SIERRA VIDEO

Ponderosa™ 3G Series Routing Switcher

User's Manual

sierravideo
A KRAMER ELECTRONICS COMPANY

PONDEROSA™ SERIES ROUTING SWITCHER

User's Manual

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The information contained in this manual is subject to change by Sierra Video

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Chapter

1

Introduction

Before You Begin

There are several terms and acronyms that you should become familiar with before reading this manual. They are shown below.

Term/Acronym	Definition
Crosspoint	The electronic switch that assigns one of the inputs on the matrix crosspoint modules to an output.
Destination	The output of a routing switcher connected to a device that receives signals from the output of the switcher.
Output	Connects the signal to the destination device.
Source	The signal that is connected to the input of the routing switcher.
Input	Connected to the source that provides the signal to the switcher.
Matrix	An array of the switch modules that connects an input to an output.
Protocol	The command structure used to affect a switch or multiple switches on the routing switcher or to control other functions.
Routing Switcher	Consists of one or more crosspoint modules that switch together, or sometimes independently, to connect the desired signals through the switcher.
Serial Port	The 9-pin RS232 connector that allow you to control the switcher using a standard personal computer or other external device. Sends control protocol commands in ASCII.

Regulatory Warnings & Safety Information

The information in the following section provides important warnings and safety guidelines for both the operator and service personnel. Specific warnings and cautions may be found throughout this manual. Please read and follow the important safety precautions noting especially those instructions relating to risk of fire, electrical shock and injury to persons.

Any instructions in this manual that require opening the equipment cover or enclosure are intended for use by qualified service personnel only. To reduce the risk of electrical shock, do not perform any servicing other than what is contained in the operating instructions unless you are qualified.

⚠ Warnings

- Heed all warnings on the unit and in the operating instructions.
- Disconnect AC power before installing or removing device or servicing unit.
- Do not use this product in or near water.
- This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting inputs or outputs.
- Route power cords and other cables so that they are not likely to be damaged, or create a hazard.
- Dangerous voltages exist at several points in this product. To avoid personal injury, do not touch unsafe connections and components when the power is on.
- To avoid fire hazard, use only the specified type, correct voltage, and current rating of fuse. Always refer fuse replacement to qualified service personnel.
- Have qualified personnel perform safety checks after any completed service.
- To reduce risk of electrical shock, be certain to plug each power supply cord into a separate branch circuit employing a separate service ground.
- If equipped with redundant power, this unit has two power cords. To reduce the risk of electrical shock, disconnect both power cords before servicing.
- Operate only with covers and enclosure panels in place – Do Not operate this product when covers or enclosure panels are removed.
- This is an FCC class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take necessary measures.

⚠ Cautions

- Use the proper AC voltage to supply power to the switcher. When installing equipment, do not attach the power cord to building surfaces.
- To prevent damage to equipment when replacing fuses, locate and correct the trouble that caused the fuse to blow before applying power.
- Use only the recommended interconnect cables to connect the switcher to other frames.
- Follow static precautions at all times when handling the equipment.
- Power this product only as described in the installation section of this manual.

⚠ Cautions (continued)

- Leave the side, top, and bottom of the frame clear for air convection cooling and to allow room for cabling. Slots and openings in the frame are provided for ventilation and should not be blocked.
- Only an authorized Sierra Video technician should service the switchers. Any user who makes changes or modifications to the unit without the expressed approval of Sierra Video will void the warranty.
- If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than the room ambient temperature. Therefore, consideration should be given to installing the equipment in an environment compatible with the manufacturer's maximum rated ambient temperature (TMRA).
- Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
- Use a shielded data cable connection between the parallel data ports and peripherals of this equipment.
- Other connections between peripherals of this equipment may be made with low voltage non-shielded computer data cables.
- Network connections may consist of non-shielded CAT 5 cable.
- Do not cover chassis ventilation slots or block enclosure openings.

FCC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the expense of the user.

The user may find the following publication prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems" (Stock number 004-000-00345-4).

Available exclusively from the Superintendent of Documents, Government Printing Office, Washington, DC 20402 (telephone 202 512-1800).

Warning

Changes or modifications not expressly approved by the party responsible for compliance to Part 15 of the FCC Rules could void the user's authority to operate the equipment.

CE Notice

INFORMATION FOR THE USER

This equipment has been tested and found to comply with the limits for Class A or Class 1 digital device, pursuant to EN 550022 Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the expense of the user.

The user may find the following publication prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems" (Stock number 004-000-00345-4).
Available exclusively from the Superintendent of Documents, Government
Printing Office, Washington, DC 20402 (telephone 202 512-1800).

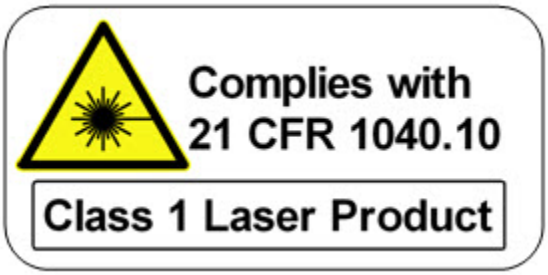
Warning

Changes or modifications not expressly approved by the party responsible for compliance to EN 55022 Rules could void the user's authority to operate the equipment.

ICAN Class A Digital Equipment

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet apparel numérique de la classe A respecte toutes les exigencies due Réglement sur le materiel brouiller du Canada.



Pulver Laboratories Inc. and Sierra Video Inc. hereby certify that the Ponderosa Series router is in compliance with VFG 523/1969, DIN 57871 / VDE 0871 / 09.84, and DIN 5785 Part 1 A2 / 10.90 (product standards) and is RFI suppressed.

The marketing and sale of this equipment in Germany has been reported to the German Postal service. They have also been given the right to retest this equipment to verify compliance with product regulations.

Compliance with applicable regulations depends on the use of shielded cables. The user is responsible for procuring the appropriate cables.

This equipment has been tested concerning compliance with the relevant RFI protection requirements both individually and on a system level (to simulate normal operation conditions). However, it is possible that these RFI requirements are not met under certain unfavorable conditions in other installations. The user is responsible for compliance of his particular installation.

Pulver Laboratories Inc.
Testing and Certification Laboratories
Sierra Video
Name of Manufacturer or Importer

Bescheinigung des Pulver Laboratories Inc. und Sierra Video hiermit wird bescheinigt, dass die Ponderosa Series router in Űbereinstimmung mit den Bestimmungen der VFG 523/1969, DIN 57871 / VDE 0871 / 09.84, und DIN 57875 Part 1 A2 / 10.90 (Amtsblattvertugung) funk-entstőrt ist.

Der deutschen Bundespost wurde das Inverkehrbringen dieses Geräts angezeigt und die Berechtigungen zur Űberprűfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

Einhaltung mit betreffenden Bestimmungen kommt darauf an, dass geschirmte Ausfűhrungen gerbraucht warden. Fűr die Beschaffung richtiger Ausfűhrungen ist der Betreiber Verantwortlich.

Dieses Gerät wurde sowohl einzeln als auch in einer Anlage, die einen normalen Anwendungsfall nachbildet, auf die Einhaltung der Funk-entstőrbestimmungen unter Ungűnstigen Umständen bei anderen Gerätekombinationen nicht Eingehalten warden. Der Betreiber ist fűr die Einhaltung der funk-eutstőrungsbestimmungen seiner gesamten Anlage verantwortlich, in der dieses Gerät betrieben wird.

Pulver Laboratories Inc.
Testing and Certification Laboratories
Sierra Video
Name des Herstellers / Importeurs

Caution

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Attention

IL y a danger d'explosion s'il y a replacement incorrect de la batterie, remplacer uniquement avec une batterie du meme type ou d'un type equivalent recommande par le constructer. Mettre au rebut les batteries usages conformement aux instructions du fabricant.

Power Supply Cords

Use only power cord(s) supplied with the unit.

If power cord(s) were not supplied with the unit, select as follows:

- For units installed in the USA and Canada: select a flexible, three-conductor power cord that is UL listed and CSA certified, with individual conductor wire size of #18 AWG, and a maximum length of 4.5 meters. The power cord terminations should be NEMA Type 5-15P (three-prong earthing) at one end and IEC appliance inlet coupler at the other end. Any of the following types of power cords are acceptable; SV, SVE, SVO, SVT, SVTO, SVTOO, S, SE, SO, SOO, ST, STO, STOO, SJ, SJE, SJO, SJOO, SJT, SJTOO, SP-3, G, W.

- For units installed in all other countries; select only a flexible, three-conductor power cord, approved by the cognizant safety organization of your country. The power cord must be Type HAR (Harmonized), with individual conductor wire size of 0.75 mm². The power cord terminations should be a suitably rated earthing-type plug at one end and IEC appliance inlet coupler at the other end. Both of the power cord terminations must carry the certification label (mark) of the cognizant safety organization of your country.

- A non-shielded power cord may be used to connect AC power to every component and peripheral of the system.

- Connect an external 18 AWG wire from earth ground to the chassis of the system as designated by the earth ground symbol.

North American Power Supply Cords

This equipment is supplied with North American power cords with molded grounded plug (NEMA-15P) at one end and molded grounding connector (IEC 320-C13) at the other end. Conductors are CEE color coded, light blue(neutral), brown(line), and green/yellow(ground). Operation of the equipment at voltages exceeding 130VAC will require power supply cords that comply with NEMA configurations.

International Power Supply Cords

If shipped outside North America, this equipment is supplied with molded ground connector (IEC 320-C13) at one end and stripped connectors (50/5mm) at the other end. Connections are CEE color coded, light blue (neutral), brown(line), and green/yellow(ground). Other IEC 320-C13 type power cords can be used if they comply with safety regulations of the country in which they are installed.

EMC Regulatory Notices

Federal Communications Commission (FCC) Part 15 Information: This device complies with Part 15 of the FCC standard rules. Operation is subject to the following conditions:

This device may not cause harmful interference

This device must accept any interference received including interference that may cause undesirable operations.

Delivery Damage Inspection

Carefully inspect the frame and exterior components to be sure that there has been no shipping damage. Make sure all modules are seated correctly and have not detached during shipment.

Ponderosa™ Series Routing Switcher

Introduction

The Ponderosa HD/SDI video routing switcher from Sierra Video is top-of-the-line modular routing for those applications requiring worry-free performance and mission critical reliability. The advanced features and performance set it apart from the competition. These include:

- Modular configurations expandable by 8 input and/or 8 output increments
- Compact frame size – 4RU (6464 frame) or 8RU (128128 frame).
- Hot-swappable video I/O boards, CPU boards, and power supplies
- Optional redundant power supplies and control processors
- Full range of Sierra control hardware and software components, including remote control panels, IP, and RS-232/422 serial control. Supported by all major third party control systems.

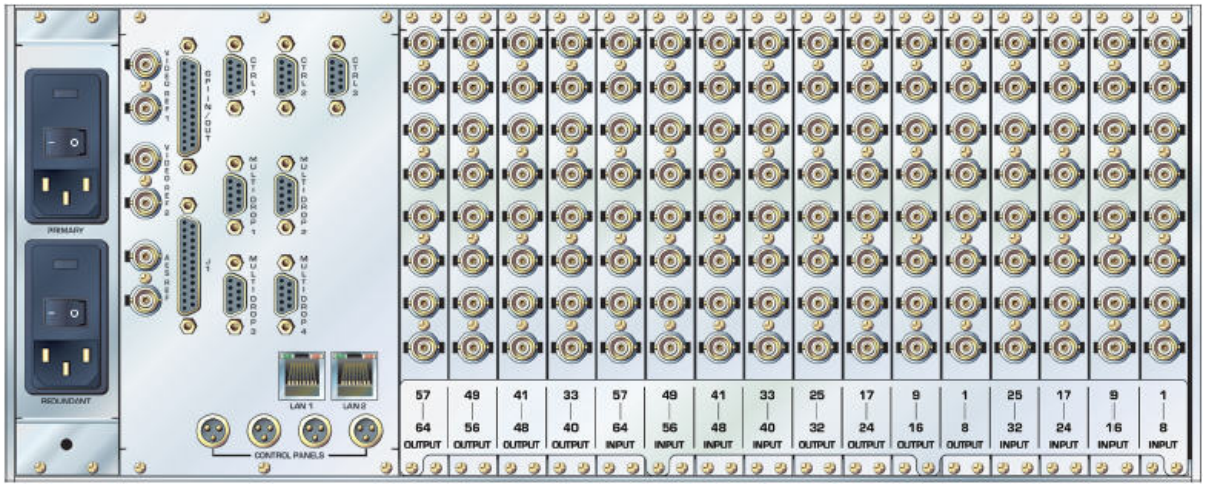
Front-door access to hot-swappable video I/O boards allows for field service or matrix reconfiguration. The power supplies are also hot-swappable, guarantee maximum in-service time and minimal interruptions. IP (Ethernet) control via TCP/IP socket connection and RS-232/422 serial control is standard in every model.

For applications requiring companion audio, the Ponderosa routing switcher is compatible with our time-tested line of audio routing switchers. Sierra Video' advanced SCP line of programmable control panels manage the routing system along with our TyLinx™ router control software featuring the most intuitive router interface in the industry.

Ponderosa 6464 Frame

Frame Front Panel

Frame Rear Panel

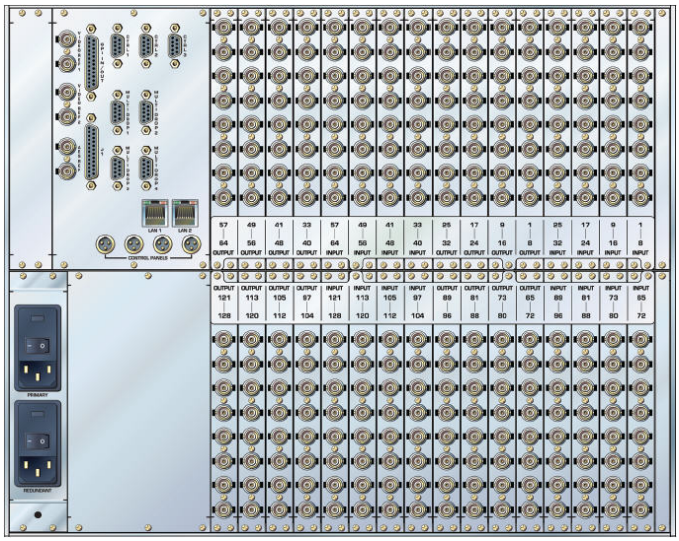


Note
The Sierra Video models shown here and in the subsequent sections are fully loaded matrices. In some cases, these frames may be configured with less outputs or inputs. Consult the rear panel serial number and model number to verify your order and product. **The system you receive is customized for the size & type requested at time of purchase from Sierra Video**

Ponderosa 128128 Frame

Frame Front Panel

Frame Rear Panel



Note
The Sierra Video models shown here and in the subsequent sections are fully loaded matrices. In some cases, these frames may be configured with less outputs or inputs. Consult the rear panel serial number and model number to verify your order and product. **The system you receive is customized for the size & type requested at time of purchase from Sierra Video**

Factors Affecting Quality of Results

There are many factors affecting the quality of results when signals are transmitted from a source to a destination.

- Signal cables — Use only the best quality cables to avoid interference, degraded signal quality and elevated noise levels.
- Sockets and connectors of the sources and destinations — Use only the highest quality, since "zero ohm" connection resistance is the target. Connectors should also match the required impedance (75 ohm in video) to minimize return loss.
- Amplifying circuitry — Must have quality performance when the desired end result is high linearity, low distortion, and low noise.
- Distance between sources and destinations — Plays a major role in the final result. For long distances (over 15 meters) between sources and destinations, special measures should be taken to avoid high frequency cable losses. These measures include using higher quality cables and/or adding line cable equalizing amplifiers.
- Interference from neighboring electrical appliances — These can have an adverse affect on signal quality. Balanced audio lines are less prone to interference, but unbalanced audio should be installed away from any main power lines, electric motors, transmitters, etc. even when the cables are shielded.

CAUTION!

Only an authorized Sierra Video technician can service the switchers. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void the warranty

Use the proper AC voltage to supply power to the switcher.

Use only the recommended interconnect cables to connect the switcher to other frames

Chapter

2

Installation

Introduction

Installation procedures are similar for all frames covered within this manual. Exceptions, if any, have been noted in each of the following paragraphs.

Rack Mounting

Carefully inspect the frame to ensure that there has been no shipping damage. Make sure all shipping material is removed from the router frame.

Each of the routing switchers described in this manual can be rack mounted in a standard 19" (RU) EIA rack assembly and includes rack "ears" at the ends of the front of the frames. None of the switcher models require spacing above or below the unit for ventilation. If ample space exists, a 1RU spacing gap is recommended.

To rack mount any of the routing switchers, simply place the unit's rack ears against the rack rails of the rack, and insert proper rack screws through each of the holes in the rack ears. Always rack mount the routing switcher prior to plugging the unit into a power receptacle or attaching any cables.

Important: Rear mounting brackets must be installed prior to installation of the router into a rack. The rear mounting brackets are contained in the accessory kit supplied with your router.

CAUTION!

The operating temperature range of the Ponderosa series router is 0 to 40 °C. Do not exceed the maximum (40 °C) or minimum (0 °C) operating temperature.

Rear mounting brackets must be installed prior to installation of the router into a rack. The rear mounting brackets are contained in the accessory kit supplied with your router.

If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than the room ambient temperature. Therefore, consideration should be given to installing the equipment in an environment compatible with the manufacturer’s maximum rated ambient temperature (TMRA).

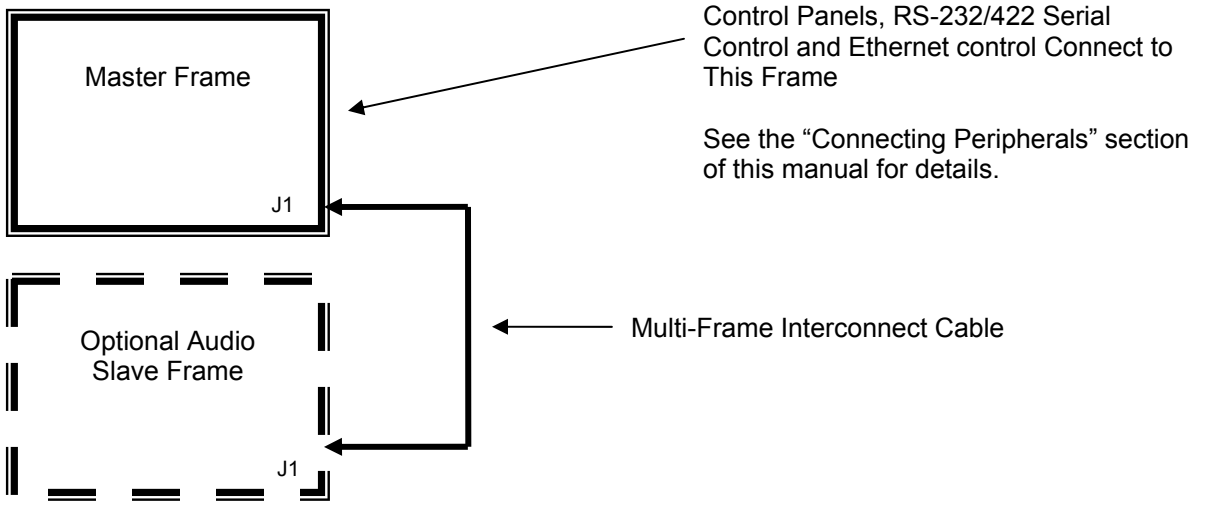
Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

Multi-Frame Connection

The Ponderosa routing switcher can be connected to other SVS routers to work as one system (i.e. audio or other signal formats).

Depending on the other frames in the system, connections are either made using the “J1” (25 pin) or “Multi-drop” (9 pin) connector. A system drawing will be included in the shipment if a multi-frame system is ordered.

Control panels and serial control connect to the frame containing the master processor.



Connecting To Video Devices

Video sources and output devices (such as monitors, or recorders) may be connected to the routing switchers through the 75 ohm BNC type connectors located on the back of the unit. Keep in mind that the output signal format will be that of the input signal format.

