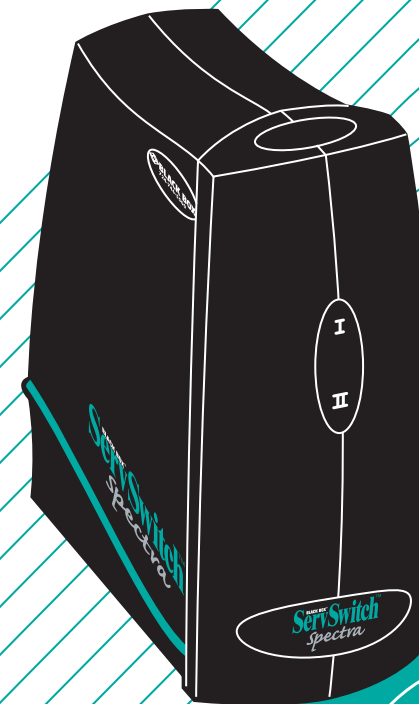


DECEMBER 2000



BLACK BOX[®] ServSwitch[™] *Spectra*



SW681A
SW681A-K

Customer Support Information:


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
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QUICK INSTALL FOR THE SERVSITCH™ SPECTRA

The ServSwitch Spectra's Keyboard Commands

Command	Keystroke Sequence	Description
Select CPU	[Ctrl] 1 or [Ctrl] 2	Switches your monitor, keyboard, mouse, and (if enabled) audio access to the specified computer CPU.
Switch to the Other CPU	[Ctrl] [Backspace]	Switches to the other CPU for monitor, keyboard, mouse, and (if enabled) audio access.
Start Scanning	[Ctrl] S	Turns Scan mode ON, causing the Spectra to scan back and forth between the two CPUs.
Stop Scanning	[Ctrl] X	Turns Scan mode OFF, giving you access to the CPU being scanned when the command is entered. (Scans can also be stopped by entering a Select CPU or Switch CPU command.)
Stop Audio Switching	[Ctrl] G1 or [Ctrl] G2	G1 suspends audio switching and makes CPU 1 the uninterrupted audio source. G2 suspends audio switching and makes CPU 2 the source.
Restart Audio Switching	[Ctrl] G0	Re-enables normal audio switching (audio is switched and scanned along with keyboard, video, and mouse).
Send Null Byte to Resync Mouse	[Ctrl] N	Causes the Spectra to send a "null byte" to the CPU's PS/2® mouse port. Enter this command to correct the selected CPU if it gets "out of sync" with the mouse. See Section 4.5 of your manual.
Reset Computer's Mouse Port	[Ctrl] O	Causes the Spectra to try to get the currently selected CPU to reset its PS/2 mouse port. See Section 4.6 of your manual.
Identify ROM	[Ctrl] I	Causes the Spectra to report the version of ROM it is using. Enter this command if you are asked to do so by a technical-support person.
Keep Settings	[Ctrl] K	Enter this command after you enter any of the four commands listed below (it saves the new settings to nonvolatile memory):
Set Scan-Delay Time	[Ctrl] Txx [Enter] (xx = 1 to 15)	Sets the time, in seconds, that the ServSwitch Spectra will pause at each CPU when scanning.
Set Mouse Mode	[Ctrl] Qx [Enter] (x = 0, 1, or 2)	For the selected CPU, Q1 translates PS/2 mouse input to serial mouse output, Q2 forces PS/2 wheel-mouse output, and Q0 resets to normal PS/2 non-wheel-mouse output.
Set Keyboard Mode	[Ctrl] Mx [Enter] (x = 1, 2, or 3)	Tells the Spectra the keyboard mode (1, 2, or 3) of the currently selected CPU. See Appendix C of your manual.
Set Keyboard Typematic	[Ctrl] Axxx [Enter] (xxx = decimal value from 0 to 127)	Sets the keyboard typematic (automatic key-repeat) function of the currently selected CPU. See Appendix C of your manual.

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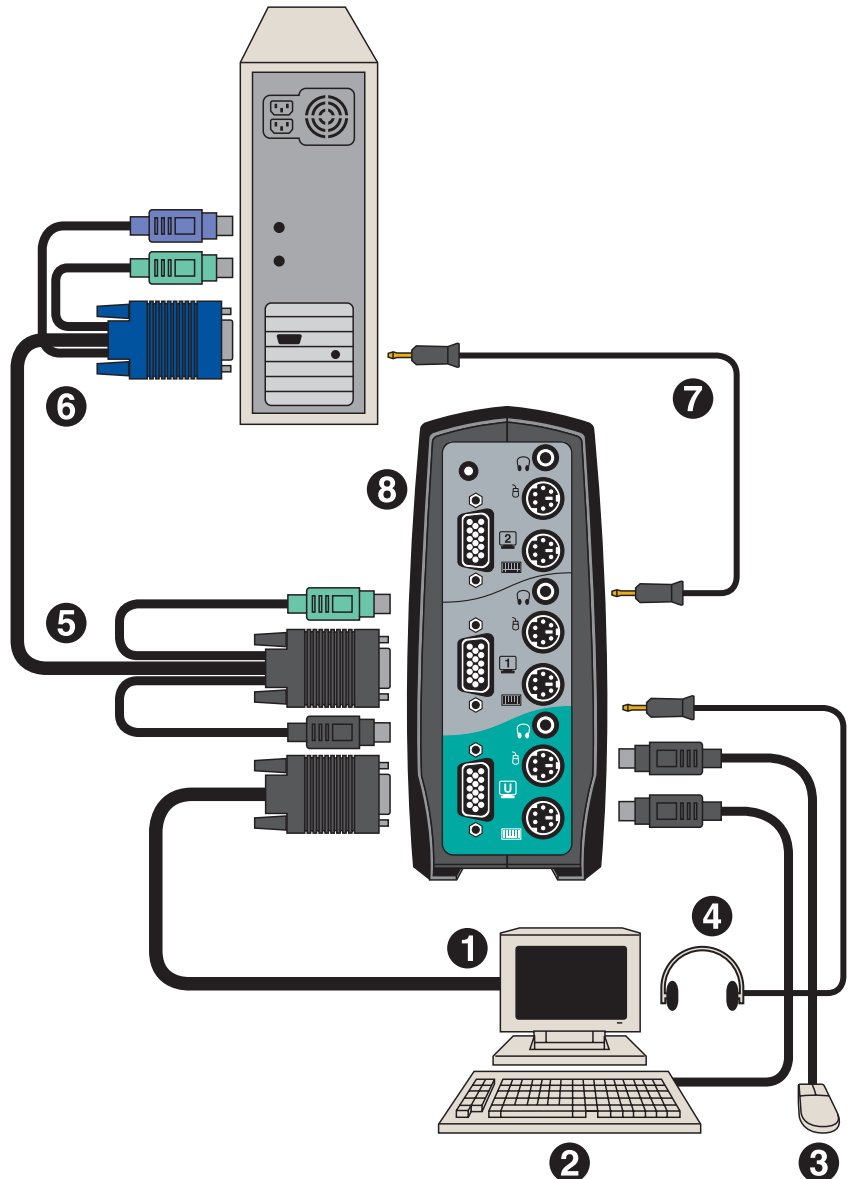


Quick Install for the ServSwitch™ Spectra

These directions are for a typical “direct plug-in” installation with PS/2® type equipment, using the EHN404 CPU-extension cable. If you have a different type of equipment, or want to use different extension cabling, see **Sections 3.3** through **3.5** of your manual.

After making sure that your computers and monitor are turned OFF:

- ❶ Plug the video cable of your **monitor** into the port on the Spectra marked .
- ❷ Plug your **keyboard** into the port in the same area marked .
- ❸ Plug your **mouse** into the port in the same area marked .
- ❹ If you're using **speakers** or **headphones**, plug them into the port in the same area marked .
- ❺ Attach extension cabling to the Spectra's CPU 1 video-input port (marked ) and to the keyboard and mouse ports in the same area marked  and . The CPU-Extension Cable EHN404 (included with the SW681A-K Kit) is shown here.
- ❻ Run this extension cabling to the **video-output**, **keyboard**, and **mouse** ports on your first computer CPU.
- ❼ If you're using headphones or speakers, run audio-extension cable from the audio-input port marked  in the Spectra's CPU 1 area to the **audio-output port** on your CPU.
- ❽ Repeat steps ❺ through ❷ for your second computer (CPU 2), using the video-input port on the Spectra marked  and the other ports in that area.



Now turn your computers and monitor ON.
 The Spectra will turn ON automatically.

