



ServSwitch™ Brand DVI-D USB KVM-over-Fiber Extender

Pure digital extension over fiber optic cable with zero compression technology. Supports EDID, stereo audio, and serial port control.



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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.
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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 lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
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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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Chapter 1: Specifications

1. Specifications

Distance: 1080p: 3200 ft. (1000 m);
1080i: 6400 ft. (2000 m)

HDCP Support: Yes

Hotkey: Yes

Video Resolution (Maximum): Full HD: 1920 x 1080;
WUXGA: 1920 x 1200;
UXGA: 1600 x 1200

User Controls: Each unit: (1) Push Button: Control Status Switch

Connectors:

Console Unit:

Console Interface: Serial port: (1) DB9 M DTE;
Keyboard and mouse: (2) USB Type A F,
Monitor: (1) DVI-I F;
Audio jack: (1) speaker and (1) microphone;

Computer Interface:

Serial port: (1) DB9 F DCE;
Keyboard and mouse: (1) USB Type B F,
Monitor: (1) DVI-I F,
Audio jack: (1) speaker and (1) microphone;
Interconnect: (1) duplex SC;

Computer Unit:

Console Interface: Serial port: (1) DB9 M DTE;
Keyboard and mouse: (1) USB Type A F;
Monitor: (1) DVI-I F;
Audio jack: (1) speaker and (1) microphone;
Interconnect: (1) duplex SC;

Computer Interface: Serial port: (1) DB9 F DCE;
Keyboard and mouse: (1) USB Type B F;
Monitor: (1) DVI-I F;
Audio jack: (1) speaker and (1) microphone

Indicators: (5) LEDs: (1) Status, (1) Local, (1) Remote, (2) Serial

Power: Each unit: 9-12 VDC, 1.5 A;
Computer unit: 7.2 W;
Console unit: 6.3 W;

Size: Each unit: 1.7"H x 8.6"W x 5.2"D (4.4 x 21.8 x 13 cm)

Weight: Each unit: 2.27 lb. (1.03 kg)

2. Overview

2.1 Introduction

The DVI-D USB KVM over Fiber Optic Extender consists of a console unit and a computer unit. It enables you to remotely access and control a computer or KVM switch up to 6400 feet (2000 m) away from using only fiber optic cable.

The extender optimizes the digital display up to a maximum resolution of Full HD (1920 x 1080)/WUXGA (1920 x 1200)/UXGA (1600 x 1200). For cascaded applications, the dedicated Mask Hotkey switch masks the master KVM extender level, enabling users to directly configure the slave level KVM switch as if the user were sitting in front of the slave KVM switch. This saves time, prevents errors, and makes the hotkey configuration more predictable.

This KVM extender includes dual-user access, the ability to control multiple computers through cascading with a KVM switch, push button for switching control, front-panel LED for status indication, hotkey control and mask hotkey switch for easy computer access, serial interface for instant data transfer, HDCP compliance, Blu-ray display support, and audio jack (speaker + microphone) for broadcasting. Besides, it is fully compatible with most popular monitor screen resolutions such as XGA, SXGA, UXGA, WSXGA all the way to Full HD, WUXGA system.

Ideal for transmission security, the extender eliminates electromagnetic radiation emission. Use it for a variety of KVM extension applications, including in medical, military, industrial, and high electromagnetic interference (EMI)/radio frequency interference (RFI) environments where real-time, high-resolution audio/video transmission is essential. The extender also enables you to secure the computers and valuable data or manage them both in remote and local sites. No software or DIP switches are required, just plug and play.

2.2 Features

- Connect the KVM extender pair via SC to SC duplex multimode fiber optic cable
- Remotely locate the keyboard, mouse and monitor up to 6400 feet (2000 meters) away from a computer (or a KVM switch) with a maximum resolution of Full HD (1920 x 1080)/WUXGA (1920 x 1200)/UXGA (1600 x 1200)
- Supports USB console
- Hotkey functions for easy computer access

Chapter 2: Overview

- Mask Hotkey Switch on the rear panel masks the cascaded KVM extender itself and directly configures KVM switch controls to the computer that's attached to the KVM switch.
- Can provide dual-user access to share multiple computers when KVM switch is cascaded
- Fiber optic connectors provide high-speed and long-distance transmission
- Supports serial interface for instant data transfer
- Fully compatible with DVI and/or HDMI standard by DDWG
- HDCP-compliant and Blu-ray ready
- Completely free from electromagnetic interference (EMI)
- Ideal for professional audio/video applications
- EDID copy and emulation features increase display compatibility and improve display quality.
- Uses multimode optical fiber
- Transmits video digitally for zero signal loss
- Compatible with most popular screen resolutions for XGA, SXGA, UXGA, WSXGA all the way to Full HD, WUXGA system

2.3 What's Included

Your package should contain the following items. If anything is missing or damaged, contact Black Box Technical Support at 724-746-5500.

- (1) KVM Extender console unit
- (1) KVM Extender computer unit
- (2) power adapters
- (2) power cords
- (2) sets [(8) pieces] foot pads
- (2) sets of DVI 2-to-2 USB cable with audio cable
- (2) sets of rackmount brackets with screws
- (1) 96-foot (30-m) fiber optic cable
- This user's manual

2.4 What You Need to Supply

- (1) computer with USB port(s) and DVI video output port
- (1) USB keyboard/mouse to control the console
- Microphone, speakers, HDCP-compliant monitors with DVI interface for the HDCP video source (optional)
- DVI KVM cable(s)
- Fiber cable
- Serial cable (for serial device applications)

2.5 Hardware Description

2.5.1 Console Unit

Front Panel

Figure 2-1 shows the DVI-D USB KVM over Fiber Optic Extender Console Unit's front panel. Table 2-1 describes its components.

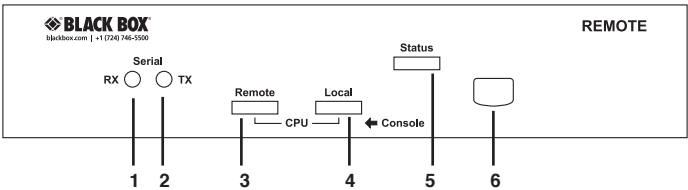


Figure 2-1. Console unit's front panel.

Table 2-1. Console unit's front panel components.

Number	Component	Description
1	Serial LED indicator	RX: Data receive
2	Serial LED indicator	TX: Data transmit
3	Remote LED indicator	Control status
4	Local LED indicator	Control status
5	Status LED indicator	Green: Power on Blue: Power on and connected to a local unit
6	Push button	Select control status

Chapter 2: Overview

Back Panel

Figure 2-2 shows the extender console unit's back panel. Table 2-2 describes its components.