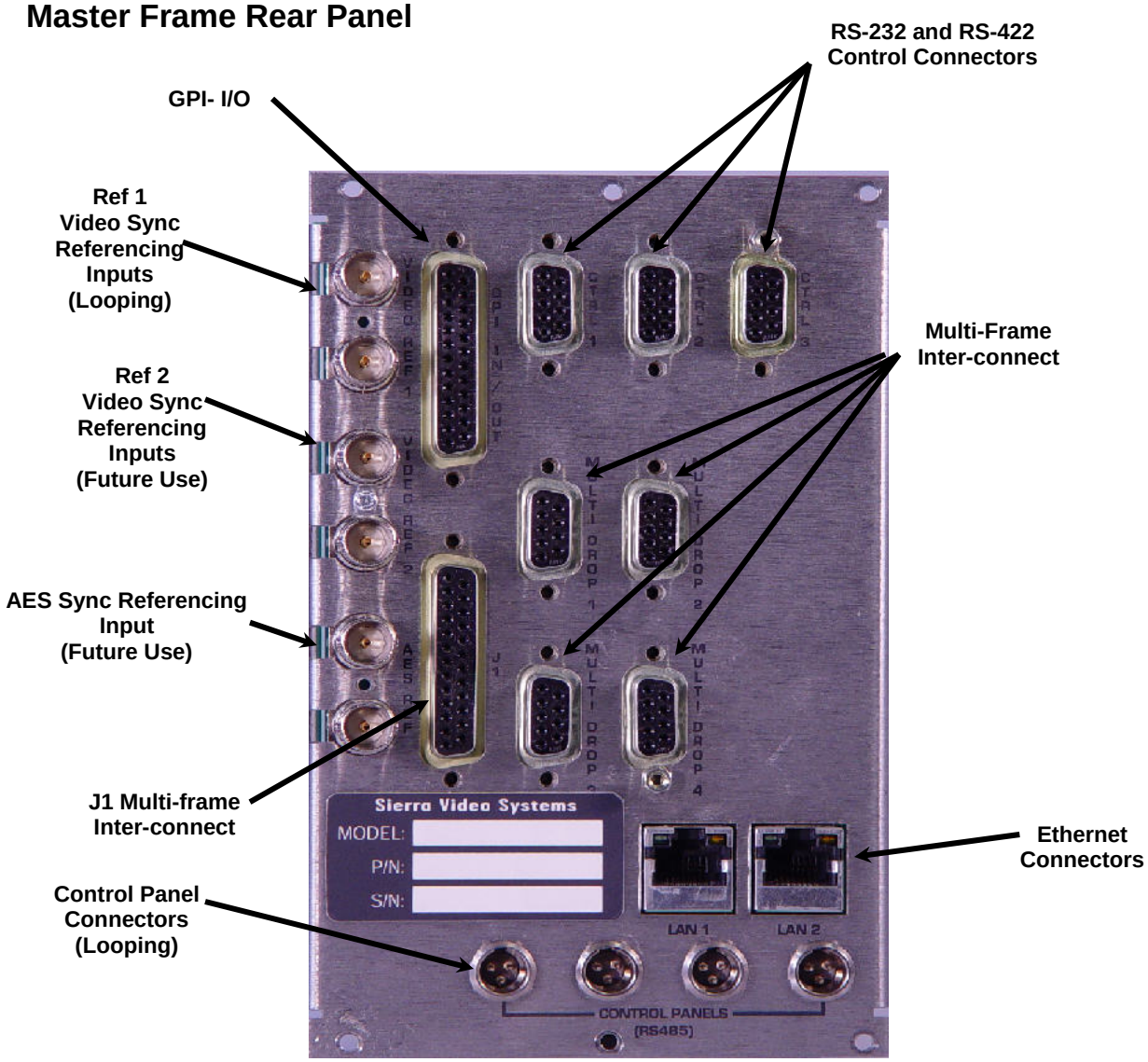
All signal connections that use more than one cable interconnecting between devices should be of equal timing length (example: cables between a camera and the switcher should have the same time delay).

Inputs are set for 75 ohm termination. Unused outputs do not need to be terminated.

Connecting Peripherals

Control panels, sync inputs, and power are all connected to the rear of the “Master” frame. The peripherals area may vary depending on the model size and type.

Master Frame Rear Panel



Reference Sync

There are three “looped” sets of BNC connectors labeled "VIDEO REF 1", “VIDEO REF 2”, and “AES REF”. These are "looping" inputs for sync referencing. Connect either composite sync or video with sync to either set of BNCs. If desired, use the second BNC in the set to loop the signal to another device. If the loop is not used, terminate the second BNC with 75 ohms.

The set of sync connectors labeled “VIDEO REF 2” and “AES Ref” are for future use and are not connected.

If no sync is available, the routing switcher will switch at a random point rather than during the vertical interval of the reference signal.

Note:

Reference sync need only be connected to the “Master” frame. The “Master” frame is the frame where the processor is installed in a multi-frame system.

Input Equalizers

The Ponderosa series routers have the ability to adjust to the input’s cable length. The factory default settings for the input equalizers are “on”. However, they can be manually set using the TyLinx Pro configuration and control software.

In the 'ON' mode: The input equalizer is enabled and the routing switcher will automatically adjust to the cable length connected to the input.

In the 'OFF' mode: The input equalizer is bypassed, and the routing switcher will not do any cable equalization.

Output Reclocking

Ponderosa provides intelligent reclocking with a microprocessor that analyzes the data rate of incoming signals. If the rates are within range of standard 270Mbps or 3Gbps data rates, Ponderosa will optimize the signal to its target rate. If the data rate of incoming signal is outside typical 270Mbps or 3Gbps data rates, like MPEG-2, Ponderosa will allow the signal to pass without interruption.

The factory default settings for the reclockers are automatic. However the reclockers can be manually set using the Sierra Video TyLinx Pro software.

AC Power Connections

Ponderosa series routing switchers offer redundant power supplies but must be specified prior to order. The power supplies are universal AC inputs. Voltage selection is not necessary because the power supply senses the correct AC input automatically.

It is advised to connect each power supply to separate AC circuits.

The rear of the frame has two AC connectors labeled Primary and Redundant regardless of if redundant power supplies are installed. For non-redundant power systems only the AC connector “primary” is connected.

There are 4 “health monitoring” LEDs on each power supply. The LEDs indicate fan and power status.

Redundant Power Supplies

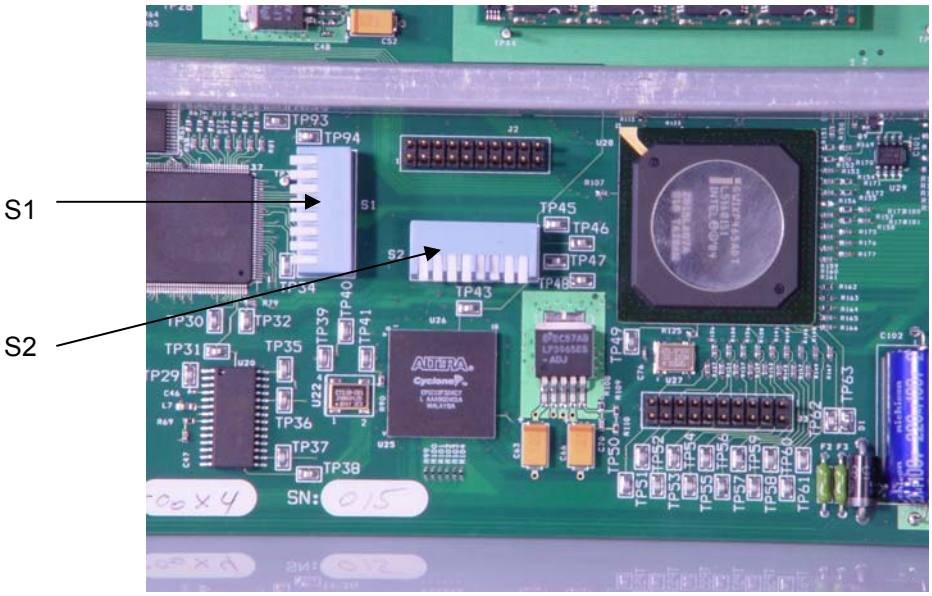
If redundant power supplies are ordered, the frame will contain two complete power supplies with health monitoring LEDs. If a power supply should fail the other power supply will automatically take over.

If a non-redundant power supply system is ordered, the redundant power supply slot will contain a power supply frame with only the fan and health monitoring LEDs. This is referred to as a “fan sled”. The “Module power” LED will not be lit on the fan sled. The redundant power AC connection need not be connected for units with non-redundant power supplies. The fan sled will operate from the primary power supply.

The “Fault” LED (red) turns on if there is a fan failure.

Control Processor DIP Switches

Your switcher has been configured at the factory for the settings you are most likely to need. However, if you want to configure the switcher differently, you can do so by setting the switches located on the processor board. DIP Switches and their action are given in the table that follows. DIP Switches are shown in their factory default settings.



Note:

Changing any DIP Switch causes an automatic reset after a few seconds.

Switch position down = ON.

DIP Switch Settings Cont.

DIP Switch	Action	
	S1	**S2**
1	Debug Messages ON= Debug Messages *OFF= Normal Operation	Force Crosspoint Initialization ON= Set X-points to 1-1, 2-2, 3-3, etc. *OFF= Last X-point Remembered
2	Bootloader Menu ON= Menu Enable *OFF= Menu Disable	Initialize Non-Volatile Memory ON= Clear All Settings *OFF= Normal Operation
3	Router Application Startup ON= Application Disable *OFF= Application Enable	Port 1 Protocol ON= Terminal Protocol- XOn/ XOff Enabled *OFF= Port Can be Changed by Software
4	Debug Server ON= Server Enable *OFF= Server Disable	Port 1 Type If S2-3 is ON; ON= RS-422 *OFF= RS-232 If S2-3 is OFF Settings Can be Changed by Software
5	Debug Break ON= Break *OFF= No Break	Port 1 Baud Rate If S2-3 is ON; 1.2K Baud 5 = OFF, 6 = OFF 9.6K Baud 5 = OFF, 6 = ON 38.4K Baud 5 = ON, 6 = OFF *115.2K Baud 5 = ON, 6 = ON
6	Debug redundant CPU ON= Debug *OFF= Normal Operation	
7	Redundant Processor Enable ON= Redundant Processors OFF= Only One Processor	Unused
8	Preferred CPU Select ON= Master CPU OFF= Standby CPU	Unused
*** = Factory Default Settings**		

Note:

To manually set Port 1 to RS-422, turn S2-3 ON and S2-4 ON.

(Baud Rate is now set by S2-5 and S2-6)

Redundant Processors

Introduction

The Ponderosa Family supports the use of redundant processors. A system with this option has two different control processors. At any given time, one of the processors is the master and the other is the standby processor. The master processor is the one that controls the system. The standby processor simply monitors the activity of the master processor, keeping track of the same routing switcher status information as the master, and takes over the job of master if it detects that the master processor has failed.

To enable redundant processors, DIP switch S1-7 must be ON on both processors. If it is off, the processor will ignore the presence of another processor and will start up as master processor and control the entire system. It will not flash the LED that indicates that the other processor has a problem.

The two processors always monitor each other and present status information on the processor LEDs to indicate the processor health.

Ethernet Setup V18.0 or newer

***For units shipped after 2/15/09**

There are two Ethernet connectors on the “Master” frame labeled “LAN 1” and “LAN 2”. For single processor systems only “LAN 1” is active.

Ethernet connections are made to the connector labeled LAN 1.

Default IP settings;

IP Address- 192.168.1.200

Subnet mask- 255.255.255.0

Gateway IP Address- 0.0.0.0

Telnet Port- 10001

To set IP parameters using the Ethernet port;

1. Connect the Ethernet cable to “LAN 1” on the back of the “Master” frame

2. Open the command prompt on a PC. In Windows XP Pro, you can access the Command Prompt by clicking on the “Start” menu “Programs”, “Accessories”, “Command Prompt”

3. Verify communications to the router by “Pinging” the router. You can do this by typing in the ping command in the Command Prompt window as follows;
   “ping 192.168.1.200” followed by a carriage return.

4. Once communications have been established you can Telnet into the router. You can do this by typing in the telnet command in the Command Prompt window as follows;
   “telnet 192.168.1.200” followed by a carriage return.

5. To login to the router, type “svsadmin” at the login prompt followed by a carriage return. Then enter the password “TED” the password is case sensitive and must be typed in uppercase characters.

6. To view the current network parameters you need to type in the following command;
   “SvsBootApp Params” followed by a carriage return.

7. To change the IP address the command is as follows;
   “SvsBootApp SetParam IP xxx.xxx.x.xxx
   Where the “x” is the IP address you want to assign to the router.

8. To set the Subnet Mask the command is as follows;
   “SvsBootApp SetParam SUBNET xxx.xxx.xxx.x
   Where the “x” is the Subnet address you wish to assign to the router

9. Once the IP address and Subnet mask have been set you can close the telnet connection to the router by typing “exit” at the \> prompt then restart the router by power cycling the “Master” frame.

10. Once the system has restarted you can verify that your settings are correct by pinging the IP address you just assigned the router i.e.
    “ping (your new IP address) followed by a carriage return.

Other Telnet Commands:

“SvsBootApp SetParam DHCP 0 “ DHCP disabled
“SvsBootApp SetParam DHCP 1” DHCP enabled

Note:

192.168.1.200 is the factory default IP address for the master CPU.

To set IP parameters using the serial port;

To set the IP address:
Connect to the Ctl 2 port using a terminal emulator such as HyperTerminal or Hyper Access.
Baud Rate 115200
Data Bits 8
Stop Bit 1
Parity None
Flow Control X-ON/X-OFF

Default settings:

Master CPU:
IP Address 192.168.1.200
Subnet Mask 255.255.255.000
Gateway Address 0.0.0.0
Telnet Port 10001 or 12000

Slave CPU (optional):
IP Address 192.168.1.201
Subnet Mask 255.255.255.000
Gateway Address 0.0.0.0
Telnet Port 10001 or 12000

Press enter to enter the Terminal Application.
Press “Ctrl W” to access the router configuration screen.
Press "B" to access the "Available Variables" screen.
Press "11" to change the IP address variable and enter the new IP address.
When complete press "12" to access the Subnet Mask Variable and enter the new subnet mask.
When complete press "18" to access the Gateway address Variable and enter the new Gateway address.
after making these changes press the escape button and then press Ctrl W, V
This will save the new settings into persistent memory.
When complete press escape.
If setting up a Redundant CPU you need to switch to the redundant CPU by pressing "T"
And answer "Y” to the following question.
Do you want to switch to the standby processor? [N]
Once the switch to the slave is complete repeat the above steps for the
slave processor then switch back to the master processor when complete.

DO NOT MAKE ANY OTHER CHANGES TO THE AVAILABLE VARABLES WITH OUT CONSULTING WITH THE FACTORY.

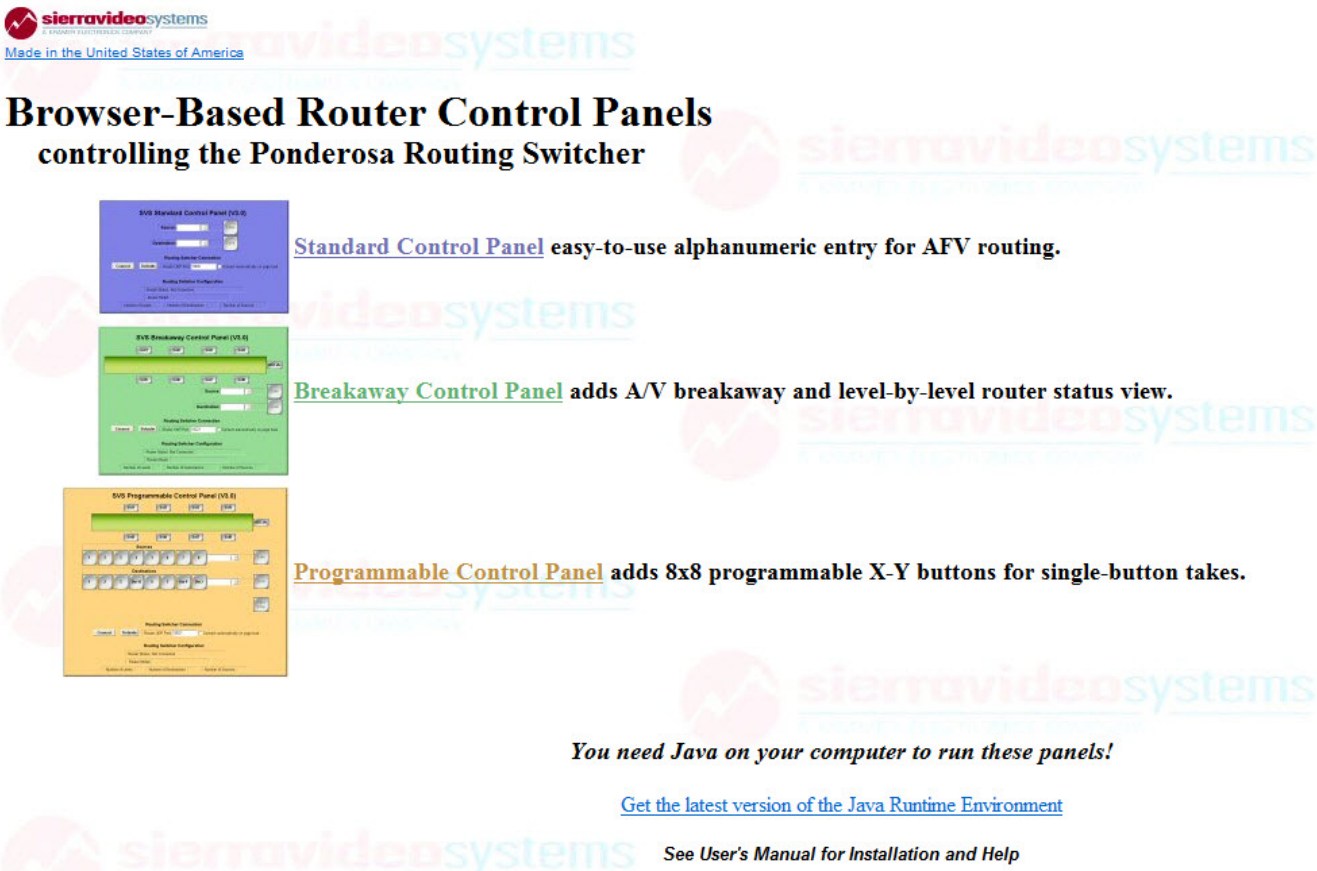
Note:

The Ethernet port accepts HOST protocol commands to switch the router. See the section of this manual on Protocol for information on Host protocol commands.

**If your server is capable of IP reservations by the MAC address you can enable the DHCP option. It is advisable to contact the Factory for further information regarding this feature.*

V18 and newer software

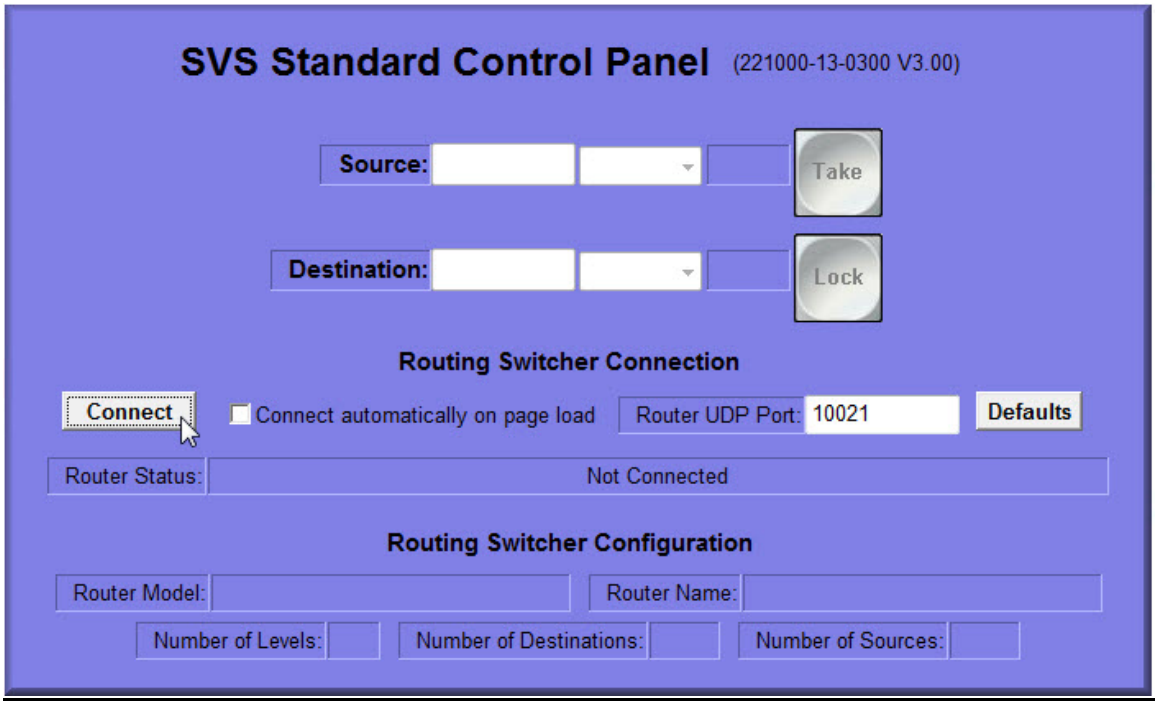
Software version 18 and newer contains web pages for switching the router. Once your PC and the routing switcher are on the same Ethernet network, open your internet browser and type in the default address of the routing switcher in the address line of the internet browser (factory default 192.168.1.200). The following will display allowing switching of the router;



You are provided with 3 different options to switch the router;

“Standard Control Panel”- easy to use alphanumeric entry for AFV routing.

The Standard Control Panel is intended for switching “all levels” and is not capable of breaking levels (i.e. Video from Audio).



Click on **Connect**. The message “Getting Router Model” will display next to **Router Status**. This is an indication that the program is attempting to contact the router for information.

Switching

To make a switch, first select a destination from the **Destination** drop down list. The current status of the selected destination will display in the Source window.

Select a new source from the **Source** drop down list and the **“Take”** button will light. Click on **“Take”** and the switch will take place.
You can also switch by entering the numeric value of the Input or Output.

Status

When a destination is selected, the current status (source currently connected to that destination) is displayed in the source window.