See the back of this sheet for a list of the ServSwitch™ Spectra's keyboard commands.

**CUSTOMER
 SUPPORT
 INFORMATION**

Order toll-free in the U.S.: Call **877-877-BBOX** (outside U.S. call **724-746-5500**)
 FREE technical 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 Drive, Lawrence, PA 15055-1018
 Web site: www.blackbox.com • E-mail: info@blackbox.com

Welcome to the ServSwitch™ Family!

Thank you for purchasing a BLACK BOX® ServSwitch™ Brand KVM switch! 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?

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

SW681A
SW681A-K

This manual also includes information about the Spectra's Mounting Plate, but it comes with its own installation sheet. Its product code is:

MP681A

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RADIO-FREQUENCY INTERFERENCE STATEMENTS**

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 J 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.

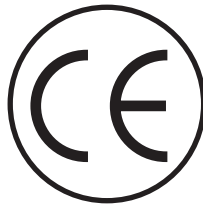
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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

This equipment complies with the requirements of the European EMC Directive 89/336/EEC.



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. Specifications

Hardware and System Software Requirements —	Refer to Section 3.2
Compliance —	CE, FCC Part 15 Subpart J Class A, IC Class/classe A
Standards —	With standard Serv cabling: VGA video; With standard Serv cabling (minimal) or coaxial cabling (recommended): SVGA video; With coaxial cabling: XGA video
Interfaces —	Video (pinned as VGA, standards listed above); IBM PS/2 keyboard and mouse—with adapters, also supports IBM PC/AT keyboards and CPUs with PC/AT keyboard ports, as well as (when EHN408 cables are used) CPUs with serial-mouse ports; 3.5-mm stereo audio
Resolution and Refresh Rate —	With standard CPU-Extension Cable: Up to 1024 x 768 noninterlaced at up to 75 Hz; With coaxial CPU-Extension Cable: Up to 1600 x 1280 noninterlaced at up to 100 Hz;
Maximum Distance —	Up to 20 ft. (6.1 m) of CPU-Extension Cable from the ServSwitch Spectra to either attached CPU, but this will depend on the type of cable, the CPU, the monitor, and the video resolution
User Controls —	Keyboard commands; Top-mounted CPU-selection pushbutton; Rear-mounted reset pushbutton
Indicators —	(2) Front-mounted selected-CPU LEDs

Connectors —	All rear-mounted: To user station: (1) HD15 female to VGA monitor; (2) 6-pin mini-DIN female: (1) to PS/2 keyboard, (1) to PS/2 mouse; (1) 3.5-mm jack to speakers/headphones; To CPUs: (2) HD15 female to video-output ports; (4) 6-pin mini-DIN female: (2) to PS/2 keyboard ports, (2) to PS/2 mouse ports; (2) 3.5-mm jack for audio-output ports
Maximum Altitude —	10,000 ft. (3048 m)
Temperature Tolerance —	32 to 131°F (0 to 55°C)
Humidity Tolerance —	5 to 80% noncondensing
Enclosure —	High-impact plastic
Power —	5 VDC at up to 1 amp from the keyboard-power leads of the attached computers
Size —	6.2"H x 2.7"W x 5"D (15.7 x 6.9 x 12.7 cm)
Weight —	Net: 1 lb. (0.5 kg); Shipping: 2 lb. (0.9 kg)

2. Introduction

Thank you for choosing a ServSwitch™ Spectra! We designed it with your needs in mind, and we hope it will simplify your life by helping you organize your two-computer application. With your ServSwitch Spectra, you can use one keyboard, monitor, and mouse to access two different IBM® compatible PCs, so you can cut down on the clutter on your desk and save money on equipment.

2.1 The Complete Package

The only extra things that come with the basic ServSwitch Spectra (product code SW681A) are a mounting plate and this manual. The ServSwitch Spectra Kit (SW681A-K) also includes two standard 10-ft. (3-m) CPU-Extension Cables. (The Cables are available separately as product code EHN404-0010.) If anything is missing or arrived damaged, contact Black Box.

2.2 Features

Some of the useful features of your ServSwitch Spectra:

- You can access two IBM PC type computer CPUs with one keyboard, monitor, and mouse.
- Smooth, safe, microprocessor-controlled keyboard and mouse switching.
- Mouse can be any 2- or 3-button PS/2 type by Microsoft® or Logitech®, including a PS/2 “wheel mouse” such as the Microsoft IntelliMouse®.
- Support for VGA, SVGA, and XGA video at resolutions up to 1600 x 1280 pixels, at refresh rates up to 100 Hz (although XGA *requires* coaxial cables).
- It uses some of the power that the attached computers would normally send to their keyboards, so you don’t have to plug it into an AC outlet.
- You can select the CPU you want with your keyboard or the button on top of the Spectra.
- Front-panel LEDs show which CPU is selected.
- The unit keeps track of the Num Lock, Caps Lock, Scroll Lock, and keyboard-mode settings for each CPU.
- It can scan (switch back and forth between) between the two CPUs every 1 to 15 seconds.
- Its “screen saver” function can turn off idle video after 1 to 999 seconds.

- Advanced users can program the keyboard's typematic rate and delay.
- Some settings for each CPU can be permanently saved in nonvolatile memory.
- A mounting plate is included for permanently surface-mounting the Spectra.

2.3 The External Controls, Indicators, and Connectors

There's a pushbutton on the top of the ServSwitch Spectra that you can press to switch between the two CPUs. There's also a pair of LEDs on the Spectra's front panel labeled with the Roman numerals "I" and "II" that tell you whether the corresponding CPU is selected ("I" for CPU 1, "II" for CPU 2).

All cable connections are made at the ServSwitch Spectra's rear panel, which also holds the Spectra's reset switch. To familiarize yourself with the Spectra's rear-panel components and what they're used for, refer to Figure 2-1 and the descriptions that follow on the next page.

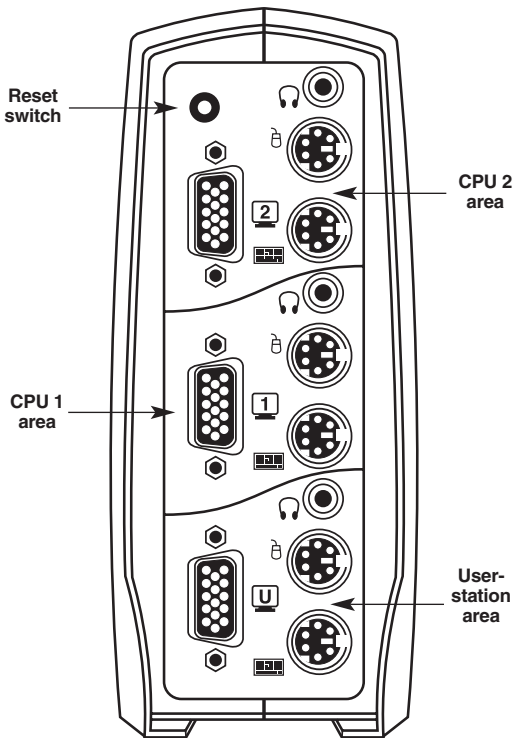








Figure 2-1. The rear panel of a ServSwitch Spectra.

<i>Panel Label</i>	<i>Component</i>	<i>Description</i>
 (Monitor)	HD15 F	Plug your monitor's video cable into this port.
 (Video from CPU 1)	HD15 F	Run cable from CPU 1's video-output port to this port.
 (Video from CPU 2)	HD15 F	Run cable from CPU 2's video-output port to this port.
 (Keybd.)	6-pin mini-DIN F	<i>User area:</i> Plug your keyboard into this port. <i>Each CPU area:</i> Run cable from the CPU's keyboard port to this port.
 (Mouse)	6-pin mini-DIN F	<i>User side:</i> Plug your mouse into this port. <i>Each CPU area:</i> Run cable from the CPU's mouse port to this port.
 (Audio)	3.5-mm stereo F	<i>User side:</i> Plug your speakers or headphones into this port. <i>Each CPU area:</i> Run cable from the CPU's audio-output port to this port.
(unlabeled reset button, upper left)	Pushbutton	To <i>reset</i> the Spectra and the attached keyboard and mouse, press and release this button (see Section 5.1). To <i>restore</i> the Spectra to its factory-default settings, hold down both this button and the CPU-selection button on top of the Spectra (see Section 5.2).

3. Installation

3.1 The Spectra's Optional Mounting Plate

The ServSwitch Spectra is slightly topheavy and can sometimes tip over when all of the CPU cables and user-station devices are connected to it. If you want to, you can mount the Spectra more firmly on a flat surface with its included mounting plate. For directions on doing this, see **Appendix B**.