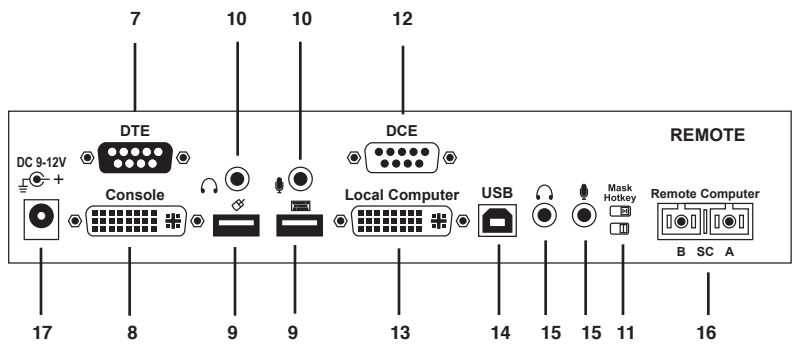


Figure 2-2. Console unit's back panel.

Table 2-2. Console unit's back panel components.

Number	Component	Description
7	DTE interface	Connects to a serial device
8	DVI connector	Connects to the monitor
9	USB Type A connectors	Connects to the console's mouse or keyboard and mouse combo
10	Audio jacks	Connects to speakers and microphone
11	Mask hotkey	OFF: Standard mode ON: Disables the KVM extender hotkey function
12	DCE interface	Connects to a serial port
13	DVI connector	Connects to local PC's video output
14	USB Type B connector	Connects to local PC's USB keyboard/ mouse port
15	Audio jacks	Connects to local PC's audio ports
16	SC duplex fiber interface	Connects to multimode fiber
17	Power supply	Supplies power to the unit

2.5.2 Computer Unit

Front Panel

Figure 2-3 shows the DVI-D USB KVM over Fiber Optic Extender Computer Unit's front panel. Table 2-3 describes its components.

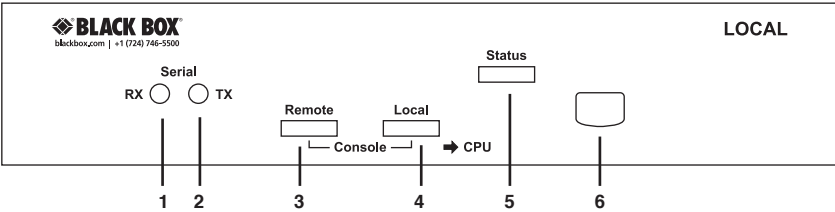


Figure 2-3. Computer unit's front panel.

Table 2-3. Computer unit's front panel components.

Number	Component	Description
1	Serial LED indicator	RX: Data receive
2	Serial LED indicator	TX: Data transmit
3	Remote LED indicator	Control status
4	Local LED indicator	Control status
5	Status LED indicator	Green: Power on Blue: Power on and connected to a remote unit
6	Push button	Select control status

Back Panel

Figure 2-4 shows the extender computer unit’s back panel. Table 2-4 describes its components.

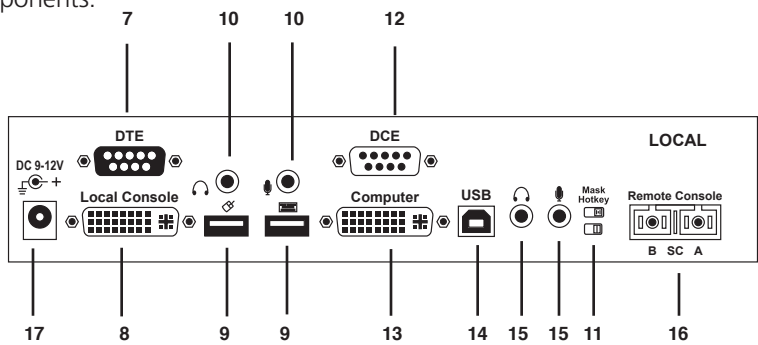


Figure 2-4. Computer unit’s back panel.

Table 2-4. Computer unit’s back panel components.

Number	Component	Description
7	DTE interface	Connects to a serial device
8	DVI connector	Connects to the monitor
9	USB Type A connectors	Connects to the computer’s mouse or keyboard and mouse combo
10	Audio jacks	Connects to speakers and microphone
11	Mask hotkey	OFF: Standard mode ON: Disables the KVM extender hotkey function
12	DCE interface	Connects to a serial port
13	DVI connector	Connects to remote PC’s video output
14	USB-B connector	Connects to remote PC’s USB keyboard/mouse port
15	Audio jack	Connects to remote PC’s audio ports
16	SC duplex fiber interface	Connects to multimode fiber
17	Power supply	Supplies power to the unit

2.6 Typical Application

Figure 2-5 shows a typical application of the extender.

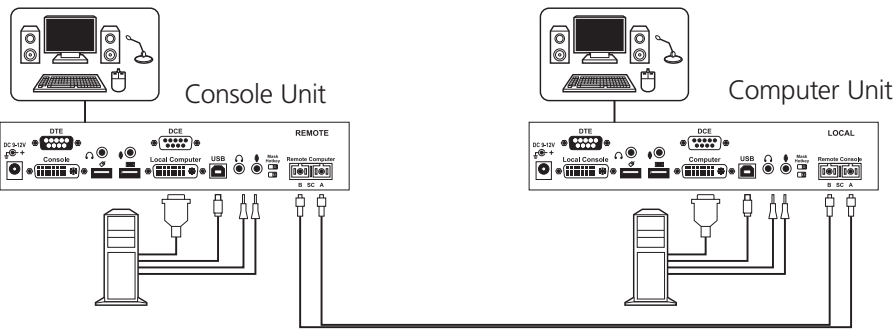


Figure 2-5. Typical application.

3. Installation

3.1 Using Fiber Optic Cable

- 1. Use multimode fiber optic cable (50/125 and 62.5/125) terminated with SC connectors to link the computer unit and the console unit. Table 3-1 lists applicable specifications.

Table 3-1. Fiber optic cable specifications.

Cable Diameter	50/125 μ m		62.5/125 μ m	
Video Signal	1080i	1080p	1080i	1080p
Maximum Cable Length	6400 ft./ 2000 m	3200 ft./ 1000 m	2240 ft./ 700 m	1120 ft./ 350 m

- 2. Use different cable lengths according to the application environment; however, the maximum cable length should be less than 6400 feet (2000 meters). Otherwise, the video resolution signal might degrade.
- 3. Check the cable length to make sure the cable being pulled is long enough for the run to prevent having to splice fiber. Try to complete the installation in one pull. Before installation, assess the route carefully to determine the methods of installation and obstacles likely to be encountered.
- 4. Do not exceed the cable bend radius. Fiber optic cable can be broken when kinked or bent too tightly, especially during pulling.
- 5. Do not twist the cable. Twisting the cable can stress the fibers. Tension on the cable and pulling ropes can cause twisting.
- 6. *CAUTION: Don't look into the ends of any fiber optic cables. Invisible laser radiation might damage your eyes.*
- 7. Connector and splice loss is caused by a number of factors. Loss will be minimized when the number of connections and splices is reduced, the two fiber cores are identical and perfectly aligned, the connectors or splices are properly finished, and no dirt is present.
- 8. Although most fiber optic cables are not conductive, any metallic hardware used in fiber optic cabling systems (such as wall-mounted termination boxes, racks, and patch panels) must be grounded.

