SXPS Manual

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1

WELCOME

ABOUT THIS MANUAL

This manual contains information about the SXPS digital video matrix switcher and video processor. Material is presented under the following sections:

Section	Chapters	Description
Introduction	Chapter 1, “Welcome.” Chapter 2, “Product Information.”	Use this section to get to know this product manual, understand key safety measures, and learn about the key features and functionality of the SXPS
Configuration	Chapter 3, “Configuration Options.”	Use this section to understand your product configuration options before you purchase, as well as learn about the video signal handling and remote control capabilities. The SXPS is a highly-configurable device and this section details the available product options for video input and output, and for CPU board and USB ports
Installation	Chapter 4, “Getting Ready to Install.” Chapter 5, “Installation Instructions.”	Use this section to learn about installing the SXPS. Included in this section are both an overview of the installation process, and detailed, step-by-step installation instructions.
Operation	Chapter 6, “About the Web-Server GUI.” Chapter 7, “Matrix Switching.” Chapter 8, “Video Scaling.” Chapter 9, “Video Windowing.” Chapter 10, “Wall Processing.”	Use this section to learn about the digital video processing capabilities of the SXPS. Get an introduction to the web-server GUI and detailed instructions on how to use the matrix switching, video scaling, video windowing, and wall processing features.
Reference	Appendix A, “RS-232 and 10/100T Protocol.” Appendix B, “Upgrading Firmware.”	Use this section to refer to detailed remote control command set information, RS-232 pinout information, and firmware upgrade information and instructions.

SAFETY INFORMATION AND INSTRUCTIONS

The following safety instructions are to ensure the safety of personnel using this equipment and to protect this device and working environment from potential damage.

CAUTION!

1. **ELECTRIC SHOCK HAZARD. DO NOT OPEN.**
2. **REMOVAL OF COVER MAY RESULT IN ELECTRIC SHOCK. There are no user-serviceable parts inside. Contact Black Diamond Video for authorized repair service.**

IMPORTANT SAFETY INFORMATION:

- Read and follow all instructions – Read all safety and operating instructions before operating this equipment. Follow all operating instructions in this manual and adhere to all warnings on this equipment and in this manual.
- Keep all documentation – Retain the User's Manual and accompanying safety instructions for future reference.
- Maintain proper ventilation – This equipment should be maintained in a well-ventilated room with adequate air flow. Do not obstruct the ventilation slots on the device.
- Keep away from heat – Do not place this device near a heat source. Failure to comply could result in overheating and damage to the equipment.
- Keep away from water and moisture – Do not place this equipment near areas of running water or dense condensation.
- Cleaning – Unplug the device before cleaning. The device can then be wiped with a water-dampened soft cloth.
- Proper electrical grounding – This device must be plugged into a properly grounded outlet in order to avoid electric shock. Do not bypass the grounding features of the power cable or plug. When using an extension cord, make sure the cord is designed for grounded plugs.

CUSTOMER SERVICE AND SUPPORT

For technical support and service, contact Black Diamond Video at:

Black Diamond Video

1000 Atlantic Avenue, Suite 114

Alameda, California, 94501

Phone: (510) 769-2959

Fax: (510) 769-2949

Visit us on the web at www.blackdiamondvideo.com.

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PRODUCT INFORMATION

INTRODUCING THE SXPS

The SXPS is an all-digital DVI processor that integrates seamless DVI matrix switching, post-output scaling, and video windowing into a single unit. The SXPS provides seamless single and dual-link DVI matrix switching in flexible I/O configurations, including 16x4, 16x8, 12x4, 12x8, 12x12, 8x12, 4x12, 8x16, and 4x16. When combined with Black Diamond Video's DVI converters, the SXPS provides the same level of switching, scaling, and windowing for any analog, SDI, or HD-SDI signal source, eliminating the need for multi-format switches and cables.

The SXPS supports DVI operation at the maximum TMDS rate of 1.65 Gb/s. The SXPS works seamlessly with Black Diamond Video's DVI X-treme Cable Kits, allowing the transmission of DVI signals over 60 meters of copper on both the input and output sides of the processor.

The SXPS system diagram (*Figure 1*) illustrates the full functionality of this DVI processor when combined with Black Diamond Video's DVI Converters and DVI X-treme Cable Kits.

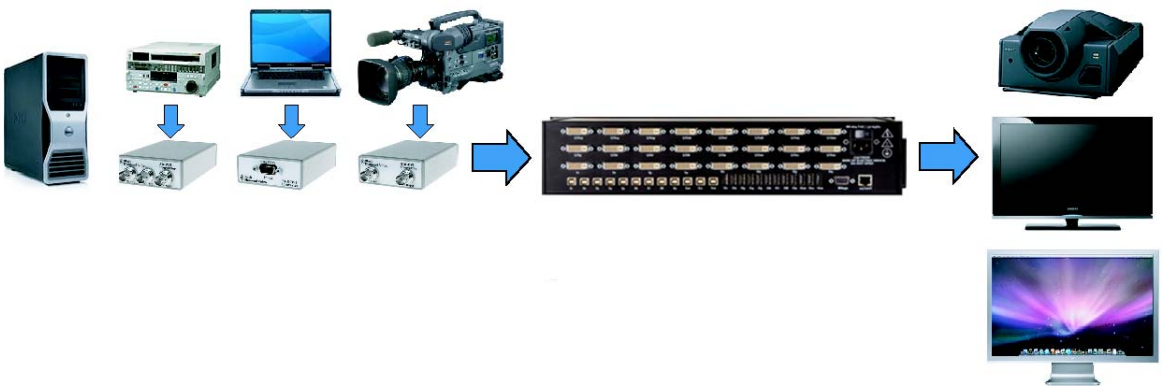

FIGURE 1. SXPS System Diagram

KEY FEATURES

Features include the following:

SWITCHING

- Seamless, non-blocking single/dual-link DVI matrix switching in 16x4, 16x8, 12x4, 12x8, 12x12, 8x12, 4x12, 8x16, and 4x16 configurations.
- Supports dual-link DVI matrix switching at the maximum TMDS rate of 2 x 1.65 Gb/s.
- Supports single-link DVI matrix switching at the maximum TMDS rate of 1.65 Gb/s
- Input and output rates from 640 x 480 up to 3840 x 2400, interlaced or progressive

IMAGE PROCESSING - VIDEO SCALING

- Each output can be populated with one Quad Dual Link Scalar (QDLS) video processing card for up to four cards.
- Auto-resolution display so that any video input will be displayed at its maximum resolution and proper aspect ratio on any video monitor
- Image controls include pan, zoom, position, contrast, brightness, and programmable LUTS
- Frame latency < 1.5 frames
- Built-in test pattern generator

IMAGE PROCESSING - WINDOWING

- Each QDLS video processing card can be equipped with video windowing functionality.
- Windows can be arbitrarily sized, positioned, and prioritized smoothly, in real time.
- Transitional effects supported: alpha blending, wipe, and chroma keying
- Chroma keying supported across multiple windows
- QDLS windowing cards can be cascaded for a maximum of 16 windows.

PHANTOM-POWER AND CONVERTER CONTROLS

- Phantom-power to Black Diamond Video's DVI X-treme Cable Kits
- Phantom-power and control for Black Diamond Video's DVI Converters

CONTROLS

- RS-232 serial
- 10/100T Ethernet

GENERAL

- 2U high, rack mountable
- Remote diagnostic capability

FRONT PANEL DETAIL

Figure 2 details the SXPS front panel.

FIGURE 2. SXPS Front Panel

REAR PANEL DETAIL

Figure 3 details a fully-equipped SXPS.

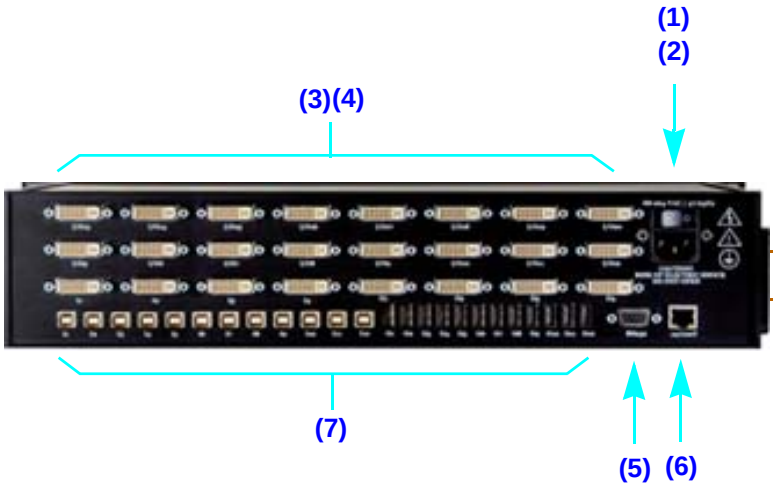

FIGURE 3. SXPS Rear Panel Diagram

1 - POWER SWITCH ON/OFF

The power switch is used to turn the unit on or off.

2 - AC POWER IN

AC input power connection (120/240 VAC).

3 - DVI-I INPUT CONNECTIONS

The DVI-I input connectors are used to connect a video source to the SXPS. If the input source is a DVI source, it can be connected directly to the device. If the input source is an analog or SDI source, the signal must first be converted to DVI using a Black Diamond Video DVI converter before connecting it to the SXPS.

Both Single-Link and Dual-Link DVI are supported on all input connectors.

For cable distances greater than seven meters, Black Diamond Video certified DVI cable should be used. Black Diamond Video certified DVI cable is factory tested and guaranteed

for distances up to 60 meters. A DVI X-treme conditioner is not required on the input side of the SXPS.

4 - DVI-I OUTPUT CONNECTIONS

The DVI-I output connectors are digital DVI outputs used to connect to a digital display device. Both Single-Link and Dual-Link DVI are supported on all output connectors.

When connecting to a display device more than seven meters from the SXPS, a DVI X-treme Cable Kit should be used, with the DVI X-treme conditioner placed on the display side of the cable.

5 - RS-232 SERIAL INTERFACE

The RS-232 interface is a DCE type used to control the SXPS by an external host over a serial-com port or alternate RS-232 controller. A direct connect type RS-232 cable must be used.

6 - 10/100T ETHERNET PORT

The 10/100T Ethernet port is used for controlling the SXPS from a remote location. This port is also used for firmware upgrades in the field. The 10/100T Ethernet port can control the SXPS through commands similar to the RS-232 port.

7 - USB MATRIX SLOT

The USB matrix slot houses a board of 24 USB connectors: 12 type B (input) connectors and 12 type A (output) connectors.

OPTIONS

The following external options are available for the SXPS:

- **DVI X-treme Cable and Cable Kits** are phantom-powered and allow DVI signals to be transmitted up to 60 meters on both the input and output sides of the switch for a cumulative distance of 120 meters. Output cable kits are available in both single-link and dual-link DVI format. These kits contain output cable and a DVI signal conditioner and are used when the distance between the SXPS and the display device exceeds seven meters. The dual-link DVI signal conditioner can accept both single-link and dual-link DVI signals. The single-link DVI signal conditioner can only accept single-link DVI.
- **SD-DVI Converter** converts any standard-definition analog signal (NTSC, PAL, SECAM) to DVI. This converter is phantom-powered and is controlled and integrates seamlessly with the SXPS.

- **RGB-DVI Converter** converts any analog RGB signal to DVI. This converter is phantom-powered and is controlled and integrates seamlessly with the SXPS.
- **SDI-DVI Converter** converts any SDI or HD-SDI source to DVI. This converter is phantom-powered and is controlled and integrates seamlessly with the SXPS.

NOTE: For information about configuration options for the SXPS, see Chapter 3, "Configuration Options."

PRODUCT SPECIFICATIONS

VIDEO SPECIFICATIONS

- Video Formats:

  DVI Single-link, supports maximum TMDS rate of 1.65 Gb/s

  DVI Dual-link, supports maximum TMDS rate of 2 x 1.65 Gb/s

- Video Resolution:

  Single-link DVI I/O rates 640x480 to 1920x1200, interlaced or progressive, 25-165 MHz

  Dual-link DVI, 165 - 333 MHz, I/O rates including: 3840 x 2400 33 Hz; 2560 x 1600 60 Hz; 2048 x 2160 60 Hz; 2048 x 1536 75 Hz; 2048 x 1080 120 Hz; 1920 x 1080 85 Hz.

- Connectors: DVI-I female

CONTROLS

- Serial Controls: RS-232 controls, DB9 female connector
- Ethernet Controls: 10/100T Ethernet control, Protocols: Telnet, FTP

GENERAL

- Dimensions/Weight: 2U, 19" rack-mountable enclosure, 16.73"W x 12"D x 3.5"H, 12 pounds
- Temperature Rating: 0-55° C
- Power: 90-240 VAC, 47-63Hz, 200 Watts

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CONFIGURATION OPTIONS

This chapter details the configuration options for the SXPS. The SXPS can be configured for the following elements:

Video Input	• 4-16 input channels
Video Output	• 4-16 output channels
	• Video scaler output cards
	• Video windowing output option
USB	• 12 Type B input channels
	• 12 Type A output channels

Figure 4 shows the back panel board and connector layout of the SXPS.

FIGURE 4. SXPS Back Panel Board and Connector Layout

VIDEO OPTIONS

The SXPS' input and output cards contain four connectors each, so your SXPS can have any combination of inputs and outputs where each channel type is a multiple of four, for up to four input boards or four output boards. For example, your SXPS can be configured with three input and three output cards for 12 x 12 channels, as shown in *Figure 4*.

Input and output cards are capable of supporting either single-link or dual-link DVI signals.

DUAL-LINK AND SINGLE-LINK

All input and output slots support single-link and dual-link DVI. This means that the SXPS supports the full 12 x 12 matrix for single-link and dual-link DVI channels.

USING DVI CONVERTERS

The SXPS accepts DVI video inputs only. Black Diamond Video offers a line of single-link DVI converters which you can use to convert your RGB, HD, and SDI video signals to single-link DVI. With the appropriate DVI converter, you can use any of these video formats as a source for the SXPS.

VIDEO INPUT OPTIONS

The SXPS has one video input board, and can be configured with up to three additional video input boards for a total of four possible. By design, the video input board can accept either dual-link or single-link DVI.

VIDEO OUTPUT OPTIONS

The SXPS has one video output board, and can be configured with up to three additional video output boards for a total of four possible. Each board has four output channels. By design, the video output board can accept either dual-link or single-link DVI.

Currently, there are three video output board options. All three options come with four output channels. New options are under development; contact Black Diamond Video for more information.

Video Output Board	Description
Repeater	Standard DVI output (no processing). Used for standard switching operation only where the output exactly matches the input signal. For more information on the operation of the repeater card, see Chapter 7, “Matrix Switching.”
Quad Dual Link Scalar (QDLS)	Video scalar dual-link DVI output. Used for scaling the input image up or down, and also offers pan and zoom functionality. For more information on the operation of the QDLS card, see Chapter 8, “Video Scaling.”
Windowing	Video windowing. For more information on video windowing, see Appendix A, “RS-232 and 10/100T Protocol.”

USB OPTIONS

The USB matrix slot houses a board of 24 USB connectors: 12 type B (input) connectors and 12 type A (output) connectors (*Figure 5*).

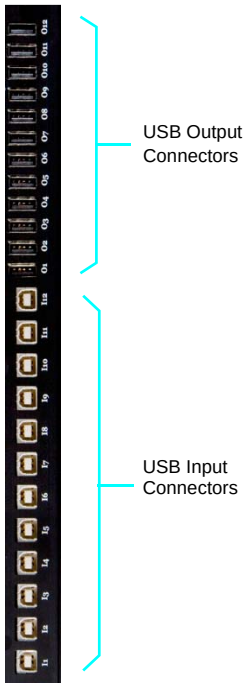


FIGURE 5. SXPS USB Board

The supported USB configurations are: **12x12.**

4

GETTING READY TO INSTALL

This chapter presents on overview of the installation process. Read this chapter to get an introduction to how to install the SXPS. Included is information about using DVI converters (required if you have video sources that are not in DVI format) and Black Diamond cable kits.

For detailed installation instructions see Chapter 5, “Installation Instructions.”

OVERVIEW OF THE INSTALLATION PROCESS

Installing the SXPS can be divided into two phases:

System Test Installation. Begin your installation process by performing a complete system test installation. The purpose of this phase is to establish remote control of the SXPS, and verify that all input and output channels are working. You will use a single test-video input and at least one of the display devices you plan to use in your final system installation. You will verify that your test-video input is properly displayed on the display device when routed through each input and output channel.

Final System Installation. Complete the installation process by doing the final system installation. In this phase, you will install the SXPS in its final location. You will establish permanent remote control, connect all necessary input and output cabling, apply all input sources (including any DVI converters as necessary), and connect all display devices. Finally, you will verify that each video source is properly displayed on each display device.

SYSTEM TEST INSTALLATION OVERVIEW

The system test installation should be performed first to verify your equipment is working properly. It will also help you begin to plan for and organize the video sources, cabling equipment, and display devices in preparation for the final system installation.

NOTE: This is an overview of the system test installation to help inform and prepare you for the actual installation process. For detailed installation instructions, see Chapter 5, “Installation Instructions.”

The system test installation consists of four steps. These steps are described below and illustrated in *Figure 6*.