3.2 Things to Keep in Mind Before You Install


- Any CPU you connect to the ServSwitch Spectra must meet these guidelines:
 - It needs to be IBM PC compatible, not Apple Macintosh or some other non-PC hardware type. The Spectra can support many older PCs, but it probably won't work with computers made before about 1989.
 - It needs to have a VGA style video port (a D-shaped HD15 connector with three rows of five pin sockets).
 - It needs to have a PC/AT or PS/2 style keyboard port (a round 5-pin DIN or 6-pin mini-DIN connector). To attach a 5-pin DIN PC/AT keyboard port, you'll need a keyboard-port adapter such as product code FA212.
 - It needs to have a PS/2 style mouse port (a round 6-pin mini-DIN connector) or a serial mouse port (a D-shaped DB9 or DB25 connector with nine or twenty-five pins respectively). To attach a serial mouse port, you'll need coaxial CPU-Extension Cable (EHN408)—standard cable doesn't carry all of the necessary wires—and a mouse-port adapter such as product code FA312.
- Some older IBM ThinkPad® laptops handle mouse data differently from other computers, in a way that the Spectra doesn't support. So we don't recommend attaching older ThinkPad computers to the Spectra, either directly or through docking stations. Some newer models should work OK, but there's no good way to tell other than by trial and error. (You can't damage your equipment by trying—if you have the wrong kind of ThinkPad, it just won't work.)
- Any monitor you connect to the Spectra needs to be able to support the highest video resolution and refresh rate that either of your CPUs can generate. For example, if one of your computers only needs its monitor to display 640 x 480 pixels at 60 Hz, but the other one needs its monitor to display 1280 x 1024 pixels at 75 Hz, make sure to use a monitor that can display at least 1280 x 1024 pixels at 75 Hz.





- Any keyboard you attach to the Spectra should be a standard type. The Spectra doesn't support keyboards with special power keys, sleep-mode keys, embedded touchpads or microphones, etc.

Also, whereas older keyboards have 101 or 102 keys, keyboards designed specifically for Microsoft Windows® 95, Windows 98, and Windows 2000 have 104 or 105 keys. 101-/102-key keyboards don't have the Windows Start (■) and Windows Application (■) keys, and there's no way they can perform the functions of those keys. Similarly, there's no way you can use a two-button mouse to perform all of the functions of a three-button mouse. For these reasons, we recommend that you use a Windows keyboard if *any* of your applications require the Windows keys, and use a three-button mouse if *any* of your applications require the center mouse button.

- Some software programs come with special copy-protection devices called “dongles.” These are designed to be inserted between the keyboard and the computer; the programs test for the dongles' presence to assure that they are being run by their legal owner only. The Spectra supports some, but not all, dongles.
- Make sure that the attached CPUs use only generic mouse drivers such as those by Microsoft or Logitech. If you use the Microsoft MOUSE.COM driver, it should be version 4.0 at least and preferably version 9.01 or higher.
- When you first switch between the two CPUs, you might notice that their mouse sensitivity (how far or fast their pointer/cursor moves in response to the mouse) is different. This is normal. You'll usually be able to adjust each CPU's mouse sensitivity through its mouse Control Panel, but the specifics vary depending on the operating system and the mouse driver.
- You should be able to freely disconnect and reconnect the mouse or keyboard from the Spectra, but if you have problems when you do this, press the Spectra's reset button or issue one of the reset commands—see **Sections 4.5** and **4.6**.

3.3 Connecting the Monitor, Keyboard, and Mouse

The first step in your ServSwitch Spectra installation is attaching your "user station" equipment (keyboard, mouse, monitor, and—if you want—headphones or speakers). Plug these into the ports in the Spectra's "user-station area" (the blue-green bottom section of the rear panel whose video port is labeled "  "):

1. Plug the **monitor's** video cable into the monitor port on the Spectra labeled  .
2. Plug your **keyboard** into the nearby PS/2 type keyboard port labeled  . If your keyboard is an old PC/AT type with a larger 5-pin DIN connector, you'll need a keyboard adapter such as product code FA211.
3. Plug your **mouse** into the nearby PS/2 type mouse port labeled  . If your mouse is an old serial mouse with a D-shaped DB9 or DB25 connector, you'll need to get a newer PS/2 type mouse. Don't worry—with the help of a coaxial CPU-Extension Cable (EHN408) and an FA312 adapter, the Spectra can translate the PS/2 mouse signals into serial mouse signals; see **Section 4.10**.
4. If you'll be using **headphones** or **speakers**, plug them into the nearby 3.5-mm stereo audio port labeled  . We don't recommend using headphones or speakers with the larger quarter-inch plugs, but if you have to, you'll need audio adapters. These are available at electronics and sound-equipment shops.

3.4 About the CPU Cables

Now for the CPUs. You could use separate video-, keyboard-, and mouse-extension cables to connect the ServSwitch Spectra to their video, keyboard, and mouse ports, but we recommend using one of our special CPU-Extension Cables instead. We offer two varieties of this cable, in lengths up to 20 ft. (6.1 m):

- The standard type, which has EHN404 product codes, will probably be just fine if you use your computers for word processing, spreadsheets, and other things that don't make heavy video demands. If you ordered the Spectra kit, you should have received a 10-ft. (3-m) length of this.

This cable is built with the special three-in-one design shown in Figure 3-1 on page 18. All of the keyboard, video, and mouse signals are carried by the cable's main strand. At each end of the cable, separate keyboard and mouse strands (labeled with matching icons) branch away from the video connector, which has screwlocks that bear the cable's weight. On the Switch end, the video and keyboard connectors are black and the mouse connector is green; on the CPU end, the video connector is blue, the keyboard connector is purple, and the mouse connector is green.

- The coaxial type, which has EHN408 product codes, contains a thick coax core like cable-TV cable. You might need this if you're using your computers for video editing, Web design, CAD/CAM, or other things that require good transmission of high-resolution video—especially if the computers are more than a few feet (more than one or two meters) from the Spectra. (You'll also need this cable for any computer that either has only a serial mouse port or outputs XGA video instead of VGA or SVGA.)



This cable is built with the special bonded design shown in Figure 3-2 on page 19. The central coaxial video strand of each cable is molded to the keyboard and mouse strands on either side, and the ends of its video strand are one inch (2.5 cm) shorter than the ends of the other strands, so that the weight of the composite cable can be borne by the video connector's screwlocks. The keyboard connectors are labeled "K" and colored orange, while the mouse connectors are labeled "M" and colored green.






To connect the Spectra to a CPU's audio port, use standard audio cable with 3.5-mm connectors, such as product code EJ110-0010 for 10-ft. (3-m) or EJ110-0020 for 20-ft. (6.1-m) cable.

CAUTION!

Avoid running any of these CPU cables too close to fluorescent lights, air conditioners, or other electrically noisy equipment. If you're not sure about a particular device, check its manual. If the manual says that the device isn't electrically or magnetically shielded, or warns that it might interfere with or damage sensitive equipment, keep the cables away from it.

3.5 Connecting the CPUs

Here's how to use the CPU cables discussed in **Section 3.4** to attach your CPUs to the ServSwitch Spectra. (Make sure your CPUs are turned OFF when you do this.) Attach one CPU—which will be referred to in the rest of this manual as “CPU 1”—to the ports in the Spectra’s “CPU 1 area” (the gray middle section of the rear panel whose video port is labeled “”). Attach the other CPU—“CPU 2”—to the ports in the “CPU 2 area” (the top section of the rear panel whose video port is labeled “”).

1. Starting at CPU 1, take the CPU end of the CPU-Extension Cable. Plug the video strand into the CPU’s video-output port. Then plug the keyboard and mouse strands into the CPU’s keyboard and mouse ports. You’ll need an FA212 adapter if the keyboard port is a PC/AT type, and you’ll need an FA312 adapter (and EHN408 coaxial CPU-Extension Cable) if the mouse port is serial (see the start of **Section 3.2**).
2. Run the cable to the Spectra. Plug the video strand into video port . Then plug the keyboard and mouse strands into that section’s keyboard port labeled  and mouse port labeled .
3. If you’ll be using headphones or speakers with CPU 1, run audio cable from the CPU’s audio-output port to the audio port labeled  in the Spectra’s CPU 1 area.
4. Repeat steps 1 through 3 for CPU 2, using the ports on the Spectra associated with video port .