9. Conductive cables require proper grounding and bonding for applicable conductors.
10. Carefully inspect all fiber optic components for damage and test it for continuity or loss if you suspect damage.
11. Move small, lightweight spools of fiber optic cable by hand. Move larger reels with appropriate lifting equipment or use two or more installers skilled in the moving operation.
12. Follow the cable manufacturer's recommendations. Fiber optic cable is often custom designed for the installation and the manufacturer may have specific instructions on its installation.

3.2 Before Installation

NOTE: See Figure 2-5 for a sample installation.

1. Make sure that all the devices you will connect are properly grounded.
2. Before installation, make sure that all the devices you will connect to this system are powered off.
3. The KVM Extender is HDCP compliant. Use an HDCP-compliant display when connecting to the HDCP video source.

3.3 Installation Steps

3.3.1 Console Unit

1. Connect the console DVI-I connector to the monitor.
2. Connect the console USB Type A connectors to the keyboard/mouse.
3. Link the speakers/microphone connectors to the console's audio ports.
4. Connect the console unit's computer connectors to the computer's DVI-I monitor, USB Type B keyboard/mouse, and speakers/microphone.

3.3.2 Computer Unit

1. Connect the computer unit's console DVI-I connector to the monitor.
2. Connect the computer unit's console USB Type A connectors to the keyboard/mouse.
3. Link the speakers/microphone connectors to the computer unit's console audio ports.
4. Connect the computer unit's computer connectors to the computer's DVI-I monitor, USB Type B keyboard/mouse, and speakers/microphone.
5. Use a multimode fiber optic cable for the SC-SC fiber port connection between the console and the computer unit. After all device connections are completed, connect the provided power cord into an appropriate power source and plug the opposite end into the power connector on the unit to power up.

4. Operation

4.1 LED Indicators

The LEDs on the KVM extender indicate the latest link, communication, and control status between the Computer Unit and Console Unit.

- 1. Press the push button on Console Unit to select "Local ON" or "Remote ON."
- 2. Press the push button on Computer Unit to select "Local ON," "Remote ON," or "Auto Mode."

Table 4-1. LEDs on the Console Unit.

LED	Status	Control Description
Remote Local	Off On*	Console unit controls its local PC.
Remote Local	On Off	Console unit is remotely taking control of the computer unit. In this mode, there are two possible statuses: 3 LEDs flashing or 3 LEDs not flashing.
3 LEDs (Num, Caps, and Scroll lock)	Flashing	The computer unit is now taking control of the system.

*By default, the LED status is set to Local On when the console unit powers on.

Table 4-2. LEDs on the Computer Unit.

LED	Status	Control Description
Remote Local	Off On	Computer unit controls its local PC or KVM switches. In this mode, the console unit can not take control of the computer unit remotely.
Remote Local	On Off	Console unit remotely takes control of the computer unit.
Remote/ Local	Flash alternately (Auto mode)*	The system is waiting for the console unit or computer unit to take control. The control power is on a first-come, first-served basis.

*By default, the LED status is set to Auto when the computer unit powers on.

4.2 Selecting Computers Using Push Buttons

The Computer Unit and the Console Unit's front panels each have a push button. Push these buttons in sequence to switch between operation modes.

4.2.1 Push Button on the Console Unit

The button on the front panel of the Console Unit can be used to switch modes by following the sequence below:

Local On—>Remote On—>Local On—>Remote On

Local On: The Local LED lights to indicate that the console unit is taking control of its local computer.

Remote On: The Remote LED lights to indicate that the console unit is remotely taking control of the Computer Unit.

4.2.2 Push Button on the Computer Unit

Through pressing the button, three modes will be generated in the sequence as shown below:

Auto—>Local On—>Remote On—>Auto—>Local On—>Remote On

Auto:

1. The Remote and Local LEDs flash alternately.
2. The system is now waiting for the Console or the Computer Unit to take control. The control priority is on a first-come, first-served basis.

For example, once the keyboard or mouse of the Computer Unit is active, the Local LED will light and the Remote LED will go off. This status indicates that the Computer Unit is now taking control on its local computer or KVM switch, and vice versa for the Console Unit. In Auto mode, you can preset the duration of latch time for taking control to 5, 15, 30, or 60 seconds via hotkeys, which enables the Computer or Console Unit to resume control again via any keystroke or mouse activity if the latch time is due and the status returns to the "Auto" mode.

In "Auto" mode whenever the Computer Unit or Console Unit detects any activity from the keyboard, mouse buttons, or mouse's scroll wheel, the Computer Unit or Console Unit immediately takes control of the system.

Local: The Local LED lights when the computer unit is taking control on its local computer or cascaded KVM switch. In this case, the user in Console Unit can identify this status from the flashing of 3 LEDs (Num, Caps, and Scroll Lock) on the keyboard.

Remote: The Remote LED lights when the system is remotely controlled by the Console Unit.

4.3 Selecting Computers Using Keyboard Hotkey Commands

A hotkey command is a short key sequence that selects a computer, activates a computer scan, etc. The KVM extender interprets keystrokes for hotkeys all the time no matter what the connection pattern is.

Standard Mode is defined as the state of the KVM extender without any connection to any KVM switch.

Compatibility Mode is defined as the state of the KVM extender with connection(s) to KVM switch(es).

In **Command for Switch Mode**, users can switch modes between Standard and Compatibility by pressing the hotkey command [left-Ctrl + left-Ctrl + Alt+E]. The unit then generates one beep to confirm Standard Mode or two beeps to confirm Compatibility Mode. *NOTE: For Alt+E, hold the Alt key down and press the E key.*

Leading Code

In Standard Mode, a hotkey command starts with the leading code

[left-Ctrl + left-Ctrl] followed by one or two more keystrokes.

In Compatibility Mode, a hotkey command starts with the leading code

[left-Ctrl + left-Ctrl + E] followed by one or two more keystrokes.

The built-in buzzer generates either a high-pitched beep for a correct hotkey command or one short and one long beep for a bad command. The bad key command won't be sent to the selected computer.

Mask Hotkey Switch

The hotkey commands differ depending on the model. Errors or unpredictable results might occur between the Extender Unit and mixed KVM switch types that connect to each other. A shortcut for cascade hotkey configuration, the Mask Hotkey Switch, allows users to bypass the Extender Unit and directly apply the cascaded KVM switch's built-in hotkey commands on the Extender Unit. This feature will be described in more detail in Section 4.3.1.

Alternate Hotkey Approach

You can press the front-panel push button and one keystroke as an alternate hotkey for a specific hotkey feature set to the user's preference. The KVM extender can not conduct any hotkey controls when its hotkey function is masked (Hotkey Mask Switch "ON"); this alternate approach is especially useful in this state. See Section 4.3.2 for more information.