Lock

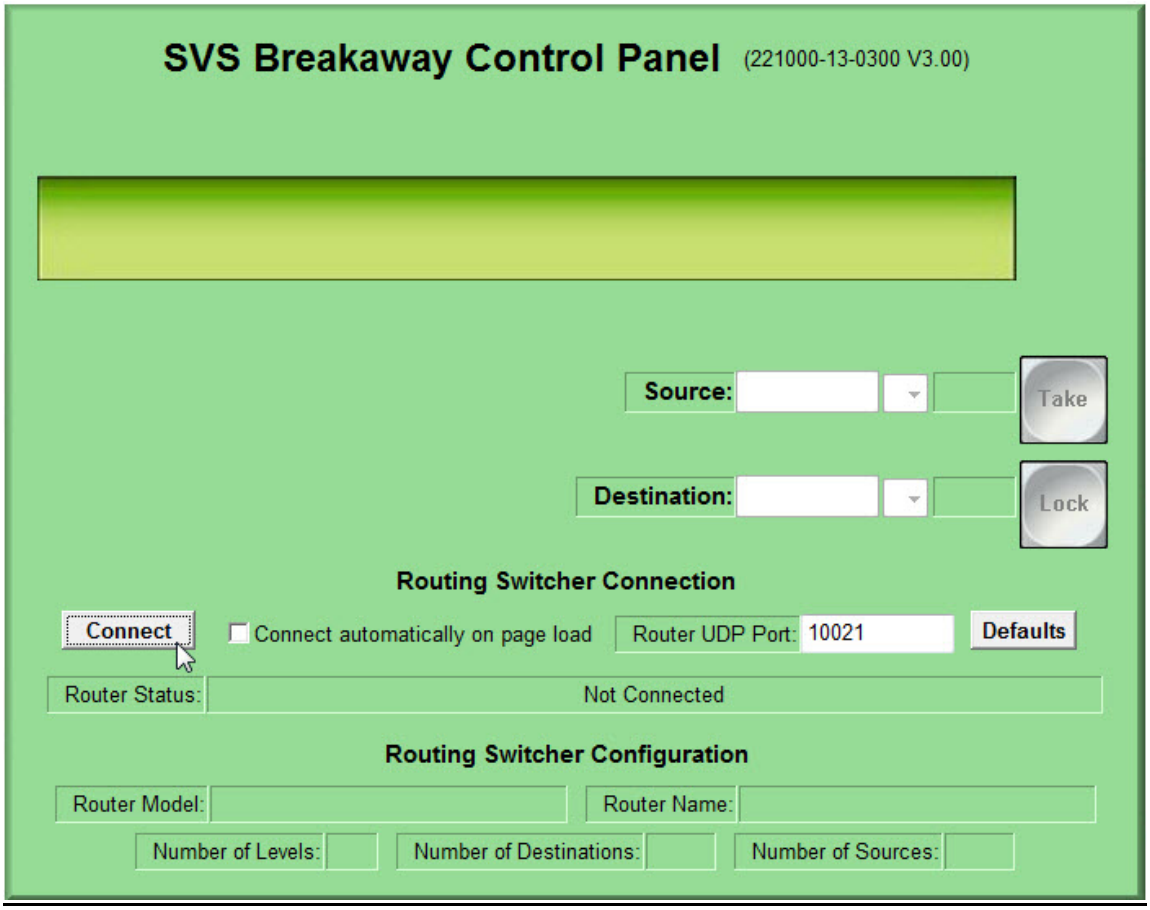
You may want to “Lock” a destination to prevent someone on the system from changing the source of that destination.

To “Lock” a destination, after switching, click on the **“Lock”** button. The “Lock” button will change color and the button label will display “Unlock” indicating that the next time the button is pressed the function will be to “Unlock” the destination. The selected destination will now be locked preventing source changes to be made to that destination.

To “Unlock” click on the **“Unlock”** button. The button will change color and the label will display “Lock”.

“Breakaway Control Panel” - adds A/V breakaway and level by level router status.

The Breakaway Control Panel gives you the option of switching selected levels or all levels.



Click on **Connect**. The message “Getting Router Model” will display next to **Router Status**. This is an indication that the program is attempting to contact the router for information.

Switching

To make a switch, first select a destination from the **Destination** drop down list. Select the levels to be switched (lit level buttons indicate enabled), then select a source from the **Source** drop down list and the “Take” button will light.

Click **“Take”** and the switch will take place.

This panel can also numerically switch and lock destinations similar to the Standard Control Panel.

Lock

You may want to “Lock” a destination to prevent someone on the system from changing the source of that destination.

To “Lock” a destination, after switching, click on the **“Lock”** button. The “Lock” button will change color and the button label will display “Unlock” indicating that the next time the button is pressed the function will be to “Unlock” the destination. The selected destination will now be locked preventing source changes to be made to that destination.

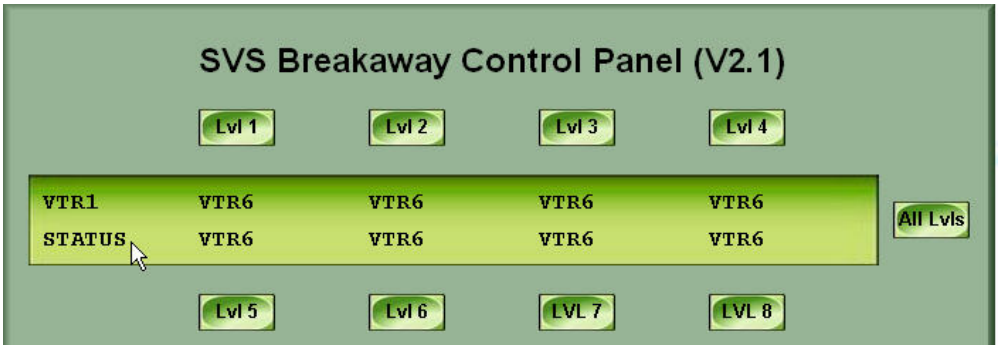
Breakaway Switching

The lit level buttons indicate the levels to be switched (preset).

To turn off a level(s) click on the level button and the button will dim. Click on “All Lvls” to restore to an “all level” preset.

Status

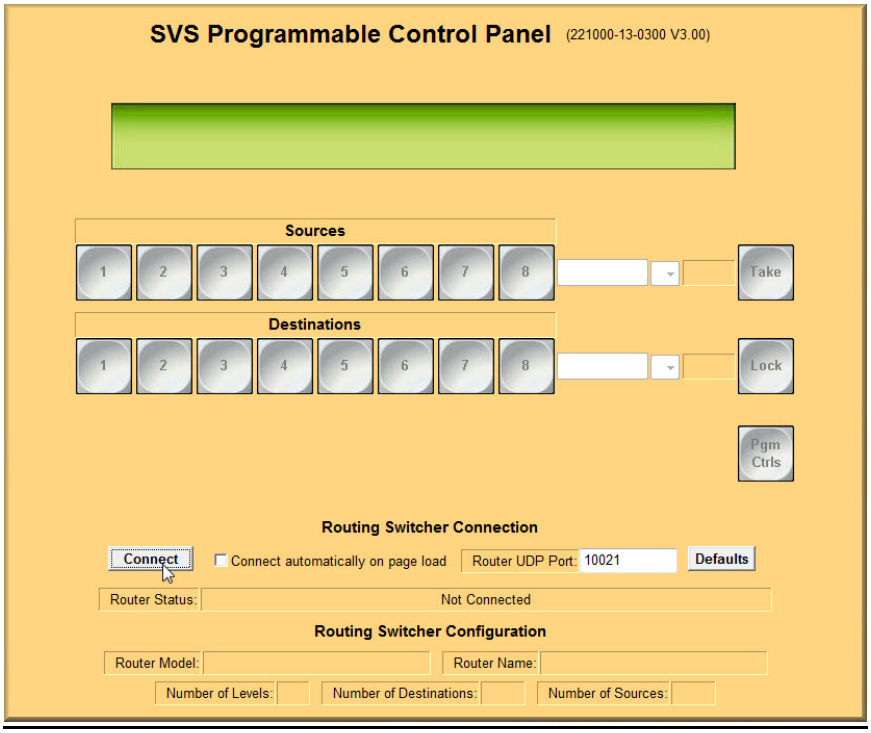
Individual Level status is indicated in the “Status” window at the top of the screen.



“Programmable Control Panel” adds 8x8 programmable XY buttons for single-button takes.

The Programmable Control Panel allows the user to program Source and Destination buttons to any source or destination desired.

The programming of this panel can be “Password Protected”.



Programming Allowable Inputs and Outputs

Buttons can be programmed to specific sources and destinations allowing access to most often used sources and destinations.

To program the panel’s defined inputs and outputs;

Click on **Pgm Btns**

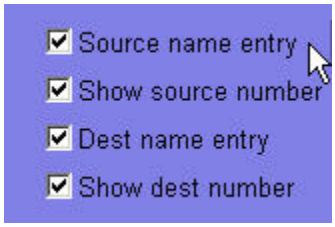
This screen will display;

Enter a Password, if desired.

Select the destinations and sources you want the panel to display from the dropdown lists.

Panel options

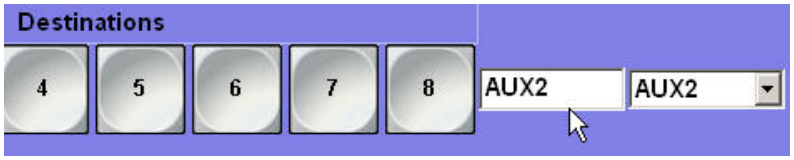
Display and operational options can be selected by placing a check in the appropriate box.



- Source name entry- Placing a check in this box allows the user to select a source by typing the name of the source in the window next to the source buttons. If this box is not checked the window will not be displayed.

- Show source number- Placing a check in this box displays the virtual source number in a screen next to the “Take” button.

- Destination name entry- Placing a check in this box allows the user to select a destination by typing the name of the destination in the window next to the destination buttons. If this box is not checked the window will not be displayed.

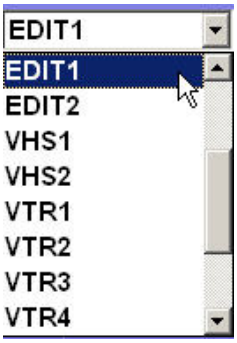


- Show destination number- Placing a check in this box displays the virtual destination number in a screen next to the “Lock” button.

Programming Buttons

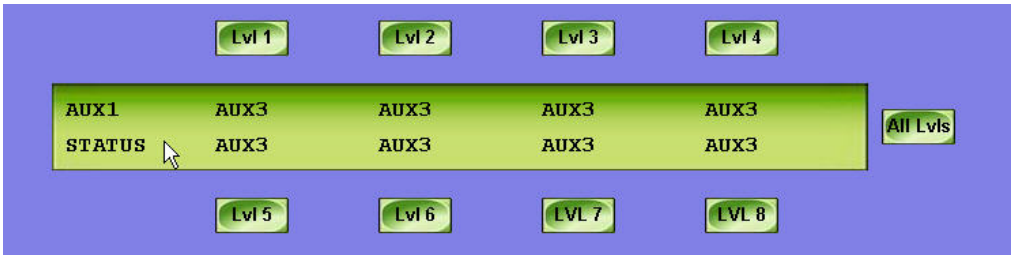
The panel’s buttons may be programmed to provide “shortcuts” for the operator.

With the “Pgm Ctrls” screen open, select a source or destination from the dropdown list and click on the button to be programmed. The button will display the selection and will select the programmed I/O when pressed.



Status

Individual Level status is indicated in the “Status” window at the top of the screen.



Warning:

When switching using programmed buttons, the switch will occur as soon as a new source is selected (auto take).

Lock

You may want to “Lock” a destination to prevent someone on the system from changing the source of that destination.

To “Lock” a destination, after switching, click on the **“Lock”** button. The “Lock” button will change color and the button label will display “Unlock” indicating that the next time the button is pressed the function will be to “Unlock” the destination. The selected destination will now be locked preventing source changes to be made to that destination.

Ethernet Setup V16.0 or older

***For units shipped before 2/15/09**

There are two Ethernet connectors on the “Master” frame labeled “LAN 1” and “LAN 2”. For single processor systems only “LAN 1” is active.

Ethernet connections are made to the connector labeled LAN 1.

Default IP settings;

IP Address- 192.168.1.200

Subnet mask- 255.255.255.0

Gateway IP Address- 0.0.0.0

Telnet Port- 10001

To set IP parameters using the Ethernet port**;**

1. Connect the Ethernet cable to “LAN 1” on the back of the “Master” frame

2. Open the command prompt on a PC. In Windows XP Pro, you can access the Command Prompt by clicking on the “Start” menu “Programs”, “Accessories”, “Command Prompt”

3. Verify communications to the router by “Pinging” the router. You can do this by typing in the ping command in the Command Prompt window as follows;
   “ping 192.168.1.200” followed by a carriage return.

4. Once communications have been established you can Telnet into the router. You can do this by typing in the telnet command in the Command Prompt window as follows;
   “telnet 192.168.1.200” followed by a carriage return.

5. To login to the router, type “svsadmin” at the login prompt followed by a carriage return. Then enter the password “TED” the password is case sensitive and must be typed in uppercase characters.

6. To view the current network parameters you need to type in the following command;
   “SvsBootApp Params” followed by a carriage return.

7. To change the IP address the command is as follows;
   “SvsBootApp SetParam IP xxx.xxx.x.xxx
   Where the “x” is the IP address you want to assign to the router.

8. To set the Subnet Mask the command is as follows;
   “SvsBootApp SetParam SUBNET xxx.xxx.xxx.x
   Where the “x” is the Subnet address you wish to assign to the router

9. Once the IP address and Subnet mask have been set you can close the telnet connection to the router by typing “exit” at the \> prompt then restart the router by power cycling the “Master” frame.

10. Once the system has restarted you can verify that your settings are correct by pinging the IP address you just assigned the router i.e.
    “ping (your new IP address) followed by a carriage return.

Note:

192.168.1.200 is the factory default IP address.

To set IP parameters using the serial port;

1. Connect the COMM port from a computer to “CTRL 2” on the back of the “Master” frame.
2. Open HyperTerminal, Hyper Access or other similar terminal emulation program.
3. Set the program’s parameters to 115.2K baud, 8 Data bits, No parity, 1 stop bit, ANSI emulation.
4. Establish communication to the router’s processor by pressing the “Esc” button on the keyboard. The terminal program screen will re-write confirming communication.
5. Turn the power off to the “Master” frame, leaving the terminal program running.
6. Remove the CPU board and set DIP switches S1-1 and S1-2, on the processor module, to on.
7. Replace the CPU board.
8. Turn power to the “Master” frame on.
9. The processor will begin to boot.
10. Within the first 4 seconds of boot-up when the processor is turned on, press the keyboard spacebar. This will interrupt the booting of the unit and enter the configuration menu.
11. Press “0” and enter the IP information, then press ENTER.
12. Turn the “Master” frame off, remove the CPU and set the DIP switches S-1 and S1-2 back to the off position.
13. Replace the board and power the frame up.

Note:

The Ethernet port accepts HOST protocol commands to switch the router. See the section of this manual on Protocol for information on Host protocol commands.

**If your server is capable of IP reservations by the MAC address you can enable the DHCP option. It is advisable to contact the Factory for further information regarding this feature.*

Commands:

“SvsBootApp SetParam DHCP 0 “ DHCP disabled
“SvsBootApp SetParam DHCP 1” DHCP enabled

GPI

The 25 pin D connector on the rear of the Master CPU frame provides relay contacts under software control that can be used to indicate a failure of router frame power supplies and fans.

The female 25 pin D connector on the rear of the CPU frame provides access to 5 relay contact sets (GPI-out 0-4). These contact sets are used to indicate failures in the router frames.

The female 25 pin D connector also provides for “GPI inputs” where an external contact closure can cause an “event”. GPI inputs need to be grounded to initiate event.

GPI setting are described in the chart below;

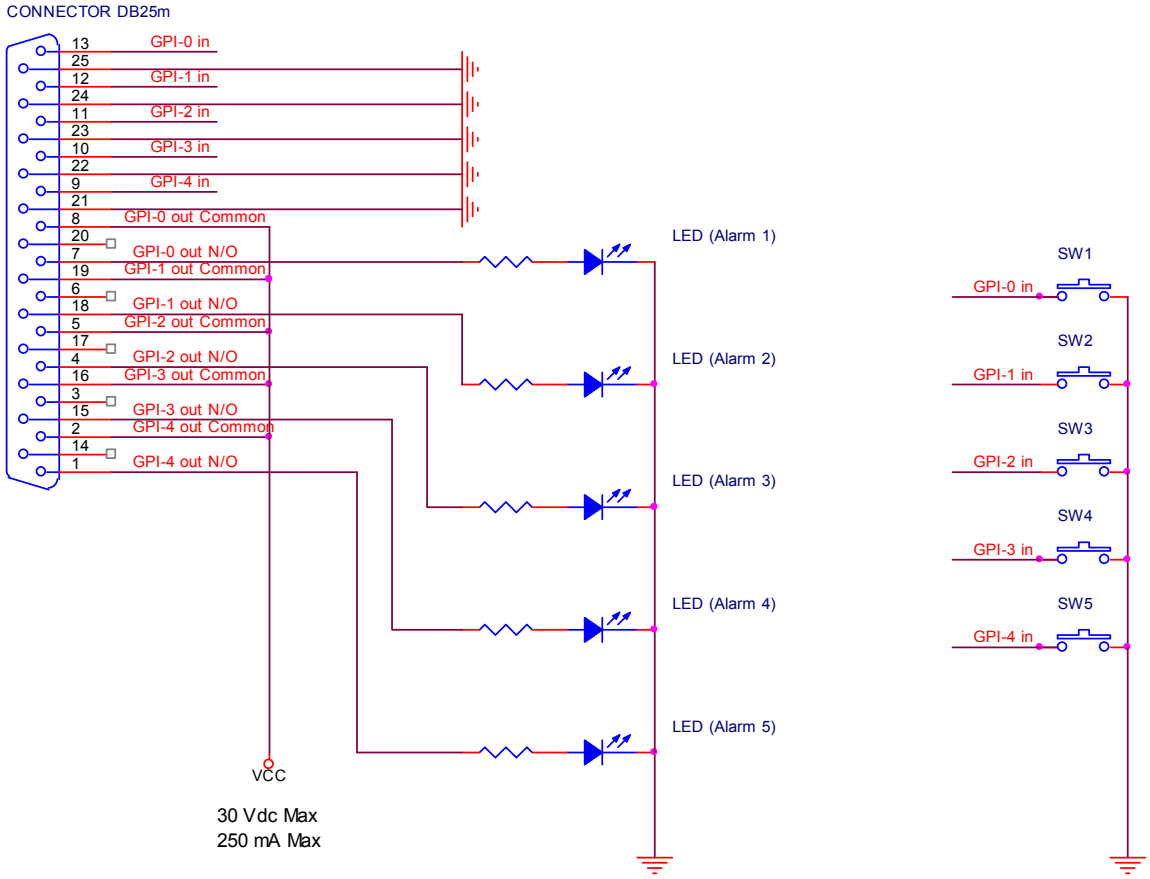
Pin #	Connection	Alarm Description
1	GPI-4 out N/O	* Future Use
2	GPI-4 out Common	
3	N/C	Not Used
4	GPI-2 out N/O	Failure- Fan Power Supply # 1
5	GPI-2 out Common	
6	N/C	Not Used
7	GPI-0 out N/O	Failure- Power Supply # 1
8	GPI-0 out Common	
9	GPI-4 in	* Future Use
10	GPI-3 in	* Future Use
11	GPI-2 in	* Future Use
12	GPI-1 in	* Future Use
13	GPI-0 in	Close All GPI- out Contacts
14	N/C	Not Used
15	GPI-3 out N/O	Failure- Fan Power Supply # 2
16	GPI-3 out Common	
17	N/C	Not Used
18	GPI-1 out N/O	Failure- Power Supply # 2
19	GPI-1 out Common	
20	N/C	Not Used
21	GND	Ground Connection for GPI in
22	GND	Ground Connection for GPI in
23	GND	Ground Connection for GPI in
24	GND	Ground Connection for GPI in
25	GND	Ground Connection for GPI in

* Contact the SVS Factory for “Future Use” updates.

Note:

All relay contacts are floating relative to any ground in the router or CPU frame. No relay contact should be more than 150VRMS from CPU frame ground. Relay contact ratings are 0.5A @ 125VAC, 2A @ 30VDC.

Suggested GPI Circuitry



Software Upgrades

From time to time software upgrades may be required for the processor, modules, or control panels. The factory will send the upgrade file.

When upgrading using the Sierra Video TYLINX PRO software via the RS- 232 serial port,

“CTRL port 2” must be used.

Chapter

3

Operation

Introduction

The purpose of a routing switcher is to switch any of the inputs (source) to any of the outputs (destination). Any input can be connected to any or all outputs but each output can only be connected to a single input. Control remains the most important component of your new system.

Control System Overview

The Ponderosa Family's three port control system incorporates many powerful features, while retaining control compatibility with many leading third party control systems and with earlier generation SVS routing switchers. The control system uses an intuitive interface for routing switcher control and configuration, pass wording, salvo setup, multiple input/output configuration and name configuration. Up to 64 control panels can be linked at any one time, daisy-chained on a single RS-485 network. A variety of programmable control panel styles are available.

Connectors associated with the system's internal control computer are located on the rear of the routing switcher frames. Only one frame in a multi-frame system will have a master control computer module installed. The following pertains to the frame that contains the master control CPU processor.