3.6 Powering Up the System and Switching from the Keyboard

Power up the two CPUs attached to the ServSwitch Spectra one at a time, giving the first one time to boot completely before turning ON the second one. (After you turn ON the first CPU, the Spectra itself will begin operating; it gets its power from the CPUs and has no ON/OFF switch.) The Spectra will talk to the computers as if it were a keyboard and mouse, so that they can boot up automatically.

Your Spectra should now be ready for operation using its default settings, though if either of your computers is an old PS/2 machine or a UNIX workstation, you might need to send a Set Keyboard Mode command (see **Appendix C**) to get proper keyboard communication. To take full advantage of the Spectra’s features, refer to **Chapter 4** for full details about the Spectra’s commands (which are summarized in **Section 4.1**). To begin switching immediately, however, just press and release your keyboard’s left Control key ([Ctrl]), then—within the next two seconds—press and release the [1] or [2] key on the regular keyboard (not the numeric keypad) to switch to CPU 1 or CPU 2 respectively.

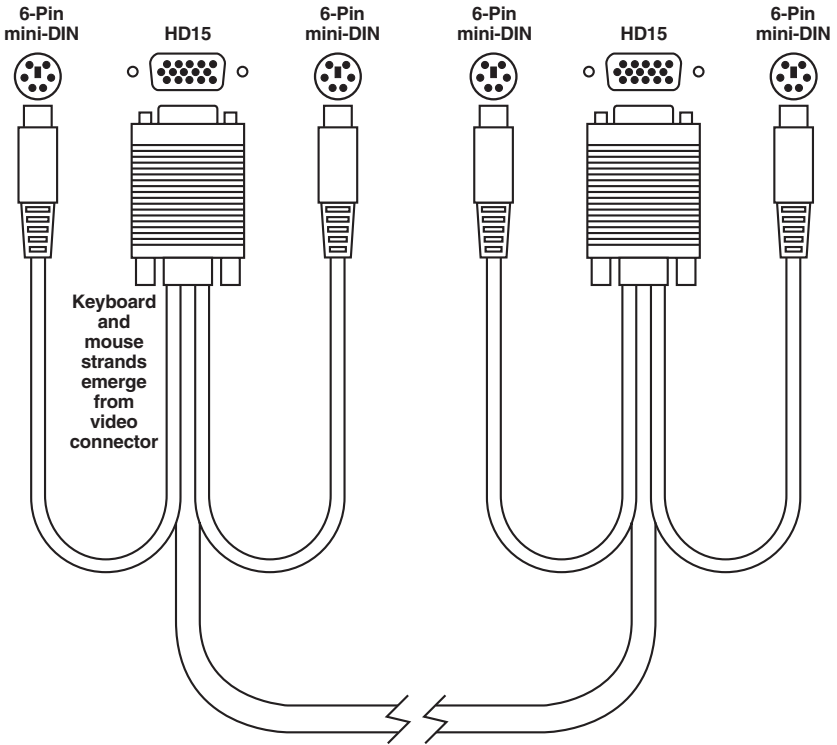


Figure 3-1. A standard CPU-Extension Cable (EHN404).

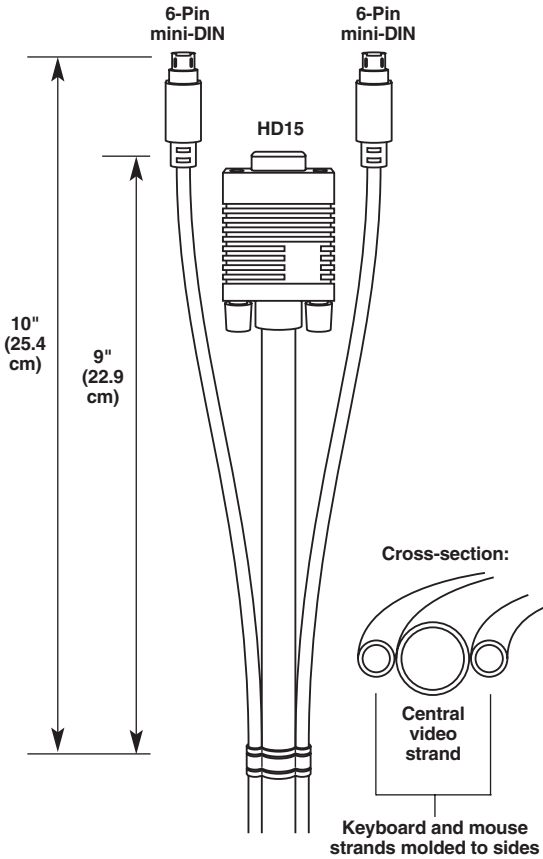


Figure 3-2. An end and a cross-section of a coaxial CPU-Extension Cable (EHN408).

4. Operation

4.1 Keyboard-Command Summary

Table 4-1 summarizes the commands that can be sent to the ServSwitch Spectra. To enter any command at your keyboard, first press and release the left Control key, represented by “[Ctrl].” (This cues the Spectra to look for commands from that keyboard.) Then press and release the command-character key(s). (Letter commands aren’t case-sensitive; they’re all shown in uppercase for clarity only. Do *not* use the [Shift], [Caps Lock], or [Alt] keys while you type in commands.)

Important: For commands that include numbers, *don’t* use the number keys in your keyboard’s keypad area; use only the number keys at the top of your keyboard.

All of the Spectra commands have a two-second timeout between characters. This means that if you begin entering a command, but you stop for more than two seconds at any time before you type the final character, the command is aborted and the Spectra returns to normal operation. This keeps the Spectra from getting stuck waiting for you to finish the command.

The [Ctrl] character is always passed through to the CPU. The command characters that follow it, however, are absorbed by the Spectra and are not sent to the CPU.

Some of these commands have factory-default values that can be reloaded if you accidentally misconfigure the Spectra; see **Appendix A** for a list of those default values and **Section 5.2** for how to restore them.

Table 4-1. The ServSwitch Spectra’s Keyboard Commands

Command	Keystroke Sequence	Description
Select CPU	[Ctrl] 1 or [Ctrl] 2	Switches your monitor, keyboard, mouse, and (if enabled) audio access to the specified CPU.
Switch to the Other CPU	[Ctrl] [Backspace]	Switches to the other CPU for monitor, keyboard, mouse, and (if enabled) audio access.
Start Scanning	[Ctrl] s	Turns Scan mode ON, causing the Spectra to scan back and forth between the two CPUs.
Stop Scanning	[Ctrl] x	Turns Scan mode OFF, giving you access to the CPU being scanned when the command is entered. (Note that scans can also be stopped by entering a Select CPU or Switch CPU command.)

Table 4-1 (continued). The ServSwitch Spectra's Keyboard Commands

Command	Keystroke Sequence	Description
Stop Audio Switching	[Ctrl] G1 or [Ctrl] G2	G1 suspends audio switching and makes CPU 1 the uninterrupted audio source. G2 suspends audio switching and makes CPU 2 the source.
Restart Audio Switching	[Ctrl] G0	Re-enables normal audio switching (audio is switched and scanned along with keyboard, video, and mouse).
Send Null Byte to Resync Mouse	[Ctrl] N	Causes the Spectra to send a null byte to the CPU's PS/2 mouse port. Enter this command to correct the selected CPU if it gets "out of sync" with the mouse (see Section 4.5).
Reset Computer's Mouse Port	[Ctrl] O	Causes the Spectra to try to get the currently selected CPU to reset its PS/2 mouse port. Only works if the CPU is running certain combinations of recent Windows operating system and recent mouse driver.
Identify ROM	[Ctrl] I	Causes the Spectra to report the version of ROM it is using. Enter this command if you are asked to do so by a technical-support person.
Keep Settings	[Ctrl] K	Enter this command after you enter any of the four commands listed below (it saves the new settings to nonvolatile memory):
Set Scan-Delay Time	[Ctrl] Txx [Enter] (xx = 1 to 15)	Sets the time, in seconds, that the ServSwitch Spectra will pause at each CPU when scanning.
Set Mouse Mode	[Ctrl] Qx [Enter] (x = 0, 1, or 2)	For the selected CPU, Q1 translates PS/2 mouse input to serial mouse output, Q2 forces PS/2 wheel-mouse output, and Q0 resets to normal PS/2 non-wheel-mouse output.
Set Keyboard Mode	[Ctrl] Mx [Enter] (x = 1, 2, or 3)	Tells the ServSwitch Spectra the keyboard mode (1, 2, or 3) of the currently selected CPU. See Appendix C .
Set Keyboard Typematic	[Ctrl] Axxx [Enter] (xxx = decimal value from 0 to 127)	Sets the keyboard typematic (automatic key-repeat) function of the currently selected CPU. Only works with CPUs that have standard keyboards and CMOS that allows users to program the typematic function. See Appendix C .