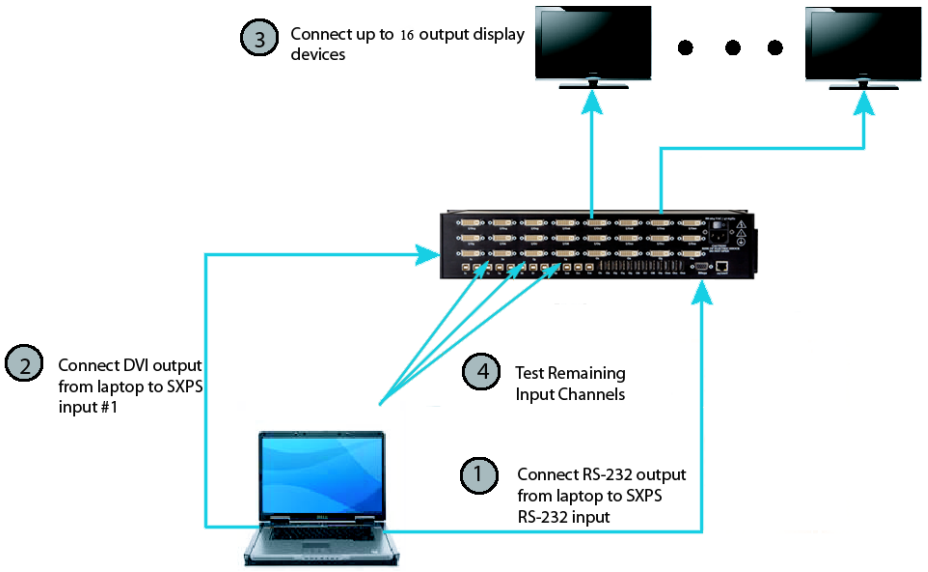


FIGURE 6. SXPS System Test Installation Diagram

Step 1. Establish Temporary Remote Control of the SXPS

Establish temporary remote control of the SXPS through a laptop computer or personal computer using the RS-232 serial interface. This allows control of the SXPS so that the video signals going into and out of the processor can be tested.

Step 2. Connect a Test DVI Input Source

Connect a test DVI video source to Input 1 on the SXPS. Only a single DVI source is required for the system test installation phase. Use Black Diamond Video tested DVI cable to connect your DVI source to the SXPS.

NOTE: If the computer you used in Step 1 has a DVI output, you can use it for the test DVI video source in this step. This computer should have a built-in DVI graphics card.

Step 3. Connect one or more Display Devices and Establish Video Output

Connect a display device to Output 1 on the SXPS. Connect additional display devices as desired. Using the test DVI input connected in *Step 2*, use serial commands to switch the input to each connected display device. Verify that all video displays or output devices (such as DVD recorders, etc) are functioning correctly.

Step 4. Test all Remaining Input Channels

Verify that all remaining input channels are functioning properly. Using the test DVI video source, connect it to each input channel on your SXPS and then route the signal to each connected display device.

FINAL SYSTEM INSTALLATION OVERVIEW

The final system installation should be performed after you have completed the system test installation. You should have all of your video sources, cabling equipment, and display devices assembled in preparation for the final system installation.

NOTE: This is an overview of the final system installation to help inform and prepare you for the actual installation process. For detailed installation instructions, see Chapter 5, “Installation Instructions.”

The final system installation consists of four steps. These steps are described below.

Step 1. Place the SXPS into the Rackmount or Other Permanent Location

The SXPS can be installed in a 2U rackmount. Place your unit in its permanent location before making any other system connections. Be sure to follow the safety warnings regarding proper ventilation of the equipment.

Step 2. Connect all Video Inputs

Connect all DVI sources directly to the SXPS input channels. All non-DVI sources must first be converted to DVI using a Black Diamond Video DVI Converter. See “Using DVI Converters” on page 16 for more information.

All cabling from the DVI Converters to the SXPS should be done using Black Diamond Video tested DVI cable. Black Diamond Video can not guarantee the quality of cable purchased from other manufacturers. See “Using Black Diamond Cable and Cable Kits” on page 16 for more information.

Step 3. Connect all Display and Output Devices

Connect all display and output devices to the SXPS output channels. All cabling from the SXPS to the display devices should be done using Black Diamond Video tested DVI cable. Black Diamond Video can not guarantee the quality of cable purchased from other

manufacturers. See “Using Black Diamond Cable and Cable Kits” on page 16 for more information.

Step 4. Establish Permanent Remote Control

Establish permanent remote control to the SXPS using RS-232 or 10/100T Ethernet control.

Step 5. Test all Input/Output Switching Configurations

Route each input to each output in turn and verify the video displays properly on the display device. If video output option boards are installed, test the video processing functions of these boards.

USING DVI CONVERTERS

The SXPS accepts DVI video inputs only. Black Diamond Video offers a line of DVI converters which you can use to convert your RGB, HD, and SDI video signals to DVI. With the appropriate DVI converter, you can use any of these video formats as an input source.

The converter should be located as close to the video source as possible to eliminate cabling problems such as attenuation and noise. See “Options” on page 7 for more information about the available DVI converters.

USING BLACK DIAMOND CABLE AND CABLE KITS

When using Black Diamond Video cable kits, signal conditioners should be applied within the last three meters of cabling before each display device. Black Diamond Video offers both single-link DVI and a dual-link DVI cable kits which include Black Diamond Video tested DVI cable and a signal conditioner. See “Options” on page 7 for more information about cable and cable kit options.

5

INSTALLATION INSTRUCTIONS

This chapter tells you how to install your SXPS system. You should read Chapter 4 “Getting Ready to Install” first to familiarize yourself with the installation process.

The installation of your SXPS should be conducted in two phases:

System Test Installation. Begin your installation process by performing a complete system test installation. The purpose of this phase is to establish remote control of the SXPS, and verify that all inputs and outputs are working. You will use a single test-video input and one of the display devices you plan to use in your final system installation. You will verify that your test-video input is properly displayed on the display device when routed through each of the input and output channels.

Final System Installation. Complete the installation process by doing the final system installation. In this phase, you will install the SXPS in its final location. You will connect all necessary input and output cabling, apply all input sources (including any DVI converters as necessary), connect all display devices, and establish permanent remote control.

SYSTEM TEST INSTALLATION

Complete a thorough test of your SXPS equipment before doing the final system installation. The system test installation consists of the following series of steps:

Step 1: AC Power Connection and System Power Up

WHAT YOU WILL NEED FOR THIS STEP

- Power cord (supplied)
- Surge protector (recommended)
- Line conditioner (recommended)

DESCRIPTION

Begin your system test installation by connecting the SXPS to an AC power supply and powering it up.

1. **Connect the power cord (supplied) to the AC input on the SXPS.**
2. **Plug the power cord into a surge protector (recommended).**
3. **Plug the surge protector into a conditioned AC power source.**

4 **Turn on the SXPS using the power switch on the rear panel.**

Step 2: Establish Test Remote Control

WHAT YOU WILL NEED FOR THIS STEP

- Laptop or personal computer with a serial port
- RS-232 direct-connect type serial cable with DB9 (male) connector

DESCRIPTION

The SXPS can be controlled over either an RS-232 or 10/100T Ethernet connection. For initial testing of this equipment, Black Diamond Video recommends temporary control of the SXPS with a laptop computer using the RS-232 terminal. Using the RS-232 interface and commands allows for the easy set-up and rapid ability to debug any installation problems.

1 **Connect a laptop or PC to the SXPS RS-232 serial interface using a direct-connect type cable.**

2 **Open up a serial port terminal on the laptop or PC connected to the SXPS. For Microsoft Windows-based programs access this with Start > All Programs > Accessories > Communications > Hyperterminal.**

The New Connection window appears.

3 **Enter a name for your connection and choose an icon.**

4 **Click OK.**

The Connect To window appears.

5 **In the Connect using field, select “COM1” port.**

6 **Click OK.**

The Port Settings window appears.

7 **Configure the settings as follows:**

- Baud: 9600
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

8 **Click Apply.**

The RS-232 connection to the SXPS is established and the processor can be controlled using the RS-232 command set found in Appendix A, “RS-232 and 10/100T Protocol.”

Step 3: Connect and Test a DVI Input on all Output Channels

WHAT YOU WILL NEED FOR THIS STEP

- DVI video input source. Black Diamond Video recommends that, for this DVI input source, you use the same laptop or personal computer that is being used to temporarily control the SXPS.
- Display device capable of displaying a DVI video input signal.
- DVI cable.
- (Optional) DVI signal conditioners. If the distance to the display requires more than seven meters of DVI cable, a Black Diamond Video DVI X-treme Cable Kit should be used with the DVI X-treme II Conditioner and appropriate length of cable provided in the cable kit.
- RS-232 Commands: SWITCH

SW	<input>	<output>

DESCRIPTION

For the system test installation, apply a single DVI test-video input signal and connect at least one of the display devices you plan to use in your final system installation. Verify that your test-video input is properly displayed on the display device when routed through each input and output channel. The easiest method to ensure transmission is to connect a reliable DVI video source directly to the SXPS input.

1 **Connect a DVI source to Input 1 of the SXPS.**

This should be done using Black Diamond Video tested DVI cable. Black Diamond Video recommends that you use the same laptop that is being used to temporarily control the SXPS simultaneously as the DVI source.

2 **Make certain that the display being tested has been set to display a DVI digital signal.**

3 **Connect Output 1 of the SXPS to the display using Black Diamond Video tested DVI cable.**

NOTE: If the distance to the display requires more than seven meters of DVI cable, a Black Diamond Video DVI X-treme Cable Kit should be used with the DVI X-treme II Conditioner.

If a DVI X-treme Cable Kit is needed, do the following:

a Connect the long length of cable from Output 1 of the SXPS to the input of the DVI X-treme II Conditioner.

b Connect the output of the DVI Xtreme II Conditioner using the short length of DVI cable to the display. The red indicator light on the DVI X-treme II Conditioner indicates a good DVI signal is being transmitted to the display.

4 **Within the serial port terminal, type in the command: `sw 1 1`.**

Input 1 is switched to display to Output 1. Video should now be displayed on your test output device.

5 **Move the output cable from Output 1 to Output 2 so that Output 2 is now connected to the display device.**

6 **Within the serial port terminal type in the command: `sw 1 2`.**

Input 1 is switched to display to Output 2. Video should again appear on the test output device.

7 **Repeat steps *Step 5* and *Step 6*, moving the output cable to each of the remaining output channels in turn. Use the `SWITCH` command to route the video through the connected channel. Verify the video displays properly through each output channel.**

8 **Move the input cable from Input 1 to Input 2 so that Input 2 is now connected to the DVI test signal.**

9 **Within the serial port terminal, type in the command: `sw 1 [output #]`, where `[output #]` is the output channel which is currently connected to your test display device.**

10 **Repeat *Step 8* and *Step 9*, moving the input cable to each of the remaining input channels in turn. Use the `SWITCH` command to route the video from the connected channel. Verify the video displays properly coming from each input channel.**

This completes the system test installation.

FINAL SYSTEM INSTALLATION

Once you have completed a thorough test of your SXPS equipment you are ready to do the final system installation. The final system installation consists of the following series of steps:

Step 1: AC Power Connection

WHAT YOU WILL NEED FOR THIS STEP

- Power cord (supplied)
- Surge protector (recommended)
- Line conditioner (recommended)

DESCRIPTION

Begin your final system installation by connecting the SXPS to an AC power supply and powering it up.

1. **Connect the power cord (supplied) to the AC input on the SXPS.**
2. **Plug the power cord into a surge protector (recommended).**
3. **Plug the surge protector into a conditioned AC power source.**
4. **Turn on the SXPS using the power switch on the rear panel.**

Step 2: Connect All DVI Inputs

WHAT YOU WILL NEED FOR THIS STEP

- All DVI video input sources you want to display through the SXPS
- All non-DVI video sources you want to display through the SXPS
- DVI converters for the non-DVI video sources
- DVI cable

DESCRIPTION

Connect all DVI sources directly to the SXPS input channels. All non-DVI sources must first be converted to a DVI signal before they connecting them to the SXPS. See Figure 7, “System Installation Overview Diagram,” on page 22 for an illustration of a typical SXPS system diagram.

1. **Connect any dual-link DVI signals to input connectors on any slot.**
2. **Connect any single-link DVI signals to input connectors on any slot.**

   All input channels can accept single-link DVI inputs.
3. **Apply DVI converters to any non-DVI signals and connect to input connectors on any SXPS slot.**

Step 3: Connect SXPS Outputs to All Displays

WHAT YOU WILL NEED FOR THIS STEP

- All DVI-capable display devices you want to use in your installation
- DVI cable
- (Optional) DVI signal conditioners. If the distance to the display requires more than seven meters of DVI cable, a Black Diamond Video DVI X-treme Cable Kit should be used with the DVI X-treme II Conditioner and appropriate length of cable provided in the cable kit.

DESCRIPTION

Connect all DVI-capable displays to the SXPS output channels. See Figure 7, “System Installation Overview Diagram,” on page 22 for an illustration of a typical SXPS system diagram.

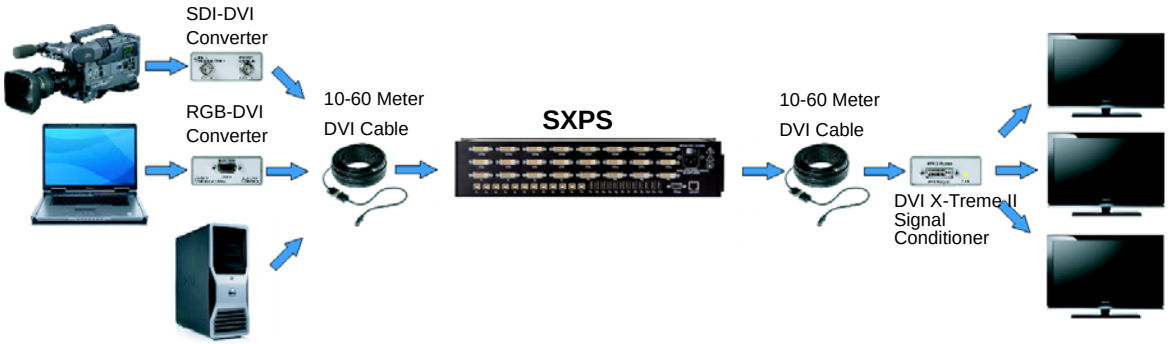


FIGURE 7. System Installation Overview Diagram

1. **Connect DVI cable to Output 1 of the SXPS.**
2. **Connect the other end of the DVI cable as follows:**
   a. If the cable is more than seven meters in length, connect it to the input of the DVI X-treme II Conditioner. Connect a second DVI cable, no more than seven meters in length, to the DVI display device.
   b. If the cable is less than seven meters in length, connect it directly to the DVI display device.
3. **Repeat Steps *Step 1* and *Step 2* for all other output channels to be used in your installation.**

Step 4: Establish Permanent Remote Control

WHAT YOU WILL NEED FOR THIS STEP

- Laptop or personal computer
- For RS-232 control: RS-232 direct-connect type serial cable with DB9 (male) connector

- For Ethernet control: Ethernet cable. If you are connecting your control computer *directly* to the SXPS, then you will need a crossover cable.
- RS-232 and Telnet Commands:

SHOWNET		
ipaddr	<ipaddr>	
telnet	<ipaddr>	8998

DESCRIPTION

When all video sources going into the SXPS and all video outputs going to the displays or recording devices have been shown to function correctly, permanent control of the SXPS can be established using the RS-232 serial interface or the 10/100T Ethernet controls. Black Diamond Video recommends that you read this section carefully before establishing permanent controls.

IMPORTANT!	When connecting a control computer to the RS-232 connector on the SXPS, you must use a **direct-connect type cable**. When connecting a control computer directly to the Ethernet connector you must use a **crossover cable**. Both the control computer and the SXPS must then use a static IP address.

Details of the serial control commands and telnet protocols are in Appendix A, “RS-232 and 10/100T Protocol.”

Whether the SXPS is controlled through an RS-232 terminal, a 10/100T Ethernet port using telnet commands, or the web-server GUI, control begins with the RS-232 terminal. The RS-232 terminal is used to check and assign an IP address for the SXPS.

Control of the SXPS can be accomplished using any one of the following five methods:

- **RS-232 Only—**This method is used when only RS-232 control is desired. Controls are managed using the Command Set (Appendix A).
- **10/100 T Ethernet and RS-232—**This method is used when 10/100T Ethernet control of the SXPS is desired and the control computer is a client on a larger network which uses DHCP (dynamic host configuration protocol) to assign IP addresses. This is the default setting for 10/100T Ethernet control of the SXPS. RS-232 control is used to determine the dynamic IP address of the SXPS.
- **10/100 T Ethernet Only—**This is a simpler method than control by 10/100 T Ethernet and RS-232, but it requires that a static IP address be assigned to the SXPS and to the control computer. A static IP address is where a computer uses the same address every time a user logs on to a network. By default, the SXPS is configured with a dynamic IP address.

The type of IP address for the control computer depends upon whether the computer is connected directly to the SXPS Ethernet connector, or if it is connected via a network:

Connection Route	IP Address Type
Direct to SXPS	Static only
Through a network	Dynamic or Static

If the computer controlling the SXPS is a client assigned to a larger network, the network administrator will need to assign the static IP address to the control computer and SXPS. If the static IP address of the SXPS is unknown, it can be accessed using the RS-232 `SHOWNET` command. The RS-232 controls must be used for initial set-up of the SXPS IP address, and thereafter will no longer be required.

- **Web-Server GUI and RS-232 Control—**This method uses a web-server GUI rather than Telnet commands to control the SXPS over a network. In this instance, the control computer is a client on a larger network which uses DHCP to assign IP addresses. The web-server GUI within the SXPS is invoked by opening a web browser on the control computer (Black Diamond Video recommends Mozilla Firefox) and entering the IP address of the SXPS into the address bar of the browser. This will bring you to the GUI log-in page.
- **Web-Server GUI without RS-232 Control—**With this method, a “static” IP address is assigned to the SXPS and the control computer. A web-browser (Black Diamond Video recommends Mozilla Firefox) is opened and the static IP address of the SXPS is entered into the address bar of the browser. This is the easiest method for controlling the SXPS.