Serial Control Ports

The internal control CPU processor has three serial ports for Terminal and/or Host protocol control. These three serial ports are used for overall routing switcher system personalities, local or networked PC computer control, and control panel network operation. Terminal Protocol is a human-readable protocol while Host Protocol is a machine-friendly protocol. The three serial ports are shipped with a factory default as described below;

Ctrl Port #	Protocol	Baud Rate	Data Bits	Parity	Stop Bits	Emulation
1	Host	115.2K	8	None	1	ANSI
2	Terminal	115.2K	8	None	1	ANSI
3	Host	115.2K	8	None	1	ANSI

Connections to the 9-pin can be made using a standard one- to-one cable. Pin functions are described below.

Host & Terminal Port Installation		
Pin	**RS-232**	**RS-422**
1	Ground	Ground
2	Transmit	Transmit (-)
3	Receive	Receive (+)
4	Not used	Not used
5	Ground	Not used
6	Not used	Not used
7	Not used	Transmit (+)
8	Not used	Receive (-)
9	Ground	Ground

Host Mode

The Ponderosa matrix switchers have three 9-pin RS-232/422 connectors that allow you to control the switcher using a standard personal computer or other external devices (such as Creston or AMX). Serial ports shipped in the “Host” mode can be changed to the “Terminal” mode by the following procedure:

- Connect a terminal to the serial port and send the following command:

  ****HOST0!!**

  The port now uses the terminal protocol.

- To restore back to the Host port, send the following command:

  ****HOST1!!**

Terminal Mode

The 9-pin connector labeled RS-232/422 Control can be used for simple terminal control, (V=T100 emulation capability). The terminal performs the following functions:

- Serves as an overall system controller
- Sets up the personality of the entire system (size, level control, change names, mapping, etc.)

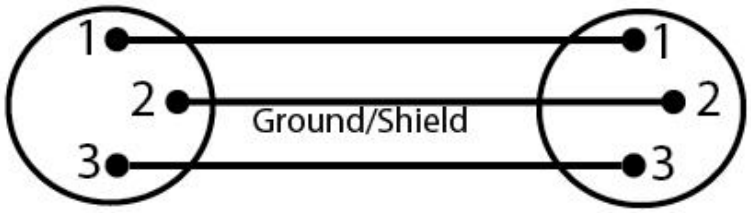
These setups are stored in non-volatile memory so that a terminal is not required unless it is necessary to change a setup.

Control Panels (RS-485)

Ponderosa Family video routing switcher frames have four male 3-pin connectors labeled “Control Panels” on the rear. These connectors are “looped” together.

The maximum system cable length is 2,000 feet (310m) when the RS-485 network operates at the higher speed of 31.25K baud. The maximum system cable length is 5,000 feet (1,524m) when operated at 9600 baud. Consult your Control Panel Manual for more detailed information.

If you make your own interconnect cables, Pin 2 is Ground. Pin 1 and 3 connect pin for pin.



RS-485 Interconnect Cable

Chapter

4

Module Overview

Introduction

The Ponderosa routing switcher is based upon a modular architecture of an integrated frame, motherboard and backplane. Common input, output, and crosspoint modules are used. There are five basic modules:

- Input Module
- Crosspoint Module
- Output Module
- Processor Module
- Power Supply Module

All modules are front extractable and “hot-swappable”. The frame is force air cooled using internal cooling fans contained within the power supply module. Power supply modules are removable from the front of the frame.

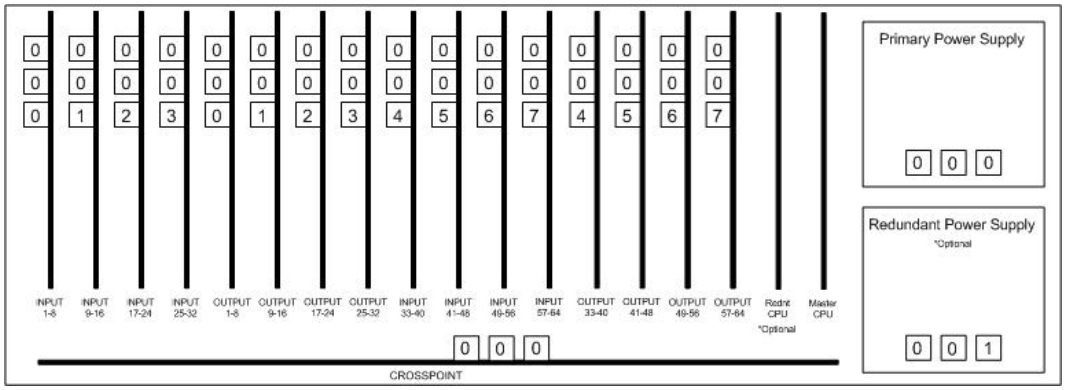
Note:

Although modules are “hot-swappable” it is advised that power be removed when removing or inserting modules when possible.

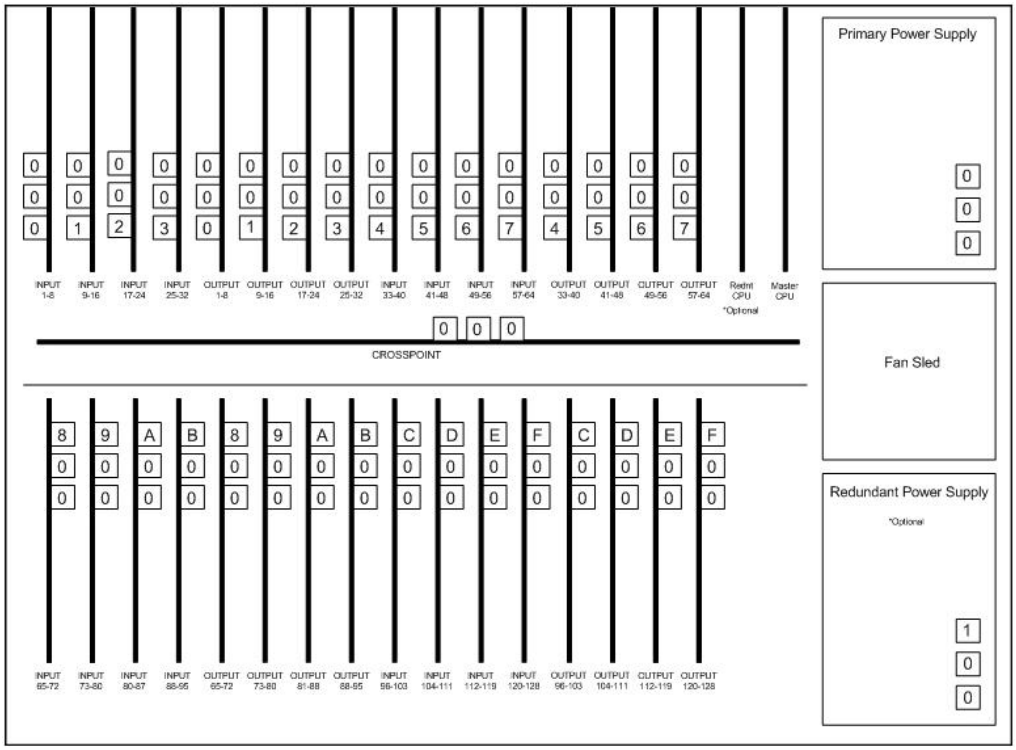
Module Layout

For the routing system to function properly, every module must have its address switches set to the values shown. Your system will be clearly labeled on your frame.

6464 Frame



128128 Frame

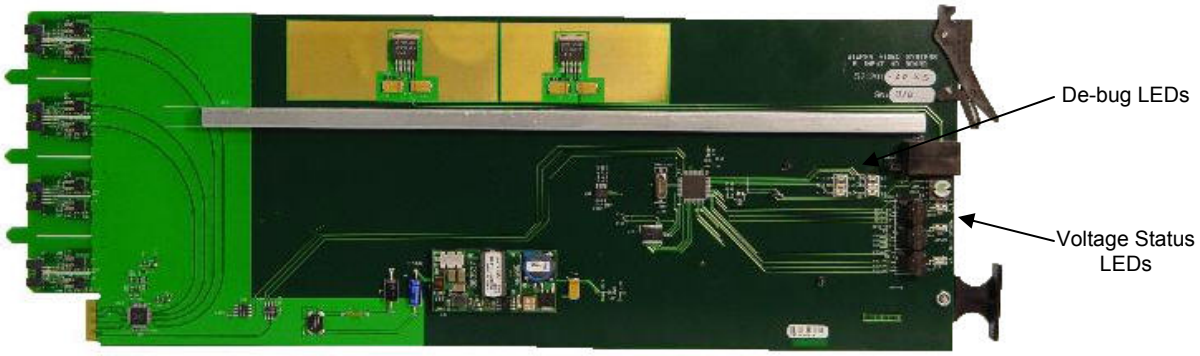


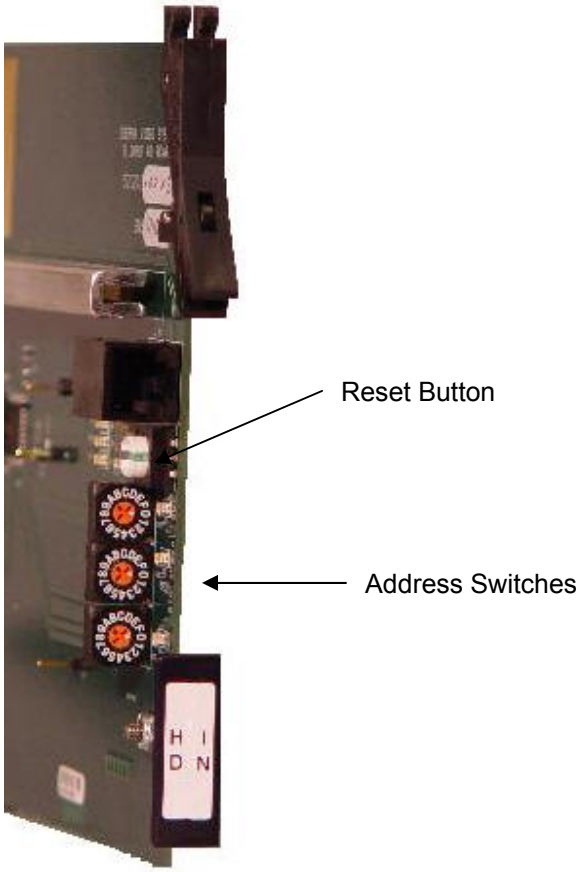
Note
The Sierra Video model shown here is a fully loaded matrix. In some cases, these frames may be configured with less outputs or inputs. Consult the rear panel serial number and model number to verify your order and product. The system you receive is customized for the size & type requested at time of purchase from Sierra Video

Input Module

Input modules are designed in groups of eight. This allows for expansion in groups of eight inputs. Each input module comes with a rear “backplane” panel consisting of eight BNC connectors.

The input module is installed from the front of the frame with the BNC panel installed directly behind the input module in the back of the frame.





Input Module LEDs

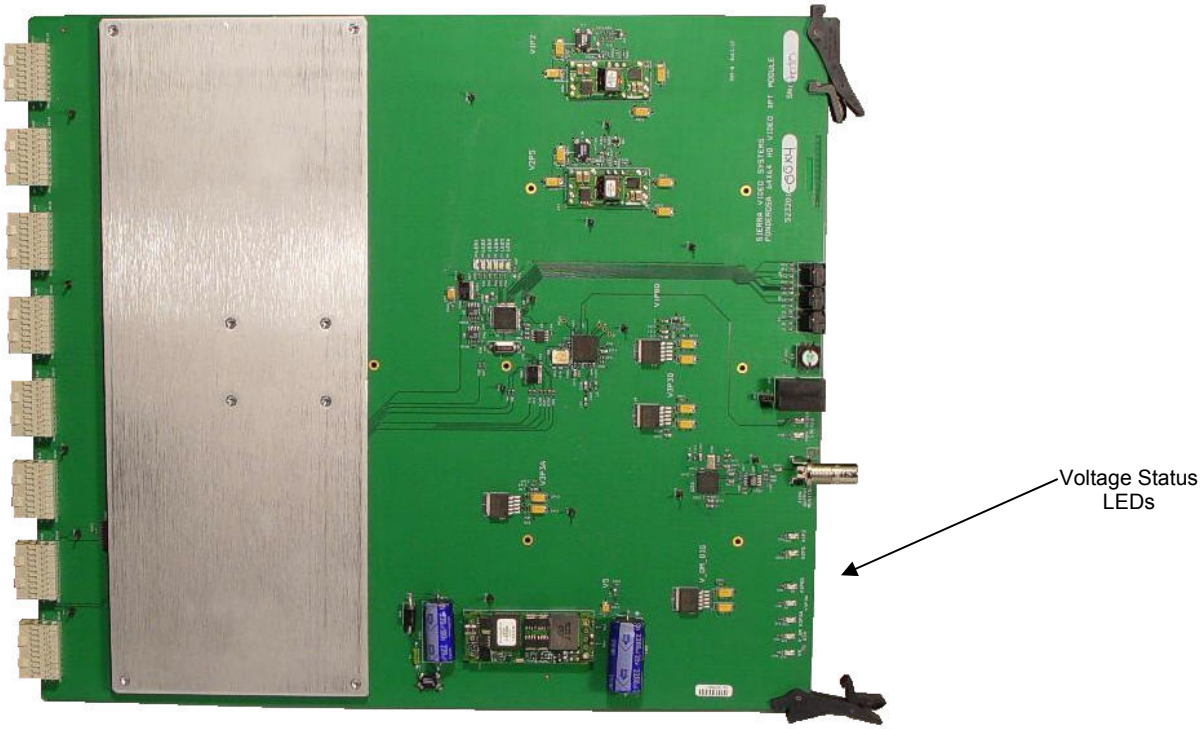
Each input module has 5 Green LEDs located on the front edge of the board. The LEDs indicate the status of the module's voltage. All 5 LEDs must be lit for the module to operate properly. The absence of any lighted LED indicates a failure of the module and the factory should be contacted.

Just behind the reset button there is a group of 6 LEDs used for de-bug purposes. The function of the LEDs are described below.

LED	Indication	Normal condition	Color
1	Transmit in progress	Flickers On/OFF when data is transferred	GREEN
2	Application has run	ON	GREEN
3	Boot program has run	ON	GREEN
4	Temperature out of range	OFF	RED
5	Voltage out of range	OFF	RED
6	Not used	OFF	RED

Crosspoint Module

The crosspoint module contains 1 crosspoint IC arranged to make a complete crosspoint array. These ICs are located under the large metal heat sink in the middle of the board. Surrounding the crosspoint array are IO buffers, the board control processor, and power supplies.



Crosspoint Module LEDs

There are 4 voltage status LEDs on the left side of the board. The LEDs indicate the status of the module's voltage. The LEDs on the right side of the board indicate CPU function and may vary with code versions. All LEDs must be lit for the module to operate properly. The absence of any lit voltage LED indicates a failure of the module and the factory should be contacted.

The factory should be contacted if any fault LEDs are lit.

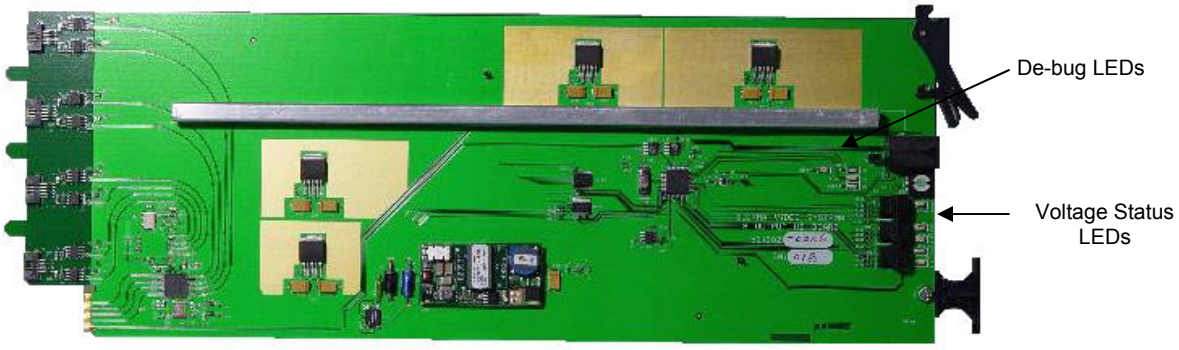
Note:

The number of LEDs may vary in de-populated systems.

Output Module

Output modules are designed in groups of eight. This allows for expansion in groups of eight outputs. Each output module comes with a rear “backplane” panel consisting of eight BNC connectors.

The output module is installed from the front of the frame with the BNC panel installed directly behind the output module in the back of the frame.

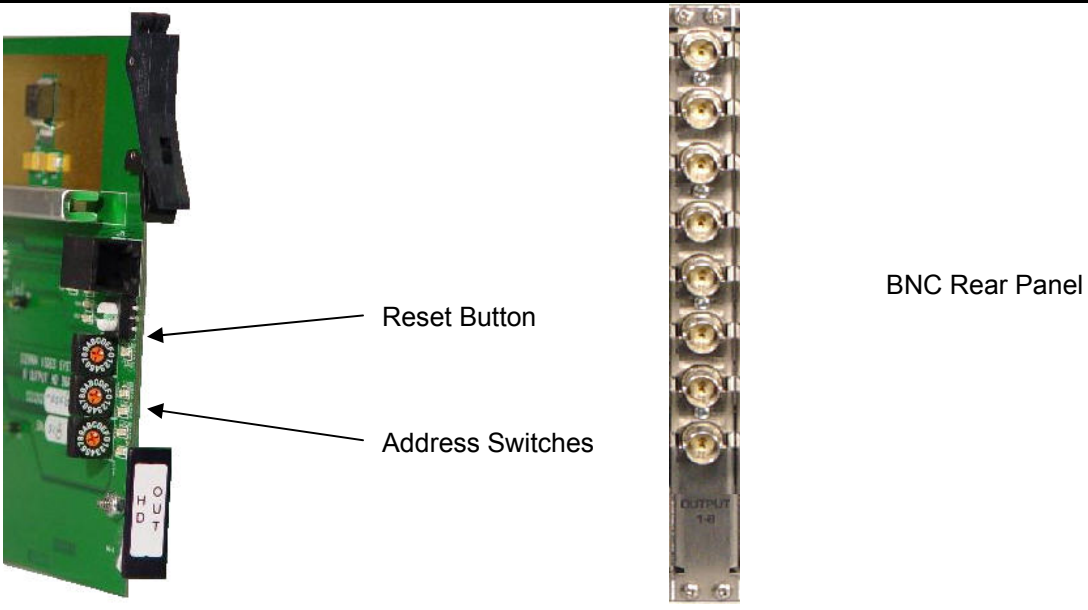


Output Module LEDs

Each output module has 5 Green LEDs located on the front edge of the board. The LEDs indicate the status of the module’s voltage. All 5 LEDs must be lit for the module to operate properly. The absence of any lighted LED indicates a failure of the module and the factory should be contacted.

Just behind the reset button there is a group of 6 LEDs used for de-bug purposes. The function of the LEDs is described below.

LED	Indication	Normal condition	Color
1	Transmit in progress	Flickers On/OFF when data is transferred	GREEN
2	Application has run	ON	GREEN
3	Boot program has run	ON	GREEN
4	Temperature out of range	OFF	RED
5	Voltage out of range	OFF	RED
6	Not used	OFF	RED



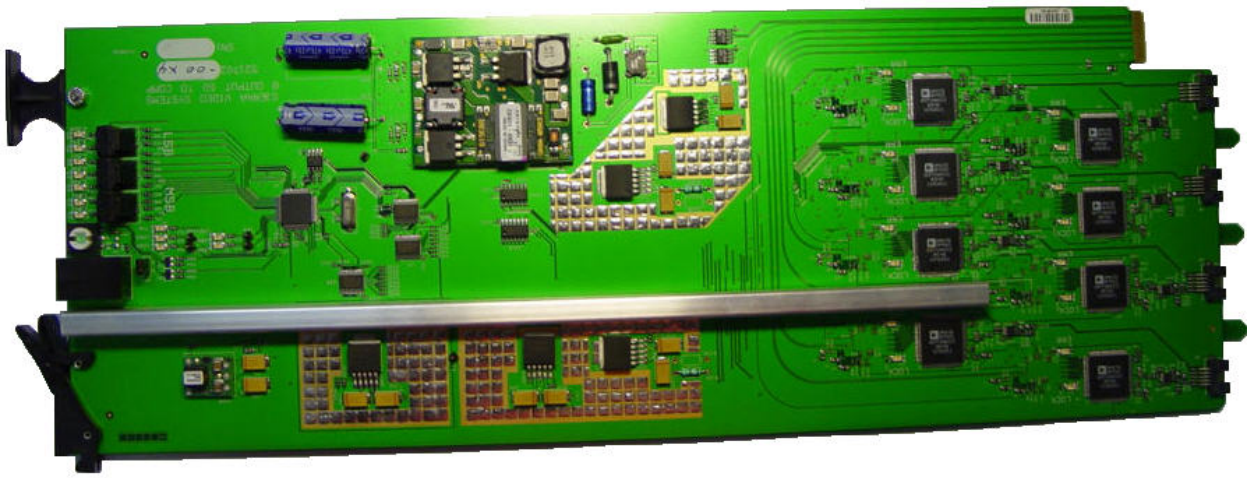
D to A Output Module (Optional)

The optional D to A Output module is an 8 output board that replaces a “standard” 8 output HD/SD board.

This board will take a valid 270 Mbps 525 or 625 digital video signal and output a valid NTSC or PAL composite video signal.

There are 8 D to A converters on each board and each of them operates independently.