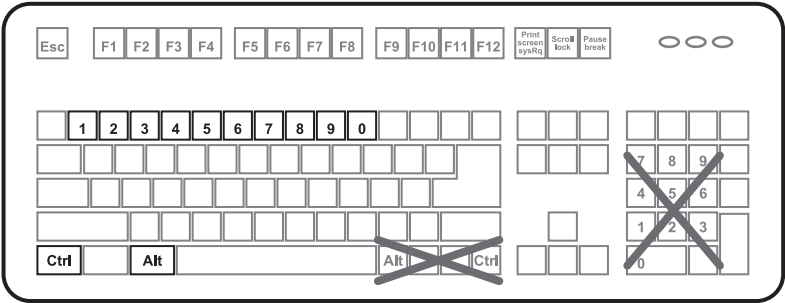


Figure 4-1. Alternate hotkeys activated on keyboard.

4.3.1 Mask Hotkey Switch

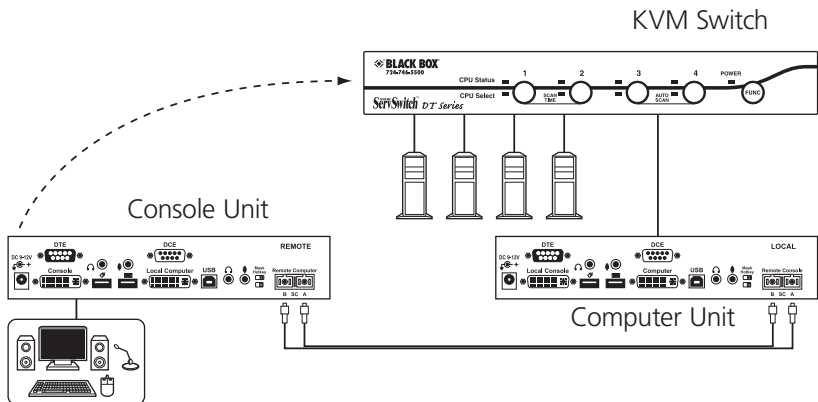
Slide the Mask Hotkey Switch (shortcut for Cascade Hotkey Configuration) located at the rear panel of both Console Unit and Computer Unit ON/OFF to switch hotkey control between the KVM switch cascaded/computer connected accordingly. The factory default is set to “OFF.”

Table 4-3. Mask hotkey switch functions.

Mask Hotkey Switch	In Cascade Architecture	In Non-Cascade Architecture
ON	The Extender Unit masks itself. Users can directly configure the computers attached to the KVM switch by applying the KVM switch’s built-in hotkey commands.	The Extender Unit hotkey function is disabled.
OFF	Users can configure the computer attached to the KVM switch by applying the KVM extender’s built-in hotkey command prefixed with the cascade leading code [left-Ctrl + left-Ctrl + E].	Users can configure the computer attached to the extender unit by applying KVM extender’s built-in hotkey command prefixed with the non-cascade leading code [left-Ctrl + left Ctrl].

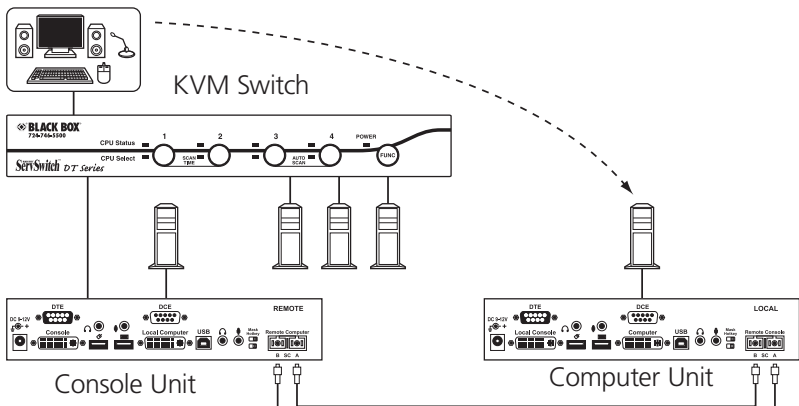
Example of Mask Hotkey set to “ON” in cascade architecture

An IT administrator sitting in front of the Console Unit can preset the Console Unit to remote mode for accessing the KVM Switch that is attached to the Computer Unit, then slide “ON” the Mask Hotkey Switch on the Console Unit. After that, the administrator can directly apply the KVM Switch’s built-in hotkey commands on the Console Unit to configure the computer that’s attached to the KVM switch. See Section 4.3.2 for more information.



LED: Remote On
Mask Hotkey: On

Figure 4-2. Console unit preset to access the KVM switch that’s attached to the Computer Unit.



Mask Hotkey On:
directly control
the computer

Figure 4-3. Apply KVM switch’s hotkey commands on the Console Unit to the attached Computer Unit.

4.3.2 Hotkey Commands

- Before inputting any hotkey commands, enable either of two modes:

Standard Mode: Input the hotkey command [left Ctrl + left Ctrl + Alt + E]. The unit will beep once to confirm.

Compatibility Mode: Input the hotkey command [left Ctrl + left Ctrl + Alt + E]. The unit will beep twice to confirm.

NOTE: Users can switch the modes alternately by repeating this hotkey command.

- Only the Ctrl key located on the lower-left corner of the keyboard is valid for hotkey commands.
- The hotkey command will automatically time-out if the keyboard detects no activity within three seconds after you input the leading code.
- When the mask hotkey switch is set to “ON,” the extender unit masks itself. In this state, users can sit in front of the extender and directly apply the KVM switch built-in hotkey commands to configure the computers attached to the KVM switch as if the users were virtually sitting in front of the KVM switch.

Table 4-4. Console unit hotkey commands and their functions.

Mask Hotkey: OFF		Mask Hotkey: ON		Function Description
Hotkey	Alternate Hotkey	Hotkey	Alternate Hotkey	
[Ctrl]+[Ctrl]+Alt+E	N/A	N/A	N/A	Select cascading status. Two beeps enable Compatibility Mode, and the user at the console unit accesses the KVM switch connected to the computer unit. One beep disables Compatibility Mode and enables Standard Mode.
[Ctrl]+[Ctrl]+Esc	N/A	N/A	N/A	Escape from Hotkey Mode.
[Ctrl]+[Ctrl]+T	N/A	N/A	N/A	Mode selection in sequence. Switch console control between the local computer and the remote computer.

Table 4-4 (Continued). Console unit hotkey commands and their functions.

Mask Hotkey: OFF		Mask Hotkey: ON		Function Description
Hotkey	Alternate Hotkey	Hotkey	Alternate Hotkey	
[Ctrl]+[Ctrl]+F2	N/A	N/A	N/A	Mode selection in sequence. Switch the console control between local computer and remote computer.
[Ctrl]+[Ctrl]+1	N/A	N/A	N/A	Select local mode. Enable the user at the console unit to access the computer on the console unit.
[Ctrl]+[Ctrl]+2	N/A	N/A	N/A	Select remote mode. Enable the user at the console unit to exclusively access the computer unit (valid only if the computer unit is in remote or auto mode). Disable the computer unit user from accessing the computer unit during this mode.
[Ctrl][Ctrl]+Q+L	[BTN]+Q+L	N/A	[BTN]+Q+L	Set video equalizer to level Low: Set video equalizer on the monitor DVI display of the Console Unit the level of Low. Before this setting, please make sure that the Computer/Console Units are well connected by using the proper fiber optic cable and the Console Unit has been set to Remote mode.

