num Lock/Scroll Lock LED pair and the Caps Lock LED on the attached keyboard. When you type in the password at the keyboard and press [Enter], the Extender will "unlock," stop flashing the keyboard LEDs, and then do the normal "non-password" bootup procedures (establish a connection to the Duo and light both its Power and Duo LEDs).

5.2 The Extender's LEDs

The ServSwitch Duo Extender has two sets of two (KV6EXTB-R2) or three (KV6EXT-R2) LEDs. The main set of LEDs is on the top panel of the Extender, so they can be read easily when the Extender is installed on a desktop or surface-mounted with adhesive strips. The auxiliary set of LEDs, identical to the main set but unlabeled, are on the same side of the Extender as the CAT5 cable jack, so they can be read easily when the Extender is rackmounted.

Here's how to interpret the LEDs on the Extender:

Name	Color	Status	Means
Power	Green	ON	The Extender is operating normally.
		OFF	The Extender isn't powered.
Duo	Red	ON	A CPU on the Duo is selected, but no keyboard or mouse data is sent to it or received from it.
		FLASHING	A CPU on the Duo is selected, and keyboard or mouse data is being sent to it or received from it.
		OFF	None of the Duo's CPUs are selected.
Local CPU (KV6EXT-R2 only)	Red	ON	The local CPU (the one attached to the Extender) is selected, but no keyboard or mouse data is being sent to it or received from it.
		FLASHING	The local CPU is selected, and keyboard or mouse data is being sent to it or received from it.
		OFF	The local CPU is not selected.

Several things can cause the Extender's Power LED to be dark or flashing. This can be caused by (in decreasing order of likelihood) loose/undone power-supply connections, AC outlet being turned OFF/not working, power supply being broken, the Extender's Power LEDs being defective, or the Extender's main board being defective. If you can't determine the cause of this problem, call Black Box for technical support.

5.3 How the Extender Uses the Keyboard LEDs

The ServSwitch Duo Extender also uses the LEDs on the attached keyboards to indicate various conditions. It will light the Num Lock, Caps Lock, and Scroll Lock LEDs in several different ways:

- Configuration-mode indication—rolling sequence.** As shown in Figure 5-1, the Extender flashes the Num Lock, Caps Lock, and Scroll Lock LEDs on the attached keyboard in sequence to show that it's in configuration mode (see **Section 4.2.2**). Num Lock will light first while Caps Lock and Scroll Lock are dark. Then Caps Lock only will be lit, then Scroll Lock only, and then Num Lock again. The cycle repeats itself continuously until you exit configuration mode, after which the LEDs will be placed back in the states they were in before you went into configuration mode.

The speed of the cycle indicates how much video compensation the Extender is applying (which is one of the things you can set in configuration mode): A slow flash rate indicates low compensation suitable for shorter cable distances, while a fast flash rate indicates high compensation suitable for longer distances. For examples of actual rates and distances, see step 1 in **Section 4.2.2.A**.

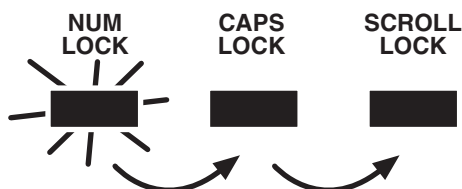


Figure 5-1. The configuration-mode LED pattern.

- Control-lockout indication—unison flashing.** As shown in Figure 5-2, the Extender flashes all three keyboard LEDs at the same time (all three ON, then all three OFF, repeating indefinitely) to show that user station directly attached to user port #1 of the Duo has keyboard and mouse control of port #1. Once the Duo's inactivity timeout expires (see the "User timeout" section of your Duo manual) so that the Extender's user can take control of the CPU, these LEDs will stop flashing and return to their previous states.