Each output will automatically detect the incoming signal format (525 or 625) and output the corresponding composite output (NTSC or PAL).



The performance specifications are:

Return loss: <-30 db @ 5 MHz

Differential gain: +/- 0.3 percent @ 3.58 MHz or 4.443 MHz

Differential phase: +/- 0.5 degrees @ 3.58 MHz or 4.443 MHz

10 bit D to A

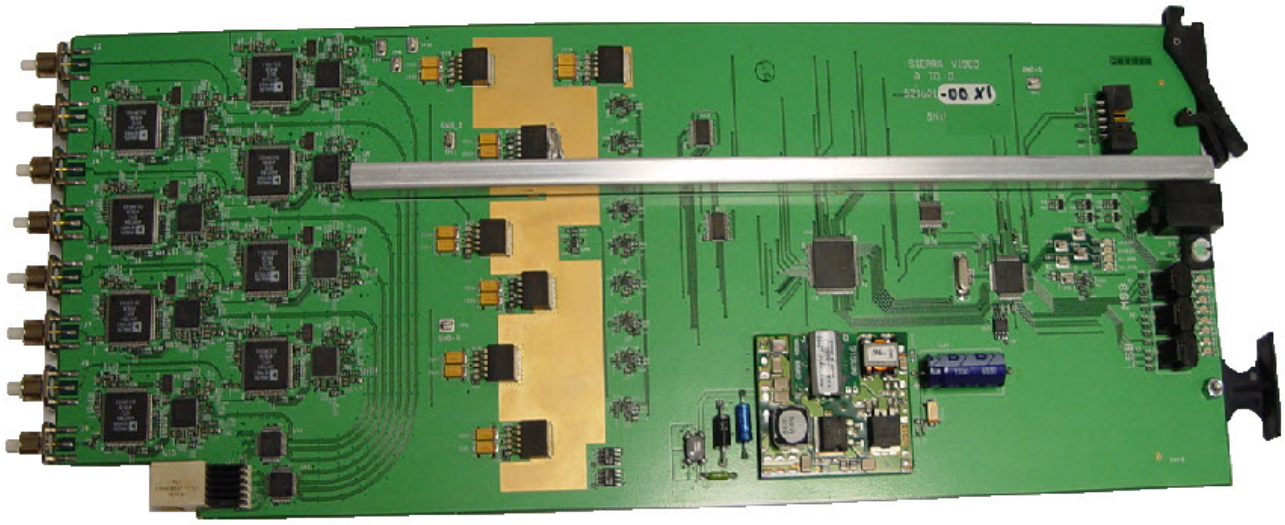
A to D Input Module (Optional)

The optional A to D Input module is an 8 input board that replaces a “standard” 8 input HD/SD board.

This board will take a valid NTSC or PAL composite video signal and convert it to 270 Mbps video.

There are 8 A to D converters on each board and each of them operates independently.

Each input will automatically detect the incoming signal format (525 NTSC or 625 PAL) and output 270Mbps digital video.



Input Impedance: 75 ohm

Quantization: 10 bits

Differential gain: less than +/- 0.7 % @ 3.58 MHz or 4.443 MHz

Differential phase: less than +/- 0.7 degrees @ 3.58 MHz or 4.443 MHz

Luma non-linearity: less than +/- 0.7% @ 3.58 MHz or 4.443 MHz

SNR unweighted: > 54 db using Luma flat field test signal

Hue Accuracy: better than 1 degree

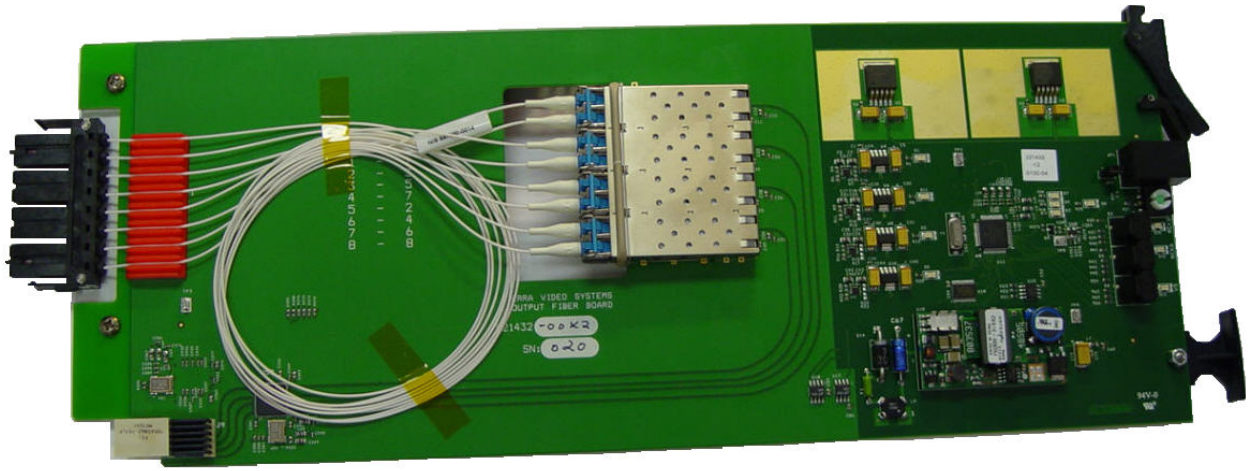
Color Saturation Accuracy: better than 1%

Fiber Output Module (Optional)

The optional Fiber Output module is an 8 output board that replaces a “standard” 8 output HD/SD board.

Each module handles 8 outputs on LC style connectors using single-mode cable.

This module provides bandwidth from 50Mbps to 3Gbps.

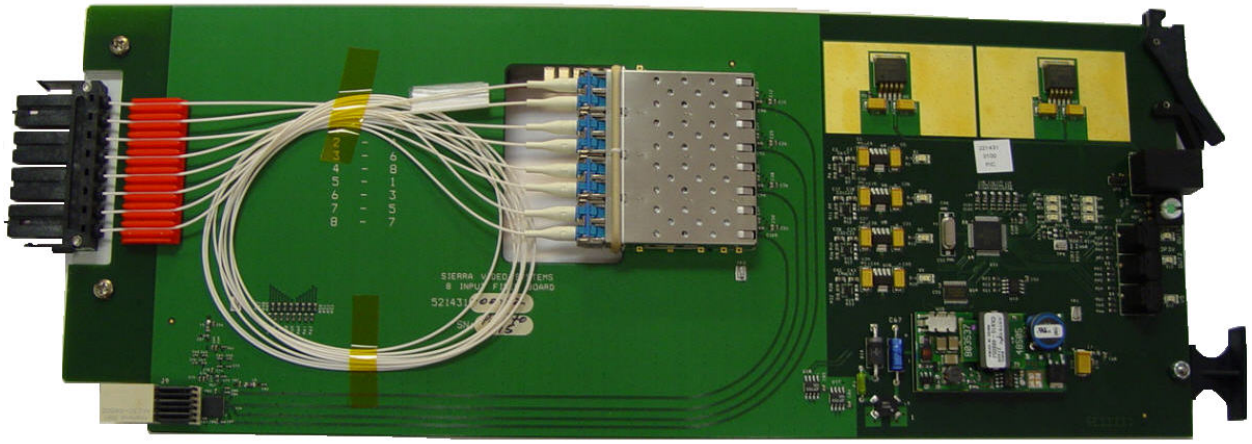


Fiber Input Module (Optional)

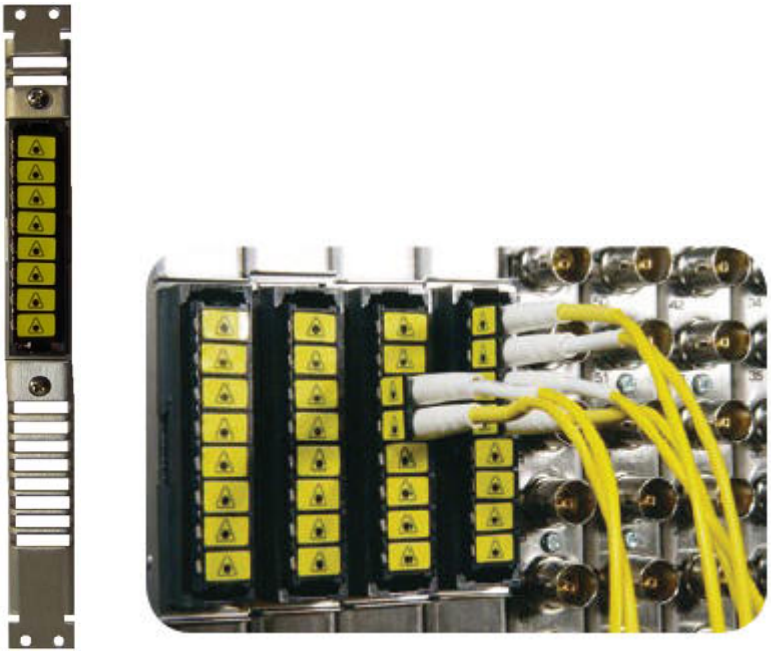
The optional Fiber Input module is an 8 input board that replaces a “standard” 8 input HD/SD board.

Each module handles 8 inputs on LC style connectors using single-mode cable.

This module provides bandwidth from 50Mbps to 3Gbps.



Fiber Rear Connector Panel



Processor Module

Master

Slave CPU

The “Slave” (bypass) processor module contains no components. The purpose of the PCB is to transfer switching commands from the “Master” processor to the crosspoint boards and must be installed in order for the slave frame(s) to operate.

Power Supply Module

Power supply modules “auto senses” input voltages 90 to 250VAC. The fuse is located behind the removable panel just above the AC connector on the rear of the frame.

The fuse sizes are 5A/250V.

Chapter 5

Optional Audio

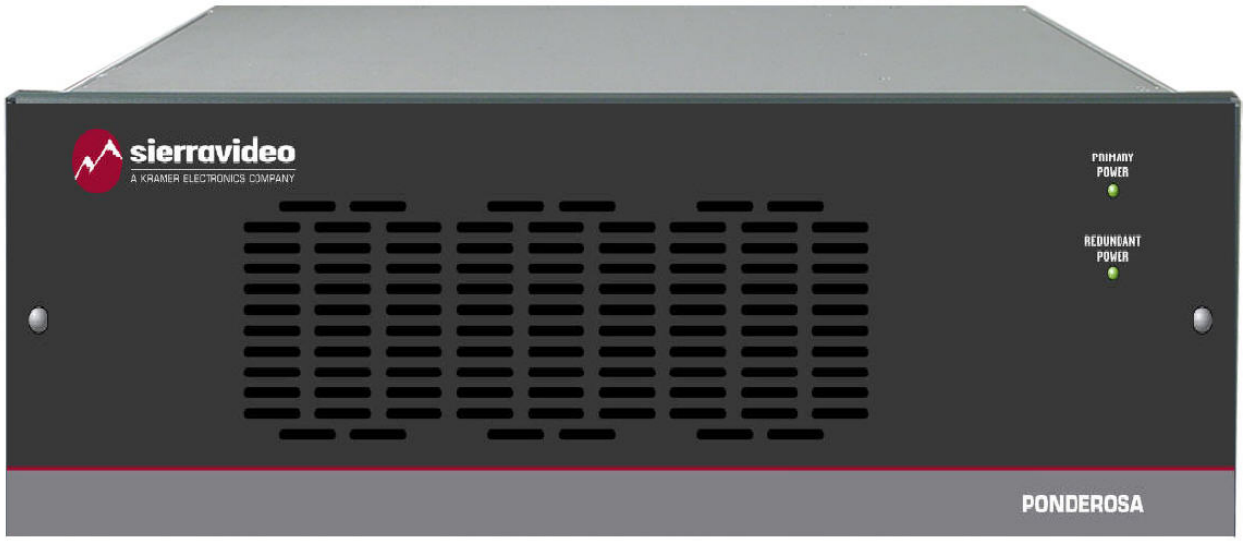
Introduction

The Ponderosa Series Audio routing switchers from Sierra Video are modular for those applications requiring worry-free performance and mission critical reliability. The advanced features and performance set it apart from the competition. These include:

- Modular configurations expandable by 32 input and/or 32 output increments
- Compact frame size – 3RU (6464 frame) or 5RU (128128 frame).
- Hot-swappable I/O boards.
- Standard redundant power supplies.

Front-door access to hot-swappable I/O boards allows for field service or matrix reconfiguration. Serial control is standard in every model.

The Ponderosa analog audio frames populate in increments of 32 on both the inputs and outputs, and come in two compact sizes: 3RU and 5RU. These frames can be configured to be either mono or stereo and are set at the factory. For example, the 3RU frame can be ordered to be either a 64x64 mono or 32x32 stereo audio router. When in the stereo mode, each channel is independently switchable.



Model Suffix Designations

This User's Guide provides installation and operational information for Ponderosa Audio Routing Switchers. Front and Rear panel illustrations are provided in the following subsections for each switcher model.

Model Suffix Designations	
A	Analog Audio
E	AES/EBU Digital Audio

Frame Configurations

Ponderosa Audio frames can be ordered in a “mono” or “stereo” mode.
Configuration is done at the factory or can be changed in the field (see section on “stereo mode” operation).

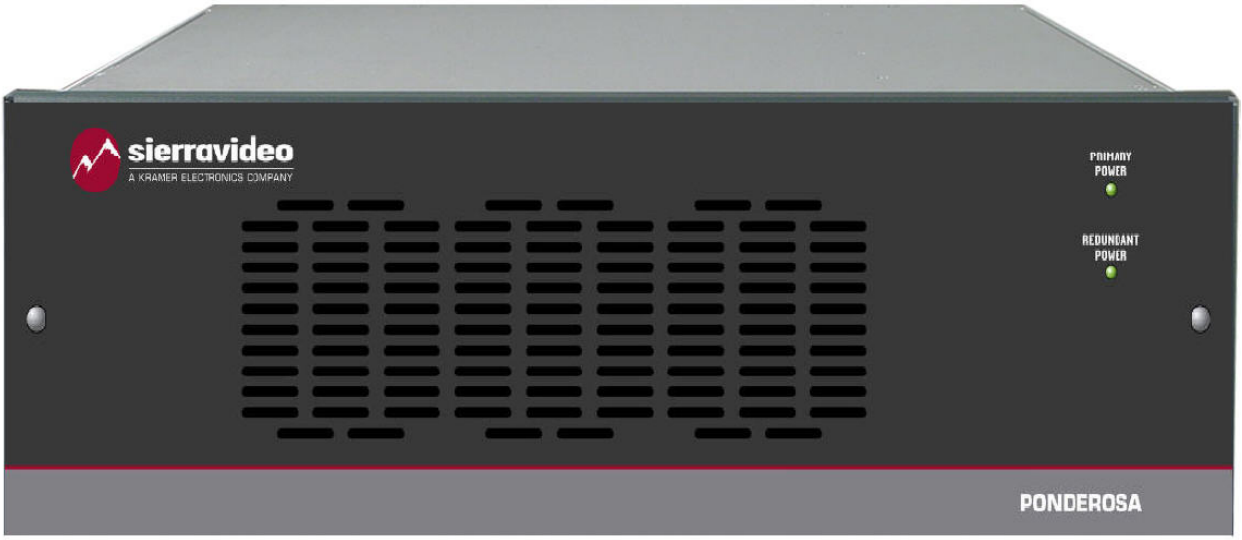
Mono Configurations	
128128 A/E Frame	**6464 A/E Frame**
32x32	32x32
32x64	32x64
64x32	64x32
64x64	64x64
32x96	
96x32	
64x96	
96x64	
96x96	
32x128	
64x128	
128x64	
96x128	
128x96	
128x128	

Stereo Configurations	
128128 A/E Frame	**6464 A/E Frame**
16x16	16x16
16x32	16x32
32x16	32x16
32x32	32x32
16x48	
48x16	
32x48	
48x32	
48x48	
16x64	
32x64	
64x32	
48x64	
64x48	
64x64	

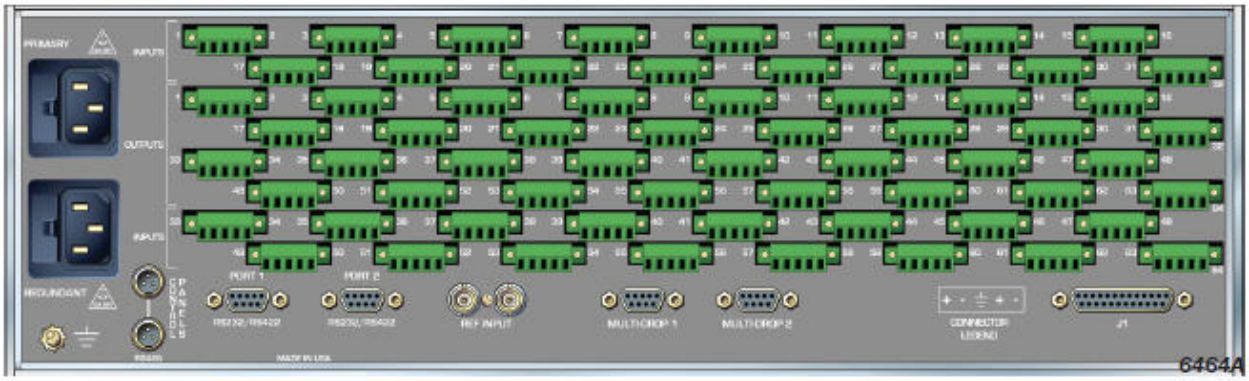
Ponderosa Analog Audio 6464 Frame

Model 6464A

Frame Front Panel



Frame Rear Panel



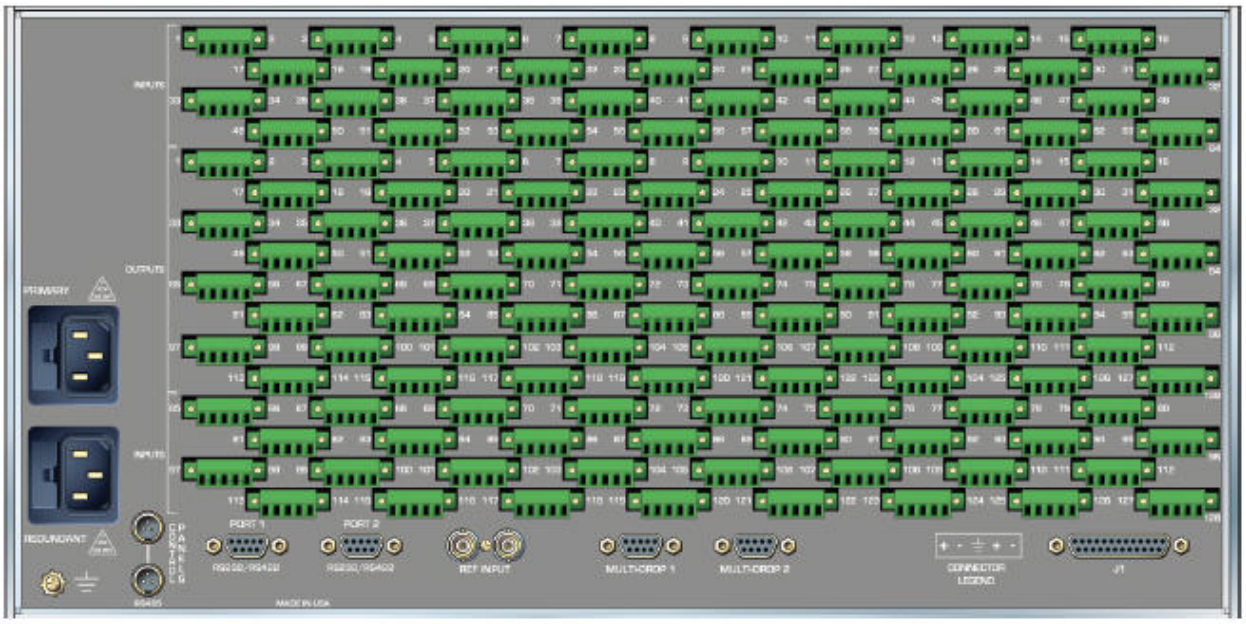
Note
The Sierra Video models shown here and in the subsequent sections are fully loaded matrices. In some cases, these frames may be configured with less outputs or inputs. Consult the rear panel serial number and model number to verify your order and product. **The system you receive is customized for the size & type requested at time of purchase from Sierra Video**