4.2 Select a CPU or Switch to the Other CPU

If you know which computer you want to access (CPU 1 or CPU 2), enter the “Select CPU” command: Press and release your keyboard’s left Control key ([Ctrl]), then press and release that CPU’s number key at the top of the keyboard ([1] for CPU 1 or [2] for CPU 2). The ServSwitch Spectra will immediately switch to that CPU.

If you want to switch to “the other computer” (the one you’re not using right now) but you’re not sure what its number is, enter the “Switch to the Other CPU” command: Press and release the left Control key ([Ctrl]), then press the [Backspace] key.

You can always, of course, select either CPU by pressing the button on top of the Spectra.

4.3 Start/Stop Scanning

To make the ServSwitch Spectra start scanning (switching continuously back and forth between the two CPUs), press and release the left Control key ([Ctrl]), then press and release [S].

As it scans, the Spectra pauses for 1 to 15 seconds at each CPU. (You can set this “Scan-Delay Time”; see **Section 4.9**.)

To make the Spectra stop scanning, press and release [Ctrl], then press and release [X]; you will have KVM access to the CPU that was being scanned when you entered the command. You can also stop scans by entering a Select CPU command (see **Section 4.2**).

4.4 Stop/Restart Audio Switching

In its default setting, the ServSwitch Spectra switches and scans the attached computers' audio output along with their video output and keyboard and mouse input. In other words, when you select a CPU with [Ctrl] [1], [Ctrl] [2], or [Ctrl] [Backspace], keyboard, mouse, video, *and* audio access are all switched to that CPU; and when you scan with [Ctrl] [S], the Spectra goes back and forth between the two CPUs' audio as well as their keyboard, mouse, and video.

In some situations, such as when you are listening to an audio CD or Web radio on one of the CPUs, you might not want the audio to be switched or scanned along with KVM access. If you want one of the CPUs to be the uninterrupted audio source, you can enter a "Stop Audio Switching" command: Press and release the left Control key ([Ctrl]), then press and release [G], then press and release that CPU's number key at the top of the keyboard ([1] for CPU 1 or [2] for CPU 2). This will suspend audio switching, switch the audio to the chosen computer, and "park" audio access on that CPU indefinitely. From that point on, when you select a CPU with [Ctrl] [1], [Ctrl] [2], or [Ctrl] [Backspace], or when you start and stop scanning with [Ctrl] [S] or [Ctrl] [X], it will switch only the keyboard, video, and mouse, *not* the audio.

To resume normal simultaneous KVM/audio switching, enter the "Restart Audio Switching" command: Press and release [Ctrl], then press and release [G], then press and release the [0] (zero) key at the top of your keyboard. Audio will immediately be switched to the CPU that's currently selected for KVM access, and audio will be switched and scanned along with KVM access as normal.

4.5 Send Null Byte to Resynchronize Mouse (CPUs with PS/2 Mouse Ports Only)

If your mouse starts acting funny (moves the pointer or cursor the wrong way or not at all, opens windows without you clicking on anything, etc.), and the selected computer CPU has a PS/2 type mouse port rather than a serial mouse port, the CPU might have gotten “out of sync” with the mouse.

Here’s what can happen: PS/2 type mice send control data to CPUs in three- or four-byte “packages.” Sometimes, because of electronic transients, unusual power-up effects, or plugging and unplugging of cables from live equipment, the currently selected CPU in a ServSwitch Spectra system can lose one or two bytes of this control information. Once that happens, the CPU still tries to interpret what it sees as normal packages of data, but it’s always looking at bytes in the wrong order and from two different packages, so it always gets it wrong.

To get the CPU back in sync, first try entering a “Reset Mouse Driver” command (see **Section 4.6**) if the CPU is running a recent version of Windows. If that doesn’t work, enter a “Send Null Byte” command to tell the Spectra to send a “null byte” to the CPU’s PS/2 mouse port (this has no other effect than getting the CPU “caught up”). To do this, press and release the left Control key ([Ctrl]), then press and release [N]. If the mouse still isn’t right after you issue this command, the CPU must have been more than one byte out of sync. Issuing the command once or twice more should do the trick.

The CPU will be thrown out of sync if it has a PS/2 mouse port and it’s in sync when you issue this command. Issue this command two or three more times to get it back in sync again.

If you have version 9.01 or higher of the Microsoft mouse driver, the CPU should never get out of sync. Contact Microsoft if you would like to upgrade your Microsoft mouse driver. CPUs with serial mouse ports are naturally immune to this problem.

Sometimes the mouse can “get stuck” for other reasons, and you’ll have to press the Spectra’s reset button to reinitialize it. See **Section 5.1**.

4.6 Reset Computer's Mouse Port

If the currently selected CPU is running Windows NT (or possibly Windows 98 or Windows 2000, depending on your mouse-driver version) and the PS/2 mouse gets “out of sync” (see **Section 4.5** for an explanation of this), you can enter a “Reset Computer's Mouse Driver” command. When you do, the ServSwitch will send the CPU a signal to reset its PS/2 mouse port by completely reinitializing its mouse driver. (For machines whose operating system and mouse driver both support this function, this command is usually more effective than [Ctrl] [N] for clearing up mouse problems.)

To do this, press and release the left Control key ([Ctrl]), then press and release the letter [O] (*not* the number zero). In contrast to [Ctrl] [N], entering [Ctrl] [O] when the mouse is in sync will have no discernible effect on the mouse. [Ctrl] [O] also has no effect on CPUs whose operating system and/or mouse driver *don't* support the reinitialization function.

Sometimes the mouse can “get stuck” for other reasons, and you'll have to press the Spectra's reset button to reinitialize it. See **Section 5.1**.

4.7 Identify ROM

Unfortunately, as with all complex equipment, problems might arise with your ServSwitch Spectra that you'll need help from a technical-support person to fix. One of the things technicians might want to know when they try to diagnose and correct your problem is the revision level of your Spectra's ROM (read-only memory, where the Spectra's operating program is stored).

The “Identify ROM” command causes the Spectra to send two numbers *xy* (short for its three-character “*x.y*” ROM level) to the currently selected CPU as ASCII keyboard data; these characters will be echoed back to your monitor if you are at some type of prompt. (You *must* be at some kind of prompt or screen capable of displaying typed-in keyboard characters, or you will not see the Spectra's response.)

To enter the Identify ROM command, press and release the left Control key ([Ctrl]), then press and release [I].

4.8 Keep Settings

The “Keep Settings” command saves the current state of the ServSwitch Spectra’s keyboard-selectable settings to nonvolatile memory (NVRAM), where they become the new default settings that are loaded when the Spectra is powered up. To enter this command from your keyboard, press and release the left Control key ([Ctrl]), then press and release [K]. Two of the four keyboard-selectable settings are described in the next two sections; the others are described in **Appendix C**.

4.9 Set Scan-Delay Time

Enter a “Set Scan-Delay Time” command to set how long, in seconds, the ServSwitch Spectra will pause at each of the CPUs when it’s scanning them. The factory-default setting is 5 seconds. To set a different delay time, press and release the left Control key ([Ctrl]), then type the letter [T] followed by the new delay time in seconds (1 to 15), and press and release [Enter]. (If you enter this command with an argument of zero, the Spectra will set the scan-delay time to the default value most recently saved in NVRAM.) Enter the Keep Settings command after you enter this command.

4.10 Set Mouse Mode

Normally the ServSwitch Spectra outputs “plain-vanilla” (non-wheel) PS/2 mouse data to the CPUs, regardless of what type of mouse you’ve actually plugged into it or what type of mouse port each of the attached CPUs has. If either of the CPUs has a serial mouse port, you need to tell the Spectra to do PS/2 to serial translation for that CPU. With that CPU selected, enter the “Set Mouse Mode to Serial” command: Press and release the left Control key ([Ctrl]), then type the letter [Q] followed by the number [1], and press and release [Enter].

Similarly, if you’re using a PS/2 wheel mouse with the ServSwitch Spectra, and either of the attached CPUs has a PS/2 mouse port and is running a driver that will handle wheel-mouse data, you should tell the Spectra to output mouse data in PS/2 wheel format to that CPU. With that CPU selected, enter the “Set Mouse Mode to PS/2 Wheel” command: Press and release the left Control key, then type the letter [Q] followed by the number [2], and press and release [Enter].