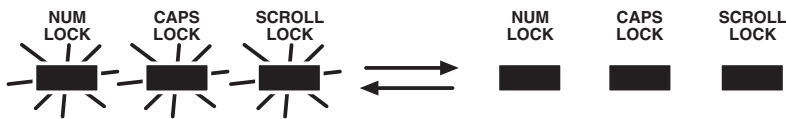


Figure 5-2. The control-lockout LED pattern.

- **Password-lockout indication—lightbar flashing.** As shown in Figure 5-3, while the Extender is locked and waiting for the user to enter a password (see **Sections 4.3** and **5.1**), it alternately lights the Num Lock/Scroll Lock LED pair and the Caps Lock LED on the keyboard. This pattern of flashing alternate LEDs is similar to that of the lights in the lightbar of a police car. Once you type in the correct password and press [Enter], these LEDs will stop flashing and return to their previous states.

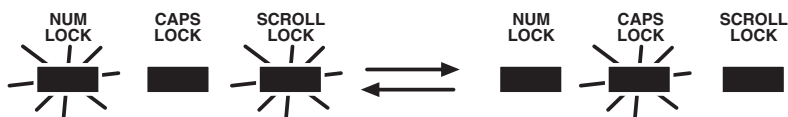


Figure 5-3. The password-lockout LED pattern.

5.4 Switching Between the Duo System and a Local CPU (KV6EXT-R2 Only)

If you haven't attached a local CPU to the full KV6EXT-R2 ServSwitch Duo Extender, you can keep the Extender switched to the Duo system at all times, and use the Duo's on-screen menu or other methods to switch between the Duo system's CPUs (see the "Selecting Computers..." sections and the "Keyboard Hotkey Commands" section in your Duo manual).

If you *have* attached the optional local CPU to the Extender, you won't be able to switch to it through the Duo. Instead, you'll have to use the Extender's own switching methods to switch back and forth between the local CPU and whichever CPU is currently selected by the Duo system. You can do this with a hotkey command (see **Section 5.7**) or—if you enable mouse switching—with your three-button mouse or wheel mouse (see **Section 5.8**).

Depending on which CPU you have selected, the Extender's "Local CPU" LED pair will be *steadily lit* if you aren't sending keyboard or mouse data or *flashing* if you are. (These LEDs are red. The main LED is labeled and is on the Extender's top panel, while the auxiliary LED is unlabeled and is the rightmost LED on the Extender's right side.)

If a Duo user is controlling a Duo-system CPU, you can still switch to that CPU. But although you might be able to see the video from that CPU, you won't get keyboard and mouse control until the Duo user relinquishes control, as described in the next section.

You can always "switch to" the nonexistent "CPU zero" to blank the Extender's monitor and deselect your currently selected CPU (see **Section 5.7**). While CPU zero is selected, all of the Extender's CPU LEDs will be dark.

5.5 Contending for Control of the Duo-System CPUs

The user station at the ServSwitch Duo Extender contends with the user stations directly attached to the Duo system for keyboard and mouse control of the Duo system's CPUs. While a user at one station is in control of a CPU, the Duo system won't accept keyboard or mouse data for that CPU. If the Extender's user station is "locked out" in this way, its keyboard's Num Lock, Caps Lock, and Scroll Lock LEDs will flash in unison (as shown in Figure 5-2 in **Section 5.3**) to show the user at that station that he or she will have to wait to access the Duo-system CPU until the other station is finished.

The Extender user can try to take keyboard and mouse control of a Duo-system CPU by selecting it with a hotkey command (see **Section 5.7**) or—if you enable mouse switching—with their three-button mouse or wheel mouse (see **Section 5.8**):