Ponderosa Analog Audio 128128 Frame

Model 128128A

Frame Front Panel

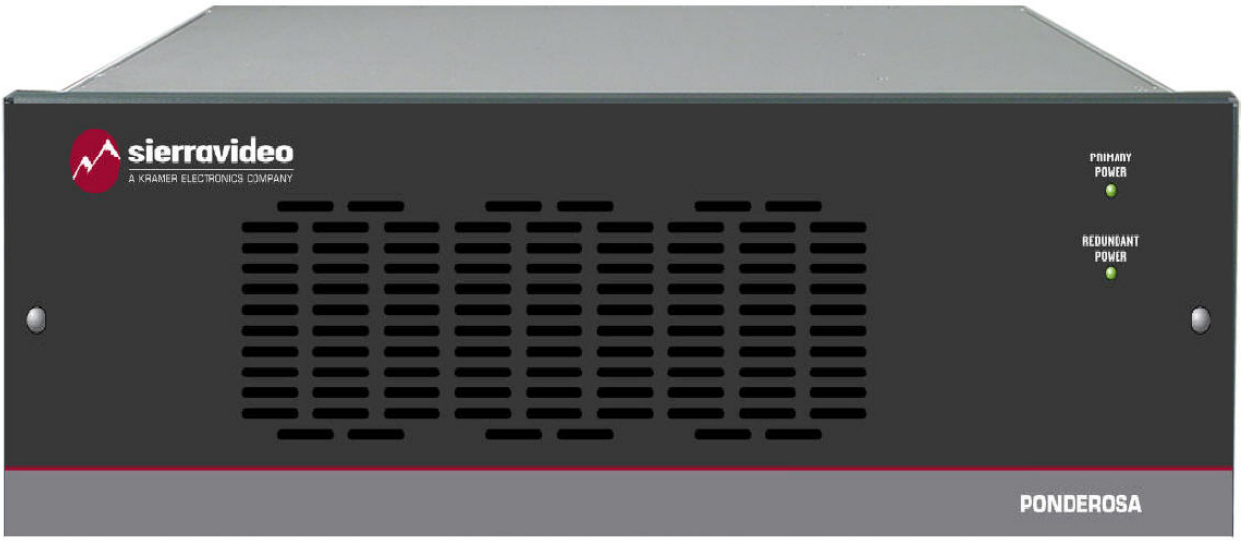
Frame Rear Panel



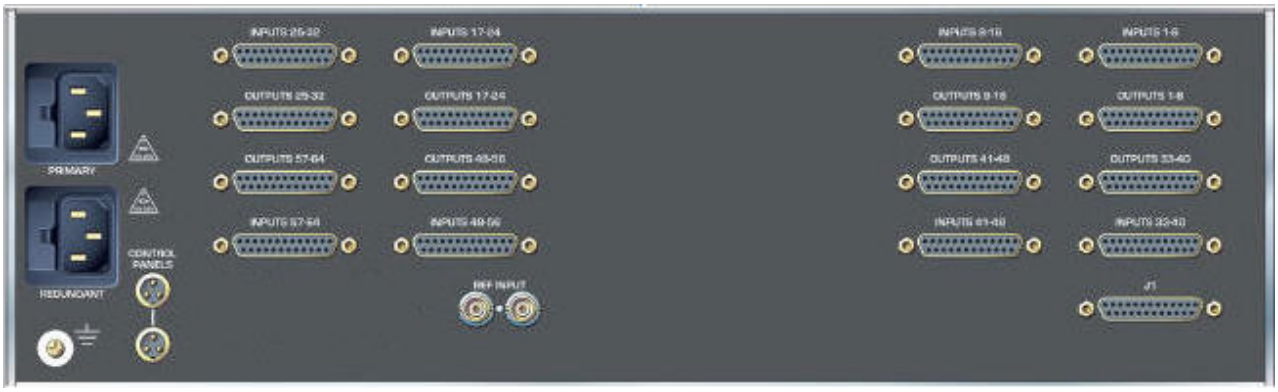
Ponderosa Digital Audio 6464 Frame

Model 6464E

Frame Front Panel



Frame Rear Panel



Note
The Sierra Video models shown here and in the subsequent sections are fully loaded matrices. In some cases, these frames may be configured with less outputs or inputs. Consult the rear panel serial number and model number to verify your order and product. **The system you receive is customized for the size & type requested at time of purchase from Sierra Video**

Ponderosa Digital Audio 128128 Frame

Model 128128E

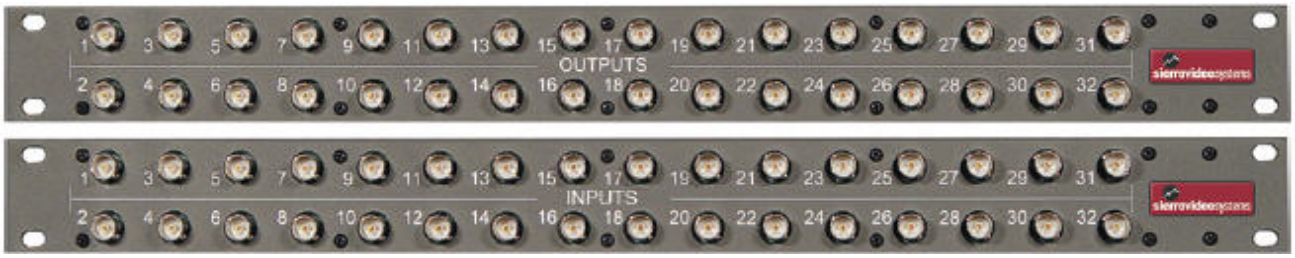
Frame Front Panel

Frame Rear Panel

Digital Audio Output Accessories

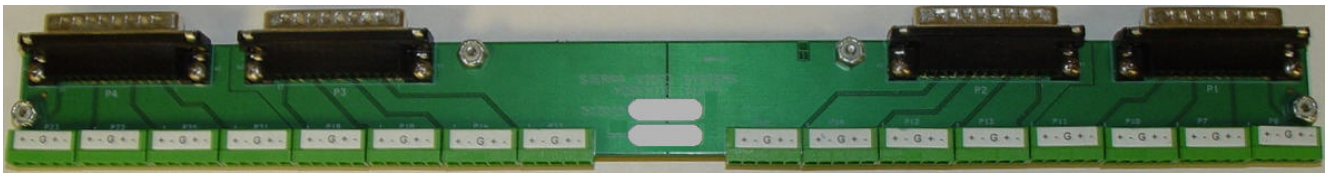
75 ohm Unbalanced Digital Audio

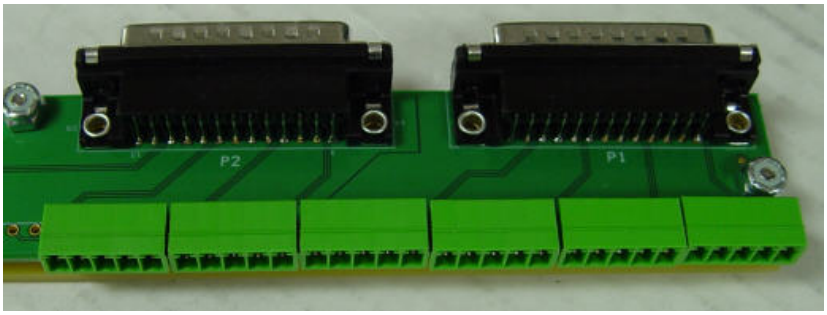
By using BNC adapter panels, each of the 110 ohm balanced inputs is converted to 75 ohm unbalanced 1 V P-P nominal input level. The BNC conversion / adapter panel option for the outputs converts each output to BNC connectors with 75 ohm source impedance and nominal 1 V P-P output level. The adapter panels require more space than the routing switcher. They are separate rack mount panels which interconnect to the 25 in D connectors with short cables that we provide with the adapter panels.



110 ohm Balanced Digital Audio

All inputs are internally terminated with 110 ohms in the Ponderosa digital audio routing switchers. Likewise, all outputs are source-terminated with 110 ohms (55 ohms per line).





Installation

Installation procedures are similar for all frames covered within this manual. Exceptions, if any, have been noted in each of the following paragraphs.

Rack Mounting

Carefully inspect the frame to ensure that there has been no shipping damage. Make sure all shipping material is removed from the router frame.

Each of the routing switchers described in this manual can be rack mounted in a standard 19" (RU) EIA rack assembly and includes rack "ears" at the ends of the front of the frames. None of the switcher models require spacing above or below the unit for ventilation. If ample space exists, a 1RU spacing gap is recommended.

To rack mount any of the routing switchers, simply place the unit's rack ears against the rack rails of the rack, and insert proper rack screws through each of the holes in the rack ears. Always rack mount the routing switcher prior to plugging the unit into a power receptacle or attaching any cables.

Important: Rear mounting brackets must be installed prior to installation of the router into a rack. The rear mounting brackets are contained in the accessory kit supplied with your router.

CAUTION!

The operating temperature range of the Ponderosa series router is 0 to 40 °C. Do not exceed the maximum (40 °C) or minimum (0 °C) operating temperature.

Rear mounting brackets must be installed prior to installation of the router into a rack. The rear mounting brackets are contained in the accessory kit supplied with your router.

If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than the room ambient temperature. Therefore, consideration should be given to installing the equipment in an environment compatible with the manufacturer’s maximum rated ambient temperature (TMRA).

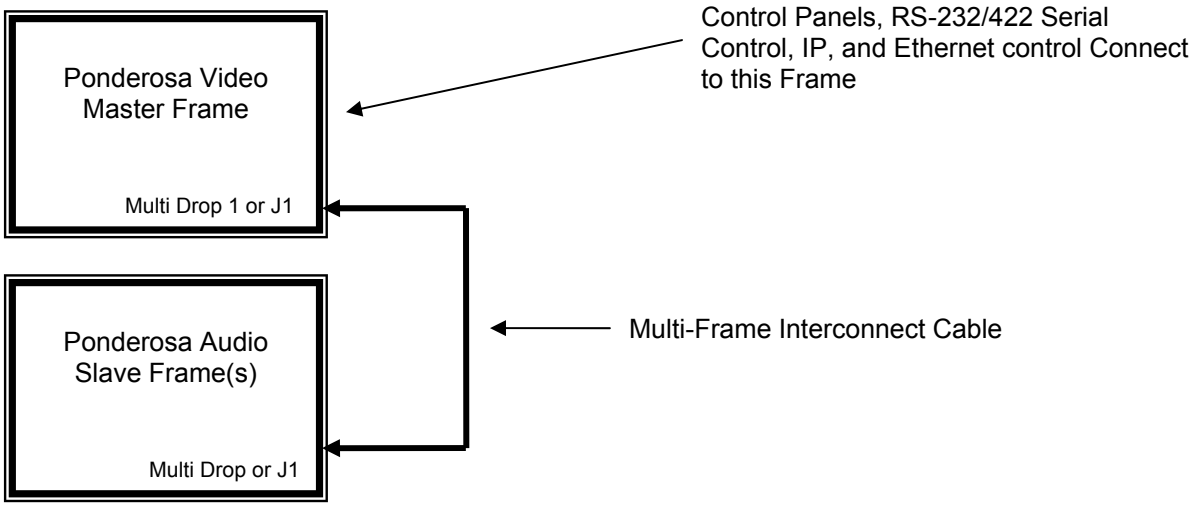
Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

Multi-Frame Connection

The Ponderosa Audio routing switcher is connected to the Ponderosa video router to work as one system.

Depending on the other frames in the system, connections are either made using the “J1” (25 pin) or “Multi-drop” (9 pin) connector. A system drawing will be included in the shipment if a multi-frame system is ordered.

Control panels and serial control connect to the frame containing the master processor.



Note:

The 9 pin Multi-drop connection is not a serial connection.

Rear Panel Connections

The Ponderosa Audio frame(s) are used in other Sierra Video audio applications and models. Therefore there are several unused connectors on the rear of the unit.

Unused connectors;

- Control Panels.
- 9 pin Serial Ports (port 1 and port 2).
- REF Input.

Only the J1 and multi-drop connectors are used in the Ponderosa Audio models.

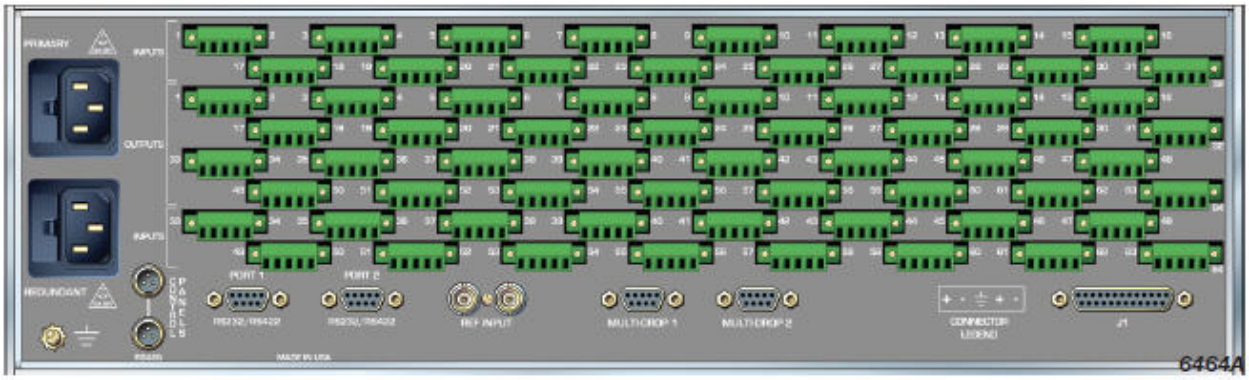
The multi-drop connectors do not exist on the digital audio (E) models.

A system drawing will be sent with your order indicating the proper connections.

Connecting to Audio Devices

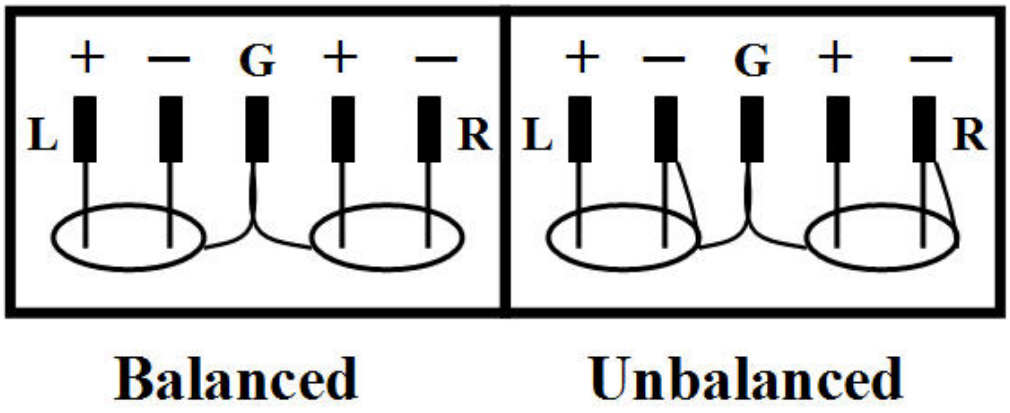
Mono Analog Audio

Audio sources and destination devices (such as amplifiers or recorders) may be connected to the switchers via a 5-pin latching, removable, terminal block style connectors located at the back of the switchers.



Balanced/Unbalanced Analog Audio Connections

All audio sources from the routing switcher are balanced audio. Connect the balanced audio to the balanced input of your destination device(s). To convert balanced to unbalanced audio signals, ground the negative (-) side and use the positive (+) side for both inputs and outputs. Grounding the negative side of the output drive adds +6dB of audio gain. The audio pin outs for balanced and unbalanced audio are described in the tables below:



Stereo Analog Audio

Ponderosa Audio frames can be ordered in a “mono” or “stereo” mode and are pre-configured at the factory. Input and output connections differ when the unit is in the stereo mode.
In the mono mode connectors are wired as silk screened on the rear of the router. However, when ordered in the stereo mode, the input or output is wired as indicated below;

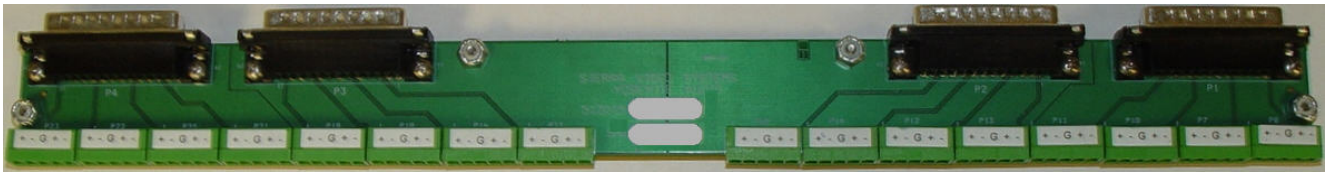
Stereo Audio Wiring											
	Connector #			Connector #			Connector #			Connector #	
I/O #	Left	Right	I/O #	Left	Right	I/O #	Left	Right	I/O #	Left	Right
1	1	2	17	33	34	33	65	66	49	97	98
2	3	4	18	35	36	34	67	68	50	99	100
3	5	6	19	37	38	35	69	70	51	101	102
4	7	8	20	39	40	36	71	72	52	103	104
5	9	10	21	41	42	37	73	74	53	105	106
6	11	12	22	43	44	38	75	76	54	107	108
7	13	14	23	45	46	39	77	78	55	109	110
8	15	16	24	47	48	40	79	80	56	111	112
9	17	18	25	49	50	41	81	82	57	113	114
10	19	20	26	51	52	42	83	84	58	115	116
11	21	22	27	53	54	43	85	86	59	117	118
12	23	24	28	55	56	44	87	88	60	119	120
13	25	26	29	57	58	45	89	90	61	121	122
14	27	28	30	59	60	46	91	92	62	123	124
15	29	30	31	61	62	47	93	94	63	125	126
16	31	32	32	63	64	48	95	96	64	127	128

Balanced Digital Audio

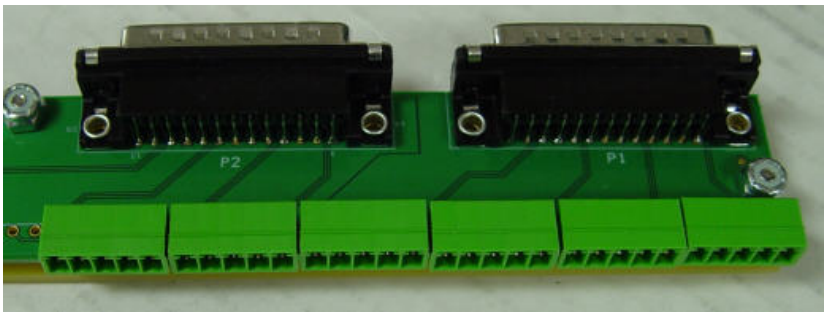
Ponderosa digital audio routers use 25-pin “D” connectors for input and output connection..

All inputs are internally terminated with 110 ohms in the digital audio routing switchers. Likewise, all outputs are source-terminated with 110 ohms (55 ohms per line).

When balanced digital audio is ordered, Sierra Video supplies a removable screw terminal adapter. Use of the adapter is optional.

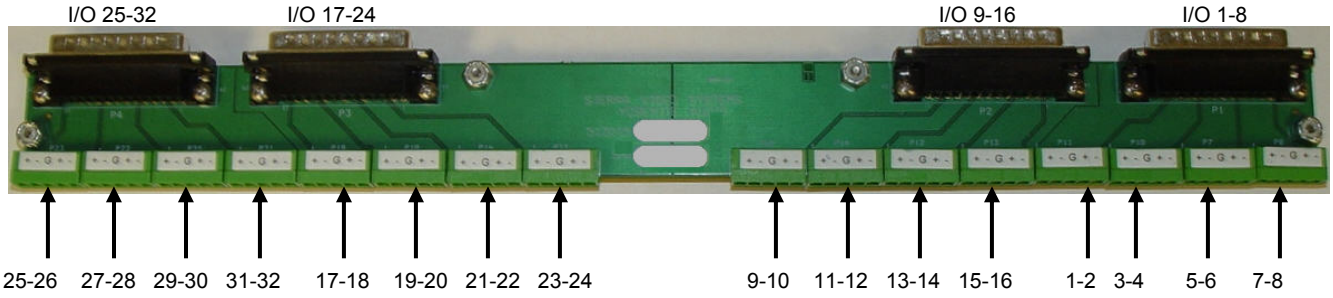


Each adapter panel connects to 4 of the 25-pin “D” connectors. This connects a total of 32 inputs or outputs.