If later you attach a computer with a PS/2 mouse port and a non-wheel-mouse driver, and you want to return to the standard mouse mode, enter the “Set Mouse Mode to PS/2 Non-Wheel” command: Press and release the left Control key, then type the letter [Q] followed by the number [0], and press and release [Enter].

Enter the Keep Settings command after you enter any of these commands.

5. Troubleshooting

The first three sections of this chapter discuss some of the problems that can arise in a ServSwitch Spectra system and suggest possible causes and solutions. If the trouble you're having with the Spectra is something you haven't seen before, or if the trouble seems minor, try the procedures detailed in **Section 5.1** and (if that doesn't work) **Section 5.2** before doing anything else. If the trouble is chronic, see **Section 5.3**.

Sections 5.4 and **5.5** discuss what's involved in calling Black Box and shipping your Spectra.

NOTE

Like many other electronic products with non-grounded plastic enclosures, the ServSwitch Spectra can be susceptible to static discharges. On rare occasions, such discharges might cause the Spectra to crash. If this happens, pressing the Spectra's reset button (see Section 5.1) should restore the unit to normal operation.

5.1 Resetting the Spectra

Sometimes the ServSwitch Spectra might stop operating correctly (or at all) because an error occurs. At other times, the attached keyboard or mouse might become confused. If:

- your keyboard gets stuck or begins misbehaving,
- you need to send mouse data to a computer CPU that hasn't enabled the mouse (this can happen if you boot up the CPU while it's disconnected from the Spectra),
- the mouse behaves strangely after you unplug it and then plug it back in (and [Ctrl] [N] and [Ctrl] [O] don't help—see **Sections 4.5** and **4.6**), or
- the Spectra itself seems to be malfunctioning,

press and release the reset button in the upper right corner of the Spectra's rear panel. (This button is unlabeled but is shown in **Section 2.3**. You might be able to press it with a finger, but you might need to use a pencil or a paper clip instead.) This will reset the Spectra's circuitry and reinitialize the keyboard and mouse. If you're still having keyboard problems, try changing the keyboard mode (see **Appendix C**). If problems of any kind persist, you can try resetting the Spectra to its factory defaults (see **Section 5.2**).

(continued on the next page)

If the affected CPU is running DOS or Windows 3.x, don't press the reset button if the CPU doesn't have a mouse driver loaded. Resetting the Spectra will cause the mouse to send data to the CPU, and many DOS/early Windows CPUs will crash if they receive unexpected mouse data. (CPUs running UNIX® or later versions of Windows don't have this problem.) If either of your CPUs is susceptible to these kinds of crashes, and you have chronic problems when you try to run applications that don't use the mouse but don't disable the mouse either, take these precautions:

- If you never actually use a mouse with that CPU, either don't plug the mouse strand of the CPU-Extension Cable into the CPU's mouse port, or don't load a mouse driver at all. If you do use the mouse, are running Windows 3.x, and sometimes exit to DOS, make sure you load a DOS mouse driver before running Windows.
- *Advanced users:* If you've loaded a DOS mouse driver and are going to use an application that disables the PS/2 mouse, first REM out any statements in your startup files (AUTOEXEC.BAT, etc.) that load the mouse driver, then reboot the computer to remove the mouse driver from memory. (Having the mouse driver unload itself doesn't do the job.)

5.2 Restoring Factory-Default Settings

If you're having difficulty with a ServSwitch Spectra, something that sometimes helps is resetting the Spectra to its factory defaults. Follow these steps:

1. Make sure that at least one powered CPU is attached to the ServSwitch Spectra (it doesn't matter which port the CPU is connected to).
2. Press and hold the CPU-selection button on top of the ServSwitch Spectra.
3. Press and release the reset button in the upper right corner of the Spectra's rear panel. (This button is unlabeled but is shown in **Section 2.3**. You might be able to press it with a finger, but you might need to use a pencil or a paper clip instead.)
4. Release the CPU-selection button. The unit should be restored to the factory-default settings listed in **Appendix A**.

Now reconfigure the Spectra to your desired settings. If you're still having difficulty, refer to **Section 5.3**. If it doesn't help you to solve your problem, call Black Box for technical support.

5.3 Common Problems

5.3.1 A CPU CONNECTED TO YOUR SPECTRA DOESN'T BOOT, AND YOU GET A KEYBOARD OR MOUSE ERROR

- A.** First make sure that the CPU is in fact connected to the ServSwitch Spectra and that the Spectra is getting power. (To get enough power to work properly, the Spectra must be cabled to the keyboard port of a powered CPU.)
- B.** If the Spectra is ON, make sure its keyboard and mouse settings are correct.
- C.** If the configuration is OK, check your cables. Tighten any loose connections. If the keyboard and mouse strands of the CPU-Expansion Cable are backwards, plug them into the proper ports (the mouse connectors are always green).
- D.** If you don't find a cable error, try swapping in different keyboards and/or mice one at a time. If the problem goes away when you substitute a keyboard or mouse, the one you were using might have gone bad.
- E.** If swapping input devices doesn't solve the problem, begin swapping your cables one at a time. If the problem goes away when you substitute a cable, the cable you were using is probably defective.
- F.** If swapping cables doesn't solve the problem, try plugging the CPU into the other CPU port on the Spectra. If the CPU boots when it's connected to the other port, one or more of the first port's connectors are probably defective.
- G.** If swapping ports doesn't solve the problem, try plugging a known-good keyboard and mouse directly into the CPU that's having the problem. If the CPU boots, the Spectra might be defective; call Black Box.
- H.** If the CPU still doesn't boot, the CPU's keyboard or mouse port (or other components) might be defective. (If the CPU's Power LED doesn't light, the fuse on the CPU's motherboard might be blown.) If you still have them, plug that CPU's original monitor, keyboard, and mouse into it and try again. If the CPU does *not* boot with its original equipment, something in the CPU is defective; call the CPU's manufacturer. If the CPU *does* boot, there is some kind of unusual mismatch between that CPU and your monitor, keyboard, or mouse; call Black Box for technical support.

5.3.2 YOU CAN'T SWITCH CPUs FROM THE KEYBOARD

A. Can you do *anything* from the keyboard? If not, the keyboard cable has probably come loose. Reconnect it.

B. The ServSwitch Spectra might have lost power for less than three seconds. (This can cause the keyboard to lock up.) Disconnect the keyboard and plug it back in.

C. The keyboard might simply have gotten a little off kilter. If the Spectra can see the keyboard at all, try reinitializing the keyboard by pressing the reset button (see **Section 5.1**).

D. The keyboard mode that the Spectra is using to send data to the CPU might be wrong. Enter a Set Keyboard Mode command to change the port's mode (see **Appendix C**). Unfortunately, sometimes this situation can confuse the CPU or keyboard so badly that you'll need to reboot the CPU.

E. If the keyboard and mouse strands of the CPU cable are backwards, plug them into the proper ports (the mouse connectors are always green).

F. You might be using the keyboard incorrectly. Make sure to use the *left* Control key to start port-switching commands. Make sure to use the number keys *at the top of the keyboard* when you type in port numbers. Make sure to release the Control key before you start typing in a CPU number. Make sure you don't wait too long before you enter a CPU number. Make sure you don't accidentally hit keys such as [Shift] or [Alt].

5.3.3 CHARACTERS THAT YOU TYPE COME UP WRONG OR MISSING

The keyboard mode that the Spectra is using to send data to the CPU might be wrong. See item D under **Section 5.3.2**.

5.3.4 YOUR MOUSE DRIVER DOESN'T LOAD

A. To recognize the mouse, the CPU must be directly connected to it, or indirectly connected to it through the Spectra, at boot-up time. Make sure that all cables are firmly attached and that the Spectra is receiving power from the other computer, then reboot the affected CPU.

B. Your mouse driver might be old or incompatible with your mouse. Try the latest version of the Microsoft mouse driver.

5.3.5 YOU CAN'T ACCESS ALL THE FUNCTIONS OF YOUR MOUSE

A. What type of mouse is it? If it's any type other than a PS/2 compatible two-button, three-button, or "wheel" mouse, chances are that the ServSwitch Spectra doesn't support it.

B. The Spectra's mouse mode might not be set correctly. See **Section 4.10**.

C. Your mouse driver might be old or incompatible with your mouse. Try the latest version of the Microsoft mouse driver.

D. If your mouse is a Logitech mouse, the Spectra supports the two-button models but not the three-button models.

5.3.6 YOUR MOUSE GETS OUT OF SYNC

Cabling might have been disturbed during mouse movement. If the currently selected CPU is running Windows NT or some other recent version of Windows, issue the Reset Computer's mouse Port command (see **Section 4.6**). Otherwise, issue the Send Null Byte command (see **Section 4.5**) one, two, or three times. You need the latest version of the Microsoft mouse driver to stop this from happening.