Table 4-4 (Continued). Console unit hotkey commands and their functions.

Mask Hotkey: OFF		Mask Hotkey: ON		Function Description
Hotkey	Alternate Hotkey	Hotkey	Alternate Hotkey	
[Ctrl][Ctrl]+Q+A	[BTN]+Q+A	N/A	[BTN]+Q+A	Set video equalizer to level Enhanced. Set video equalizer on the monitor DVI display of the Console Unit to the level of Enhanced. Before this setting, please make sure that the Computer/Console Units are well connected by using the proper fiber optic cable and the Console Unit has been set to Remote mode (the factory default).
[Ctrl][Ctrl]+Q+H	[BTN]+Q+H	N/A	[BTN]+Q+H	Set video equalizer to level High. Set video equalizer on the monitor DVI display of the Console Unit to the level of High. Before this setting, please make sure that the Computer/Console Units are well connected by using the proper fiber optic cable and the Console Unit has been set to Remote mode.

Table 4-4 (Continued). Console unit hotkey commands and their functions.

Mask Hotkey: OFF		Mask Hotkey: ON		Function Description
Hotkey	Alternate Hotkey	Hotkey	Alternate Hotkey	
[Ctrl][Ctrl]+V+4 digits	[BTN]+V+4 digits	N/A	[BTN]+V+4 digits	Prevent the video resolution setting from exceeding the capability of the connected display (require CPU reboot); the following options for video resolution are available for selecting: Input 4 digits with 1007 for resolution of 1024 x 0768; 1210 for resolution of 1280 x 1024; 1612 for resolution of 1600 x 1200; 1912 for resolution of 1920 x 1200; 1914 for resolution of 1920 x 1440; 2011 for resolution of 2048 x 1152
[Ctrl][Ctrl]+V+D	[BTN]+V+D	N/A	[BTN]+V+D	Set the display on both Console and Computer Units to DVI mode that is incapable of carrying any audio signals (factory default setting).
[Ctrl][Ctrl]+V+M	[BTN]+V+M	N/A	[BTN]+V+M	Set the display on both Console and Computer Units to HDMI mode that is capable of carrying high-definition digital audio and video signals.
Follow the KVM switch user's manual (applies only in compatibility mode)				Select KVM switch's CPU port.

By default, the EDID Emulation (Video Synchronization) setting between the Console Unit and Computer Unit will follow the Console Unit setting after reboot.

The following options for video resolution are available for selecting:

Table 4-5. Video resolution options.

4-Digit Code	Resolution	4-Digit Code	Resolution
1007	1024 x 768	1612	1600 x 1200
1208	1280 x 800	1610	1680 x 1050
1210	1280 x 1024	1910	1920 x 1080
1307	1366 x 768	1912	1920 x 1080
1409	1440 x 900	1914	1920 x 1440
1410	1440 x 1050	2011	2048 x 1152
1609	1600 x 900	—	—

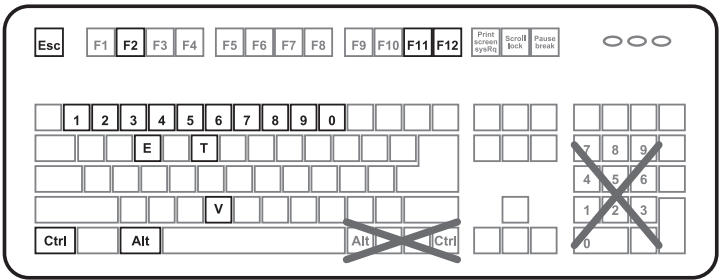


Figure 4-4. Don't use the numeric pad or the right Alt and Ctrl buttons.

Table 4-6. Computer unit hotkey commands and their functions.

Mask Hotkey: OFF		Mask Hotkey: ON		Function Description
Hotkey	Alternate Hotkey	Hotkey	Alternate Hotkey	
[Ctrl]+[Ctrl]+Alt+E	N/A	N/A	N/A	Select cascading status. Two beeps: Enable compatibility mode so users can access the KVM switch that connects to the computer unit. One beep: Disable compatibility mode and enable standard mode.
[Ctrl]+[Ctrl]+Esc	N/A	N/A	N/A	Escape from hotkey mode
[Ctrl]+[Ctrl]+T	N/A	N/A	N/A	Select modes in sequence. Toggle to select Auto, Local On, or Remote On mode.
[Ctrl]+[Ctrl]+1	N/A	N/A	N/A	Select local mode. Enables exclusive access for the user at the computer unit to the PC/KVM switch that connects to the computer unit. Disables the user at the console unit from accessing the connected PC/KVM switch.
[Ctrl]+[Ctrl]+2	N/A	N/A	N/A	Select remote mode. Enables exclusive access for the user at the console unit to the PC/KVM switch that connects to the computer unit. Disables the user at the computer unit from accessing the connected PC/KVM switch.

Table 4-6 (Continued). Computer unit hotkey commands and their functions.

Mask Hotkey: OFF		Mask Hotkey: ON		Function Description
Hotkey	Alternate Hotkey	Hotkey	Alternate Hotkey	
[Ctrl]+[Ctrl]+3	N/A	N/A	N/A	Select Auto mode.
[Ctrl]+[Ctrl]+F3	[BTN] +F3	N/A	[BTN] +F3	Select Latch time. The extender beeps 1 to 4 times to indicate the latch time: 5, 15, 30, or 60 seconds.
[Ctrl]+[Ctrl]+V +C	[BTN]+V +C	N/A	[BTN]+V +C	Copy local monitor EDID.
[Ctrl]+[Ctrl]+V +4 digits	[BTN]+V +4 digits	N/A	[BTN] +V +4 digits	Prevent the video resolution setting from exceeding the capability of the connected display (require CPU reboot); the following options of video resolution are available for selecting: Input 4 digits with 1007 for resolution of 1024 x 0768 ; 1210 for resolution of 1280 x 1024 (see the Table 4-5 on page 26 for the complete option list)
[Ctrl]+[Ctrl]+V +D	[BTN]+V +D	N/A	[BTN]+V +D	DVI display mode setting (factory default): Set the display on both Console and Computer Units to the DVI mode that is incapable of carrying any audio signals.

Table 4-6 (Continued). Computer unit hotkey commands and their functions.

Mask Hotkey: OFF		Mask Hotkey: ON		Function Description
Hotkey	Alternate Hotkey	Hotkey	Alternate Hotkey	
[Ctrl]+[Ctrl]+V +M	[BTN]+V +M	N/A	[BTN]+V +M	HDMI display mode setting: Set the display on both Computer and Console Units to HDMI mode that is capable of carrying high-definition digital audio and video signals.
Follow the KVM switch user’s manual (applies only in Compatibility Mode)				Select KVM switch’s CPU port.

NOTE: Standard Mode is defined as the state of the KVM extender without additional connection to any KVM switch(es).