The 25-pin “D” connectors each support a group of 4 inputs or outputs and the screw terminals are in groups of 4 containing 2 inputs or outputs each.
Example: If an adapter panel is connected to the top row of 25-pin “D” connectors on the back of the frame, the screw terminals will be configured as below;

Rear of Frame



Use of the screw terminal adaptable is optional. If it is preferred to wire directly to the 26-pin “D” connectors using a male 25-pin “D” connector, the pinout connections are as follows;

Inputs & Outputs 1 - 32

Audio Pin Connections – I/Os 1 - 32								
Pin #	**1-8**		**9-16**		**17-24**		**25-32**	
Pin #1	8	(+)	16	(+)	24	(+)	32	(+)
Pin #14	8	(-)	16	(-)	24	(-)	32	(-)
Pin #2	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #15	7	(+)	15	(+)	23	(+)	31	(+)
Pin #3	7	(-)	15	(-)	23	(-)	31	(-)
Pin #16	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #4	6	(+)	14	(+)	22	(+)	30	(+)
Pin#17	6	(-)	14	(-)	22	(-)	30	(-)
Pin #5	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #18	5	(+)	13	(+)	21	(+)	29	(+)
Pin #6	5	(-)	13	(-)	21	(-)	29	(-)
Pin #19	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #7	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #20	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #8	4	(+)	12	(+)	20	(+)	28	(+)
Pin #21	4	(-)	12	(-)	20	(-)	28	(-)
Pin #9	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #22	3	(+)	11	(+)	19	(+)	27	(+)
Pin #10	3	(-)	11	(-)	19	(-)	27	(-)
Pin #23	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #11	2	(+)	10	(+)	18	(+)	26	(+)
Pin #24	2	(-)	10	(-)	18	(-)	26	(-)
Pin #12	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #25	1	(+)	9	(+)	17	(+)	25	(+)
Pin #13	1	(-)	9	(-)	17	(-)	25	(-)

Inputs & Outputs 33 - 64

Audio Pin Connections – I/Os 33 -64								
Pin #	**33-40**		**41-48**		**49-56**		**57-64**	
Pin #1	40	(+)	48	(+)	56	(+)	64	(+)
Pin #14	40	(-)	48	(-)	56	(-)	64	(-)
Pin #2	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #15	39	(+)	47	(+)	55	(+)	63	(+)
Pin #3	39	(-)	47	(-)	55	(-)	63	(-)
Pin #16	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #4	38	(+)	46	(+)	54	(+)	62	(+)
Pin#17	38	(-)	46	(-)	54	(-)	62	(-)
Pin #5	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #18	37	(+)	45	(+)	53	(+)	61	(+)
Pin #6	37	(-)	45	(-)	53	(-)	61	(-)
Pin #19	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #7	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #20	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #8	36	(+)	44	(+)	52	(+)	60	(+)
Pin #21	36	(-)	44	(-)	52	(-)	60	(-)
Pin #9	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #22	35	(+)	43	(+)	51	(+)	59	(+)
Pin #10	35	(-)	43	(-)	51	(-)	59	(-)
Pin #23	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #11	34	(+)	42	(+)	50	(+)	58	(+)
Pin #24	34	(-)	42	(-)	50	(-)	58	(-)
Pin #12	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #25	33	(+)	41	(+)	49	(+)	57	(+)
Pin #13	33	(-)	41	(-)	49	(-)	57	(-)

Inputs & Outputs 65 - 96

Audio Pin Connections – I/Os 65-96								
Pin #	**65-72**		**73-80**		**81-88**		**89-96**	
Pin #1	72	(+)	80	(+)	88	(+)	96	(+)
Pin #14	72	(-)	80	(-)	88	(-)	96	(-)
Pin #2	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #15	71	(+)	79	(+)	87	(+)	95	(+)
Pin #3	71	(-)	79	(-)	87	(-)	95	(-)
Pin #16	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #4	70	(+)	78	(+)	86	(+)	94	(+)
Pin#17	70	(-)	78	(-)	86	(-)	94	(-)
Pin #5	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #18	69	(+)	77	(+)	85	(+)	93	(+)
Pin #6	69	(-)	77	(-)	85	(-)	93	(-)
Pin #19	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #7	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #20	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #8	68	(+)	76	(+)	84	(+)	92	(+)
Pin #21	68	(-)	76	(-)	84	(-)	92	(-)
Pin #9	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #22	67	(+)	75	(+)	83	(+)	91	(+)
Pin #10	67	(-)	75	(-)	83	(-)	91	(-)
Pin #23	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #11	66	(+)	74	(+)	82	(+)	90	(+)
Pin #24	66	(-)	74	(-)	82	(-)	90	(-)
Pin #12	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #25	65	(+)	73	(+)	81	(+)	89	(+)
Pin #13	65	(-)	73	(-)	81	(-)	89	(-)

Inputs & Outputs 97 - 128

Audio Pin Connections – I/Os 97-128								
Pin #	**97-104**		**105-112**		**113-120**		**121-128**	
Pin #1	104	(+)	112	(+)	120	(+)	128	(+)
Pin #14	104	(-)	112	(-)	120	(-)	128	(-)
Pin #2	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #15	103	(+)	111	(+)	119	(+)	127	(+)
Pin #3	103	(-)	111	(-1)	119	(-)	127	(-)
Pin #16	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #4	102	(+)	110	(+)	118	(+)	126	(+)
Pin#17	102	(-)	110	(-)	118	(-)	126	(-)
Pin #5	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #18	101	(+)	109	(+)	117	(+)	125	(+)
Pin #6	101	(-)	109	(-)	117	(-)	125	(-)
Pin #19	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #7	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #20	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #8	100	(+)	108	(+)	116	(+)	124	(+)
Pin #21	100	(-)	108	(-)	116	(-)	124	(-)
Pin #9	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #22	99	(+)	107	(+)	115	(+)	123	(+)
Pin #10	99	(-)	107	(-)	115	(-)	123	(-)
Pin #23	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #11	98	(+)	106	(+)	114	(+)	122	(+)
Pin #24	98	(-)	106	(-)	114	(-)	122	(-)
Pin #12	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #25	97	(+)	105	(+)	113	(+)	121	(+)
Pin #13	97	(-)	105	(-)	113	(-)	121	(-)

Unbalanced Audio Pin Out Example

Pin #	**1-8**		**9-16**		**17-24**		**25-32**	
Pin #1	8	(+)	16	(+)	24	(+)	32	(+)
Pin #14	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Pin #2	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground

Unbalanced Digital Audio

Since all audio sources and destinations in the routing switcher are balanced, Sierra Video supplies BNC adapter panels when you order unbalanced digital audio.

By using BNC adapter panels, each of the 110 ohm balanced inputs is converted to 75 ohm unbalanced 1 V P-P nominal input level. The BNC conversion / adapter panel option for the outputs converts each output to BNC connectors with 75 ohm source impedance and nominal 1 V P-P output level. The adapter panels require more space than the routing switcher. They are separate rack mount panels which interconnect to the 25 in D connectors with short cables that we provide with the adapter panels.

Each panel accommodates 4 of the 25-pin “D” connectors.

Input BNC adapter panels are “active” and come with an external power supply. Output BNC adapter panels are passive and do not require power to operate.

Chapter 6

Audio Module Overview

Introduction

The Ponderosa Audio routing switcher is based upon a modular architecture of an integrated frame, motherboard and backplane. Common input and crosspoint modules are used. The same two types of modules are used for both frame sizes: 64x64 and 128x128.

There are two basic modules:

- Input Buffer Module
- Crosspoint/ Output driver Module

The 64x64 frame has positions for two 32-channel input buffer and two crosspoint/output driver modules; and the 128x128 frame has positions for four 32-channel buffer modules and four crosspoint/output driver modules.

All modules are front extractable and “hot-swappable”. The frame is force air cooled using internal cooling fans contained within the front panel.

Note:

Although modules are “hot-swappable” it is advised that power be removed when removing or inserting modules when possible.

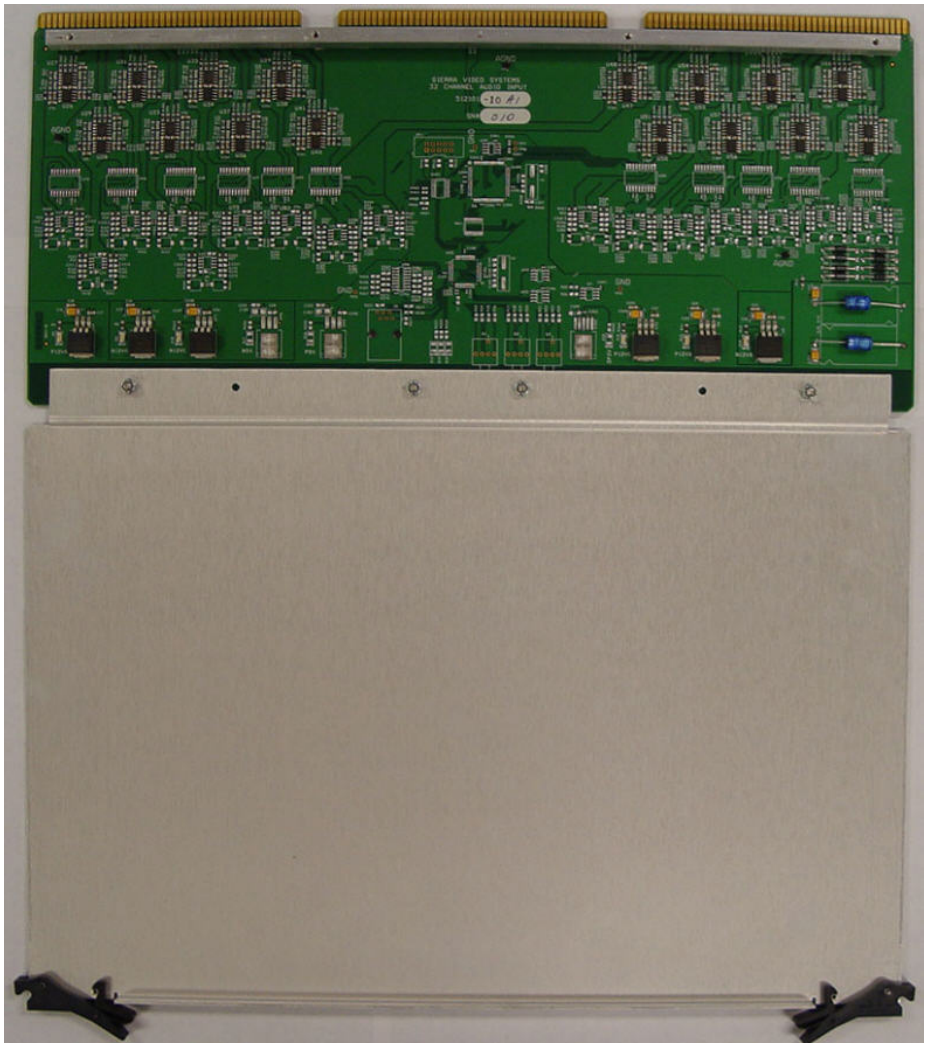
Analog Audio

Input Buffers

Each input buffer module has 32 identical circuits. Ponderosa Audio routers are designed to work in broadcast and production facilities, and are compatible with balanced interconnections.

The buffers have multiple purposes:

1. **Present a high impedance to the incoming signal.**
2. **Remove unwanted common mode IE Hum signal.**
3. **Convert the signal to the level and impedance needed by the switching matrix that follows.**



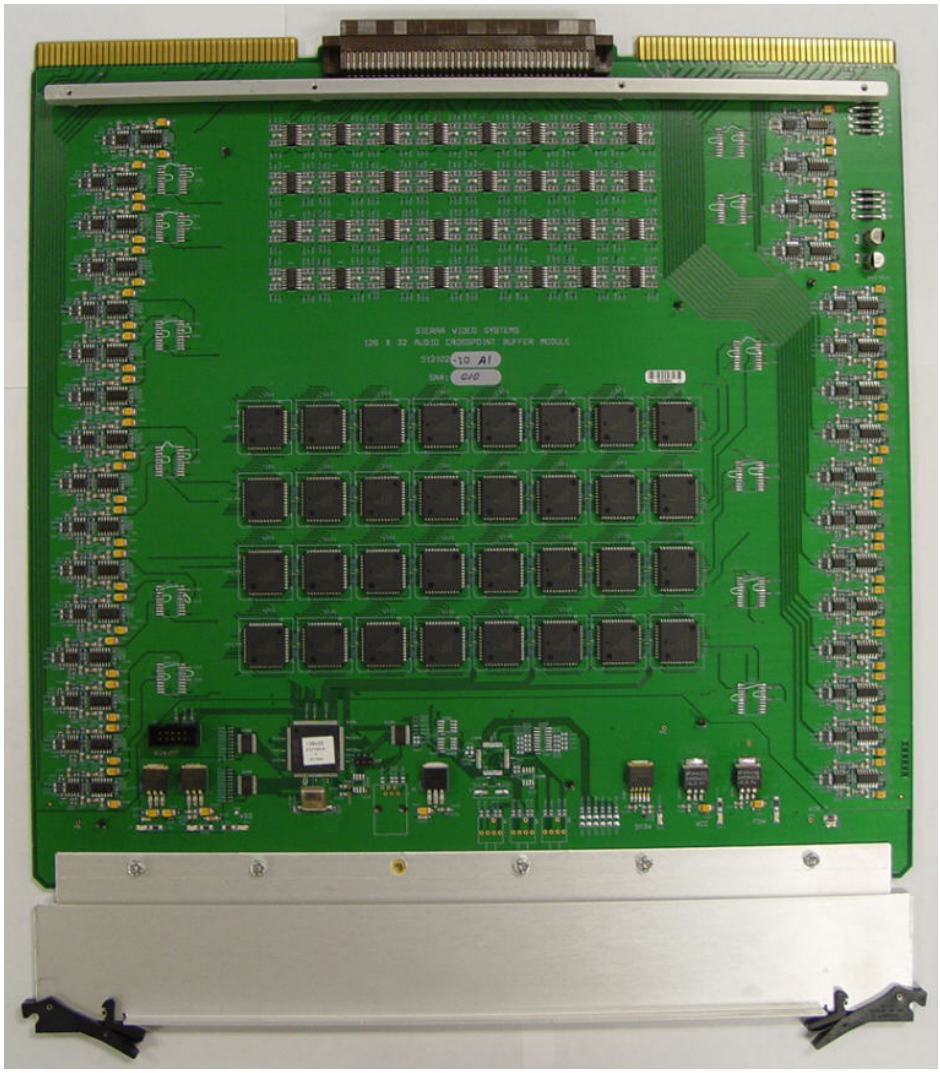
The output of the input buffer circuits are connected to the switching matrix via the internal motherboard. The 64x64 frame has positions for two 32-channel buffer modules; and the 128x128 frame has positions for four 32-channel buffer modules.

Crosspoint/ Output Driver Modules

The analog audio crosspoint module used in Ponderosa Audio is a 128x32 module. The switching integrated circuit (IC) is a HCMOS 16x8 array. Thirty-two of these switching IC's are arranged to form a 128x32 matrix.

Each output bus from the switching matrix feeds a differential output. The output driver provides a symmetrical low impedance output signal.

The 64x64 frame has positions for two 128x32 / 32-channel output driver modules; the 128x128 frame has positions for four 128x32 / 32-channel output driver modules. Grounding the negative side of the output drive adds +6dB of audio gain.



Digital Audio

As with analog audio systems described above, the digital audio routing switchers use digital modules with the same form factor. These audio AES/EBU compatible routers use high-frequency digital 110 ohm balanced line receivers. They can also be ordered to support S/PDIF single-ended signals with an input/output impedance of 75 ohm.

Input buffers

The basic digital audio input buffer module has thirty-two balanced 110 ohm AES/EBU audio line receiver circuits that in turn connect their outputs via the motherboard to the crosspoint modules.

Module Layout

For the routing system to function properly, every module must be placed in the proper slot.

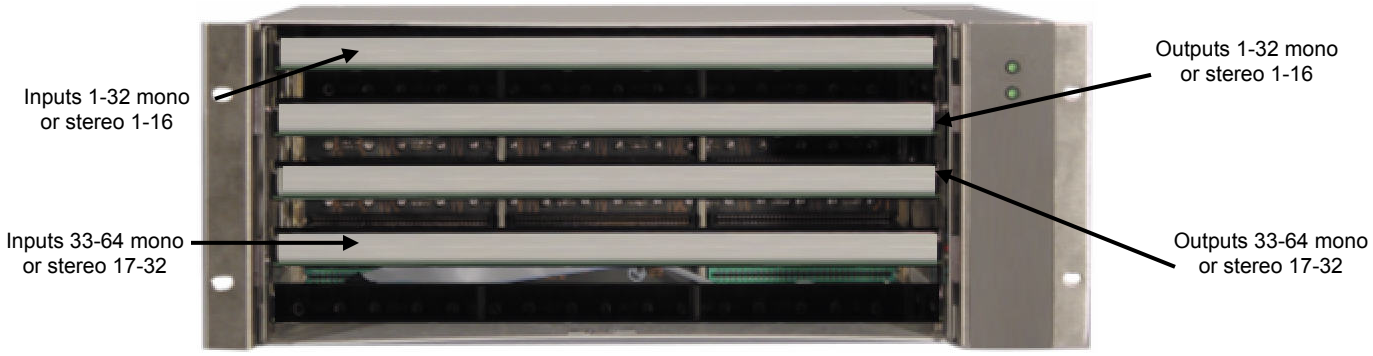
Access to the modules is made by removing the front door containing the fans and unplugging the fan harness.

Warning:

The unit must not be operated with the front fans removed or damage could be caused to the modules. Although modules are "hot-swappable" it is advised that power be removed when removing or inserting modules when possible.

6464 Frame Analog Mono and Digital

The 3RU 6464 has 5 slots for modules with the bottom slot unused.



The top slot in both the analog and digital frame contains the input buffer module for inputs 1-32.

The next (2nd) slot down contains the crosspoint/output driver module for outputs 1-32.

The 3rd slot from the top contains another crosspoint/output driver module for the outputs 33-64.

The 4th slot from the top contains an input buffer module for inputs 33-64.

*The bottom slot (slot 5) is not used.

Note:

If the frame is configured as a 32x32 mono router, only the top 2 slots are loaded with modules.

6464 Frame Analog Stereo

Modules are arraigned the same in the stereo mode as the mono mode with the exception of which inputs and outputs the module controls.

The top slot controls stereo (left and right) inputs 1-16.

The next (2nd) slot down controls stereo outputs 1-16.

The 3rd slot from the top controls stereo outputs 17-32.

The 4th slot from the top control stereo inputs 17-32.

*The bottom slot (slot 5) is not used.

128128 Frame Analog Mono and Digital

The 5RU 128128 is similar to the 6464 frame except it has 9 slots for modules with the bottom slot unused.

The top slot in both the analog and digital frame contains the input buffer module for inputs 1-32.

The next (2nd) slot down contains the input buffer module for inputs 33-64.

The 3rd slot from the top contains a crosspoint/output driver module for the outputs 1-32.

The 4th slot from the top contains a crosspoint/output driver module for the outputs 33-64.

The 5th slot from the top contains a crosspoint/output driver module for the outputs 65-96.

The 6th slot from the top contains a crosspoint/output driver module for the outputs 97-128.

The 7th slot down contains the input buffer module for inputs 65-96.

The 8th slot down contains the input buffer module for inputs 97-128.

*The bottom slot (slot 9) is not used.

128128 Frame Analog Stereo

Modules are arraigned the same in the stereo mode as the mono mode with the exception of which inputs and outputs the module controls.

The top slot controls stereo (left and right) inputs 1-16.

The 2nd slot from the top controls stereo inputs 17-32.

The 3rd slot down controls stereo outputs 1-16.

The 4th slot from the top controls stereo outputs 17-32.

The 5th slot from the top controls stereo outputs 33-48.

The 6th slot from the top contains stereo outputs 49-64.

The 7th slot from the top contains stereo inputs 33-48.

The 8th slot down contains stereo inputs 49-64.

*The bottom slot is not used.

Front Door Fans

Three 12VDC cooling fans are mounted on the front door and plugged into the frame's power supply.

The unit should not be operated without the front door with fans operating as this could cause failure of the modules.

Chapter 7

Specifications

HD Video Specifications

Video	
Data Rates	19Mbps – 2.97Gbps
Data Types	SMPTE 424, 372M, 310M, 259, 344M, 292M, DVB-ASI, ITU-R BT.601
Jitter	< 0.2 UI
INPUT	
Video Level	800mV p-p +/-10%
Connector Type	BNC
Impedance	75 Ohm
Return Loss	<-20dB up to 2.97 GHz
Cable Equalization	0 – 100 meters for SMPTE 292, 424 or 372M, Belden 1694A 0 – 300 meters for all other standards, Belden 1694A
OUTPUT	
Video Level	800mV p-p +/-10%
Connector Type	BNC
Impedance	75 Ohm
Return Loss	<-20dB up to 2.97 GHz
Rise/Fall Times	< 0.4 nsec for 270 Mbps SDI and < 135 psec for HD-SDI
Optional D to A Output Module	
Return Loss	<-30db @ 5 MHz
Differential Gain	+/- 0.3 % @ 3.58 MHz or 4.443 MHz
Differential Phase	+/- 0.5 Deg @ 3.58 MHz or 4.443 MHz

Fiber Option	
Input/Output	Modules accept 8 fiber optical connectors
Connector Type	LC
Fiber Type	Single Mode
Wavelength	1310 (nm)
Data Rates	50Mbps – 3Gbps
Min. Optical Input/Output Power	-5dBm
Max. Distance @ 3Gbps	10km

Control	
Serial	3 General purpose 9-pin D. Each switchable RS-232 or RS-422 9600, 38.4K, 115.2K baud
Serial Protocols	SVS Host, simple Kramer and select others
Ethernet	10/100 Base-T, full duplex, RJ-45 connector
Ethernet Protocols	ARP, ICMP, TCP/IP, Telnet, HTTP
Web Server	For control
Redundant Control Processor	Optional
Control Panels	Supports full line of Sierra Video SCP remote control panels
GPI/GPO	5 inputs/ 5 outputs

General	
Rack Unit/ Frame Size	4RU-6464 Frame & 8RU-128128 Frame
Dimensions	6464 Frame-19” W x 7” H x 20 ⅜” D 128128 Frame 14” H x 20 ⅜” D Mounts in Standard 19” rack Depth measurements do not include front panel hardware or rear cabling
Power	90VAC to > 240VAC Auto-detecting <150Watts for 6464 Frame <300Watts for 128128 Frame
Redundant Power Supply	Optional
Storage Temperature	-40° to +150° F
Operating Temperature	30° to 100° F Ambient
Humidity	10% to 90% Non-condensing

Analog Audio Specifications

Gain	+/- 0.5 dB
Frequency Response: 20 Hz to 20 KHz	+/- 0.5 dB
Max I/O Level- Balanced	+21 dB
Max I/O Level- Unbalanced	+15 dB
Noise (20 Hz to 20 KHz)	-79 dBu
Crosstalk: 1 KHz	< -90 dB
Crosstalk: 10 KHz	< -70 dB
THD+N (20 Hz to 20 KHz @ +4 dBu)	< 0.025%
IM (20 Hz to 20 KHz @ +4 dBu	< 0.025%

Digital Audio Specifications

	AES 3	**AES 3-id**
I/O connections	110 ohm balanced/shielded cable	75 ohm BNC
Input/Output impedance	110 ohm +/- 20%	75 ohm
Return Loss	< -15 db	< -15 db
Output Voltage	2 V p-p Min	1 V p-p +/- 20%
DC Offset	N/A	< 50 mv
Rise/Fall Time	5 to 30 ns	30 to 44 ns
Intrinsic Jitter	< 0.025 UI using intrinsic-jitter filter	< 0.025 UI using intrinsic-jitter filter
Min Input Voltage	200 mv p-p	320 mv p-p
Data Rates	32 KHz to 96 KHz Sampling Rate 2.048 Mbps to 6.144 Mbps Data Rates Meets all above specifications with 32 KHz, 44.1 KHz, 48 KHz, and 96 KHz Sampling Rates	

General	
Rack Unit/ Frame Size	3RU-6464 Frame & 5RU-128128 Frame
Dimensions	6464 Frame-19” W x 5 1/4” H x 20 1/2” D 128128 Frame 8 3/4” H x 20 1/2” D Mounts in Standard 19” rack Depth measurements do not include rear cabling
Power	90VAC to > 240VAC Auto-detecting <150Watts for 6464 Frame <300Watts for 128128 Frame
Redundant Power Supply	Standard
Storage Temperature	-40° to +150° F
Operating Temperature	30° to 100° F Ambient
Humidity	10% to 90% Non-condensing

Chapter

8

Communication Protocol

Introduction

The protocol uses the 7-bit ASCII character set, usually sent over an RS232-C or RS422 serial link — 115.2K bps is recommended with 8 data bits and no parity. Protocol commands can also be sent over the Ethernet connection.