- If the Duo-system CPU is being controlled by another Duo user, these attempts will fail, although the Extender user will be able to see the Duo-system CPU's video unless the Duo user has selected the CPU for "exclusive use" (see the "Exclusive Use" and "Selecting Computers Using the On-Screen Menu" sections of your Duo manual).
- If the Duo-system CPU is available (none of the Duo users are controlling it), these attempts will succeed. The Extender user will see the Duo-system CPU's video and will have keyboard and mouse control. He or she will keep control until he or she stops using the keyboard and mouse or selects the local CPU or the nonexistent "CPU zero." At that point, the Duo will begin counting down toward its inactivity timeout (see the "User timeout" section of the Duo manual). Until the timeout expires, the Extender user can reset the timeout by reselecting the Duo-system CPU or by resuming activity at their idle keyboard and mouse. Even after the timeout expires, the Extender user can reclaim control if he or she is the first to select the Duo-system CPU. But if a Duo user is the first to select that CPU after the timeout expires, the Extender user must then wait until the Duo user relinquishes control.

5.6 Things To Keep in Mind About the Keyboards and Mice

PC bootstrap sequence: When your PC CPUs are powered on, they communicate with any attached keyboards and mice and load the setup parameters required by their particular operating systems. If you have a local CPU attached to the full KV6EXT-R2 Extender, it is necessary for the Extender to be powered on during this sequence so that it can give the CPU the required responses and keep track of the modes and settings requested by the CPU.

Mouse characteristics: Do not unplug a PS/2 mouse connection from a CPU while the CPU is on. Because of the way PS/2 mice communicate, the CPU will lose mouse function and you will have to reboot the CPU to regain normal operation. Unplugging a shared PS/2 mouse from the Extender will have no immediate effect, but the selected PC will lose mouse function as soon as you plug the mouse back in. (Mice can usually be freely unplugged and replugged from CPUs' RS-232 mouse ports, provided that an RS-232 mouse was connected when the operating system initially booted.) The Extender has a PS/2 mouse-recovery system which allows you to disconnect and reconnect the mouse without powering down the system, but we recommend using this only when absolutely necessary. See **Section 5.9** for details.

Keyboard- and mouse-mode handling during CPU switching: The Extender keeps a log of the keyboard and mouse modes and resolution settings requested by each of the Duo system's CPUs, including the keyboard Num Lock, Caps Lock, and Scroll Lock states. These settings are automatically restored to the keyboard and mouse when you switch to a different CPU, as well as when the Extender is returned from configuration, password-lockout, or control-lockout mode to normal operation, ensuring maximum software compatibility.

5.7 Keyboard Control: Hotkey Commands

NOTE

On the basic KV6EXT-R2 Extender, or when the Duo-system CPU is selected on the full KV6EXT-R2 Extender, you won't use any of the Extender's own hotkey commands to switch to a different CPU in the Duo system. Instead, you'll use the Duo's on-screen menu, or {Duo Hotkeys} + [channel number]. See Section 5.5.

You can control several functions on the ServSwitch Duo Extender—including CPU selection, screen blanking, locking, and entering configuration mode—from the keyboard, using commands triggered with the Extender's currently selected hotkey combination. All of the hotkey-control commands are invoked by holding down the one or two hotkeys and then pressing a command key. By default, the two hotkeys are [Ctrl] and [Alt], but you can change to any of six other combinations by setting positions 6 through 8 of the Extender's DIP switch (see **Section 4.2.1**).

Normally, when you send a hotkey command, you have to release the hotkeys and the command key before you can send another one. The one exception to this rule is {Hotkeys} + [Tab], the “switch to the other CPU” command; you can “tab back and forth” between the CPUs by holding down the hotkeys and repeatedly pressing [Tab].

The hotkey commands are summarized below. Note that to generate the numeric digits in the commands that contain them, you need to press the number keys on the top row of the main section of the keyboard, *not* the number keys on the keypad; the Extender will not recognize keypad numbers.

- *KV6EXT-R2 only*: Use {Hotkeys} + [1] to switch from the local CPU to whichever CPU you most recently selected on your Duo system. You simply get normal access (governed by the Duo's inactivity timeout—see the “User timeout” section in the Duo manual) if that CPU is available, or video or no access if it isn't.
- *KV6EXT-R2 only*: Use {Hotkeys} + [2] to select any local CPU (if you have one directly attached to the Extender).
- *KV6EXT-R2 only*: Use {Hotkeys} + [Tab] to switch from the Duo-system CPU to the local CPU or vice versa.