NOTE: The default password needed to log in to the is *blackdiamond.*

RS-232 ONLY

1. **Connect the control computer to the RS-232 connector on the SXPS using an RS-232 direct-connect type cable.**
2. **Open up a serial port terminal on the control computer connected to the SXPS.**

   On Microsoft Windows, you can use HyperTerminal for serial communications.
3. **Configure the port settings as follows:**
   - Baud: 9600
   - Data bits: 8
   - Parity: None
   - Stop bits: 1
   - Flow control: None

The RS-232 connection to the SXPS is established and the processor can be controlled using the RS-232 command set found in Appendix A, “RS-232 and 10/100T Protocol.”

NOTE: To avoid recreating the connection parameters each time you reestablish RS-232 connection to the SXPS, you can save the connection for subsequent control sessions.

10/100T ETHERNET AND RS-232

1. **Connect the SXPS to your network using the Ethernet connector.**
2. **Connect the RS-232 control computer to the SXPS with an RS-232 direct-connect type cable.**
3. **From the RS-232 control computer, determine the SXPS IP address:**
   a. Establish RS-232 control of the SXPS as described in “RS-232 Only” on page 24.
   b. Enter the command: `SHOWNET` (see Appendix A, “RS-232 and 10/100T Protocol,” for details).

   The SXPS IP address is returned.
4. **From the Ethernet control computer, which must be connected to the same network as the SXPS, open All Programs > Accessories > Command Prompt and enter the command `telnet <IP address> 8998` using the IP address obtained in *Step 3*.**

   The Telnet session is initiated.
5. **Enter the network password.**

   The default network password is “blackdiamond”.

   Telnet control is established. See Appendix A, “RS-232 and 10/100T Protocol,” for a list of key commands and how they are used to control the SXPS.

NOTE: The RS-232 control computer and the Ethernet control computer can be the same machine or two different machines.

To exit the network connection, enter the command `exit`.

NOTE: If the SXPS is powered off for several days, when the equipment is powered back on, the DHCP server within the network may issue a new IP address. If this happens, 10/100T Ethernet control can only be restarted by beginning at *Step 3* and determining the new IP address using the RS-232 SHOWNET command again.

10/100T ETHERNET ONLY

1. **Connect the control computer directly to the SXPS with an RS-232 direct-connect type cable and a 10/100T Ethernet crossover cable.**
2. **Set the static IP address of the SXPS:**
   a. Establish RS-232 control of the SXPS as described in “RS-232 Only” on page 24.
   b. Issue the `IPADDR` command. For example:

      ```
      IPADDR 192.168.1.103
      ```

      The SXPS is assigned the static IP address 192.168.1.103.
3. **Set the static IP address of the control computer. If you are using Microsoft Windows, follow these steps:**
   a. Click Start > All Programs > Accessories > Communications > Network Connections.

      The Network Connections window appears.
   b. Right-click on Local Area Connection and select Properties.

      The Local Area Connection Properties window appears.
   c. Click on Internet Protocol (TCP/IP) to highlight it and click Properties.

      The Internet Protocol (TCP/IP) Properties window appears.
   d. Select Use the following IP address and enter an address in the IP address field.

      For example, enter `192.168.1.10`.
   e. Click on Subnet mask and the number `255.255.255.0` should appear.
   f. Enter the static IP address in the Default gateway field.

      For example, enter `192.168.1.1`.
   g. Click OK.

      The static IP address of the control computer is set.
4. **Click Start and navigate to All Programs > Accessories > Command Prompt.**

   The Command Prompt window appears.
5. **Enter the command `telnet <IP address> 8998` using the IP address assigned to the SXPS in *Step 2* above.**

   Telnet control is established. See Appendix A, “RS-232 and 10/100T Protocol,” for a list of commands and how they are used to control the SXPS.

   Because the SXPS now has a static IP address, the RS-232 interface is no longer required. If the IP address of the SXPS is misplaced, simply reconnect the RS-232 controls and use the `SHOWNET` command to retrieve the IP address.

   The final system installation process is complete.

RS-232 ONLY

1. **Connect the control computer to the RS-232 connector on the SXPS using an RS-232 direct-connect type cable.**
2. **Open up a serial port terminal on the control computer connected to the SXPS.**

   On Microsoft Windows, you can use HyperTerminal for serial communications.
3. **Configure the port settings as follows:**

   - Baud: 9600
   - Data bits: 8
   - Parity: None
   - Stop bits: 1
   - Flow control: None

   The RS-232 connection to the SXPS is established and the processor can be controlled using the RS-232 command set found in Appendix A, “RS-232 and 10/100T Protocol.”

NOTE: To avoid recreating the connection parameters each time you reestablish RS-232 connection to the SXPS, you can save the connection for subsequent control sessions.

10/100T ETHERNET AND RS-232

1. **Connect the SXPS to your network using the Ethernet connector.**
2. **Connect the RS-232 control computer to the SXPS with an RS-232 direct-connect type cable.**
3. **From the RS-232 control computer, determine the SXPS IP address:**

   a. Establish RS-232 control of the SXPS as described in “RS-232 Only” on page 24.

   b. Enter the command: `SHOWNET` (see Appendix A, “RS-232 and 10/100T Protocol,” for details).

   The SXPS IP address is returned.
4. **From the Ethernet control computer, which must be connected to the same network as the SXPS, open All Programs > Accessories > Command Prompt and enter the command `telnet <IP address> 8998` using the IP address obtained in *Step 3*.**

   The Telnet session is initiated.
5. **Enter the network password.**

   The default network password is “blackdiamond”.

Telnet control is established. See Appendix A, “RS-232 and 10/100T Protocol,” for a list of key commands and how they are used to control the SXPS.

NOTE: The RS-232 control computer and the Ethernet control computer can be the same machine or two different machines.

To exit the network connection, enter the command `exit`.

NOTE: If the SXPS is powered off for several days, when the equipment is powered back on, the DHCP server within the network may issue a new IP address. If this happens, 10/100T Ethernet control can only be restarted by beginning at *Step 3* and determining the new IP address using the RS-232 SHOWNET command again.

10/100T ETHERNET ONLY

1. **Connect the control computer directly to the SXPS with an RS-232 direct-connect type cable and a 10/100T Ethernet crossover cable.**
2. **Set the static IP address of the SXPS:**
   a. Establish RS-232 control of the SXPS as described in “RS-232 Only” on page 24.
   b. Issue the `IPADDR` command. For example:

      ```
      IPADDR 192.168.1.103
      ```

      The SXPS is assigned the static IP address 192.168.1.103.
3. **Set the static IP address of the control computer. If you are using Microsoft Windows, follow these steps:**
   a. Click Start > All Programs > Accessories > Communications > Network Connections.

      The Network Connections window appears.
   b. Right-click on Local Area Connection and select Properties.

      The Local Area Connection Properties window appears.
   c. Click on Internet Protocol (TCP/IP) to highlight it and click Properties.

      The Internet Protocol (TCP/IP) Properties window appears.
   d. Select Use the following IP address and enter an address in the IP address field.

      For example, enter `192.168.1.10`.
   e. Click on Subnet mask and the number `255.255.255.0` should appear.
   f. Enter the static IP address in the Default gateway field.

For example, enter `192.168.1.1`.

g Click OK.

The static IP address of the control computer is set.

4 **Click Start and navigate to All Programs > Accessories > Command Prompt.**

The Command Prompt window appears.

5 **Enter the command `telnet <IP address> 8998` using the IP address assigned to the SXPS in *Step 2* above.**

Telnet control is established. See Appendix A, "RS-232 and 10/100T Protocol," for a list of commands and how they are used to control the SXPS.

Because the SXPS now has a static IP address, the RS-232 interface is no longer required. If the IP address of the SXPS is misplaced, simply reconnect the RS-232 controls and use the `SHOWNET` command to retrieve the IP address.

The final system installation process is complete.

WEB-SERVER GUI AND RS-232

1 **Download Java software onto the RS-232 control computer:**

a Open your web browser and go to www.java.com.

For Windows operations systems, download the Windows Offline version.

b Black Diamond Video supports Java Applet versions up to 5.0.

2 **(Recommended) Download and install the Mozilla Firefox web browser onto the control computer from www.mozilla.com/firefox/.**

3 **Connect the control computer directly to the SXPS with an RS-232 direct-connect type cable and a 10/100T Ethernet crossover cable.**

4 **From the RS-232 control computer, determine the SXPS IP address:**

a Establish RS-232 control of the SXPS as described in "RS-232 Only" on page 24.

b Enter the command: `SHOWNET` (see Appendix A, "RS-232 and 10/100T Protocol," for details).

The SXPS IP address is returned.

5 **Open the Firefox web browser on the control computer and enter the IP address obtained in *Step 4* into the browser address bar.**

The GUI is initiated and control of the SXPS is now done through the GUI.

NOTE: If the SXPS is powered off for several days, when the equipment is powered back on, the DHCP server within the network may issue a new IP address. If this happens, web-server control can only be restarted by beginning at *Step 3* and determining the new IP address using the RS-232 SHOWNET command again.

WEB-SERVER GUI ONLY

1 **Download Java software onto the RS-232 control computer:**

   a Open your web browser and go to www.java.com.

   b For Windows operations systems, download the Windows Offline version.

   c Black Diamond Video supports Java Applet versions up to 5.0.

2 **(Recommended) Download and install the Mozilla Firefox web browser onto the control computer from www.mozilla.com/firefox/.**

3 **Connect the control computer directly to the SXPS with an RS-232 direct-connect type cable and a 10/100T Ethernet crossover cable.**

> **NOTE:** The RS-232 control computer and the Ethernet control computer can be the same machine or two different machines.

4 **Set the static IP address of the SXPS:**

   a Establish RS-232 control of the SXPS as described in “RS-232 Only” on page 24.

   b Issue the `IPADDR` command. For example:

   ```
   IPADDR 192.168.1.103
   ```

   The SXPS is assigned the static IP address 192.168.1.103.

5 **Set the static IP address of the control computer. If you are using Microsoft Windows, follow these steps:**

   a Click Start > All Programs > Accessories > Communications > Network Connections.

   The Network Connections window appears.

   b Right-click on Local Area Connection and select Properties.

   The Local Area Connection Properties window appears.

   c Click on Internet Protocol (TCP/IP) to highlight it and click Properties.

   The Internet Protocol (TCP/IP) Properties window appears.

   d Select Use the following IP address and enter an address in the IP address field.

   For example, enter `192.168.1.10`.

   e Click on Subnet mask and the number `255.255.255.0` should appear.

   f Enter the static IP address in the Default gateway field.

   For example, enter `192.168.1.1`.

   g Click OK.

The static IP address of the control computer is set.

6 **Open the Mozilla Firefox web-browser and type the SXPS IP address set in *Step 4* into the address bar of the browser and press Enter.**

The GUI will be invoked and control of the SXPS is now done through the GUI. Details of the web-server GUI controls are in Chapter 7, “Matrix Switching,” and Chapter 8, “Video Scaling.”

Because the SXPS now has a static IP address, the RS-232 interface is no longer required. If the IP address of the SXPS is misplaced, simply reconnect the RS-232 controls and use the SHOWNET command to retrieve the IP address.

SYSTEM RESET

Occasionally, the SXPS CPU may need to be reset. Prior to installing the equipment in its final position, you can simply power cycle the unit using the power switch on the rear panel. However, once the unit is installed, it may not be easy to access the rear panel. In this situation, you can use the RS-232 serial command RESET.

NOTE: The system reset mimics a power cycle and does not affect your system configuration settings, such as matrix routing settings.

STARTUP MACRO

The Startup Macro feature allows the user to set up a list of commands that will be executed automatically by the SXPS after it is powered on, or after a power cycle or interruption. This feature is available beginning with firmware version 4.85. There are four commands related to the Startup Macro: CSM, DSM, RSM, and VSM.

These Startup Macro commands are detailed below.

Create Startup Macro

The CSM command creates the Startup Macro. To create the startup Macro:

1 **Issue the command: CSM.**

2 **Enter the commands you would like stored in the Macro, up to 2048 characters.**

a Editing the Macro commands is difficult to do in the terminal program as it is not a text editor. Therefore, it is suggested that a real text editor be used to create or edit the Macro. The commands may then be copied and pasted into the command prompt.

3 **Press Esc.**

4 **Press carriage return.**

Delete Startup Macro

The `DSM` command deletes the Startup Macro. To delete the Startup Macro, issue the command: `DSM.`

Run Startup Macro

The `RSM` command runs the Startup Macro manually. After powering the system on, the Startup Macro will run automatically. To run the Startup Macro manually, issue the command: `RSM.`

View Startup Macro

The `VSM` command allows the user to view the commands in the Startup Macro. To view the commands in the Startup Macro, issue the command: `VSM.`

6

ABOUT THE WEB-SERVER GUI

The most common SXPS functions can be handled using the web-server GUI. This chapter describes how to access the GUI web-server and introduces the GUI's appearance and functions.

More information on using the GUI appears in the following operational chapters covering matrix switching and video scaling.

ACCESSING THE GUI

NOTE: Java Applet must be installed prior to opening the web-server GUI. For instructions, see Chapter 5, "Installation Instructions."

The web-server GUI within the SXPS is invoked by opening a web browser on the control computer (Black Diamond Video recommends Mozilla Firefox) and entering the IP address of the SXPS into the address bar of the browser. This will bring you to the GUI log-in page, shown in *Figure 8*. Logging in will give you access to the two GUI Web Controller pages: the Switch page (*Figure 9*), and the Control page (*Figure 10*).

Log into the GUI by entering your password. The default password associated with your SXPS is *blackdiamond*.

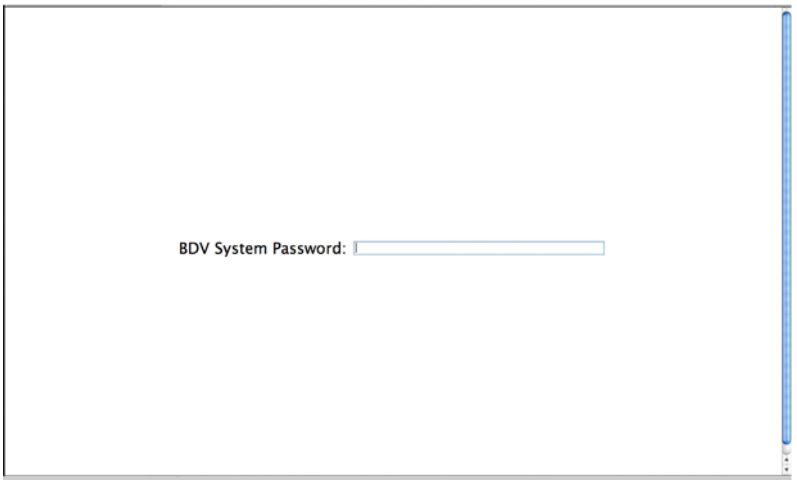


FIGURE 8. SXPS GUI Log-In Page

APPEARANCE AND FUNCTIONS OF THE GUI

The GUI Web Controller is divided into two sections: Switch and Control. The Switch and Control pages are accessible via the labelled tabs located at the top of the GUI Web Controller screen.

- **Switch**—this section allows you to switch between input sources and output displays using a mouse or touch-panel. The switch section of the GUI reflects only the last input to be selected and the output sources to which it is currently routed. Their respective input and output buttons are illuminated green, indicating that they are connected.

  For example, in *Figure 9*, the most-recently selected output is Output 1, shown by the green Output 1 button. Output 1 is routed to Input 6, indicated by the green Input 6 button.

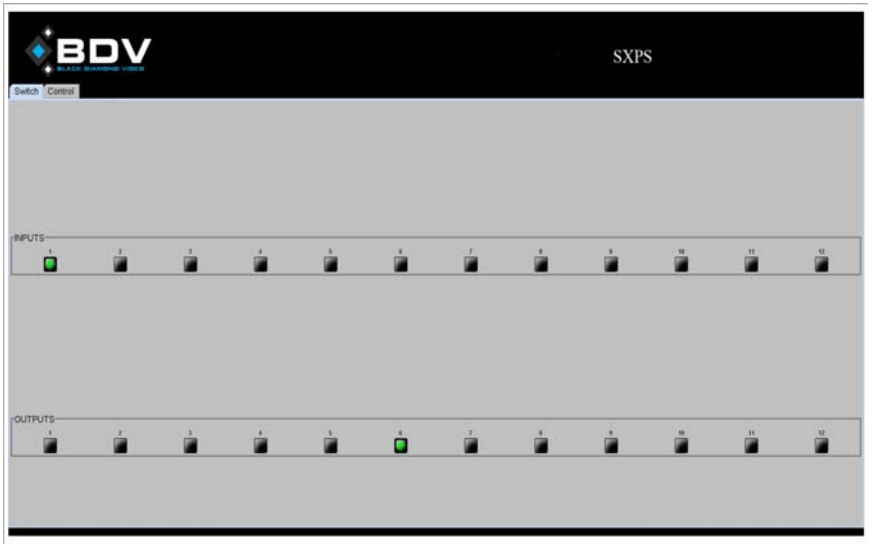


FIGURE 9. SXPS GUI Switch Section

More information about the Switch section of the web-server GUI can be found in Chapter 7, “Matrix Switching.”