NOTE: [Ctrl]+[Ctrl] denotes the following:

In Standard Mode, the hotkey sequence [Ctrl]+[Ctrl].

In Compatibility Mode, the hotkey sequence [Ctrl]+[Ctrl]+E

NOTE: [BTN] denotes Press and Hold the front-panel push button for two seconds.

NOTE: After you Press and Hold the push button, the hotkey state will automatically time out if:

1. The keyboard detects no activity within six seconds afer you press and hold the push button for two seconds.
2. You press the [Esc] button once to exit the hotkey state.
3. You press the push button once to escape from the hotkey state and switch to the Auto, Local, or Remote Mode.

NOTE: An alternate for the hotkey command on the Computer Unit to select latch time is described below:

Step 1: Press and hold the Computer Unit’s front-panel push button for two seconds.

Step 2: Press the F3 key once and listen for one, two, three, or four beeps to confirm the latch time setting: 5, 15, 30, or 60 seconds. Repeat Steps 1 and 2 to select the desired latch time.

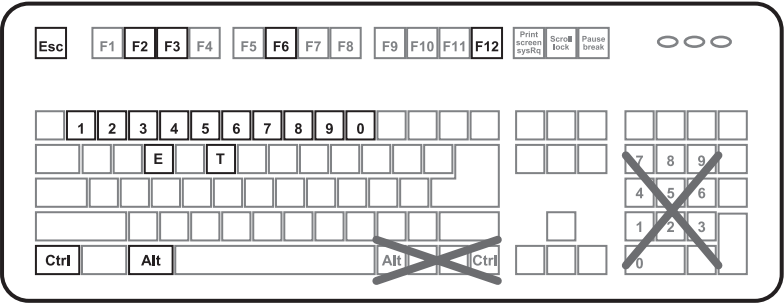


Figure 4-5. Keyboard keys that don't function as hotkeys.

4.3.3 Push Button for Alternate Hotkey Control (Computer Unit Only)

When the mask hotkey switch is set to ON or OFF, you can press and hold the push button on the front panel for two seconds instead of entering the leading code [Ctrl] + [Ctrl] or [Ctrl] + [Ctrl] + E for some specific hotkey control on the Computer Unit as described below and on the next page.

- Latch time selection: Select the duration of the latch time: 5, 15, 30, or 60 seconds.
Press and hold the push button for 2 seconds, then press F3
- DVI mode for monitor display: Set the display(s) on both the Console and Computer Units to DVI mode without audio.

NOTE: Do this step before creating the connection between the extender units and/or the KVM switch(es).

Press and hold the push button for two seconds, then press V + D

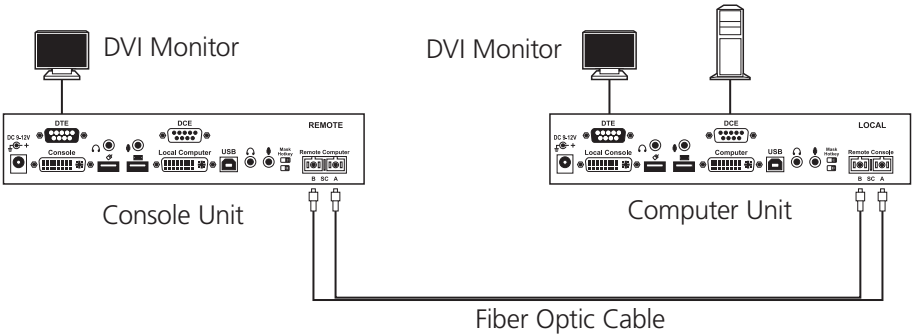


Figure 4-6. DVI mode for monitor display configuration.

Chapter 4: Operation

- HDMI mode for monitor display: Set the display(s) on both Console and Computer Units to HDMI mode to carry high-definition digital audio and video signals.

NOTE: Perform this setting only on the computer unit before creating the connection between the extender units and/or the KVM switch(es).

Press and hold the push button for two seconds, then press V + M

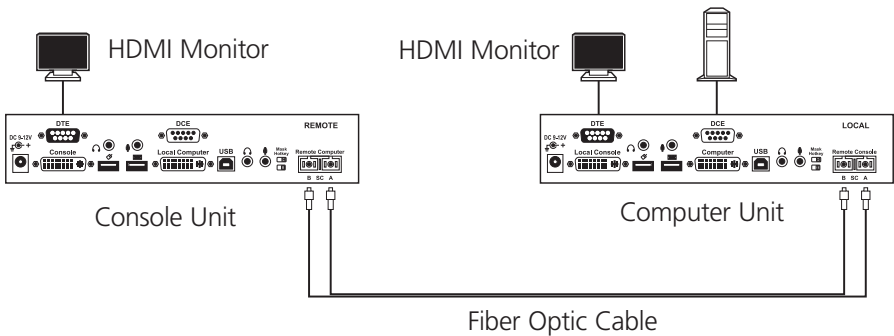


Figure 4-7. HDMI mode for monitor display configuration.

Refer to Section 4.3.2 for further configurations.

NOTE: By factory default, the display mode on Console and Computer Units is set to DVI mode.

- Set video equalizer to Low level: On the Console Unit, set the video equalizer on the monitor DVI display of the Console Unit to Low. Before this setting, make sure that the Computer/Console Units are connected using the proper fiber optic cable and make sure that the Console Unit is set to Remote mode. (The Remote LED flashes GREEN and Local LED remains OFF. Press and hold the push button for two seconds.)

Press and hold the push button for two seconds + Q + L

- Set video equalizer Enhanced level: On the Console Unit, set the video equalizer on the monitor DVI display of the Console Unit to Enhanced. Before this setting, make sure that the Computer /Console Units are connected using the proper fiber optic cable and make sure that the Console Unit is set to Remote mode. (The Remote LED flashes GREEN and Local LED remains OFF. Press and hold the push button for two seconds.)

Press and hold the push button for two seconds + Q + A

- Set the video equalizer to High level: On the Console Unit, set the video equalizer on the monitor DVI display of the Console Unit to High. Before this setting, make sure that the Computer/Console Units are connected using the proper fiber optic cable and make sure that the Console Unit is set to Remote mode. (The Remote LED flashes GREEN and Local LED remains OFF. Press and hold the push button for two seconds.)

Press and hold the push button for two seconds + Q + H

NOTE: By factory default, the video equalizer level is set to Enhanced.

5. Cascade Configuration

You can connect one KVM extender per console port of the KVM switch in a cascade configuration. To prevent any conflict between hotkey commands among the connected units, press the E key after you press Ctrl + Ctrl to access the extender directly. Or, use a shortcut through Hotkey Mask to significantly simplify the cascade hotkey configuration. To manage your system, refer to the NOTES section on the next page.