- Use {Hotkeys} + [0] to select nonexistent “CPU zero.” This causes the Extender to (a) stop lighting its CPU LEDs, (b) disable keyboard and mouse input to any CPU (although Extender commands will still work), and (c) shut off the video output to the attached monitor. (Be aware that this will cause some monitors to go into standby mode or shut themselves off.) If you were controlling a Duo-system CPU before you did this, the Duo starts counting down toward its inactivity timeout; if it expires before you reselect the Duo-system CPU (which will reset the timer), that CPU will become available for any Duo user station to select. You can re-enable video by selecting either the local CPU or the Duo-system CPU with the keyboard hotkeys or with the mouse (if mouse switching is enabled and the mouse is a 3-button or IntelliMouse type—see **Section 5.8**). If the CPU you select is available, or if you reselect the Duo-system CPU and the inactivity timeout hasn’t expired yet, you will gain keyboard and mouse control as well.
- Use {Hotkeys} + [L] to lock the Extender. If no password has been set for the Extender (see **Section 4.3**), this command is equivalent to the {Hotkeys} + [0] command described above. If a password has been set, this command also causes the Extender to (a) stop accepting keyboard and mouse input except for password attempts until someone enters the password and (b) alternately light the Num Lock/Scroll Lock LED pair and the Caps Lock LED on the attached keyboard. Note that if anyone has tried to type something at the Extender’s keyboard while the Extender is locked, you will have to press [Enter] to clear those characters so that they won’t invalidate the password when you proceed to type it in.
- Use {Hotkeys} + [Enter] to cause the Extender to go into configuration mode. See **Section 4.2.2**.

Examples of common hotkey commands for a KV6EXT-R2 Extender (assuming that the Duo’s hotkeys are [Ctrl] and [Alt] and that the Extender’s hotkeys have been changed to [Alt] and [Shift]):

- *To select the Duo-system CPU, then select Duo CPU 14:*
Press and hold [Alt] and [Shift], press [1], release [Alt] and [Shift]. Then press and hold [Ctrl] and [Alt], press and release [1], press and release [4], release [Ctrl] and [Alt].
- *To “tab back and forth” between the local CPU and the Duo-system CPU:*
Press and hold [Alt] and [Shift], press and release [Tab] (repeat as many times as necessary), release [Alt] and [Shift].

5.8 Mouse Switching (KV6EXT-R2 with Local CPU Only)

If you have a local CPU attached to your full KV6EXT-R2 ServSwitch Duo Extender, another convenient way to switch between it and the Duo-system CPU is by using a three-button mouse. Simply hold down the central mouse button or “wheel” button, then click on the left-hand mouse button to switch from the local CPU to the Duo-system CPU or vice versa.

If you want to do this, you’ll have to go into configuration mode (see **Section 4.2.2**) and issue the [M] [2] [Enter] command to enable mouse switching. (The Extender comes from the factory with mouse switching disabled.) To turn mouse switching back off after you’ve enabled it, issue the [M] [1] [Enter] command.

Be aware that if you enable mouse switching and use a regular three-button mouse to do it, you won’t be able to use the mouse’s center button for any application functions or other non-switching purposes. In fact, the Extender will tell the CPU that it has a 2-button mouse attached to it in this situation. (The wheel button on IntelliMouse and similar mice is not disabled this way.)

5.9 Hot-Plugging a PS/2 Mouse or Mouse Port into the Extender or Re-Enabling a Disconnected PS/2 Mouse Port (KV6EXT-R2 with Local CPU Only)

It is advisable to switch off any local computer that you’re going to connect to the full KV6EXT-R2 ServSwitch Duo Extender before you install it. However, even if this is not possible, most systems can be “hot-plugged” (connected to the Extender while they are powered and operating); the PS/2 mouse-port malfunctions this usually causes can often be overcome by using the Extender’s mouse-restoration functions. (The keyboard connection will normally restore itself automatically.)