5.3.7 YOUR MOUSE DOESN'T MOVE THE POINTER/CURSOR

A. What type of mouse is it? If it's any type other than a PS/2 compatible two-button, three-button, or "wheel" mouse, chances are that the ServSwitch Spectra doesn't support it.

B. The mouse might not be configured properly.

C. The Spectra's mouse mode might not be set correctly. See **Section 4.10**.

D. Your mouse must be connected to the ServSwitch Spectra when the CPUs are booted and when mouse applications are run. Try exiting and re-entering your application; if this doesn't work, press the reset button (see **Section 5.1**).

5.3.8 YOUR MONITOR DISPLAY IS FUZZY

- A. Check the settings of your monitor, especially the sharpness control.
- B. If you can't solve the problem by changing the monitor settings, you might have run cable too far; maximum distance of extension cable from any CPU to the ServSwitch Spectra is 20 ft. (6.1 m)—or less, if you are using high-resolution video. You might need to upgrade from standard cables to coaxial cables that carry the video signal better. See **Section 3.4**.

5.3.9 YOUR VIDEO IS NOT SYNCHRONIZED OR IS THE WRONG COLOR

- A. Check the settings of your monitor, especially the sync or color controls.
- B. Your monitor might not be capable of synching to the selected video resolution or frequency (refresh rate). Try a lower resolution or frequency or a more powerful monitor.
- C. If the video problem is not centered on the monitor itself, check the monitor cable and the video strand of the CPU-Extension Cable. Tighten any loose connections.
- D. If no cable connectors are loose, begin swapping your cables one at a time. If the problem goes away when you substitute a cable, the cable you were using is probably defective.
- E. If swapping cables doesn't solve the problem, try plugging the CPU into the other CPU port on the ServSwitch Spectra. If the problem goes away when the CPU is connected to the other port, the first port's video connector is probably defective.

5.3.10 YOUR VIDEO IS OK IN LOW-RESOLUTION MODE, BUT YOU CAN'T GET INTO HIGH-RESOLUTION MODE

- A. If you're using XGA, you *must* use coaxial CPU cable (see **Section 3.4**).
- B. Check your video driver. It might not be set up correctly for your desired resolution.

5.3.11 ONE OR BOTH OF YOUR CPUS LOCK UP WHEN YOU START WINDOWS 3.X

The usual cause of this problem is that the affected CPUs are set to load a Logitech or other type of mouse driver when Windows starts up. Set the CPU to load the generic Microsoft mouse driver instead.

5.3.12 THE SPECTRA DOESN'T WORK WITH YOUR DOCKING STATION

The ServSwitch Spectra doesn't support some docking stations for portable computers.

5.3.13 THE SPECTRA DOESN'T WORK WITH YOUR DONGLE-PROTECTED SOFTWARE

The ServSwitch Spectra doesn't support some dongles (the devices required to be inserted into the keyboard line by some software for copy protection).

5.3.14 THE SPECTRA DOESN'T WORK WITH YOUR IBM THINKPAD

The ServSwitch Spectra supports only "stream mode" (continuous) mouse data. It doesn't support the "prompt mode" (burst-on-request) method for handling mouse data that some older IBM ThinkPad models use, regardless of whether the ThinkPad is connected to the Spectra directly or through a docking station (and see **Section 5.3.12**).

5.4 Calling Black Box

If you determine that your ServSwitch Spectra is malfunctioning, *do not attempt to alter or repair the unit*. It contains no user-serviceable parts. Call 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;
- 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.

5.5 Shipping and Packaging

If you need to transport or ship your ServSwitch Spectra:

- Package it carefully. We recommend that you use the original container.
- If you are shipping the Spectra for repair, make sure you include the CPU cables you're using with it. If you are returning the Spectra, make sure you include everything you received with it. Before you ship, contact Black Box to get a Return Authorization (RA) number.

Appendix A: NVRAM Factory Defaults

The table below shows the default values for some of the ServSwitch Spectra's options that are stored in nonvolatile memory (NVRAM) when the Spectra is shipped from the factory. It also shows you both how to change these settings and how to save the changed settings to NVRAM, so that they become the new defaults loaded when the Spectra is powered OFF and back ON again.

Option	Factory-Default Setting	To Change	To Save Changes
Caps/Scroll/ Num Lock	Num Lock ON (fixed)	Select port, then press the corresponding button on the keyboard	Can't be saved
Scan	OFF	Type [Ctrl] S (to turn ON) or [Ctrl] X (to turn OFF)	Can't be saved
Scan-Delay Time	5 seconds	Type [Ctrl] Txx [Enter] (xx = 1 to 15, time in seconds)	[Ctrl] K
Keyboard Mode	Mode 2	Select port, then type [Ctrl] Mx (x = 1, 2, or 3)	[Ctrl] K
Keyboard Typematic	43 (delay of 1/2 second, rate of 10.9 characters per second)	Type [Ctrl] Axxx [Enter] (xxx = 0 to 127; see Appendix C)	[Ctrl] K
Mouse Mode	PS/2 non-wheel for each computer	Select CPU, then type [Ctrl] Q1 [Enter] for serial or [Ctrl] Q2 [Enter] for PS/2 wheel or [Ctrl] Q0 [Enter] for PS/2 non-wheel	[Ctrl] K

Appendix B: Surface-Mounting the Spectra

If you want to firmly mount your ServSwitch Spectra on a flat surface—we'll refer to this as the “mounting surface” in the rest of these instructions—use the included mounting plate. We recommend attaching the plate to the mounting surface with either adhesive material or screws.

To surface-mount the Spectra with adhesive material, you'll need either (a) double-sided tape or adhesive strips or (b) strips of Velcro® or similar hook-and-loop material with adhesive on both sides. If possible, these should be *thick* from top to bottom (between the adhesive layers) and *narrow* from side to side. Once you have these in hand, take these steps, referring to Figure B-1 on the next page:

1. If you look at the bottom of the Spectra, you'll see that it has a recessed track with wraparound flanges on either side. Slide the mounting plate into the bottom of the Spectra along this track, so that the plate's elevated “wings” fit snugly into the flanges. The Spectra will not lock into place, but if you slide it all the way onto the plate, it will be very tightly secured.
2. Attach the adhesive material to the underside of the plate. If you're using something like double-sided tape that isn't very thick between its adhesive layers, you might have to attach a single strip to the plate's middle groove in order for the adhesive to make contact with the surface. But this probably won't create a very firm or stable grip, so we recommend attaching two strips of something thicker, one to each of the plate's “wings” on either side of the middle groove. (You might have to trim these strips if they're wide enough to interfere with sliding the Spectra on and off of the plate.)
3. Press the Spectra, plate, and adhesive material firmly onto the mounting surface.

To surface-mount the Spectra with screws, you'll need a pair of screws that are appropriate for the material and thickness of the mounting surface. Make sure that these screws' shafts are thin enough to fit the holes in the mounting plate, and that their heads aren't taller than the groove in the middle of the plate. Once you have two such screws in hand, take these steps, referring to Figure B-2 on page 37:

1. If screwholes of the proper width, depth, and spacing don't already exist in the mounting surface, such holes will need to be drilled by an experienced person taking all appropriate safety precautions. The holes in the mounting plate can be used as guides. (Make sure to get the proper authorization to have this done!)

2. If you haven't already done so, place the plate on the mounting surface so that its middle groove is lower than its "wings." Align the holes in the plate with the screwholes in the surface.
3. Screw your selected pair of screws through the holes in the mounting plate, into the screwholes in the surface. Make these screws tight enough that the plate doesn't move when you jiggle or bump it.
4. If you look at the bottom of the Spectra, you'll see that it has a recessed track with wraparound flanges on either side. Slide the bottom of the Spectra onto the plate along this track, so that the plate's elevated wings fit snugly into the flanges. The Spectra will not lock into place, but if you slide it all the way onto the plate, it will be very tightly secured.