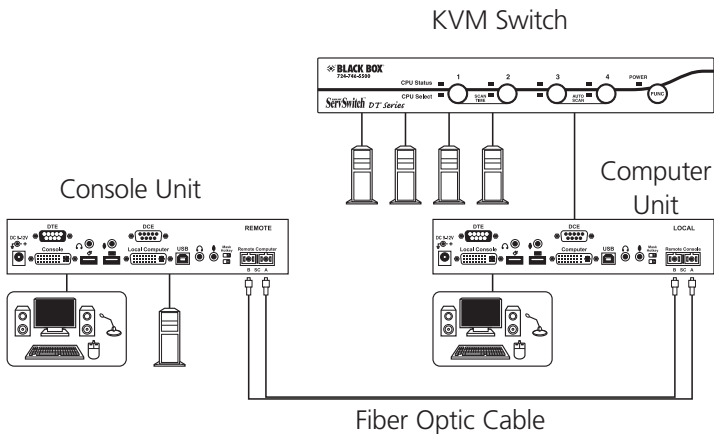


Figure 5-1. Computer Unit and Console Unit cascaded from a KVM switch.

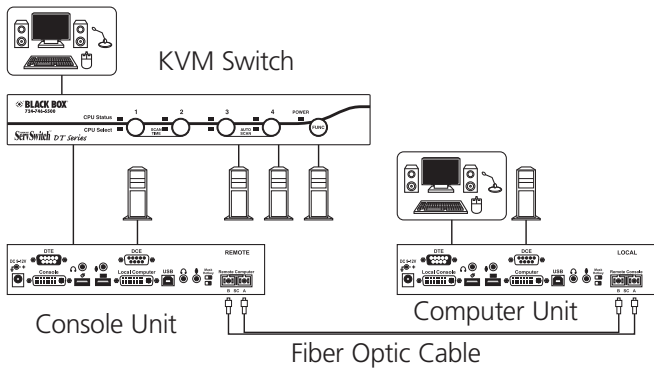


Figure 5-2. Console Unit and Computer Unit cascaded from a KVM switch.

NOTES: Cascade Connection

1. *An external power source is required to supply enough power to the KVM extender's Computer Unit when connecting to the KVM switch. To purchase an optional power adapter, call Black Box Technical Support at 724-746-5500.*
2. *To prevent sending wrong keystrokes for Hotkey control to the KVM extender's Console Unit, set up the latch time and push button control parameters before connecting to the KVM switch.*

Before the Cascade Connection

Before connecting the KVM switch to the Console or Computer Unit, make sure the following statuses have been set up.

1. Determine whether either a DVI or HDMI monitor display will be used, and then, on the Computer Unit, set monitor display to DVI (press and hold Push-Button for two seconds + V + D) or HDMI (press and hold Push-Button for two seconds + V + M) according to the monitor display connected to the Console Unit. (The signal from the Computer Unit is transmitted to the Console Unit in a single direction only, and is displayed on the monitor attached to the Console Unit. You do not need to make this setting on the Console Unit.)
2. Enable Compatibility Mode by inputting the hotkey command [left Ctrl] + [left Ctrl] + [Alt] + E and then two beeps should be generated as the confirmation. In the Compatibility Mode, set the control to (Local or Remote) by inputting the hotkey [left Ctrl] + [left Ctrl] + T . OR

Set the Mask Hotkey Switch ON or OFF according to the cascade correlation algorithm and user preference. (If the KVM Switch is directly connected to Computer Unit, switch ON the Mask Hotkey on both Units. If the KVM Switch is directly connected Console

Connect the KVM Switch to the Console or Computer Unit after the above set up is completed.

Mask Hotkey Switch (Shortcut for Cascade Hotkey Configuration)

You can slide ON/OFF the Mask Hotkey switch located at the rear of both console unit and computer unit to switch hotkey control between the cascaded KVM switch/connected computer accordingly. The factory default is set to "OFF."

Table 5-1. Mask Hotkey Switch settings.

Mask Hotkey Switch	In cascade architecture	In non-cascade architecture
ON	The extender masks itself, as if you are sitting in front of the KVM switch to directly configure the computers attached to the KVM switch by applying the KVM extender's built-in hotkey commands.	The extender unit hotkey function is disabled.
OFF	The extender mask is OFF, so you can configure the computer attached to the KVM switch by applying the KVM extender's built-in hotkey commands prefixed with the cascade leading code: [Left-Ctrl] + [Left-Ctrl] + E	You can configure the computer attached to the extender unit by applying the KVM extender's built-in hotkey command prefixed with the non-cascade leading code: [Left-Ctrl] + [Left-Ctrl]

Example of Mask Hotkey set to ON in Cascade Architecture

An IT administrator is sitting in front of the console unit, and he presets the console unit to remote mode for accessing the KVM switch that is attached to the computer unit.. He slides ON the Mask Hotkey Switch on the console unit. Then he can use the console unit to directly configure the computer unit that is attached to the KVM switch. Refer to the Hotkey Commands section of this manual for more information.

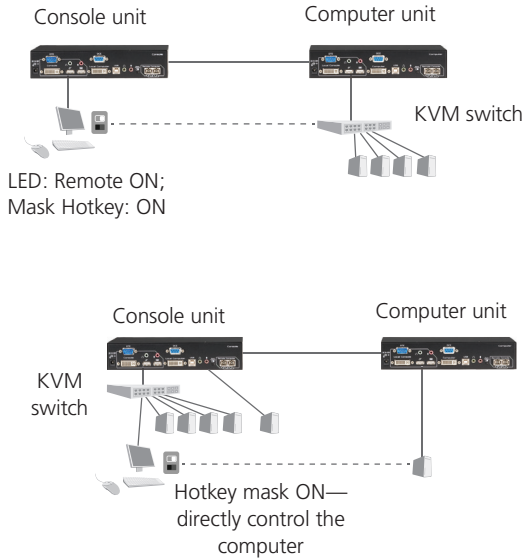


Figure 5-3. Hotkey mask set to ON.

Chapter 6: Video Adjustment

6. Video Adjustment

Make sure that all the system units and devices are connected properly before adjusting the video. To optimize the video performance, users can adjust the video equalization (sharpness) through hotkey commands or push button configurations.

6.1 Video Adjustment Configuration (EQ) (on Console Unit only)

Adjust the video Equalization (sharpness) through hotkey commands or push button configurations by following the instructions listed below:

EQ Adjustment through hotkey:

- Set the video equalization to Normal
 - in Standard Mode: [left Ctrl + left Ctrl + Q + L]
 - in Compatibility Mode: [left Ctrl + left Ctrl + E + Q + L]

OR

- Set the video equalization to Enhanced (Factory Default)
 - in Standard Mode: [left Ctrl + left Ctrl + Q + A]
 - in Compatibility Mode: [left Ctrl + left Ctrl + E + Q + A]

OR

- Set the video equalization to High
 - in Standard Mode: [left Ctrl + left Ctrl + Q + H]
 - in Compatibility Mode: [left Ctrl + left Ctrl + E + Q + H]

EQ Adjustment through push button:

Whether the Mask Hotkey Switch is set to ON or OFF, you can use push buttons and keystroke(s) to:

- Set the video equalization to Normal:
Press & Hold Push Button 2 Sec. + Q + L

OR

- Set the video equalization to Enhanced (Factory Default):
Press & Hold Push Button 2 Sec. + Q + A

OR

- Set the video equalization to High:
Press & Hold Push Button 2 Sec. + Q + H

7. EDID Configuration

Make sure that all the system units and devices are connected properly before configuring EDID. For premium display, users may copy or emulate EDID, and select DVD/HDMI modes through hotkey commands or push button configurations.