Let’s take this from the top: On many PCs, mouse movement will be lost if the PS/2 mouse is unplugged and plugged back in while the PC is running. Mouse movement can then be restored only by rebooting the PC. This is because the mouse drivers only set up and enable the mouse when the PC is initially booted.

If you have powered down your Extender, or if you are attempting to hot-plug a CPU into it, you might be able to restore lost mouse movement using the Extender’s mouse-restoration functions. These should be used with caution, because unpredictable results might occur if you select the wrong mouse type. If in doubt, restore the mouse by rebooting the PC normally.

Standard PS/2 mouse data is formatted differently than IntelliMouse data, so two reset functions are provided on the Extender. The type of data format expected by the PC depends on the driver and the type of mouse that was connected when the driver was booted. You can use the following table as a guide; note that the mouse-reset functions predict the likely mouse *resolution* settings but might not restore the *speed* or *sensitivity* of the mouse to exactly what they were when the PC originally booted:

Type of mouse/ system connected at startup:	Driver type:	Probable expected data format:	Suggested restoration command:
PS/2	PS/2 only	PS/2	PS/2—type [M] [6]
PS/2	IntelliMouse	PS/2	PS/2—type [M] [6]
IntelliMouse	PS/2 only	PS/2	PS/2—type [M] [6]
IntelliMouse	IntelliMouse	IntelliMouse	IntelliMouse—type [M] [7]

To restore lost mouse movement on a local CPU directly connected to the Extender:

1. If you're working with the Duo-system CPU, select the local CPU instead.
2. Enter configuration mode (see **Section 4.2.2**) by pressing the hotkeys followed by [Enter].
3. To restore a PS/2 mouse connection, issue the [M] [6] [Enter] command. Or, to restore an IntelliMouse connection, issue the [M] [7] [Enter] command.
4. Press [Enter] again to exit configuration mode.
5. Move the mouse a short distance to make sure that the connection has been restored properly.

6. Troubleshooting

If you have difficulty with your ServSwitch™ Duo Extender, see if the problem is listed in **Section 6.1** and, if so, try the suggested remedies. If you've forgotten your password, see **Section 6.2**. If you need to reset the Extender to its factory defaults, see **Section 6.3**. If nothing seems to help, get the Extender's firmware-revision level as described in **Section 6.4** if possible, then call Black Box Technical Support as directed in **Section 6.5**. If you need to ship your Extender, see **Section 6.6**.

6.1 Things To Try

Problem:

Poor video quality with smearing, fuzziness, or rippling.

Possible Solution:

Make sure that the video compensation has been set for your system, as described in **Section 4.2.2.A**. Make sure your Category 5 cable is pinned and paired properly; see **Appendix A**. Also, make sure any cables you're using to make your monitor/CPU video connections are shielded or screened coaxial video cables.

Problem:

Your mouse does not move the cursor/pointer.

Possible Solutions:

1. Watch the Extender's red Control LEDs while you move the mouse. If you move the mouse and these LEDs don't flash, then the Extender is not receiving data from the mouse—proceed with the next few steps.
2. Check the mouse's connection to the Extender and the CAT5 cabling between the Extender and the Duo; if the cable connections are OK, try removing and restoring power to the Extender.
3. If you are attempting to connect the mouse to a PS/2 mouse port on a Duo CPU that has not been powered down, you will need to use the Duo's mouse-restoration function (see the "Hot-Plugging Devices Into the ServSwitch Duo..." section in the Duo manual). If you're attempting to connect the mouse to a non-powered-down local CPU on a KV6EXT-R2 Extender, use the Extender's mouse-restoration function (see **Section 5.9** of this manual).
4. Make sure that you have an appropriate mouse driver loaded and that your computer's software is configured to accept a supported mouse of the type that you have connected. See the relevant paragraphs in **Section 3.1**.