- **Control**— this section allows you to manipulate the video displayed on outputs connected to the SXPS. Using the tools in the Control section, shown in *Figure 10*, you can:

  - Zoom into and out of an image on an output display

  - Pan around an image

  - Fit, fill, center, or stretch an image on an output display

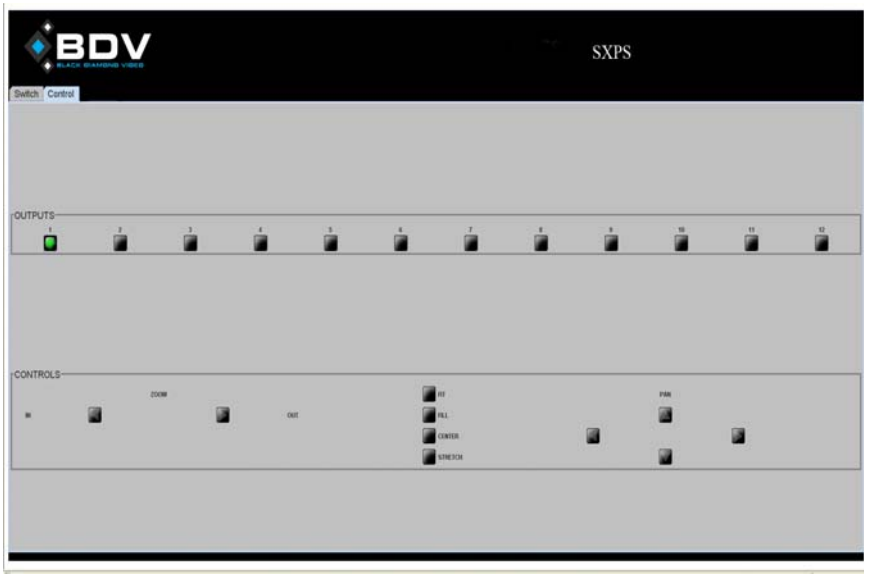


FIGURE 10. SXPS GUI Control Section

For more information on using the Control section of the GUI, see Chapter 8, “Video Scaling.”

7

MATRIX SWITCHING

This chapter explores the matrix switching capabilities of the SXPS.

ABOUT MATRIX SWITCHING

The SXPS provides 12 x 12 DVI matrix switching and is controlled with the web-server GUI or by using RS-232 or telnet commands. Any connected input can be switched to any output channel.

By default, the first single-link DVI input is routed to all single-link outputs and the first dual-link DVI input is routed to all dual-link outputs. Single-link and Dual-link DVI inputs can be displayed on any output channel. For more information on this limitation, see “Dual-Link And Single-Link” on page 10.

MATRIX SWITCHING CONTROL: GUI

The I/O Switching Selection buttons found on the Switch page of the GUI let you quickly and easily set up and modify matrix-switching assignments. This page can be accessed by clicking the Switch tab of the GUI Web Controller.

Figure 11 shows an example of the SXPS GUI being used to control matrix

switching assignments.

To view matrix switching assignments

Matrix switching assignments can be viewed by pressing the numbered output buttons found in the Outputs section of the Switch page. Selecting a numbered output button will illuminate both the selected button and the input buttons to which it has been routed.

EXAMPLE

To see what input is routed to Output 1, press the Output 1 button. In our example, *Figure 11*, you can see that Input 1 is routed to Output 6, as indicated by the green lights illuminating their respective buttons.

FIGURE 11. Matrix-Switching Section of the Web Controller

To switch an input to an output

1. **In the I/O Switching Selection of the GUI, click the input button for the input you want to switch.**

   The button will flash green, indicating that it has been selected. You now have 5 seconds to route it to an output destination.

2. **Click the Output button for the output to which you want to route the selected input.**

3. **The selected input is now routed to the output channel you have just chosen.**

   Both input and output buttons will be illuminated green to indicate their connection.

EXAMPLE ONE

To route Input 1 to display at Output 6, you must first select the Input 1 button, and then select the Output 6 button. This will route Input 1 to Output 6, as illustrated in *Figure 11*.

EXAMPLE TWO

To route Input 3 to display at Outputs 1 *and* 2, select the Input 3 button, then select the Output 1 button, routing Input 3 to Output 1. Then, select the Input 3 button again, and select the Output 2 button, routing Input 3 to Output 2.

MATRIX-SWITCHING CONTROL: RS-232/TELNET

For matrix switching control, there are two commands: `SWITCH` and `OSTAT`. With these commands, you can switch any input to display on any output channel and you can check which input is currently set to display on any output.

For a complete list of serial control commands, see Appendix A, "RS-232 and 10/100T Protocol."

NOTE RS-232 commands and Telnet protocol are identical.

Switch Command

The `SWITCH` command is used to route any input to display on any output channel. The command is:

```
SW <input #> <output #>
```

An input can be routed to multiple outputs, which lets you display the same input image on multiple displays.

EXAMPLE

In *Figure 12*, the switch command is used to route a DVI video source connected to Input 1 to three different output channels. If all three commands are issued in succession, the result is that Input 1 would appear on all three output devices.

Command	Action
`SW 1 10`	**Example A—**routes Input 1 to Output 10
`SW 1 11`	**Example B—**routes Input 1 to Output 11
`SW 1 12`	**Example C—**routes Input 1 to Output 12

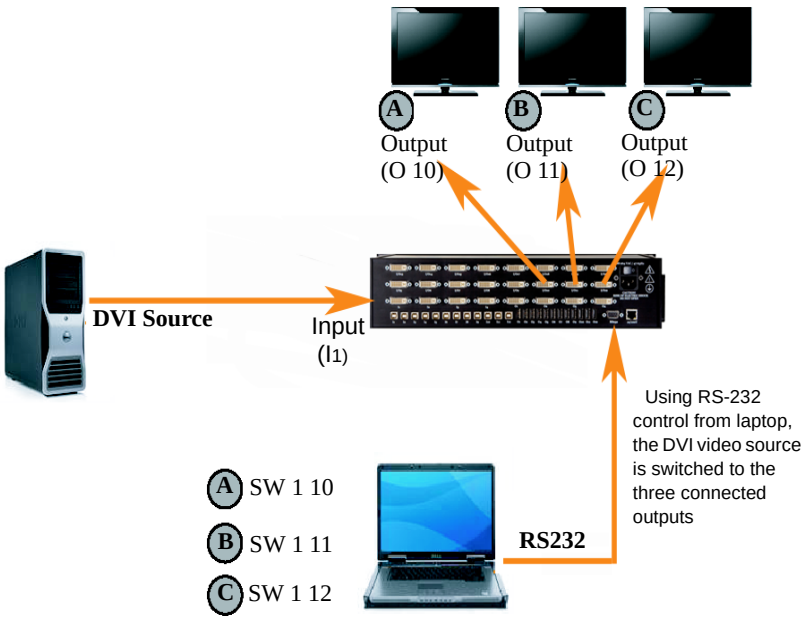


FIGURE 12. Matrix Switching Example

Output Status Command

The OSTAT command is used to determine which input is connected to a particular output. The command is:

```
OSTAT <output #>
```

EXAMPLE

Referring to *Figure 12*, the OSTAT command would be used as follows:

Command	Action
`OSTAT 12`	**Example A—**checks the input channel routed to Output 12. Returns `input: 1`.

Simultaneous Switching Outputs

Using RS-232/Telnet *Simultaneous Switching Outputs* commands, you can change multiple input-output assignments simultaneously using preset input-output pairs.

The steps required to perform simultaneous matrix switching are listed below.

1. SET INPUT-OUTPUT PAIRS

The Simultaneous Switching Outputs (SSO) command allows the user to store input-output pairs in four different preset slots. The maximum number of I/O pairs is equal to the maximum channels installed.

To store input-output pairs to a preset slot (numbered 1-4), issue the command:

```
SSO <preset#> <input> <output> <input> <output>.... <input> <output>
```

Where:

- `<input> <output>` represents an input-output pair.
- `<preset #>` refers to the slot (1-4) to which you would like to store these switching pairs.
-

To delete the preset input-output assignments, issue the command:

```
SSODEL <preset#>
```

This will erase the I/O pair assignments you had saved to that preset slot.

2. SIMULTANEOUSLY SWITCH OUTPUTS

Once you have assigned input-output pairs to a preset slot number (1-4), you may simultaneously switch all inputs to display on their specified output.

To simultaneously switch outputs using the preset input-output pairs, issue the command:

```
SSORUN <preset#>
```

This will switch each input to display on its paired output, as specified by the pairs you selected in the previous step.

USB Switching

USB Switching may be performed using the three USB commands below.

USB COMMAND

Change USB switching mode by issuing the command:

`USB <mode>`

Where `<mode>` is either “lock” or “free.”

- When in lock mode, USB switching assignments will follow the video switch assignments. For example, if you issue the video switch command `SW 1 2` to route input 1 to output 2, this would also switch USB 1 to 2.
- When in free mode, USB switching assignments will *not* follow video switching assignments, and the user must issue the `USBSW` command to perform USB switching, as described below.

USB SWITCH COMMAND

The USB Switch command controls USB switching when under free mode. Use the command:

`USBSW <usb input #> <usb output #>`

USB STATUS COMMAND

The USB Status command displays the USB Input/Output connections and also the USB mode selected.

To view USB status, issue the command: USBSTAT

8

VIDEO SCALING

ABOUT VIDEO SCALING

The SXPS output slots can each be populated with a Quad Dual-Link Scalar card (QDLS card) for a maximum of four scalar cards. With the QDLS card, the video output can be manipulated. The output image can be scaled up or down or modified to fit a display resolution different than the native resolution of the input signal.

The most common scalar operations are discussed below. Scalar operations are performed using RS-232/ Telnet, or GUI control.

- For more about configuring the SXPS output channels, see Chapter 3, “Configuration Options.”
- For information on window scaling, see Chapter 9, “Video Windowing.”
- For a complete list of RS-232 and Telnet serial control commands, see Appendix A, “RS-232 and 10/100T Protocol.”

NOTE RS-232 commands and Telnet protocol are identical.

AUTO-RESOLUTION DISPLAY

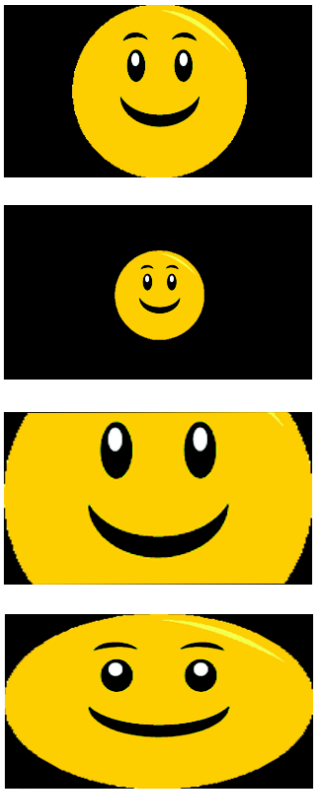
By default, any input routed through a QDLS card output channel is automatically scaled up or down to fit the resolution of the connected display device. The original aspect ratio of the input image in maintained. If this input aspect ratio is different than that of the display device, black bars fill the areas of unfilled pixels.

This is an automatic feature of the scalar card and does not need to be programmed. This feature automatically detects the display resolution and displays any input source at its maximum resolution and proper aspect ratio.

For example, if you have a 1024 x 768 input and you route it through a QDLS output to a display device operating at 1900 x 1200, the image is automatically scaled up to fill the screen vertically. Black bands appear on either side of the image in the areas of unfilled pixels, and the 4:3 aspect ratio is maintained on the output.

PRESET VIDEO POSITIONING

In addition to the default auto-resolution display processing, video going out to a display device can be positioned in different ways to fit within the display. *Figure 13* illustrates the four most common methods for positioning video within a display.



FIT

Full image is displayed with the proper aspect ratio at the display's maximum resolution.

CENTER

Full image is displayed at the image's native resolution, with a proper aspect ratio, and centered on the display.

FILL

Either full vertical or horizontal portion of the image is displayed, with remaining portion of the image cropped. Aspect ratio is maintained.

STRETCH

Image is stretched to fit onto the display without cropping when the aspect ratio of the input is different than that of the display device. The aspect ratio will not be maintained if the image is stretched.

FIGURE 13. Video Output Positioning Presets

FIT

`FIT` scales an image up or down to match a display's maximum resolution. At the same time, the proper aspect ratio of the video input is maintained and the entire picture is visible. The entire output image is "fit" onto the display.

EXAMPLE ONE

To display the 800 x 600 image (4:3 aspect ratio) coming from Output 1 on a 1920 x 1080 display (16:9 aspect ratio) by scaling the image up such that the entire image is visible, and maintaining its proper 4:3 aspect ratio, use the FIT function. Black vertical bars will appear on either side of the image in areas of unfilled pixels.

EXAMPLE TWO

To display the 1920 x 1080P image coming from Output 5 on a 1280 x 1024 display (5:4 aspect ratio) by scaling the image down and maintaining its 16:9 aspect ratio, use the FIT function. Horizontal black bars will appear above and below the image in areas of unfilled pixels.

NOTE: `FIT` is actually the same as auto-resolution (see “Auto-Resolution Display” on page 43). You can use the `FIT` control to return to this default processing behavior after setting an alternative video position, such as with the `CENTER`, `FILL, or STRETCH` controls, or with a custom setting.

CENTER

`CENTER` maintains the native resolution of the image and centers it within a display that has a different resolution. The output image is “centered” on the display and surrounded by black borders in the area of unfilled pixels.

EXAMPLE

To display the 800 x 600 image coming from Output 1, at its native resolution, centered and surrounded by black borders on a 1280 x 1024 display, use the CENTER function.

FILL

`FILL` scales an image up or down to match a display’s maximum resolution and also maintains the proper aspect ratio of the video input. Unlike the `FIT` mode, however, the entire image may or may not be displayed. If the input aspect ratio matches the aspect ratio of the display device, the entire image will appear. However, if the aspect ratios are different, then one dimension of the image will be cropped.

When scaling up, the image is scaled until it fills the screen both horizontally and vertically. With different aspect ratios, this means that the dimension which required less scaling before filling the screen is cropped as scaling continues in order to fill the screen in the other dimension.

When scaling down, the image is scaled until one dimension fills the screen. At that point, scaling ceases and the other dimension is cropped.

EXAMPLE

To display the 800 x 600 image (4:3 aspect ratio) coming from Output 1 on a 1920 x 1080 display (16:9 aspect ratio) by scaling the image up and maintaining its proper 4:3 aspect ratio so that it fills the entire display, use the FILL function.

As more scaling is required to fill the horizontal dimension than the vertical dimension, the image fills the screen and is cropped vertically on the display.

STRETCH

STRETCH "stretches" an image to fit onto the display without cropping when the aspect ratio of the input is different than that of the display device. The resulting image may be horizontally and/or vertically stretched to fit onto the entire display, and thus will not maintain its original aspect ratio.

EXAMPLE

To display the 800 x 600 image coming from Output 1, stretched to fit a 1280 x 1024 display, use the STRETCH function. The image will be stretched both horizontally and vertically to fit the display screen.

Video Positioning Control: RS-232/ Telnet

All four of the video positioning methods use the `OWS` command paired with an argument to select the positioning method: `FIT`, `CENTER`, `FILL or STRETCH`.

FIT COMMAND

The command is:

```
OWS <output #> FIT
```

where <output #> is the number of your chosen output. For example, to scale the image displayed on Output 1 to "fit" the output's maximum resolution, while still keeping all of the image visible, issue the command `OWS 1 FIT`.

CENTER COMMAND

The command is:

```
OWS <output #> CENTER
```

where <output #> is the number of your chosen output. For example, to center the image displayed on Output 1, issue the command `OWS 1 CENTER`.

FILL COMMAND

The command is:

```
OWS <output #> FILL
```

where <output #> is the number of your chosen output. For example, to fill the display on Output 1, issue the command `OWS 1 FILL`.

STRETCH COMMAND

The command is:

`OWS <output #> STRETCH`

where <output #> is the number of your chosen output. For example, to stretch the image displayed on Output 1, issue the command `OWS 1 STRETCH`.

Video Positioning Control: GUI Control page

To access the control section of the web-server GUI, simply select the control tab, as seen in *Figure 14*. In our example, the SXPS is enabled to connect to 12 outputs, but your SXPS may be configured to connect to the full 16 outputs.These outputs will be numbered 1-12 (or 1-16) in the Outputs section of the Control screen.

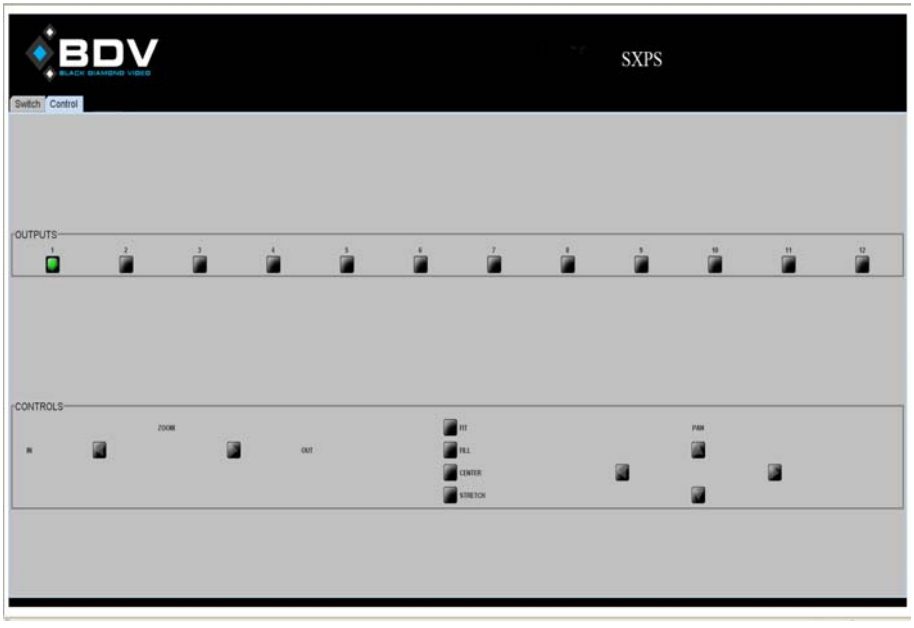


FIGURE 14. Control Section of the GUI

Below the Outputs section of the GUI Control page is the Controls section. This area houses the controls for all four preset video positions (Fit, Fill, Center, and Stretch), as well as the Pan and Zoom controls.

Each of the four video positioning methods can be engaged by selecting the numbered output button that corresponds to the output you wish to control, and then clicking either Fit, Fill, Center, or Stretch to manipulate the image on that output's display. This process is described in greater detail below.

For information on using the GUI Pan and Zoom controls, see "Pan and Zoom: GUI Control Page" on page 51.