7.1 EDID Copy (on Computer Unit only)

Copy local monitor EDID

You might have display problems caused by incorrect Extended Display Identification Data (EDID) communication between the display device and computer graphics card or insufficient EDID data programmed into the display device. The Fiber KVM Extender provides optimal video resolution.

While the computer is booting up, users are required to implement the EDID copy on the Computer Unit. Copy local monitor EDID through push buttons and keystroke(s) by following the instructions listed below:

in Standard Mode: [left Ctrl + left Ctrl + V + C]

in Compatibility Mode: [left Ctrl + left Ctrl + E + V + C]

OR

Press and hold push button for 2 seconds and press V + C

7.2 EDID Resolution Emulation

Emulate built-in EDID

Some display systems don't have EDID and EDID copy functions. The extender has EDID Resolution Emulation to prevent the video resolution setting from exceeding the capability of the connected display. Users can emulate built-in EDID through push buttons or keystroke(s):

in Standard Mode: [left Ctrl + left Ctrl + V + 4 digits]

in Compatibility Mode: [left Ctrl + left Ctrl + E + V + 4 digits]

OR

Press & Hold Push-Button for 2 seconds and press V + 4 digits

Select from the following video resolution options:

Table 7-1. Video resolution options.

4-Digit Code	Resolution	4-Digit Code	Resolution
1007	1024 x 768	1612	1600 x 1200
1208	1280 x 800	1610	1680 x 1050
1210	1280 x 1024	1910	1920 x 1080
1307	1366 x 768	1912	1920 x 1080
1409	1440 x 900	1914	1920 x 1440
1410	1440 x 1050	2011	2048 x 1152
1609	1600 x 900	—	—

7.3 DVI Mode for Monitor Display

Set the display(s) of both Console and Computer Units to DVI mode without audio signals. (Set this before creating the connection between the Extender Units and/or the KVM Switch[es]).

in Standard Mode: [left Ctrl + left Ctrl + V + D]

in Compatibility Mode: [left Ctrl + left Ctrl + E + V + D]

OR

Press and Hold the push button for 2 seconds and press V + D

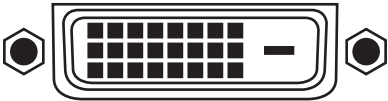


Figure 7-1. DVI connector.

7.4 HDMI Mode for Monitor Display

Set the display(s) on both Console and Computer Units to HDMI mode to carry high-definition digital audio and video signals. (Perform this setting before connecting the Extender Units and/or the KVM Switch(es))

in Standard Mode: [left Ctrl + left Ctrl + V + M]

in Compatibility Mode: [left Ctrl + left Ctrl + E + V + M]

OR

Press and hold push button for 2 seconds + V + M



Figure 7-2. HDMI connector.

NOTE: By factory default, the display mode on Console and Computer Units is set to DVI mode.

NOTE: The HDMI/DVI video adjustment is applicable only if the fiber optic cable is connected and the Console Unit is set to remote mode.

8. Serial Configuration

The KVM Extender has serial ports on both the Console and Computer units. You can connect these serial ports to serial terminal and serial devices for device configurations such as POS, bar-code scanners, card readers, and touch screens. The extender units transmit data without baud rate limits or configuration. The serial terminal baud rate setting must match the connected serial device's serial baud rate, shown in Figure 6-1.

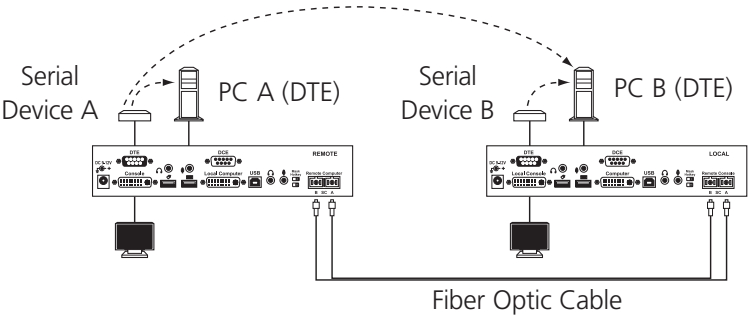


Figure 8-1. Serial configuration.

NOTE: Serial Device A—> PC A (serial terminal). Device A and PC A should have the same baud rate setting.

Table 8-1. LED functions.

	Control Status	Communication	LED Indicator
Console Unit	Local	Device A — PC A	TX: Green RX: Green
Computer Unit	Local	Device B — PC B	TX: Green RX: Green
Console Unit Computer Unit	Remote Remote	Device A — PC B	TX: Green Processing: Flashing Red

Appendix. Cable Requirements/Fiber Optic Cable/Blu-ray

A.1 Cable Requirements

A fiber optic cable terminated with multimode SC connectors is normally used to connect the Computer Unit to the Console Unit. Your package includes a fiber optic cable. However, you might need to order different cable lengths depending on the application environment. (Call Tech Support at 724-746-5500 for details.) The maximum cable length should be less than 6400 feet (2000 meters); otherwise, the video resolution signal might degrade.

A.2 Fiber Optics Cable

The KVM extender requires fiber optic cable that's up to 6400 feet (2000 m) long. Choose our Multimode Duplex SC Terminated Fiber Cable (EFN6025 for 50-micron; EFN4021 for 62.5-micron).

A.3 Blu-ray Ready

The KVM extender supports high-definition video such as DVD or Blu-ray and multichannel audio. The high bandwidth allows for the transmission of large amounts of information at a very high rate of speed.

Blu-ray uses a blue-violet laser to read and write data, while current optical disc technologies such as DVD, DVD±R, DVD±RW, and DVD-RAM rely on a red laser to read and write data. Blu-ray uses a blue-violet laser (405 nm) that has a shorter wavelength than a red laser (650 nm), which makes it possible to focus the laser spot with even greater precision. Data can be packed more tightly and stored in less space, so you can fit more data on the disc even though it's the same size as a CD/DVD.

A.4 HDCP Compatibility

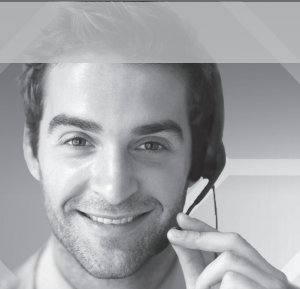
High-Bandwidth Digital Content Protection (HDCP) protects video content as it is transmitted across DVI-D or HDMI connections. HDCP compliant devices do not allow users to make copies of protected content and do not allow non-HDCP devices to view protected content.

When a new display device is added to the extender unit, the unit will stop transmitting protected content until the new display device is validated by the source device. The duration of this process may last up to 15 seconds. The display will continue automatically upon successful authentication.

The KVM Extender serves as a repeater between compliant HDCP source and display devices. When all display devices and the source device are HDCP compliant, high definition content will display normally.

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