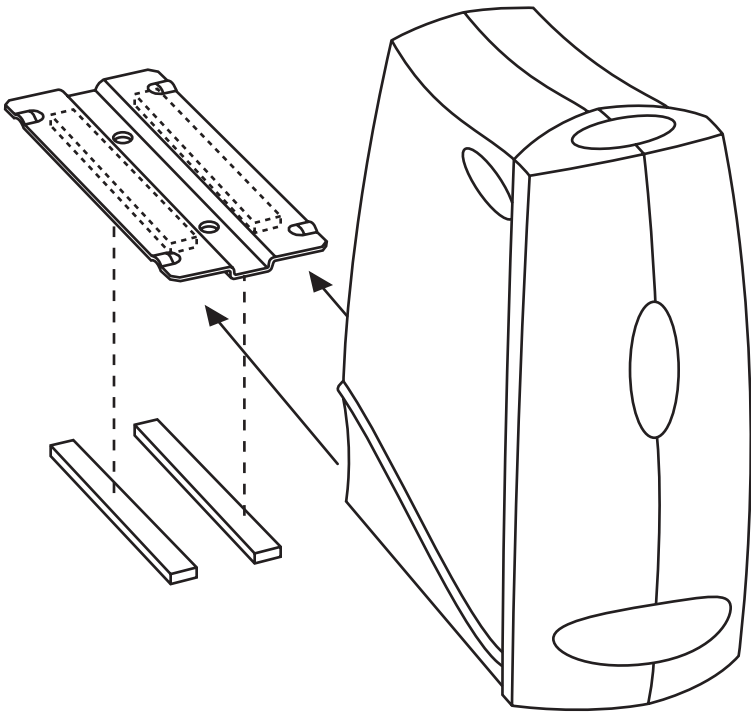


Figure B-1. Semi-permanent surface-mounting with adhesive strips.

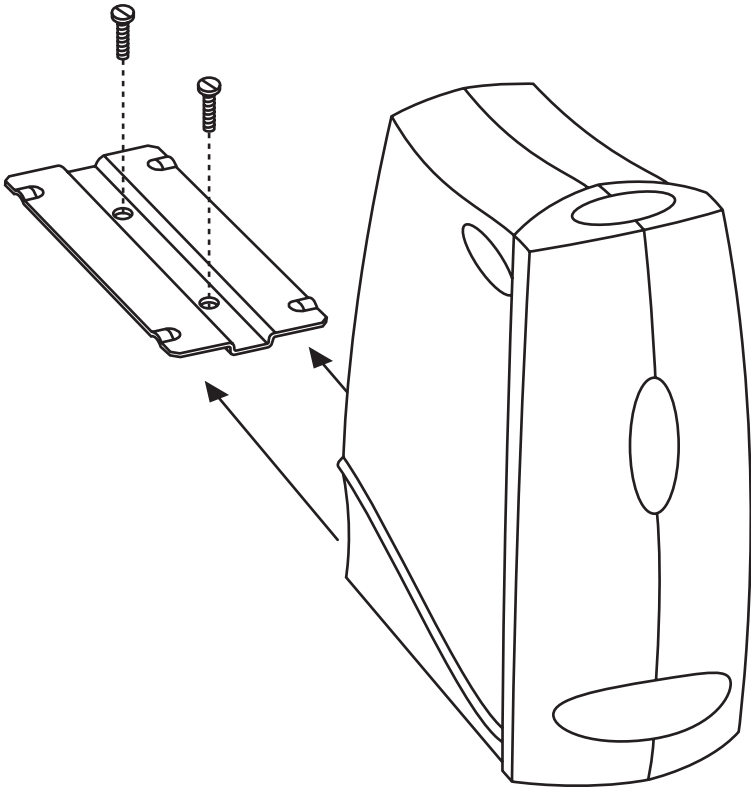


Figure B-2. Permanent surface-mounting with screws.

Appendix C:

Commands for Advanced Users

C.1 Set Keyboard Mode

Some CPUs might require you to set the ServSwitch Spectra to output a different keyboard mode than usual. Keyboard “modes” are electrical signaling protocols that determine how a powered CPU and keyboard interact. A CPU and keyboard must use the same mode in order to work with each other. Of the three standard keyboard modes currently in use, mode number 2 is the one used by the vast majority of CPUs. It is also the default state of all 101-key and PS/2 keyboards. Mode 1 is used primarily by certain PS/2 CPUs. Mode 3 is used by some servers and UNIX workstations.

The ServSwitch Spectra supports all three of these modes and translates between them. As it receives signals from your keyboard, it sends them to the currently selected CPU while emulating a keyboard of the appropriate mode for that CPU. As it receives signals for the keyboard from the currently selected or scanned CPU, it sends them to the keyboard while emulating a CPU of the appropriate mode.

Most CPUs that use keyboard mode 1 or 3 send a “mode command” to the keyboard at power-up, to put the keyboard in the proper mode. A Spectra can use these commands to automatically detect each such CPU’s keyboard mode when you turn on the CPU *after* it has been cabled to the Spectra. However, the Spectra doesn’t automatically save this value; unless you send it a Keep Settings command, it will forget the modes it has detected when it is powered down, then default to each port’s most recently saved setting when it’s powered up again.

The Spectra can’t detect the CPU’s keyboard mode if the CPU doesn’t send “mode commands” (most CPUs that use mode 2 fall into this category) or if the CPU is already ON when you connect it to the Spectra (it shouldn’t be). In these situations, the Spectra tries to use the keyboard-mode setting stored in its nonvolatile memory for that port. The factory-default is mode 2 for all ports. Send the Set Keyboard Mode command to change the keyboard mode for a port if:

- the CPU on that port uses mode 1 or 3,
- it uses mode 2, but the default setting of the port you want to connect it to has been changed, or
- you don’t know which mode the CPU uses or the port is set for, but the keyboard’s behavior makes you suspect that the port’s setting is wrong.

To set the keyboard mode of the currently selected port on a Spectra, press and release the left Control key ([Ctrl]), then type [M] followed by the mode number ([1], [2], or [3]). After you enter this command, enter the Keep Settings command to save the mode setting in NVRAM, so that the new setting becomes the default value (preserved during power-down and reloaded at power-up).

If either of the CPUs you'll be connecting to your Spectra system use a keyboard mode other than 2, you might want to change the defaults of the affected CPU port(s) of the Spectra at installation time. This is because if the Spectra is accidentally disconnected from the CPUs, or if both CPUs lose power, the Spectra's CPU ports will return to their default keyboard mode when power is restored.

C.2 Set Keyboard Typematic

Most keyboards have an internal seven-bit "typematic" setting, which governs the way the keyboard responds when you hold a key down to force it to repeat. The five "low" bits of this setting represent the rate at which the key repeats; the two "high" bits represent the delay after you begin holding down the key before it begins to repeat. Sometimes a keyboard's typematic setting isn't suitable for a given user or for a given application. To change the typematic setting of your keyboard, issue the Set Keyboard Typematic command: Press and release the left Control key, type [A] followed by the desired "typematic value," and press [Enter]. The "typematic value" is the decimal equivalent of the binary seven-bit typematic setting: While the typematic setting = delay bits + rate bits, the typematic value = decimal delay value + decimal rate value (see Table C-1 below and Table C-2 on the next page). For example, to set your shared keyboard to register a key 16 times per second after the key has been held down for half a second (typematic value = 7 + 32 = 39), type [Ctrl] [A] [3] [9] [Enter]. Enter the Keep Settings command ([Ctrl] [K]) after you enter this command.

Table C-1. Typematic Delay

Decimal Value	Binary Bit Values	Delay Before Key Repeats
0	00[xxxxx]	1/4 second (250 ms)
32	01[xxxxx]	1/2 second (500 ms)
64	10[xxxxx]	3/4 second (750 ms)
96	11[xxxxx]	1 second (1000 ms)

Table C-2. Typematic Rate

Decimal Value	Binary Bit Values	Repeat Rate in Keys per Second
0	[xx]00000	30
1	[xx]00001	26.7
2	[xx]00010	24
3	[xx]00011	21.8
4	[xx]00100	20
5	[xx]00101	18.5
6	[xx]00110	17.1
7	[xx]00111	16
8	[xx]01000	15
9	[xx]01001	13.3
10	[xx]01010	12
11	[xx]01011	10.9
12	[xx]01100	10
13	[xx]01101	9.2
14	[xx]01110	8.6
15	[xx]01111	8
16	[xx]10000	7.5
17	[xx]10001	6.7
18	[xx]10010	6
19	[xx]10011	5.5
20	[xx]10100	5
21	[xx]10101	4.6
22	[xx]10110	4.3
23	[xx]10111	4
24	[xx]11000	3.7
25	[xx]11001	3.3
26	[xx]11010	3
27	[xx]11011	2.7
28	[xx]11100	2.5
29	[xx]11101	2.3
30	[xx]11110	2.1
31	[xx]11111	2

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