FIT CONTROL

To use the GUI Control page Fit control:

1. **Select an output to control by clicking on one of the output buttons in the Outputs section of the Controls screen.**

   The output button should become green once selected.

2. **Then click on the Fit button located in the Controls section.**

   The Fit button should become green once selected, and the full image should be displayed with the proper aspect ratio at the display's maximum resolution.

FILL CONTROL

To use the GUI Control page Fill control:

1. **Select an output to control by clicking on one of the numbered output buttons in the Outputs section of the Controls screen.**

   The output button should become green once selected.

2. **Then click on the Fill button located in the Controls section.**

   The Fill button should become green once selected, and the image should fill the display screen (with some potential cropping).

CENTER CONTROL

To use the GUI Control page Center control:

1. **Select an output to control by clicking on one of the numbered output buttons in the Outputs section of the Controls screen.**

   The output button should become green once selected.

2. **Then click on the Center button located in the Controls section.**

   The Fill button should become green once selected, and the image should become centered within the output display screen.

STRETCH CONTROL

To use the GUI Control page Stretch control:

1 **Select an output to control by clicking on one of the numbered output buttons in the Outputs section of the Controls screen.**

The output button should become green once selected.

2 **Then click on the Stretch button located in the Controls section.**

The Stretch button should become green once selected, and the uncropped image should become stretched onto the output display screen.

CUSTOM VIDEO POSITIONING

Besides the preset video function of the QDLS card, you can also assign specific horizontal and vertical dimensions to a video output using RS-232 or Telnet control. With this function, aspect ratios are not constrained, and, depending on the custom dimensions you specify, the original aspect ratio may not be preserved.

The command is:

`OWS <output #> <hsize> <vsize>`

where `<hsize>` represents a custom number of display pixels and `<vsize>` represents a custom number of lines.

EXAMPLE

To display an 800 x 600 image from Output 3 as a 1280 x 1024 image size, and not maintain the original 4:3 aspect ratio, issue the command: `OWS 3 1280 1024`.

The image is scaled up from 800 x 600 to 1280 x 1024, with a modified aspect ratio of 5:4.

PAN AND ZOOM

The QDLS card output offers both pan and zoom functions. These functions let you focus on portions of an image and increase and decrease the zoom, and can be engaged using the web-server GUI or RS-232 or Telnet control

Pan and Zoom: RS-232/Telnet

When using RS-232 or Telnet control, you have two types of pan/zoom controls. The first is a step pan or zoom, where you pan or zoom a percentage each time you issue the command. The second type of control is a continuous pan or zoom. This type of zoom is meant for use with a programmable external control device.

PAN

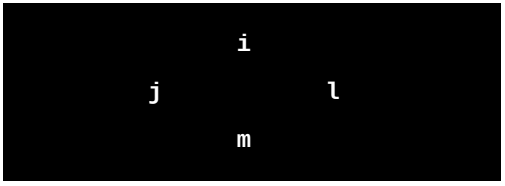
With the PAN command, you can to pan up, down, left, and right at slow or accelerated speeds.

The command is:

```
PAN <output #>
```

When you issue this command, the following field appears to let you control the pan action:

Pan control: `i` - up, `m` - down, `j` - left, `l` - right `q` - quit



Each time you press one of these letters, you pan in the selected direction by a set percentage.

Accelerated pan control: Use the capital “F” key to pan more quickly, or the capital “S” key to pan more slowly.

ZOOM

The standard zoom control lets you step zoom in or out of an image at slow or accelerated speeds.

The command is:

```
ZOOM <output #>
```

When you issue this command, the following field appears to let you control the zoom action:

Zoom control: <+> zoom in, <-> zoom out, <q> quit

Each time you press `+` or `-`, you zoom in or out a set percentage.

Accelerated zoom control: Use the lowercase “f” key to zoom more quickly, or the lowercase “s” key to zoom more slowly.

CONTINUOUS PAN & ZOOM

In addition to the standard pan and zoom controls described above, there are special controls meant for use with a programmable external control device. The continuous pan and zoom controls lets you continue an action until the `STOP` command is issued.

For details on continuous pan and zoom controls, see “Continuous Pan & Zoom” on page 94.

Pan and Zoom: GUI Control Page

The GUI’s pan and zoom controls are located in the Controls section of the Control page.

PAN

With the Pan controls, you can to pan up, down, left, and right in increments or continuously.

To pan around an image:

1. **Select an output to control by clicking on the corresponding numbered output button**
2. **Click on the left or right pan buttons to pan left or right, respectively. Click on the upper or lower pan buttons to pan up or down.**

   Clicking one of these buttons once will adjust the view by a small percentage. Holding the mouse key down after selection will allow you to continually pan in the chosen direction until the mouse button is released or you reach the end of the image.

ZOOM

With the Zoom controls, you can to zoom into or out of an image in increments or continuously.

To zoom into or out of an image:

1. **Select an output to control by clicking on the corresponding numbered output button**
2. **Click on the In or Out buttons to zoom in or out, respectively.**

   Clicking one of these buttons once will adjust the view by a small percentage, while holding the mouse key down after selection will allow you to continually zoom until the mouse button is released.

ADVANCED VIDEO SCALING OPERATIONS

This section deals with advanced video scaling operations that are primarily applicable to custom applications. These scaling operations are employed using RS-232 or Telnet control, and are listed below:

Genlock

- Match the output timing to the input timing
- Turn off all output scaling

Programmable Look-up Tables

- Customize the red, green, and blue color values of an output
- Modify one or more color values for custom effects

Genlock

Genlocking video signals is used when you want to synchronize the output timing to the input timing *exactly*. The image is passed through to the output without any scaling or timing shift.

The command is:

`GL <output #> <ON|OFF>`

EXAMPLE

To genlock the output timing of Output 7 to the input source timing, issue the command: `GL 7 ON`.

Programmable Look-Up Tables

The table below shows the four look-up table commands you can employ to customize your output's color settings.

`WBLUT`	`WBLUT <output #> <value>`	Changes the output gain for blue channel. `<value>` is a value from 0-200. Default = 100.
`WGLUT`	`WGLUT <output #> <value>`	Changes the output gain for green channel. `<value>` is a value from 0-200. Default = 100.
`WLUT`	`WLUT <output #> <value>`	Changes the output gain for all three color channels: red, green, and blue. `<value>` is a value from 0-200. Default = 100.

WRLUT	WRLUT <output #> <value>	Changes the output gain for red channel. <value> is a value from 0-200. Default = 100.

9

VIDEO WINDOWING

ABOUT VIDEO WINDOWING

With video windowing, multiple input signals can be displayed on one output display screen using RS-232 or Telnet commands. All windows can be individually positioned and scaled up or down, and each window's image can also be panned, zoomed, fit, filled, centered, or stretched to suit your needs.

To change the video input routed to a window, act as you would when routing an input to a normal output display screen, as described in Chapter 7, "Matrix Switching."

WINDOW FUNCTION

The window function commands switch the windowing function at the chosen outputs ON or OFF. When using this command, the user can select different configurations of windows to display on a composite output, with a total of four windows possible.

ENABLING WINDOW FUNCTION

To turn windowing function on, issue the command

```
WINON <window output #> <window #> <window #> <window #>
<window #>
```

Where:

- `<window output #>` is the number of the composite output
- `<window #>` is the number of the output you would like to use under windowing mode.
- The sequence of the `<window #>` entries determines the initial priority of those windows.

EXAMPLE

If outputs 2, 3, and 4 display at output 1 as windows, with Window 4 at the highest priority, the command is: `WINON 1 4 2 3`.

DISABLING WINDOW FUNCTION

To turn windowing function off, issue the command

```
WINOFF <window output #>
```

TURNING A WINDOW ON/OFF

Using an RS-232/Telnet Window command, you can turn an individual window on or off, without affecting other windows.

To turn a window on or off, issue the command:

`WIN <window output #> <output #> <ON|OFF>`

Where:

- `<window output #>` is the number of the composite output.
- `<output #>` is the number of the output whose window you would like to control.

WINDOW IDENTITY

The Window Identity RS-232/Telnet command identifies the window belonging to a selected output, and provides the window's position and size.

After issuing the command, the selected window will be on top of other windows on the display screen, and will blink for 5 seconds. On the command line, the position and size of the selected window is returned.

To learn a window's identity, issue the command:

`WINID <window output #> <output #>`

Where:

- `<window output #>` is the number of the composite output
- `<output #>` is the number of the output whose window you wish to identify

WINDOW PRIORITY

Window priority controls the order in which you would like your windows arranged on the windowing display screen; each window has its own priority. For example, if your display screen houses a total of four windows, these windows would have numbered priorities 1 through 4, depending on their order.

The window priority control is useful when windows overlap on the display screen.Window Priority 1 is the foremost window location on the display screen. Setting any window to

Priority 1 will bring it to the foreground, on top of any windows it was previously behind. Window Priority 2 is the window position second from the front; setting any window to Priority 2 will bring it to the front of every other window but the window set to Priority 1. In following, Window Priority 3 is the window position third from the front, and Window Priority 4 is the position fourth from the front.

An example of the effects of the window priority feature can be seen in *Figure 15*.

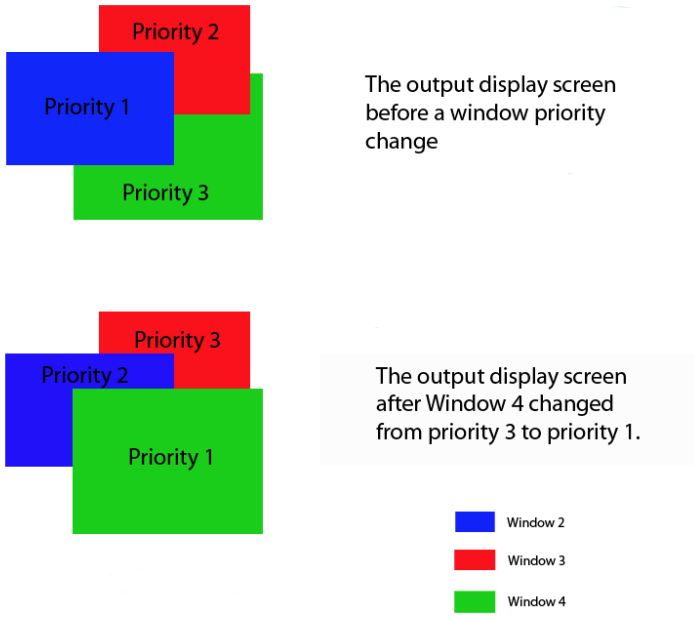


FIGURE 15. Window Priority Example

To change an output's window priority, issue the command:

```
WINPRI <window output #> <output #> <priority>
```

Where:

- `<window output #>` is the number of the composite output.
- `<output #>` is the number of the output whose window you wish to control.

- <priority> is the priority number you would like to assign to the chosen output.

WINDOW POSITION AND SIZE

The position of each window on the output display can be independently manipulated using RS-232 or Telnet commands.

TO CONTROL WINDOW POSITION AND SIZE INTERACTIVELY

With the Window Position command, you are able to interactively control the positioning of the window for the selected output.

To control window position, issue the command

```
WINPOS <output #>
```

A control field will appear that will allow you to interactively position and size the window to suit your needs.

TO CONTROL WINDOW POSITION AND SIZE USING EXACT VALUES

With multiple arguments, the window is positioned at the specified location and size.

Issue the command:

```
WINPOS <output #> <hpos> <vpos> <hsize> <vsize>
```

Where:

- <hpos> and <vpos> refer to the upper left corner of the window.
- <hsize> is in pixels.
- <vsize> is in lines.

CONTINUOUS WINDOW POSITION AND SIZE

This type of command is meant for use in “background mode,” with a programmable external control device. The continuous window position and size controls let you continue an action until the STOP command is issued.

When controlling a window’s location and size in background mode, issue the command:

```
WINPOS <output #> <su | sd | ml | mr | mu | md | stop> <speed>
```

Where:

- su = size up

- `sd` = size down
- `ml` = move left
- `mr` = move right
- `mu` = move up
- `md` = move down
- `<speed>` is a value from 1 - 4 and sets the speed of the action.

TO ADJUST WINDOW ALIGNMENT

Using the window position alignment commands, you can adjust the position of the window while maintaining its size. You may center the window in the middle of the windowing output display, or you may adjust left, right, top, or bottom window alignment to move the selected window to the edge of the display screen in the selected direction.

To adjust the window's position on the composite output screen, issue the command:

```
WINPOS <output #> <LA | RA | TA | BA | CA>
```

Where:

- `<LA>` is left align
- `<RA>` is right align
- `<TA>` is top align
- `<BA>` is bottom align
- `<CA>` is center align.

WINDOW QUAD FORMATION

The Set Quad command sizes each window to one quarter the size of the windowing display, and arranges them in quad formation according to their priorities.

A visual depiction of quad formation can be seen below, in *Figure 16*. The shaded areas represent areas of the window that may extend out of view when using a single-link scalar card. No portion of the window will extend outside the display when using a dual-link scalar card.

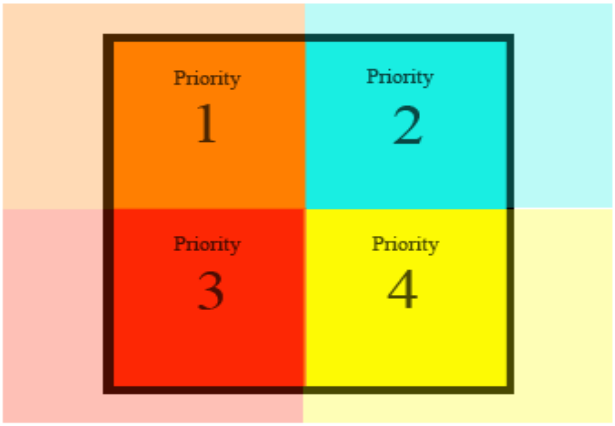


FIGURE 16. A Display Containing Windows in Quad Formation

To arrange windows in quad formation, issue the command:

`SETQUAD <window output #>`

Where:

- `<window output #>` is the number of the composite output.

FULL SCREEN WINDOWING

The Window Full Screen command will expand the selected window to fill the entire display screen.

To fill the composite display screen with the selected window, issue the command:

`WINFS <window output #> <window #>`

Where:

- `<window output #>` is the number of the composite output.
- `<window #>` is the number of the window you would like to control

WINDOW VIDEO POSITIONING PRESET TOOLS

Each individual window's displayed image may be independently manipulated via RS-232/Telnet Input Window Size command. These commands apply preset video positioning to the specified output channel.

NOTE: This command will affect window size and position.

To implement a preset video position, issue the command:

```
OWS <output #> <FIT|FILL|CENTER|STRETCH>
```

The effects of the four window video positioning preset tools are described below. For a more detailed description of the preset fit, fill, center, and stretch tools, see Chapter 8, "Video Scaling."

FIT

<FIT> fits the entire window onto the display, maintaining the original aspect ration. Equivalent to resetting the video scaling to the default auto-resolution display.

FILL

<FILL> scales a window up or down to fill the display, maintaining proper aspect ratio of the input. Image will be cropped if the input and output aspect ratios do not match

CENTER

<CENTER> maintains native resolution of the input and centers the selected window within a display.

STRETCH

<STRETCH> stretches a window to fit onto the display without cropping when the aspect ratio of the input is different than that of the display device. The aspect ratio will not be maintained if the image is stretched.

WINDOW ZOOM AND PAN

(NOT CURRENTLY IMPLEMENTED)

Use the Window Zoom and Pan controls to zoom or pan within a chosen window on the output screen.

TO ZOOM AND PAN

To zoom, use the command:

```
WINZM <output #>
```

After you issue this command, the pan and zoom control field will appear, as seen in *Figure 17*.

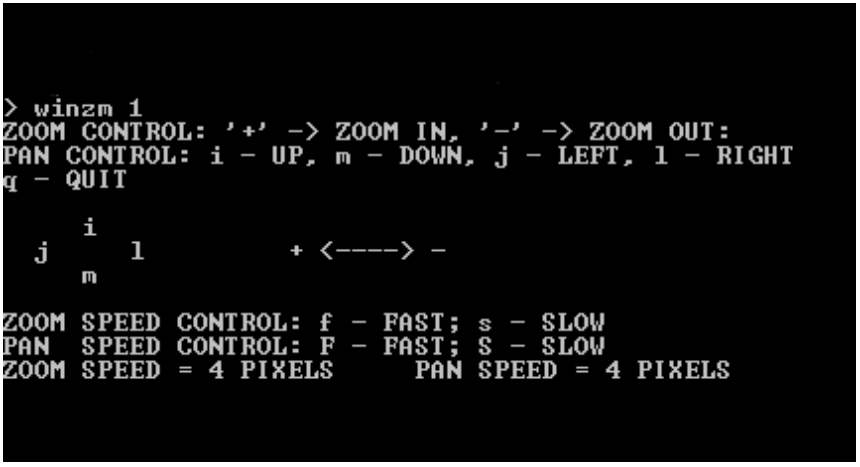


FIGURE 17. The Telnet Pan/Zoom controls

Zoom Control: Every time you press the + or - keys, you zoom in or out one preset increment of pixels.

To zoom more quickly, press the lower-case f key, or press the lower-case **s** key to zoom more slowly. Each time you press either of these keys, the Zoom Speed Control pixel value will be adjusted up or down by one increment. The greater the pixel value, the greater the speed at which you will zoom.Once you have set the zoom speed, press the + or - key to zoom at the chosen speed.

Pan Control: Press the lower-case “i” key to pan up, the lower-case “m” key to pan down, the lower-case “j” key to pan left, or the lower-case “l” key to pan right. Every time you press one of these keys, you pan in the chosen direction one preset increment of pixels.

Press the upper-case “S” key to pan more slowly, or press the upper-case “F” key to pan more quickly. Each time you press any of these keys, the Pan Speed Control pixel value will be adjusted by one increment. Once you have set the pan speed, use the “i”, “m”, “l”, and “j” keys to pan in the desired direction at the speed you have chosen.