5. Make sure that (a) the mouse and computer were both connected to the Extender before any part of the system was powered up, and (b) the Extender was powered ON before the attached computer. If you're not sure whether this was the case, then (if it's possible to do so) power everything down, make sure all cable connections are correct and secure, power up the Extender, then power up all attached computers.

Problem:

Your keyboard does not function or functions only intermittently. The Num Lock LED does not always light when the Num Lock key is pressed.

Possible Solution:

Some older keyboards were designed for use with specific computers and are not truly PC/AT or PS/2 compatible. These are not common, but if you're having problems like this and you're using an old keyboard, try a newer keyboard.

Problem:

I'm stuck at a blank screen and don't seem to have any keyboard or mouse control.

Possible Solutions:

You might have tried to switch to a CPU channel on the Duo system that some other user has exclusive use of (see the "Exclusive Use" and "Selecting Computers Using the On-Screen Menu" sections of your Duo manual); if this is the case, switch to a different CPU until the exclusive user has finished.

Another possibility on the full KV6EXT-R2 Extender is that you've selected the directly attached local CPU, but the local CPU is not installed or isn't working. Check the local CPU and make sure it is working properly and is attached securely to the Extender. If you have no local CPU installed but you switched to its port accidentally, type in {Hotkeys} + [1] to switch back to the Duo system.

Problem (KV6EXT-R2 only):

Just using your mouse in a normal way causes the Extender to unexpectedly switch between the Duo system and either the local CPU (if you have a working local CPU installed) or a blank screen (if you don't).

Possible Solutions:

Some cheaper mice are not fully compatible with the Extender and can lose data, which—if mouse switching is enabled (see **Section 5.8**)—sometimes causes the Extender to interpret a data stream as a CPU-change request. Try using a Microsoft, Logitech, IBM, Compaq, or Hewlett-Packard® mouse instead.

Make sure that you are using a Microsoft compatible mouse driver on your PC. Some drivers by other manufacturers can cause the mouse to use proprietary mouse-data formats that the Extender doesn't support. If you have unplugged and reconnected a mouse to the Extender—especially if the mouse is an IntelliMouse—use the mouse-restoration function (see **Section 5.9**).

Problem:

Compaq MX11800 model integrated keyboard and mouse only: The mouse consistently fails to boot when the Extender is connected to a PC running Windows NT 4.0 through its PS/2 style mouse port.

Possible Solutions:

There are three possible solutions to this problem:

1. Use a different type of mouse.
2. Connect the Extender to your NT 4.0 PCs through an adapter and one of the PC's serial ports rather than through its PS/2 port.
3. Select "CPU zero," or another CPU if you have another PC connected that isn't running NT 4.0, while NT is booting. You should be able to use the system normally once the logon screen appears.

6.2 Clearing the Extender's Password

If you ever forget a password you've set for the ServSwitch Duo Extender, you can use the Duo to erase it. With the Duo system selected (as opposed to the local CPU), press {Duo Hotkeys} + [Enter] to get into the Duo's menu system, then press the [F1] function key and select "FUNCTIONS" to bring up the FUNCTIONS menu. Admin users will see an option in this menu to "Clear UTP Extender Password." Select this, then confirm it by pressing the [F8] function key. A message that the password has been cleared will appear on screen.

If you want to restore the Extender to its factory-default configuration as well as to erase the password, use the procedure described in **Section 6.3**.

6.3 Restoring the Extender to Its Factory-Default Configuration

If your ServSwitch Duo Extender has become misconfigured, or if you're swapping in a new (and very different) local CPU, etc., you can set all of the Extender's keyboard-controlled configuration options back to their factory defaults. First go into configuration mode, then issue the [F] [8] [Enter] command. ("[F] [8]" is the letter "F" followed by the number "8", not the [F8] function key.) This will also clear any password you've set, but it will have no effect on the Extender's video compensation, CPU selection, or locked/unlocked state, nor will it change the hotkey setting, which is controlled with the Extender's DIP switch.