CONTINUOUS WINDOW ZOOM AND PAN

This type of command is meant for use in “background mode,” with a programmable external control device. The continuous window zoom and pan controls let you continue an action until the `STOP` command is issued.

When zooming or panning a window in background mode, issue the command:

```
WINZM <output #> <zi | zo | pl | pr | pu | pd | stop> <speed>
```

Where:

- `zi` = zoom in
- `zo` = zoom out
- `pl` = pan left
- `pr` = pan right
- `pu` = pan up
- `pd` = pan down
- `<speed>` is a value from 1 - 4 and sets the speed of the action.

PICTURE-IN-PICTURE

Picture-in-picture is a special windowing mode that can be controlled via RS-232/Telnet commands. When picture-in-picture mode is on, one output will fill the entire background, and another output will be an inset window in the middle of the foreground, as shown in *Figure 18*.

To turn picture-in-picture mode on, issue the command:

```
PIPON <window output #> <foreground> <background>
```

Where:

- `<foreground>` is the number of the output that will be displayed as a window in the center of the foreground

- `<background>` is the number of the output that will be displayed as a window that fills the background, behind the window in the foreground.

To turn off picture-in-picture mode, issue the command:

```
PIPOFF <window output #>
```

EXAMPLE

To display Output 2 as a window in the foreground of Output 1, with Output 3 acting as the background window, the command is:

PIPON 1 2 3

FIGURE 18. Picture-in-Picture Mode

DISSOLVE AND FORCE

The video dissolve feature creates a transition in which one output's video gradually fades into the video of another. The video force feature creates a transition in which one output's video is immediately "cut," or replaced by the video of another without any fade effect.

The Dissolve RS-232/Telnet commands allow the user to dissolve or cut one windowing output, while the Simultaneous Dissolve Output (SDO) commands allow the user to

dissolve several windowing outputs simultaneously. With these commands' capabilities, the user is able to dissolve or cut from window to window or from output to output when in windowing or picture-in-picture modes.

Dissolve

The Dissolve commands allow the user to cut or dissolve a windowing output. The three steps involved are listed below.

1. SET UP WINDOWING

You can choose to use either standard windowing mode or picture-in-picture mode. For instructions on setting up standard windowing, see "Window Function" on page 55 or see "Picture-In-Picture" on page 63 for help setting up picture-in-picture mode.

2. SET UP THE DISSOLVE OR FORCE EFFECT

To set up dissolve effect settings, use the command:

`DISSETUP <output #> <from source> <type> <duration>`

Where:

- `<output #>` is the output or window whose video is dissolved into the video from `<from source>`.
- `<from source>` is one of the following:

  `output1 | output2 | output3 | output4 | window1 | window2 | window3 | window4 | black`.
- `<type>` is either "`dissolve`" or "`force`".

  Selecting "`force`" will allow you to cut the windowing output, while selecting "`dissolve`" will allow you to dissolve it.
- `<duration>` is the number of frames for the transition.

NOTE: You may dissolve or cut from window to window, or from output to output. Thus, `<output #>` and `<from source>` must both be either windows or outputs.

3. DISSOLVE OR CUT

To perform the dissolve or force effect, issue the command:

`DIS <output #>`

Where:

- `<Output #>` is identical to the output number specified in setup.

TO DELETE DISSOLVE SETTINGS

To reset output parameters to default settings, use the command:

```
DISDEL <output #>
```

Where:

- `<Output #>` is identical to the output number specified in setup.

Simultaneous Dissolve Output

The Simultaneous Dissolve Output (SDO) commands allow users to simultaneously dissolve multiple groups of windowing outputs by storing output-source pairs in four different preset slots. The maximum number of pairs is equal to the maximum channels installed. The steps needed to simultaneously dissolve are listed below.

1. SET UP WINDOWING

See “Window Function” on page 55 or “Picture-In-Picture” on page 63.

EXAMPLE

Set Output 2 to display as a window in the foregrounds of Outputs 1 and 3 by issuing the picture-in-picture commands:

```
PIPON 1 2 1

PIPON 3 2 3
```

Then set Output 8 to display as a window in the foregrounds of Outputs 5 and 6 by issuing the commands:

```
PIPON 5 8 5

PIPON 6 8 6
```

2. SET SIMULTANEOUS DISSOLVE PAIRS

To set up simultaneous dissolve settings, use the command:

```
SDO <preset #> <dissolve rate> <output #> <from source>...
<output #> <from source>
```

Where:

- `<preset #>` refers to the slot (1-4) to which you would like to store these pairs.
- `<output #> <from source>` represents a preset dissolve pair.
- `<output #>` is the output or window whose video is dissolved into the video from `<from source>`.
- `<from source>` is a number 1 through 9, as explained below:

```
1= output 1, 2= output 2, 3= output 3
4= output 4, 5= window 1, 6= window 2
7= window 3, 8= window 4, and 9= black.
```

NOTE: You may only dissolve from window to window. Thus, `<output #>` and `<from source>` must both be windows.

EXAMPLE

After setting up picture-in-picture mode in the previous example, and choosing the dissolve rate of 120, the command is:

```
SDO 1 120 1 3 5 6
```

This sets preset 1 to trigger output 1 to dissolve into output 3, and output 5 to dissolve into output 6.

3. DISSOLVE

To perform the simultaneous dissolve effect, issue the command:

```
SDORUN <preset #>
```

EXAMPLE

According to the setup of the previous two steps' examples, the command is:

```
SDORUN 1
```

TO DELETE SIMULTANEOUS DISSOLVE SETTINGS

To remove a particular preset number's simultaneous dissolve settings, issue the command:

```
SDODEL <preset#>
```

CROP

By issuing the RS-232/Telnet CROP commands, areas of a window may be interactively cropped, or cropped at a specific location and size. Cropping a window will replace the removed portion with background.

Cropping Interactively

The three steps involved in interactively cropping a window are listed below.

1. SELECT A WINDOW TO CONTROL

In order to crop a window, you must first select a window to control.

To select a window to crop, issue the command:

```
CROP <output #>
```

After entering this command, the Crop control field will appear, as seen in *Figure 19*. You may then use this field to control the window you have selected.

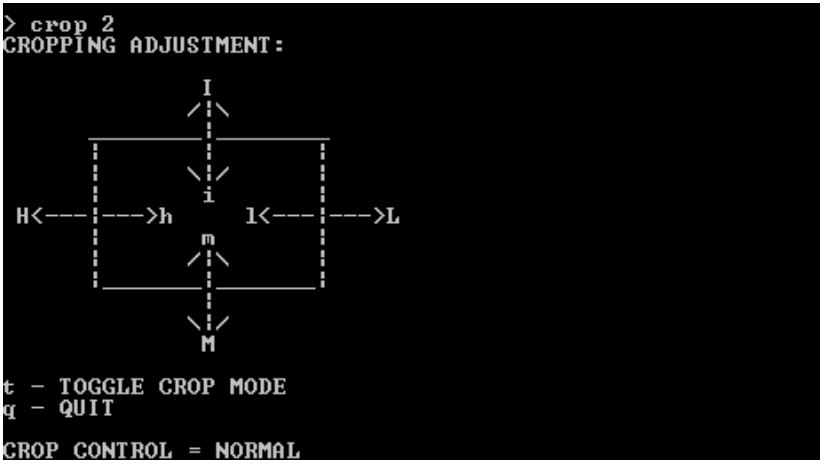


FIGURE 19. The Crop Control Field

2. CHOOSE "CROP"

You must choose to crop the selected window using the Toggle Crop Mode key, the lower-case "t" key.

Pressing this key will change the Crop Control setting at the bottom of the control field to read "Normal" (as in *Figure 19*) or "Crop." If Crop Control is set to "Normal," no cropping action may be taken.

3. CROP THE SELECTED WINDOW

Once you have set Crop Control to “crop”, you may then perform this action on a portion of the selected window using the Cropping Adjustment control keys.

All lower-case control keys (h, l, i, m) crop the chosen area of the window by one preset increment of pixels. To reverse this action, use the upper-case control keys. The upper-case control keys (H, L, I, M) decrease the cropped area by one increment, exposing the previously hidden portion of the window.

The table below explains the action each cropping adjustment control key can perform in this step.

Key	Action
h	Crops the left side of the window by one increment.
H	Decreases the left crop by one increment.
l	Crops the right side of the window by one increment.
L	Decreases the right crop by one increment.
i	Crops the top of the window by one increment.
I	Decreases the upper crop by one increment.
m	Crops the bottom of the window by one increment.
M	Decreases the lower crop by one increment.

Cropping at a Specific Location and Size

With multiple arguments, you can crop a window by providing the location and size of the window area you would like to alter.

The command is:

```
CROP <output #> <hpos> <vpos> <hsize> <vsize> <cropmode>
```

Where:

- `<hpos>` and `<vpos>` refer to the upper left corner of the window.
- `<hsize>` is in pixels; `<vsize>` is in lines.
- Crop mode: 0=normal, 1=crop

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WALL PROCESSING

ABOUT WALL PROCESSING

In addition to routing and manipulating video displayed on standard output screens and in windows, the SXPS can also route any input source to one or several large-scale wall displays, including, but not limited to, large television screens and projectors.

WALL PROCESSING FUNCTION

The SXPS can support multiple groups of walls. Each group is identified by its first output number.

ENABLING WALL PROCESSING FUNCTION

To turn the wall processing on, issue the command:

```
WALL <input#> <first output#> <column> <row> ON
```

Where:

- `<input #>` is the input you would like to route to the wall display.
- `<first output#>` is the first output number in the group
- `<column>` and `<row>` specify the size of the wall.

DISABLING WALL PROCESSING FUNCTION

To turn wall processing function off, issue the command:

```
WALL <first output> OFF
```

ADJUSTING WALL POSITION

To interactively adjust the position of the wall output, issue the command:

```
WALLADJ <output #>
```

This will cause the wall adjustment control field to appear, as shown in *Figure 20*.

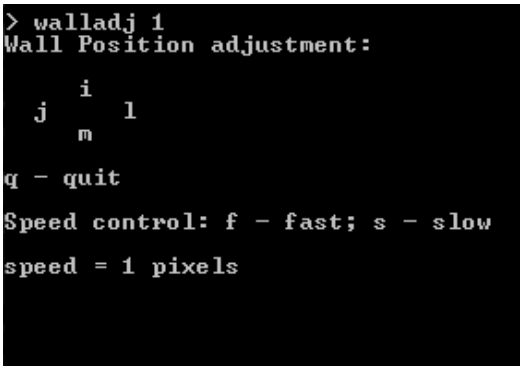

FIGURE 20. The Wall Adjustment Control Field

Wall Position Adjustment Control:

- To move the wall position to the left one preset increment, press the lower-case “j” key.
- To move the wall position to the right one preset increment, press the lower-case “l” key.
- To move the wall position to the up one preset increment, press the lower-case “i” key.
- To move the wall position to the down one preset increment, press the lower-case “m” key.

Speed Control:

- To increase the adjustment speed, press the lower-case “f” key.
- To decrease adjustment speed, press the lower-case “s” key.
- Each time the “f” or “s” key is pressed, the speed is adjusted by 1 preset increment of pixels.

SWITCHING INPUT SOURCES

The input source routed to a group of wall displays can be switched using the RS-232/Telnet Wall Switch command. When selecting a different input to display on the wall outputs, issue the command:

`WALLSW <input #> <first output #>`

`Where:`

- `<input #>` is the input you would like to route to the wall display.
- `<first output#>` is the first output number in the group.

RS-232 AND 10/100T PROTOCOL

A

SXPS COMMAND SET

The SXPS is controlled by using RS-232 or Ethernet connection using telnet protocol. Commonly used commands are presented and defined in the following tables covering scaling, switching, general system commands, wall processing, and windowing.

DISSOLVE AND FORCE COMMANDS

Command	Syntax	Action
CLEAREFFECT	CLREFFECT	Clears all effects in memory, including SSO, SDO, WINDOW, WALL, and DISSOLVE.
DISSETUP	DISSETUP <output #> <from source> <type> <dissolve rate or force %>	Sets up dissolve effect. <output #> is the output or window whose video is gradually replaced by the video from <from source>. <output #> is the number of the output channel connected to the window/output you would like to select. <from source> is the number of the output channel connected to the window/output you would like to select, or the number 100 for black. <type> is either “dissolve” or “force” <dissolve rate or force %> is the number of frames (1-1024) for the dissolve transition or the percentage of <output #> visible through <from source> for the force effect. **NOTE:** When dissolving from a window to its background, <output #> and <from source> will both be the number of the channel connected to the chosen output display.
DIS	DIS <output #>	Performs the dissolve effect. <output #> must be the same as in setup.
	DIS <output #> <delay rate>	Performs the dissolve effect. <output #> must be the same as in setup. <delay rate> is the number of frames for the delay (1-1024). **NOTE:** The delay rate feature can only be used when dissolving from a window to its background.
DISDEL	DISDEL <output #>	Removes dissolve settings, resetting the output parameters to defaults.

DISSOLVE AND FORCE COMMANDS

Command	Syntax	Action
DISFF	DISFF <output #>	Special Command. Performs the Dissolve FlipFlop effect: after the dissolve effect is completed, the original content of the output will be switched to the source output. <output #> must be the same as in setup. **NOTE:** The DISFF command can only be used when dissolving between two output channels that are NOT under windowing mode. These channels must be connected to display screens. Available for firmware version 4.80 and above.
SDO	SDO <preset #> <dissolve rate> <output #> <from source> ... <output #> <from source>	Sets up the simultaneous dissolve output window pairs. <preset #> refers to the preset slot (1-32) to which you would like to store the dissolve pairs. <output #> is the output or window whose video is gradually replaced by the video from <from source>. <output #> is the number of the output channel connected to the window/output you would like to select. <from source> is the number of the output channel connected to the window/output you would like to select, or the number 100 for black. <dissolve rate> is the number of frames (1-1024) for the dissolve transition.
SDODEL	SDODEL <preset #>	Removes simultaneous dissolve settings.
SDORUN	SDORUN <preset #>	Performs the simultaneous dissolve effect using the preset window pairs.

SCALING COMMANDS

Command	Syntax	Action
CKOFF	CKOFF <output #>	Turns off chromakeying. **NOTE:** For firmware version 4.80 and above.
CKON	CKON <output #> <fg> <bg> <red-lo> <green-lo> <blue-lo> <red-hi> <green-hi> <blue-hi>	Turns on chromakeying and selects the color within the specified range of RGB key values. **NOTE:** For firmware version 4.80 and above.
DBUFFER	DBUF <output #> <threshold>	Changes the double buffer threshold value.e **NOTE:** For firmware version 4.80 and above.
FREEZE	FZ <output #> <ON|OFF>	Freezes selected output. **NOTE:** For firmware version 4.80 and above.

SCALING COMMANDS

Command	Syntax	Action
GAMMA	GAMMA <output #> <value>	Changes the gamma of the selected output channel. <gamma> is a value from 10-250. 10 is equal to gamma 0.1 and 250 is equal to gamma 2.5. Default = 100, which equals gamma 1.0.
	GAMMA <red|green|blue> <output #> <value>	Adjusts the gamma of an individual color at the output.
GENLOCK	GL <output #> <ON|OFF>	Genlocks the output timing to the associated input timing.
GENLOCKALL	GLALL <ON|OFF>	Genlocks the output timing of all outputs to the associated input timing. **NOTE:** For firmware version 4.80 and above.
OUTPUTWINDOWSIZE	OWS <output #> <FIT|FILL|CENTER|STRETCH>	Applies preset video positioning to the specified output channel. <FIT> fits the entire image onto the display, maintaining the original aspect ration. Equivalent to resetting the video scaling to the default auto-resolution display. <FILL> scales an image up or down to fill the display, maintaining proper aspect ratio of the input. Image will be cropped if the input and output aspect ratios do not match <CENTER> maintains native resolution of the input and centers it within a display with a different resolution. <STRETCH> stretched an image to fit onto the display without cropping when the aspect ratio of the input is different than that of the display device. The aspect ratio will not be maintained if the image is stretched.
	OWS <output #> <hsize> <vsize>	Specifies a custom output resolution for the specified output channel. Aspect ratio is not constrained.
PAN	PAN <output #>	Activates controls to pan around the active boundary of zoomed video of the selected output or window. Control pan action with: i - up, m - down, j - left, l - right q - quit
PIWS	PIWS <output #>	Special command. Retrieves the source window and destination window values from the NURAM. **NOTE:** For firmware version 4.80 and above.
PIWSALL	PIWSALL <output #>	Special command. Retrieves the source window and destination window values from the NURAM for all outputs only if the outputs all share the same input. **NOTE:** For firmware version 4.80 and above.

SCALING COMMANDS

Command	Syntax	Action
RSTDBUFFER	RSTDBUF <output #>	Resets the double buffer threshold to the factory default value. **NOTE:** For firmware version 4.80 and above.
RSTOUTPUTATTR	RSTOUTPUTATTR	Resets the output gamma, lower, upper, brightness, and contrast to the default values. When using firmware version 4.85 or previous, issue the RFD command and then this command after installing a new board or updating firmware.
SFREEZE	SFZ <output #> <output #> ... <output #> <ON | OFF>	Simultaneously freezes or unfreezes multiple outputs.
SQUAREPIXEL	SPXL <output #> <ON | OFF>	Switches between ITU601 and square pixel for NTSC and PAL signals.
UHD	UHD <output #> <ON | OFF>	Turns ultra high-definition (UHD) processing on or off. UHD refers to 4Kx4K processing. **NOTE:** For firmware version 4.80 and above.
UHDZOOM	UHDZM <output #>	Zooms and pans the UHD output interactively. **NOTE:** For firmware version 4.80 and above.
	UHDZM <output #> <zi | zo | pl | pr | pu | pd | stop> <speed>	Zooms the UHD output. zi = zoom in, zo = zoom out, pl = pan left, pr = pan right, pu = pan up, pd = pan down, stop= stop the process. Speed is 1 to 10.
ZOOM	Zoom <output #>	Activates zoom control for the selected output channel or window. Control zoom action with: <+> zoom in <-> zoom out
	ZOOM <output #> <action> <speed>	This type of pan and zoom is meant for use with a programmable external control device. Run the command in background mode. This command will run until it reaches the limit or receives a stop instruction. <output #> is the number of the output channel connected to the output display or window you want to control. <action> is one of the following: zi- zoom in, zo- zoom out, pu- pan up, pd- pan down, pl- pan left, pr- pan right, STOP. <speed> is a value from 1 - 10 and sets the speed of the action.
ZOOM2	ZM2 <output #><output #>	Activates zoom control for two output channels simultaneously. **NOTE:** The two outputs channels must be routed to the same input. For firmware version 4.80 and above.

SCALING COMMANDS

Command	Syntax	Action
	`ZM2 <output #> <output #> <zi | zo | pl | pr | pu | pd | stop> <speed>`	Zooms or pans 2 output channels simultaneously. zi = zoom in, zo = zoom out, pl = pan left, pr = pan right, pu = pan up, pd = pan down, stop= stop the process. Speed is 1 to 10. **NOTE:** The two outputs channels must be routed to the same input. For firmware version 4.80 and above.
`ZOOM3`	`ZM3 <output #> <output #> <output #>`	Activates zoom control for 3 outputs simultaneously. **NOTE:** The 3 output channels must be routed to the same input. For firmware version 4.80 and above.
	`ZM3 <output #> <output #> <output #> <zi | zo | pl | pr | pu | pd | stop> <speed>`	Zooms or pans 3 outputs simultaneously. zi = zoom in, zo = zoom out, pl = pan left, pr = pan right, pu = pan up, pd = pan down, stop= stop the process. Speed is 1 to 10. **NOTE:** The 3outputs channels must be routed to the same input. For firmware version 4.80 and above.

SWITCHING COMMANDS

Command	Syntax	Action
`BRIGHTNESS`	`BRI <input #> <bright>`	Adjusts the brightness of the input signal. RGB and SD inputs only. `<bright>` is a value from -100 to 100.
`CLEAREFFECT`	`CLREFFECT`	Clears all effects in memory, including SSO, SDO, WINDOW, WALL, and DISSOLVE.
`CONTRAST`	`CONT <input #> <contrast>`	Adjusts the contrast of the input signal. RGB and SD inputs only. `<contrast>` is a value from 0 to 200.
`COPYOUTPUTTIMING`	`CPOT <from> <to>`	Copies output timing from one output to the other. <from> is the number of the output whose timing you are copying. <to> if the number of the output who will be receiving the copied output timing. **NOTE:** For firmware version 4.80 and above.

SWITCHING COMMANDS

Command	Syntax	Action
CREATEINPUTHOST	CINHOST <slot #> <name> <hfp> <hs> <hbp> <hact> <vfp> <vs> <vbp> <vact> <hfreq> <sync> <phase> <vpol> <hpol> <interlace>	Creates an input host timing in the designated slot number (1-40), with the specified parameters. <slot #> is a number 1-40. <name> is limited to 16 characters. <hfreq> in Hz. <sync> is 3,4, or 5 wire. <vpol> is vertical sync polarity; 1 = positive, 0 = negative. <hpol> is horizontal sync polarity. <interlace> is 1 = interlaced, 0 = non-interlaced.
CREATEOUTPUTHOST	COUTHOST <slot #> <name> <hfp> <hs> <hbp> <hact> <vfp> <vs> <vbp> <vact> <hfreq> <sync> <phase> <vpol> <hpol> <interlace>	Creates an output host timing in the designated slot number, with the specified parameters. <slot#> is a value from 501 to 540. <name> is limited to 16 characters. <hfreq> in Hz. <sync> is 3,4, or 5 wire. <vpol> is vertical sync polarity; 1 = positive, 0 = negative. <hpol> is horizontal sync polarity. <interlace> is 1 = interlaced, 0 = non-interlaced.
HOSTLIST	HLIST	Lists the host timing table.
HOSTMATCH	HM <input #>	Lists the default hosts that match the input timing. RGB inputs only.
HUE	HUE <input #> <hue>	Adjusts the hue of the input signal. SD inputs only. <hue> is a value from -180 to 180.
INPUTFORMAT	INFMT <input #> <format>	Changes the input format of the selected channel. <format> can be composite, s-video, or component.
INPUTLIST	INLIST	Lists the user timing table.
INPUTLISTDEL	INLISTDEL <user slot #>	Deletes the timing in the user timing table at the selected slot.
INPUTMODULUS	INMOD <input #>	Adjusts the modulus of the input signal. RGB inputs only.
INPUTNAME	INN <input #> <name>	Creates a name for the input signal. RGB inputs only.
INPUTPHASE	INPH <input #>	Adjusts the phase of the input signal. RGB inputs only.
INPUTPOSITION	INPOS <input #>	Adjusts the position of the input signal. RGB inputs only.

SWITCHING COMMANDS

Command	Syntax	Action
INPUTSAVE	INS <input #> <user slot #>	Saves the input timing to the user timing table. RGB inputs only.
INSTATUS	INSTATUS <input #>	Verifies whether there is a valid signal applied to the input. 1 indicates a valid signal. 0 indicates there is no signal on the input.
INPUTTIMING	INT <input #>	Shows the input timing.
LOWER	LOWER <output #> <+/- 100>	Adjusts the lower level of the input mapped to the specified output channel.
	LOWER <red|green|blue> <output #> <+/- 100>	Adjusts the lower level of the chosen color at the output.
MSW	MSW <input #> <output #>...<output #>	Special command. Switches the input to multiple outputs. **NOTE:** For firmware version 4.80 and above.
OUTBRI	OUTBRI <output #> <+/1 100>	Adjusts the brightness of the output.
OUTCONT	OUTCONT <output #> <0-200>	Adjusts the contrast of the output.
OUTPUTLIST	OUTLIST	Lists the output custom host timing table.
OUTPUTLISTDEL	OUTLISTDEL <slot #>	Deletes the output custom host timing at the specified slot.
OUTPUTSTATUS	OSTAT <output #>	Returns the input number connected to the output.
OUTPUTSTATUSALL	OSTATALL	Returns all of the input/output switching assignments.
OUTT	OUTT <output #>	Displays the output timing of the selected output channel. **NOTE:** For firmware version 4.80 and above.
PROFILEDELETE	PD <profile #>	Deletes the chosen profile. **NOTE:** For firmware version 4.80 and above.
PROFILERECALL	PR <profile #>	Sets up the input/output configuration from a stored profile. **NOTE:** For firmware version 4.80 and above.
PROFILESAVE	PS <profile #>	Saves the current input/output configuration as a profile, with up to 10 profiles possible. <profile #> can be any number 1-10. **NOTE:** For firmware version 4.80 and above.
SATURATION	SAT <input #> <sat>	Adjusts the saturation of the input signal. SD inputs only. <sat> is a value from 0 to 200.

SWITCHING COMMANDS

Command	Syntax	Action
SETINPUTTIMING	SETIT <input #> <host>	Assigns a default host timing to the input. The Vtotal, Hperiod, and interlace mode of the host must match the input source. <host> is a number which refers to the built in host table. Use the command HOSTLIST to display the host table
SETOUTPUTTIMING	SETOT <output #> <host>	Assigns a default host timing to the output. <host> is a number which refers to the built in host table. To display the host table, use the HOSTLIST command.
SSO	SSO <preset#> <input> <output> <input> <output> ..... <input> <output>	Simultaneous Switching Outputs command allows user to store switching pairs in 32 different slots. The maximum number of I/O pairs is eighteen.
SSODEL	SSODEL <preset#>	To delete the SSO setup.
SSORUN	SSORUN <preset#>	To simultaneously switch outputs using the preset input-output pairs.
SWITCH	SW <input #> <output #>	Routes the input to the output. An input can be routed to more than one output.
SWITCHBO	SWBO <output #>	Blanks the specified output. This output will be unblanked automatically when an active input is switched to it. **NOTE:** For firmware version 4.80 and above.
UPPER	UPPER <output #> <0-200>	Adjusts the upper level of the input mapped to the specified output channel.
	UPPER <red|green|blue> <output #> <0-200>	Adjusts the upper level of the chosen color at the output.
USB	USB <mode>	<mode> is “lock” or “free”. When in lock mode, USB switch will follow the video switch assignment (e.g. sw 1 2 will also switch USB 1 to 2). In free mode, USB switch will not follow the video switch assignment, and the user must issue the USBSW command to perform USB switching.
USBSTATUS	USBSTAT	Displays the USB I/O connections and also the USB mode selected.
USBSWITCH	USBSW <usb input #> <usb output #>	Performs USB switching.
VIDEOFORMAT	VFMT <input #>	Returns the video format of the specified input channel.
YUV	YUV <output #> <ON|OFF>	Turns YUV support on or off.

SYSTEM COMMANDS

Command	Syntax	Action
BAUD	BAUD <9600|1920|38400| 57600|115200>	Changes the baud rate of the RS-232 communication. **NOTE:** For firmware version 4.80 and above.
BLANKALLOUTPUT	BAO	Blanks all output channels.
BLANKOUTPUT	BO <output #>	Blanks the selected output channel.
COPYEDID	CPEDID <output #> <input #>	Copies the EDID from the display device to the input. NOTE: Before issuing this command, disconnect the input from the source. **NOTE:** For firmware version 4.80 and above.
COPYEDIDTIMING	CPET <output #> <slot #>	Copies output timing from the output to the output host slot, assuming the output timing is created from EDID information.
COPYINEDID	CPINEDID <input#> <output #>	Copies the input's EDID to the output and programs the display device connected to that output with the input's EDID information. **NOTE:** For firmware version 4.80 and above.
CSM	CSM	Creates the startup macro. Issue this command, then issue every command you would like stored in the macro. When finished, press Esc and then carriage return to end the session.
CUSTOMEDID	CEDID <input #> <host> <hsize> <vsize>	Sets the EDID timing from the host table. <hsize> and <vsize> values are compared to the resolution of the hosts in the host table. When the first match is found, the timing of that host is used to calculate the EDID value, which is then programmed to the input channel. NOTE: Before issuing this command, disconnect the input from the source.
	CEDID <input #> <host #>	Sets the EDID timing from the host table. Use when you know the host number.
DSM	DSM	Deletes the startup macro.
EXTCTL	EXTCTL <ON|OFF>	Enables/disables a special protocol for using an external controller, such as Crestron or AMX to control the SXPS.
FORCEOUTPUT	FOUT <output #> <ON|OFF>	Forces the specified output channel to send out a signal even when the SXPS cannot detect a connected display device. **NOTE:** If a monitor is connected to the SXPS via a fiber cable, there will be no hot plug, and thus the output will be undetected by the SXPS. To combat this issue, use the FOUT command to force output detection.

SYSTEM COMMANDS

Command	Syntax	Action
FORCEOUTPUTALL	FOUTALL <ON|OFF>	Forces all the output channels to send out a signal even when the SXPS cannot detect the connected display devices. **NOTE:** For firmware version 4.80 and above.
FRAMESYNC	FRAMESYNC <master> <slave1>...<slave3>	Frame-synchronizes all the slave channels to the master channel.
GET8051	G8051 <input #>	Reads back the RGB to DVI converter timing of the selected input channel.
GETDVIINTIMING	GDIT <input #>	Returns the input DVI timing at the specified channel.
GETDVIOUTTIMING	GDOT <output #>	Returns the output DVI timing at the specified channel.
GETEDID	GEDID <output #>	Returns the EDID data from the display device connected to the selected output channel.
GETEXTREME	GEX <output #>	Reads back the ID of the Extreme Cable Conditioner at the selected output channel.
GFRAMESYNC	GFRAMESYNC <start output #> <end output #>	Synchronizes the frames of all outputs within the range of <start output #><end output #> to the start output. **NOTE:** For firmware version 4.80 and above.
HELP	H	Lists all user commands.
HOSTLIST	HLIST	Lists the host timing table.
ID	ID	Returns system information.
INPUTAUTOSENSE	INAS <input #> <ON|OFF>	Turns the SD input auto sensing on or off. When autosense is ON, the unit attempts to automatically identify the format of the input signal (component, svideo, or composite). When autosense is OFF, the format of the input signal must be set using the INPUTFORMAT command. Default = ON.

SYSTEM COMMANDS

Command	Syntax	Action
INTESTPATTERN	INTP <input #> <host> <pattern>	Turns on the test pattern <pattern> with host <host> from the input RGB converter. The converter generates an RGB host signal internally. To turn the test pattern generator off, issue the command intp F <host>. Although it is required, the <host> setting is ignored. Test patterns <pattern>: 0 color bars 1 grey ramp 2 red ramp 3 green ramp 4 blue ramp 5 grey 64 steps 6 red 64 steps 7 green 64 steps 8 blue 64 steps 9 Auto Calibration F Turns the test pattern generator off Output modes <host>: 0 800x600 1 1024x768 2 1280x1024 3 1600x1200 4 1920x1080 5 1920x1200
IPADDRESS	IPADDR <ip address>	Sets the static IP address for network use.
IPGATEWAY	IPGW <ip gateway>	Sets the network gateway.
IPNETMASK	IPNM <net mask>	Sets the network mask.
NEWEDID	NEDID <INPUT #> <hfp> <hs> <hbp> <hact> <vfp> <vs> <vbp> <vact> <hfreq> <sync> <phase> <vpol> <hpol> <interlace>	Creates a special EDID timing for the designated input, with the specified parameters. <hfreq> in Hz. <sync> is 3,4, or 5 wire. <vpol> is vertical sync polarity; 1 = positive, 0 = negative. <hpol> is horizontal sync polarity. <interlace> is 1 = interlaced, 0 = non-interlaced. **NOTE:** For firmware version 4.80 and above. Before issuing this command, disconnect the input from the source.
OUTPUTPOWER	OUTP <output #> <ON|OFF>	Turns the output's phantom power on or off. **NOTE:** For firmware version 4.80 and above.
PROGALLEDID	PROGALLEDID <DL|SL>	Programs all inputs with the factory-default dual-link or single-link EDID value. **NOTE:** For firmware version 4.80 and above.

SYSTEM COMMANDS

Command	Syntax	Action
PROGEDID	PROGEDID <input #> <DL|SL>	Programs the default dual link or single link EDID value to the selected input channel. NOTE: Before issuing this command, disconnect the input from the source.
PROGJUPEDID	PROGJUPEDID <input #>	Allows you to program the Cyviz-xpo3 50 Hz EDID data to the specified input of the SXPS. NOTE: Before issuing this command, disconnect the input from the source.
PROGSRXEDID	PROGSRXEDID <input #>	Allows you to program the SONY SRX projector's EDID data to the specified input of the SXPS. NOTE: Before issuing this command, disconnect the input from the source.
PROGXPOEDID	PROGXPOEDID <input #>	Allows you to program the Cyviz-xpo3 EDID data to the specified input of the SXPS. NOTE: Before issuing this command, disconnect the input from the source.
RDINEDID	RDINEDID <input #>	Returns the EDID data on the selected input channel. NOTE: Before issuing this command, disconnect the input from the source.
RESET	RST	Initiates a system reset of the SXPS.
RESETNETPASSWORD	RSTNPW	Resets the network password to default. Default = `blackdiamond` External control must be turned off before this command is issued. The system should be rebooted after this command is issued. **IMPORTANT:** This command requires assistance from Black Diamond Video technical support.
RESETOUTPUTTIMING	RSTOT <output #>	Resets the output timing according to the EDID information from the display device. If no EDID information is available, host #5 is used (1280x 1024).
RESTOREDEFAULT	RFD	Restores the factory defaults for user parameters When using firmware version 4.85 or previous, issue this command after installing a new board or updating firmware, followed by the `rstoutputattr` command.
RSM	RSM	Runs the startup macro manually. After the Phantom 800 is powered on, the macro will run automatically.
SECURITY	SECURITY <ON | OFF>	Turns the password requirement for the GUI connection on or off.
SETID	SETID -model <model name> -serial <serial #> -date <date> -password BDVid	Sets the system's ID.

SYSTEM COMMANDS

Command	Syntax	Action
SETNETPASSWORD	SETNPW	Sets the network password. Default = blackdiamond
SETUSB	SETUSB <1 | 2> -password BDVid	Tells the system how many USB boards are in the system.
SHOWNETWORK	SHOWNET	Shows the network setup parameters.
SOFTDEINTERLACER	SDI <output #> <ON|OFF>	Turns the soft deinterlacer ON or OFF for the specified output channel. Default = ON.
UNBLANKALLOUTPUT	UBAO	Unblanks all output channels.
UNBLANKOUTPUT	UBO <output #>	Unblanks the selected output channel.
UPDATEFIRMWARE	UFW	Initiates a firmware update.
VERSION	VER	Returns the firmware version of the system.
VSM	VSM	Shows the content of the startup macro.

WALL PROCESSING COMMANDS

Command	Syntax	Action
CLEAREFFECT	CLREFFECT	Clears all effects in memory, including SSO, SDO, WINDOW, WALL, and DISSOLVE. **NOTE:** For firmware version 4.80 and above.
EDGEBLEND	EB <output #> <H value> <V value>	Sets the edgeblending value on a wall output.
MULLION	MUL <# of pixels>	Compensates for the width of mullion in wall processing. **NOTE:** For firmware version 4.80 and above.
PMEDGEBLEND	PMEB <H value> <V value>	Allows the user to set the edge blending value on a PMWALL output.
PMMULLION	PMMUL <# of pixels>	Compensates for the width of the mullion in pixel-mapped wall processing. **NOTE:** For firmware version 4.80 and above.
PMWALL	PMWALL <# of windows> <column> <row> ON	To turn on pixel-mapped wall processing. <# of windows> is the number of windows in the wall. **NOTE:** For firmware version 4.80 and above.
	PMWALL OFF	Turns off pixel-mapped wall processing. **NOTE:** For firmware version 4.80 and above.