If you only want to erase the Extender's password without resetting its configuration options to their factory-default values, you can select "Clear UTP Extender Password" in the Duo's FUNCTIONS menu, as described in **Section 6.2**.

6.4 Displaying the Extender's Firmware Revision

For technical-support purposes, it might be necessary to find out the firmware-release version of your ServSwitch Duo Extender. To do this, select a CPU that is showing a DOS prompt or is running a text editor, word processor, etc.—it doesn't matter what software is running, as long as it displays characters typed in at the keyboard on the screen. Then refer to **Section 4.2.2** as you take these steps:

1. Go into configuration mode by pressing the hotkeys followed by [Enter] at the keyboard.
2. Get the Extender to report its firmware revision by issuing the [F] [1] [Enter] command. (“[F] [1]” is the letter “F” followed by the number “1”, not the [F1] function key.)
3. Press [Enter] again to exit configuration mode.

The version number will be reported on the CPU screen as the letter “V” followed by three numbers, the first of which is the major revision level and the other two of which are the minor revision level. For example, if the Extender reports “V118”, the firmware version is 1.18.

6.5 Calling Black Box

If you determine that your ServSwitch Duo Extender is malfunctioning, *do not attempt to alter or repair the unit*. 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 nature and duration of the problem;
- when the problem occurs;
- the components involved in the problem—that is, which Unit(s), what type of cable, what types of computers, what type of keyboard, brand of mouse, make and model of monitor, 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.

6.6 Shipping and Packaging

If you need to transport or ship your ServSwitch Duo Extender:

- Package it carefully. We recommend that you use the original container.
- Before you ship the unit back to Black Box for repair or return, contact us to get a Return Authorization (RA) number.

Appendix A: Guidelines for Twisted-Pair Cabling

To connect your ServSwitch™ Duo Extender to a ServSwitch Duo, you can use either shielded twisted-pair (STP) or unshielded twisted-pair (UTP) cable. It should be pinned straight-through and paired according to the TIA-568A or (preferred) -568B specification, as shown in Figure A-1 on the next page. Category 5 cable will give the best results for distances up to 200 m (655 ft.), but you should be able to use Category 3, 4, or 5e if you keep the distance short (not more than 100 m [325 ft.]). *Avoid* using cabling rated as “Level 6,” “Level 7,” etc., for data rates above 155 Mbps; the large differences between the twist ratios of the wire pairs in these cables cause the video signals from the Duo’s CPUs to get out of sync with each other.

CAUTION!

Do *not* use cables paired according to the USOC specification—Pin 1 with 2, 3 with 4, 5 with 6, and 7 with 8. These will work badly and will yield a horrible picture.

We recommend a solid-core CAT5 cable such as product codes EYN737MS (preterminated) or EYN840A (unterminated bulk); specify the length you’d like when you order. Terminate any unterminated cable with high-quality shielded RJ-45 plugs such as those in our FM732 (unshielded) and FM733 (shielded) 25-packs.

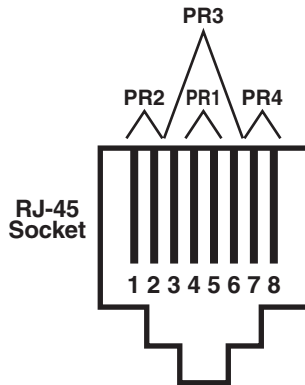
CAUTION!

Keep in mind that if you use shielded twisted-pair cable, the maximum distance at which the Extender will operate will be cut at least in half, to no farther than 100 m (325 ft.).

All twisted-pair cables are built in such a way that each of the twisted pairs has a slightly different twist ratio. This is done to reduce the electrical crosstalk between signals carried on adjacent pairs. Because of this, the wire distance that an electrical signal has to travel is different for the different pairs. This does not normally cause a noticeable problem—in fact, the twist differences have no effect at all on digital signals such as network data. But if you’re sending higher video resolutions (which are analog signals) across long cables, you might start to see color separation caused by the red, blue, and green signals arriving at the Extender at slightly different times.

If this happens, you might be able to improve your video by reterminating your cable so that the video signals are on the pairs whose twist ratios are the closest to each other. Most network-quality cables have one pair that’s much more tightly

twisted than the other three; this pair should be avoided. Unfortunately, different manufacturers—and even different cable types by the same manufacturer—use different pairs for the “tight pair,” so call your cable supplier. If they can’t tell you which pair to avoid, cut a short section off the end of the cable, open it up, and look at the pairs; the tight pair is usually quite obvious.



Cable Pinning: Straight-through (Pin 1 to Pin 1, 2 to 2, etc.)

Cable Pairing:

Pair 1: Pins 4 and 5 (differential green video and vertical sync)

Pair 2: Pins 1 and 2 (differential blue video)

Pair 3: Pins 3 and 6 (differential red video and horizontal sync)

Pair 4: Pins 7 and 8 (keyboard and mouse data)

Figure A-1. Twisted-pair cable specifications.

Appendix B: Rackmounting

We offer a Rackmount Kit (our product code RMK19WX) for mounting a ServSwitch™ Duo Extender in 1U of vertical space in a 19" rack. It consists of a front-paneled rack shelf and a pair of countersunk screws. To use this Kit to mount an Extender, take these steps, referring to Figure B-1:

1. Place the Extender on the Kit shelf so that the RJ-45 jack and auxiliary LEDs on its side are facing forward and are aligned with the cutouts in the shelf's front panel. In this position, the two screwholes on the bottom of the Unit should be lined up with the matching holes on the bottom of the shelf.
2. Screw the two screws included with the Kit through the holes in the shelf, into the bottom of the Extender.
3. Once you've attached the Extender to the shelf, match the holes at the ends of the shelf's front panel to an appropriate set of matching holes on your equipment rack. Screw the Extender assembly to the rack using your own screws, bolts, cage nuts, etc. (not included).

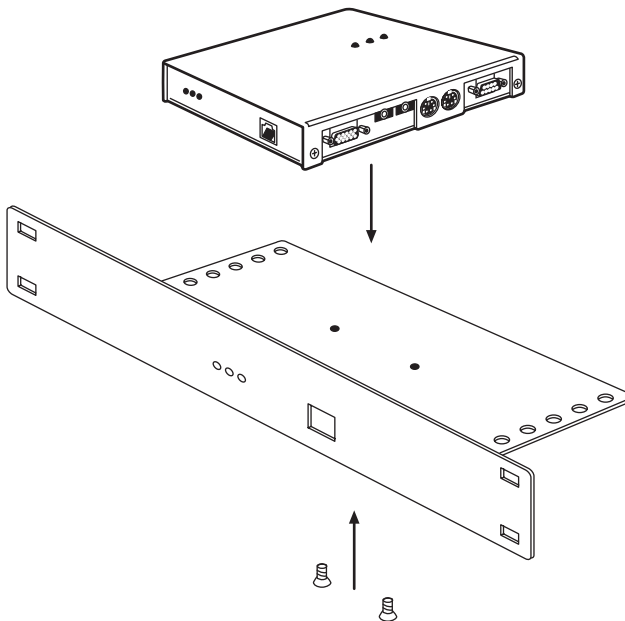


Figure B-1. Rackmounting an Extender.

DISCLAIMERS

While every precaution has been taken in the preparation of this manual, the manufacturer and its authorized agents assume no responsibility for errors or omissions. Neither do they 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.

Neither the manufacturer nor its authorized agents can accept liability for damage due to misuse of the product or due to other circumstances outside their control. And they will not be responsible for any loss, damage, or injury arising directly or indirectly from the use of this product.

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