WALL PROCESSING COMMANDS

Command	Syntax	Action
GROUP	GRP <group> <output #> <output #> <output #> <output #>	Sets four outputs to feed to the quad display as a group. The gamma, contrast, and brightness on outputs in this group will track on each other if the I/O pairs are the same.
GROUPDELETE	GRPDEL <group>	Deletes the specified group.
GROUPSTATUS	GRPSTAT	Displays the status of the groups.
WALL	WALL <input#> <first output#> <column> <row> ON	Turns the wall processing on. The SXPS can support multiple groups of walls. Each group is identified by its first output number. <column> and <row> specify the size of the wall. **NOTE:** The output channels used by the wall must be in consecutive order -- you may not skip a channel when creating a wall.
	WALL <input #> <first output #> <column> <row> <output #>...<output #> ON	Turns the wall processing on. The SXPS can support multiple groups of walls. Each group is identified by its first output number. <column> and <row> specify the size of the wall. **NOTE:** With this command, output channels used by the wall do not need to be in consecutive order. For firmware version 4.80 and above.
	WALL <first output> OFF	Turns the wall processing off.
WALLADJ	WALLADJ <first output #>	Adjusts the position of the wall output. This is an interactive command.
WALLSW	WALLSW <input #> <first output #>	Routes an input to the wall outputs.
WALLWINSIZE	WWS <output #> <FIT|FILL|CENTER|STRETCH>	Adjusts the size of the window in wall processing mode. **NOTE:** For firmware version 4.80 and above.

WINDOWING COMMANDS

(For Version 4.80 and above)

Command	Syntax	Action
BORDER	BORDER <output #>	Returns the state of the border and the width.
BORDERCOLOR	BORDERCOLOR <red> <green> <blue>	Returns the value of red, green, and blue for the border.
BORDEROFF	BORDEROFF <output #>	Turns off the border of the magnifying lens.
BORDERON	BORDERON <output #> <width>	Turns on the border if the magnifying lens. <width> is the number of pixels across the lens.
BORDERWIDTH	BORDERWIDTH <output #> <width>	Allows the user to change the width of the border.

WINDOWING COMMANDS

(For Version 4.80 and above)

Command	Syntax	Action
CASCADE	CC <display output #>	Causes windows to become equally sized and positioned in an overlapping arrangement that s diagonally across the display. The windows are organized in ascending order by priority. <display output #> is the number of the output displaying the windows.
CIWS	CIWS <output #>	Special command. Saves source window and destination window values into NURAM. **NOTE:** For firmware version 4.80 and above.
CLEAREFFECT	CLREFFECT	Clears all effects in memory, including SSO, SDO, WINDOW, WALL, and DISSOLVE.
CLONE	CLONE <window #> <output #>	The specified output mirrors the window output. Control remains at the window output. NOTE: The window and output must be in the same slot.
CROP	CROP <window #>	Interactively crop of the window. Cropping will replace the removed section with background.
	CROP <window #> <left> <top> <right> <bottom> <cropmode>	With multiple arguments, the window is cropped at the specified location and size. <left> and <right> crop in pixels. <top> and <bottom> crop in lines. <cropmode> is 0 or 1: 0= normal, 1=crop
DCWINON	DCWINON <display output #> <start window #> <end window #>	Creates windows in a range, beginning with <start window #> and ending with <end window #>. **NOTE:** For firmware version 4.80 and above.
DUALVIEW	DV <display output #>	Arranges a maximum of 2 windows (with priorities 1 and 2) into dualview formation according to the priorities assigned to them when window function was enabled. <display output #> is the number of the output displaying the windows.
LENSSIZE	LENSSIZE <output #> <hsize> <vsize>	Adjusts the size of the magnifying lens.
MAGFACTOR	MAGFACTOR <output #> <factor>	Adjusts the magnification factor. By default, <factor> is 2, but can be any number 1-4.
MAGOFF	MAGOFF <output #.	Turns off the magnifying lens feature.
MAGON	MAGON <output #> <fg> <bg>	Turns on the magnifying lens.
PAN	PAN <window #>	Activates controls to pan around the active boundary of zoomed video of the selected window. Control pan action with: i - up, m - down, j - left, l - right q - quit

WINDOWING COMMANDS

(For Version 4.80 and above)

Command	Syntax	Action
PIPON	PIPON <display output #> <foreground> <background>	Turns on picture-in-picture windowing mode. <foreground> is the output that will be displayed as a window in the center of the foreground, and <background> is the output that will be displayed in the background, behind this window.
PIPOFF	PIPOFF <display output #>	Turns off picture-in-picture mode. <display output #> is the channel number of the output displaying the windows.
RSTCLONE	RSTCLONE <output #>	Resets the clone on the specified output channel. The output will return to the regular switching mode.
TRIBOTTOM2	TB2 <output #>	Arranges a maximum of 3 windows (with priorities 1, 2, and 3) into TB2 formation according to the priorities assigned to them when window function was enabled. Arranges the first window on the top half of the output and the other 2 windows at the bottom half of the output. **NOTE:** For firmware version 4.80 and above.
TRIVIEW	TV <display output #>	Arranges a maximum of 3 windows (with priorities 1, 2, and 3) into triview formation according to the priorities assigned to them when window function was enabled. <display output #> is the channel number of the output displaying the windows.
QUADBOTTOM3	QB3 <output #>	Arranges up to 4 windows in QB3 formation: the first window appears on the upper half of the specified output and the other 3 appear at the bottom half of the output. **NOTE:** For firmware version 4.80 and above.
QUADMAP1	QM1 <quad1> <quad2> <quad3> <quad4>	Special command. <quad 1> - <quad 4> are the outputs feeding to those quadrants. The quadrants are numbered from left to right, top to bottom. Quadrants 1 and 3 will be filled with one input source, and the other 2 will each be filled with different input sources. **NOTE:** For firmware version 4.80 and above.
QUADMAP2	QM2 <quad1> <quad2> <quad3> <quad4>	Special command. <quad 1> - <quad 4> are the outputs feeding to those quadrants. The quadrants are numbered from left to right, top to bottom. Quadrants 1 and 3 will be filled with one input source, and Quadrants 2 and 4 will be filled with another input source. **NOTE:** For firmware version 4.80 and above.

WINDOWING COMMANDS

(For Version 4.80 and above)

Command	Syntax	Action
QUADSPLIT	QS <display output #>	Sizes each of a maximum of 4 windows to one quarter the size of the output display screen, and arranges them in quad formation according to the priorities assigned to them when window function was enabled. <display output #> is the channel number of the output displaying the windows.
RESETQUADMAP	RSTQM <quad1> <quad2> <quad3> <quad4>	Resets the QUADMAP1 or QUADMAP2 command. **NOTE:** For firmware version 4.80 and above.
VERTICAL2	V2 <output #>	Arranges the first 2 windows into V2 formation: the window with priority 1 will appear in the top half of the output, and the window with priority 2 will appear in the lower half. **NOTE:** For firmware version 4.80 and above.
WINDOW	WIN <display output #> <window #> <ON | OFF	Turns the window on or off.
WINDOWIDENTITY	WINID <display output #> <window #>	Identifies the window for the selected output. On the windowing output, the selected window will be on top of other windows and blink for 5 seconds. On the command line, the position and size of the selected window is returned. <display output #> is the channel number of the output displaying the windows.
WINDOWPOSITION	WINPOS <window #>	Controls the positioning and size of the output under windowing mode. This is an interactive command.
	WINPOS <window #> <hpos> <vpos> <hsize> <vsize>	Controls the positioning and size of the output under windowing mode. With this command, the window is positioned at the specified coordinate and size. <hpos> and <vpos> refer to the upper left corner of the window. <hsize> is in pixels; <vsize> is in lines.
	WINPOS <window #> <zi | zo | ml | mr | mu | md | stop> <speed>	Controls the positioning and size of the output under windowing mode. Run the command in background mode. This command will run until it reaches the limit or receives a stop instruction. zi = zoom in, zo = zoom out, ml = move left, mr = move right, mu = move up, md = move down, stop= stop the process. Speed is 1 to 10.

WINDOWING COMMANDS

(For Version 4.80 and above)

Command	Syntax	Action
	`WINPOS <window #> <LA | RA | TA | BA | CA>`	Aligns the output under windowing mode. LA= left align, RA= right align, TA= top align, BA= bottom align, CA= center align.
`WINDOWPRIORITY`	`WINPRI <display output #> <window #> <priority>`	Changes the priority of the output.
`WINFS`	`WINFS <display output #> <window #>`	Expands the selected window to fill the entire display screen.
`WINON`	`WINON <display output #> <window #> <window #> <window #> <window #>`	Turns the windowing function ON. `<display output #>` is the channel number of the output displaying the windows. - User can select different configurations of windows, with a maximum of 4 windows possible. - The sequence of the <window #> entries determines the initial priority of those windows. - EXAMPLE: If outputs 6, 7, and 8 display at output 5 as windows, with Window 8 at the highest priority, the command will be: WINON 5 8 6 7.
`WINOFF`	`WINOFF <display output #>`	Turns the windowing function OFF. `<display output #>` is the number of the output displaying the windows.
`WINDOWZOOM`	WINZM <window #>	Zooms/pans the content inside the window. This is an interactive command.
`ZOOM`	`ZOOM <window #>`	Activates zoom control for the selected window. This is an interactive command. Control zoom action with: `<+>` zoom in `<->` zoom out **NOTE:** Using the ZOOM command's zoom controls when under windowing mode will size the window up or down. Use the WINZM command to zoom within a selected window.

WINDOWING COMMANDS
(For Version 4.80 and above)

Command	Syntax	Action
	`ZOOM <window #> <action> <speed>`	This type of pan and zoom is meant for use with a programmable external control device. Run the command in background mode. This command will run until it reaches the limit or receives a stop instruction. `<window #>` is the number of the output channel connected to the window you want to control. `<action>` is one of the following: zi- zoom in (size up), zo- zoom out (size down), pu- pan up, pd- pan down, pl- pan left, pr- pan right, STOP. `<speed>` is a value from 1 - 10 and sets the speed of the action. **NOTE:** Using the ZOOM command's zoom controls when under windowing mode will size the window up or down. Use the continuous WINPOS command to zoom within a selected window.

USING AN EXTERNAL CONTROLLER

For a more robust communications protocol, the SXPS supports external controllers, such as Crestron or AMX devices. Black Diamond Video has developed a special control protocol which will enable most control applications. This protocol is enabled and disabled with the command `EXTCTL <ON|OFF>`.

Once the protocol is enabled, all commands sent to the SXPS are echoed back to the controller. The feedback from the SXPS is structured as follows:

```
STX(0x02) [command in upper case] [result] ETX(0x03)
```

EXAMPLE

With a DVI signal connected to input 3, you want to know if input 3 has a valid signal.You use the `INSTATUS 3` command. As a valid signal is present, the result is `1`.

The ascii code issued from the controller for this example is:

```
0x69 0x6E 0x73 0x74 0x61 0x74 0x75 0x73 0x20 0x33 0x0A 0x0D
```

The SXPS echoes back the command in upper case together with the result, and bracketed by the start and end transmission codes:

```
0x02 0x49 0x4E 0x53 0x54 0x41 0x54 0x55 0x53 0x20 0x33 0x20
0x31 0x0A 0x0D 0x03
```

Continuous Pan & Zoom

CONTINUOUS PANNING AND ZOOMING AN OUTPUT DISPLAY

This type of pan and zoom is meant for use with a programmable external control device. The continuous pan and zoom controls let you continue an action until the `STOP` command is issued.

The command is:

```
ZOOM <output #> <action> <speed>
```

Where:

- `<output #>` is the number of the output channel connected to the output display or window you want to control.
- `<action>` represents the type of pan or zoom:

Action	Description
`ZI`	Zoom in
`ZO`	Zoom out
`PL`	Pan left
`PR`	Pan right
`PU`	Pan up
`PD`	Pan down
`STOP`	Stop action

- `<speed>` is a value from 1 - 10 and sets the speed of the action.

CONTINUOUS PANNING AND ZOOMING A WINDOW

This type of command is meant for use with a programmable external control device. The continuous pan and size controls let you continue an action until the `STOP` command is issued.

NOTE: Using the ZOOM command to zoom in or out will adjust the window's size. To zoom in or out *within* a window, use the continuous WINPOS command described in the section "Continuous Window Position & Zoom" on page 95. Once the window is large enough to completely fill the display screen, the pan controls may be used to pan within the window.

The command is:

```
ZOOM <window #> <action> <speed>
```

Where:

- `<window #>` is the number of the output channel connected to the window you want to control.
- `<action>` represents the type of pan or zoom.

  Remember: zooming in or out of a window using the ZOOM command will adjust the window's size.

Action	Description
`ZI`	Zoom in (sizes window up)
`ZO`	Zoom out (sizes window down)
`PL`	Pan left
`PR`	Pan right
`PU`	Pan up
`PD`	Pan down
`STOP`	Stop action

- `<speed>` is a value from 1 - 10 and sets the speed of the action.

Continuous Window Position & Zoom

This type of window position and zoom command is meant for use with a programmable external control device.The continuous window position and zoom controls let you continue an action until the `STOP` command is issued.

The command is:

WINPOS <window #> <zi | zo | ml | mr | mu | md | stop> <speed>

Where:

- zi = zoom in
- zo = zoom out
- ml = move window left
- mr = move window right
- mu = move window up
- md = move window down
- `<speed>` is a value from 1 - 10 and sets the speed of the action.

RS-232 PINOUT

The RS-232 connector on the SXPS uses the pinout configuration as shown in *Figure 21*.

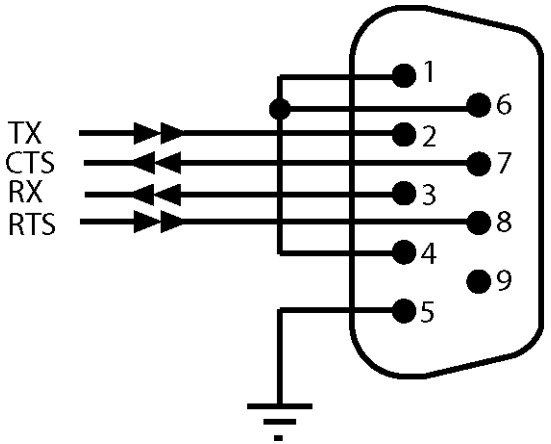

FIGURE 21. SXPS RS-232 Pinout

B

UPGRADING FIRMWARE

As a hardware device, the SXPS contains firmware. Firmware is embedded software that provides the necessary machine instructions for how the device operates. From time to time, Black Diamond Video publishes firmware updates. These updates may add functionality to or improve the operational efficiency of the SXPS.

Firmware updates, as they become available, are accessible from the Support page of the Black Diamond Video web site (www.blackdiamondvideo.com). You may also receive a firmware upgrade on a CD.

Firmware upgrades are performed using a 10/100T Ethernet connection, and, optionally, RS-232 control.

Download or Copy Firmware Upgrade to the Control Computer

The first step in performing a firmware upgrade for your SXPS is to acquire the update file and store it to a location on the Ethernet control computer. Firmware updates may be downloaded from the Black Diamond Video web site or provided to you on a CD.

1 **On the Ethernet control computer, create a folder to store the firmware upgrade.**

For this example, we'll create the folder on the Local Disk (C:) and name it `upgrade`.

> **NOTE:** You may save the upgrade file to any drive you wish and use any folder name you like.

2 **Download the firmware upgrade file from a CD or from the Black Diamond Video web-site into the folder created in *Step 1*.**

The file name is **`bdvsxps.bin`.xxx**, where **.xxx** is the firmware version number. You are now ready to upgrade the firmware of the SXPS.

Upgrade the SXPS Firmware

The upgrade can be accomplished entirely through Ethernet control, or you can use RS-232 control to issue the final upgrade command.

1 **Open the Command Prompt on the Ethernet control computer. For Windows, navigate to Start > Programs > Accessories > Command Prompt.**

The Command Prompt window opens.

2 **Type the command :** `rfd`

3 **Change the directory to the directory (folder) into which the firmware upgrade was downloaded from the task "Download or Copy Firmware Upgrade to the Control Computer." In our example this is done by entering the command: `cd\upgrade`.**

The new command prompt is `C:\upgrade>`.

4 **Open the 10/100T Network Connection between the control computer and the FTP Server within the SXPS by typing in the commands:**

```
ftp <ip address>

User: bdv

Password: blackdiamond
```

A prompt sign appears: >

NOTE: If the IP address is not known, establish RS-232 control of the SXPS and issue the `SHOWNET` command. This returns the IP address of the device.

5 **Type the command: `bin`**

A command prompt appears again: >

6 **Type the command: `put <filename>`, where the file name is the name of the file you downloaded in *Step 2* of "Download or Copy Firmware Upgrade to the Control Computer."**

In our example, the command is: `put bdvSXPS.bin.xxx`

7 **Close the connection to the SXPS ftp server by typing the command: `quit`**

The connection to the SXPS ftp server is closed.

8 **Open a Telnet session with the SXPS by typing the command: `telnet <ipaddr> 8998`**

The Telnet session is initiated.

9 **Enter the network password.**

The default password is "blackdiamond".

10 **Issue the upgrade firmware command in one of two ways:**

a From the serial port terminal, issue the RS-232 command: `ufw`

Progress information about the upgrade process appears on the terminal.

b From the Ethernet connection Command Prompt, type in the command: `ufw`

11 **The upgrade process takes approximately 2 - 3 minutes. When the upgrade is done, you are instructed to power cycle the SXPS.**

12 **Type the command : `rfd`**

Once you have issued this command, the firmware upgrade is complete, unless you are using firmware version 4.85 or previous.

13 **If you are using firmware version 4.85 or previous, type the command:** `rstoutputattr`

Once you have issued this command, the firmware upgrade is complete.