The protocol is compact, with few characters required to cause switch changes to occur. It is also human-readable and thus easy to understand and use. Several different crosspoint switch request commands are defined, so that the one that is most compact for any given switcher and application can be chosen.

The protocol is useful with both very small and very large routing switchers. The sizes of the numbers representing inputs, outputs, and levels are not fixed, but can be as large or small as necessary. Special provisions allow numbers to be packed one after another with no intervening delimiter character, in order to make the protocol compact, as long as each number is the largest size necessary for that particular switcher.

All input, output, and level numbers begin at number 1, not 0.

Levels can be switched together or separately.

Generic Protocol

Commands are sent to a routing switcher in a group called a command string. A command string can contain zero or more commands, limited only by the size of the receive buffer of the router, whose size depends on the particular router model.

A command string consists of a leader string of asterisk characters, zero, or more commands, and a trailer string of exclamation marks. Larger routers require two leader (**) and trailer (!!) characters, while small routers require only one, in order to make the protocol compact for those routers. The remainder of this document gives examples using doubled characters. Note that two leader/trailer characters may be sent to small routers even when only one is required, and they will still work fine.

If a leader character (**) is encountered within the command string being processed by a router, the command string up to that point is discarded and a new command string is expected. This ensures that a router will always act on a complete command string sent to it, even if the previous one was never completely received.

When a command string is received, it is not acted upon (but rather, is merely buffered up) until the final trailer character (!) character of the command string is received. At that time, the routing switcher begins to execute the commands within the string.

The protocol uses only 7-bit ASCII characters. The 8th bit of received characters is treated as if it is 0. Within the command string, certain ASCII characters may be present and are ignored: any ASCII character whose code is *less than* the SPACE character (includes all control characters and the SPACE character) and the DEL (ASCII 7F) character. Alphabetic characters within the command string may be in either upper-case or lower-case letters. The router always *sends* upper case characters, except for character strings such as input, output, and level names, which may have lower case characters in them.

When sending commands *to* the router, SPACE characters are optional, but if used may only appear before and after each individual command and NOT embedded within an individual command. Within command strings sent *from* the router, a single SPACE character appears before and after each individual command. SPACES may also appear in character strings, such as input, output, and level names.

Certain commands (R, Q, L, and G) have character strings that appear as arguments. The first three, “R”, “Q”, and “L”, have character strings only in commands sent *from* the router, and these character strings are always terminated with a ~ (tilde) character. No special character marks the start of these strings, they simply begin at the appropriate point within the command. The “G” command, on the other hand, uses the ~ (tilde) character to mark both the *start and end* of a character string argument.

Just before the router begins executing a command string, it sends a leader (**) to the host (the same number as are required in commands from the host). As it executes the commands, some of them may generate additional output back to the host. These command response characters are always preceded and followed by a space character, making the response string easily human-readable.

After the command string has been executed, the routing switcher returns the string " **OK** " (with a single space character before and after the word "OK"), followed by the trailer (!!) and a CR (carriage return, ASCII 0D) character, to the host. This indicates that the command has executed successfully. If an error occurs within any command of a command string, the remainder of the command string is ignored and the router returns the string " **ERROR** ", followed by *an optional descriptive string* followed by a string of

trailer characters and a CR character, to the host. An error can be caused by an unknown command name or bad arguments to a command.

The simplest possible command string would be:**!! which consists of the leader and trailer characters but no commands between them. This command string would generate the response:

** OK !!<CR>

This can be useful for verifying that the serial link to the router is operational. In routers requiring only one leader/trailer character, the simplest command string would be: *! which would generate the response:

* OK !<CR>

(To determine whether a particular router uses one or two leader/trailer characters, send it "!!**" and check the response to see which of the above two responses it is. It won't hurt to always use two even if only one is required.)

The simplest error response is one with no optional descriptive string. For example, this command string:

** XXX !! might generate this response from the router:

** ERROR Syntax: No Number:XX !!

The descriptive string always ends with a colon and up to three characters from the command string that caused the error. Generally, the error can be assumed to have occurred just before these characters.

Leader and Trailer

The simplest possible command string would be “**!!” which consists of the leader and trailer characters but no command between them. This command string would generate the response “**OK!!” followed by “CR”. This can be useful for verifying that the serial link to the switcher is operational.

The following is the set of commands available for sending to the router, a subset of which may be implemented in any given routing switcher.

Syntax	Example	Description
R	R	Router Reset
I	I	Capabilities Inquiry
Q	Q	Model Name and Software Version Inquiry
L	L	Matrix Size and Level Names Inquiry
O	O5	Output Status inquiry
N	N5	Input Status inquiry
S	S	Status inquiry
C	C	Clear matrix
K	K9999	Set Password to Change Protected Settings
M	M139	Set Remote Address
U {0 1}	U0	Update request on/off
V out,in,in…	V3,1,2,2	Connect levels
W lvl,in,in…	W1,4,19	Connect outputs
X out,in,lvl	X12,9,2	Connect crosspoint
Y out,in	Y1,7	Connect AFV
Z in in…	Z13,12,8	Connect AFV
D numsyncs	D300	Delay vertical sync intervals
T {A-Z}	TB	Trigger a Salvo Connect sequence
P {A-Z}	PBY1,7~	Preset a Salvo connect sequence
B	B21	Output Lock inquiry or change
F	F5	Field Delay for crosspoint output
HOST	HOST0	Select Host or Terminal Protocol

“R”: Router Reset

Use this command to force the routing switcher to reset, by sending it the command "**RESET**". If an administrator password has been set (using the “G ADMIN_PASSWORD” command described later in this document), then the password must be sent in a “K” message prior to sending this command, else this command will generate an error. For example, the command:

**RESET!!

would initiate a reset (if the password has been entered, if required), and when the router finished the reset operation, something like this would be received, just as if the router had powered up:

** RESET Tahoe Vx.xx (C) 2000~ !!<CR>

“I”: Capabilities Inquiry

The command "**I**" requests that command capability information be returned to the host. The information is sent as a string of characters. The first characters are a space followed by "**I**", the next characters are the letters of the commands that are implemented and available in this router, and the last character is "~" (tilde). Do not count on the characters being in any specific order. Search all characters for a particular one.

All routing switchers implement the **I, L, S, and X** commands. The Q command will eventually be added to all.

For example, the command:

**I!!

might return the following string:

** ILSX~ OK !!<CR>

indicating that the router supports the **I, L, S, and X** commands from the host.

“Q”: Model Name and Software Version Inquiry

The command "**Q**" requests that the router model name and software version number string be returned to the host. The information is sent as a string of characters. The first characters are a space followed by "**Q**", the next characters are the router model name, terminated by a "~" (tilde). Following this are the characters of the software version number string, again terminated by a "~" (tilde).

For example, the command:

**Q!!

might return the following string:

** QSmall~V2.1~ OK !!<CR>

indicating that the router model name is "Small" and the software version number is "V2.1".

“L”: Matrix Size and Level Names Inquiry

The command "**L**" requests that matrix size (Nout, Nlvl, Nin) and level name information (lvl1, lvl2, etc.) be returned to the host. The information is sent as a string of characters. The first characters are a space followed by "**L**", some optional values described below, then the number of outputs (Nout), a comma, the number of levels (Nlvl), a comma, the number of inputs (Nin), a comma, and then the level names, each terminated by a "~" (tilde), and the last followed by two tildes.

For example, the command:

**L!!

might return the following string:

** L64,3,32,VIDEO~AudioL~AudioR~~ OK !!<CR>

indicating that the router has 64 outputs, 3 levels, and 32 inputs, and the levels are named "VIDEO", "Audio L", and "Audio R".

“O”: Output Status Inquiry

The command "**O**" requests that matrix status information for a single output be returned to the host. The status information is sent as a “Y” command or a “V” command or as a sequence of L “X” commands, where L=number of levels.

For example, the command:

**O5!!

to a 3-level router might have the following three commands as its response:

** X65,23,1 X5,-,2 X5,0,3 !!

Note the dash, indicating that on level 2, output 65 is not connected to an input. Also note the 0, indicating that the connection on level 3 is either unknown or that output 65 doesn’t exist or isn’t mapped on level 3.

Or, a 3-level router might have the following single command as its response:

** V65,23,-,0 !!

which has the same information as the three X commands in the previous example.

If the router has only one level, or if all levels are connected the same, the router might instead use the **Y** command. For example:

** Y65,23 !!

“N”: Input Status Inquiry

The command "**N**" requests that matrix status information for a single input be returned to the host. This command is only useful on those router levels that allow an input to be connected to at most one output. The status information is sent as a “Y” command or a sequence of L “X” commands, where L=number of levels that allow an input to be connected to at most one output (each such level generates a single “X” command of status). Thus, a 6-level router with three single-output-per input levels would generate 3 “X” commands of status command output. A router that has *all of its levels* as single-output-per-input may return a single “Y” command instead of individual “X” commands if all of the levels are connected to the *same output*. The “X” and “Y” commands are formatted exactly as with the "**O**" command.

For example, the command:

**N4!!

to a router might have the following three commands as its response:

** X12,4,2 X-,4,3 X0,4,4 !!

giving the status of levels 2, 3, and 4 (level 1 presumably not being a single-output-per-input level). Note that on level 3 the ë-ë (dash) indicates that the input is disconnected, and on level 4 the 0 indicates that the connection to the input is either unknown or that input does not exist or is not available on that level.

If the router has only one level, or if all levels are connected the same, it might instead use the **Y** command. For example:

** Y12,4 !!

“S”: Status Inquiry

Use command S to request that status information be returned to the host. The status information is sent as a string of L x O substrings, where L = number of levels and O = number of outputs. Each level/output combination generates a single substring of status. Thus, a 21-level 16 output router would generate 2x16 = 32 substrings of status command output. The length of each substring depends on the size of the particular switcher involved. Larger switchers use bigger numbers for inputs, outputs, and levels.

The first substring of status is for level 1 output 2, etc.; however, each substring contains the level and output numbers, so the sequence in which the data is sent is not important). The first characters of each substring are a space followed by “X”, then the output number, a comma character, the input number connected to the output (or 0 if no connection exists), another comma, and finally the level number at which the input-output pair is connected. For example, the command:

****S!!**

might have the following two substrings at the beginning of its response:

****x01, 12, 1 x02, 02, 1!!**

This indicates that output 1 is connected to input 12 on level 1, and that output 2 is connected to input 2 on level 1.

The number of digits used for each number is generally the maximum number of digits ever required for that particular switcher. Thus, a switcher with between 10 and 99 inputs would use two digits for the input number, and a switcher with less than 10 levels would use one digit for the level number.

“C”: Clear Matrix

Use command C to request that the switcher matrix be cleared so that all outputs are disconnected from inputs (in switchers where this is possible) or else all outputs at all levels have input 1 as their source. This command can take several seconds to execute (depending on the size of the switcher matrix). In order to help ensure that this command isn’t accidentally executed, it requires four additional characters following the “C” character, to spell out the word “CLEAR” in full. For example, the command:

****CLEAR!!**

would clear the matrix and when finished — the following response would be generated:

****OK!!<CR>**

“K”: Set Password

The command "**K**" is followed by a password, which may be 0 to *cancel* the previous password, thus causing no password to be specified, or, it may be a value between 1 and 9999 to supply a password, which remains in effect until another password (or password 0) is supplied in another “K” command. The password is stored by the router under the remote address specified using an “M” command, or under the *control portís* remote address if an “M” command was not specified before the “K” command in the same command string as the “K” command. The password that is set remains in effect until another “K” command is received from the same remote address.

It would be used to establish a password for a remote address, to be used for such things as locking and unlocking outputs and modifying the router configuration. When the router receives a protected command (one which requires use of a password) from a remote address, it compares the current password for that remote address with the password required to execute the protected command. Protected commands consist of many of the “G” commands that change router configuration, as well as *take* and *salvo trigger* commands when the output to be taken is locked. In the former case, the administrator password is the one that must be sent in the “K” command to permit the router configuration to be changed, while in the latter case the password that was used to lock the output is the one that must be sent in the “K” command to permit the *take* to occur.

Refer to the “B” command and the “G ADMIN_PASSWORD” command (in a separate document) for more information.

For example, the command:

** M197 K1777 !!

requests that password 1777 be stored as the current password for remote address 197. The command:

** M197 Y7,9 !!

requests that output 7 be connected to input 9, using the password stored for remote address 197 as the output lockout override password. The *take* will succeed if output 9 is either not locked or is locked with password 1777. Otherwise, the *take* will fail.

“M”: Set Remote Address

The command "**M**" is followed by a remote address value, and it sets the remote address to be used by all remaining commands in the current command string. This command is supported on larger routers. It would be used when a client/server software system on a router control port permits multiple remote users to send commands to the router through that control port. In such a system, the server software that talks to the control port can insert an “M” command at the beginning of each command string it sends to the router on behalf of its clients. The server would assign a different address to each of its clients. The router uses the address to control access to and modification of protected resources. The “M” command will typically work in conjunction with the “K” command, which allows a password to be sent to the router. Some commands, such as those that allow modification of router configuration settings, might require entry of an administrator password before allowing the router configuration to be modified. The “K” command is used to send the password, but the router must be able to record that password in association with a particular remote user. The router would save the password as the one established by the remote address specified in the “M” command. The examples below show how this would work.

If the “M” command is not present in a control string received on a serial port, the address assigned to the *serial port itself* is used as the address for all commands in that command string.

The “M” command works on an honor system. There is nothing to keep a remote device from forging a false address. This conforms with the philosophy of providing protection mechanisms that are not designed to be totally hack-proof, but rather, are designed under the assumption that controlling devices will honor the system. A dedicated hacker can always hack into the system if he chooses. Note, however, that the server in a client/server relationship can provide a great deal of added security for the system, forcing the correct “M” command to be sent each time, and filtering out bogus “M” commands received from clients.

When the router receives an “M” command in a command string, it echoes the same “M” command in its response. This allows the server connected to the serial port to parse the received response string and determine to which client it should route the response.

Normally the server will assign remote addresses to its clients. However, it should always provide a way to send these addresses to the client, because the client needs to know its address in order to know how to interpret some responses. By simply passing each “M” response command received from the router back to the client, the server can let the client know what its address is.

For example, the command:

** M139 K9664 !!

establishes password 9664 as the password for remote address 139. The response to this command string would be:

** M139 OK !!

If remote address 13 later sends the command:

** M139 Y8,27 !!

to request that output 8 be connected to input 27, the router would check to see if output 8 has been locked. If so, the router compares the password of remote address 139 (which has previously been set to 96643) to the password that was used to lock output 8. If they match, the connection request succeeds, but if they don’t match, output 8 is left unchanged.

“U”: Update Request on/off

The command "**U**" turns on or off the automatic sending of output change reports. The command letter must be followed by either a number 0, 1, or 2 to specify the new automatic change report state, as follows:

0: Automatic output change reporting is turned off.

1: Automatic output change reporting is turned on. Crosspoint change commands do not immediately report changed status, but instead, the report comes up to a few seconds after the crosspoint change command is received.

2: Automatic output change reporting is turned on, and crosspoint change commands immediately report changed status as part of the response to the command.

3: Like 1 except this enables "V" and "Y" commands also (version 10 and later).

4: Like 2 except this enables "V" and "Y" commands also (version 10 and later).

Output change reports are automatic messages sent to the host whenever an output is crosspoint status (i.e. connected source) is changed.

For example, the command:

**U1!!

turns on automatic output change reporting. When a crosspoint is changed, the following message might be received:

** X5,17,3 !!<CR>

indicating that output 5 is now connected to input 17 on level 3. Alternatively, if the router has only a single level or if all levels of the output are connected the same, it might send:

** Y5,17 !!<CR>

indicating that output 5 is now connected to input 17. Alternatively, newer routers might use the “V” command instead of “X” commands to report a change:

** V5,17,12,0 !!<CR>

indicating that output 5 is now connected to input 17 on level 1, to input 12 on level 2, and does not exist or is not available on level 3.

To turn off output change reporting, use the command:

**U0!!

The difference between an argument value of 1 versus 2 has to do with the response generated by the router when it receives a crosspoint connect command (“V”, “W”, “X”, “Y”, or “Z” command). For example, suppose the router sends the following crosspoint connect commands in a single command sequence:

** Y1,18 Y8,34 !!

If U1 is in effect, the response to this command will be:

** OK !!<CR>

and then sometime later, perhaps up to several seconds later, the crosspoint change reports will be sent as separate command sequences for each output:

** Y1,18 !!<CR>

** Y8,34 !!<CR>

On the other hand, if U2 is in effect, the response to the original crosspoint change command sequence will be:

** Y1,18 Y8,34 OK !!<CR>

and no additional crosspoint change reports will be sent because they already HAVE been sent. The U2 mode of operation is generally more convenient because it produces more immediate feedback to the controlling device that is sending a crosspoint change command. The U1 mode of operation is provided for compatibility with older control systems.

“V”: Connect Levels

The command "**V**" is used to request that a connection be made. It must be followed by an output number, a comma, and a comma-separated list of input numbers, one for each level, up to the number of levels in the router. Fewer than the number of levels may be specified if desired, and the remaining levels will be left unchanged.

For example, the command:

**V12,7,8,9!!

says that connections are to be made to output 12: from input 7 on level 1, input 8 on level 2, and input 9 on level 3.

An input number of 0 means the output connection is to be left *unchanged*.

An input number of ë-ë (dash) means the output is to be *disconnected*. If the router does not support disconnected outputs, the output connection will be left unchanged.

“W”: Connect Outputs

The command "**W**" is used to request that a connection be made. It must be followed by a level number, a comma, and a comma-separated list of input numbers, one for each output, up to the number of outputs in the router. Fewer than the number of outputs may be specified if desired, and the remaining outputs will be left unchanged.

For example, the command:

**W1,17,3,9!!

says that connections are to be made on level 1: from input 17 to output 1, input 3 to output 2, and input 9 to output 3.

If the level number is specified as "0", this means that the connection is to be made on **all levels** (AFV).

For example, the command:

**W0,8,3,7!!

says that connections are to be made on all levels: from input 8 to output 1, input 3 to output 2, and input 7 to output 3.

An input number of 0 means the output connection is to be left *unchanged*.

An input number of ë-ë (dash) means the output is to be *disconnected*. If the router does not support disconnected outputs, the output connection will be left unchanged.

It is an error to request connection of an input or output that doesn’t exist on the specified level, even if the input or output does exist on some other level. However, if the level number is “0”, any input or output may be used as long as it exists on at least one level, and in that case no connection will be made on any level on which the input and output does not exist. If the requested connection has an output or input number that isn’t

mapped to a physical connector (on virtual-mapped routers) on one or more levels, those levels are simply not changed.

If “U2” is in effect (see “U” command), the response will include one or more V, Y, or X commands to report the new status of the outputs. The response will be the same as if “O” commands were issued for the outputs immediately following the “W” command. No response is generated if this command is being used to define a salvo.

“X”: Connect Crosspoint

Use command X to request that a connection be made. It must be followed by an output number, a comma, an input number, a comma, and a level number. For example:

****X8, 3, 2!!**

This string says that a connection is to be made between output 8 and input 3 on level 2. If the level number is specified as “0”, this means that the connection is to be made on all levels (AFV). For example, the command:

****X8, 3, 0!!**

This string says that a connection is to be made between output 8 and input 3 on all levels.

“Y”: Connect AFV

Use command Y to request that a connection be made. It must be followed by an output number, a comma, and an input number. The connection is made on all levels (AFV). For example, the command:

****Y2, 8!!**

This string says that input 8 is to be connected to output 2 on all levels.

“Z”: Connect AFV

The command "**Z**" is used to request that a connection be made. It must be followed by a comma-separated list of input numbers, one for each output, up to the number of outputs in the router. Fewer than the number of outputs may be specified if desired, and the remaining outputs will be left unchanged. The connection is made on all levels (AFV).

For example, the command:

**Z4,18,7!!

says that input 4 is to be connected to output 1 on all levels, input 18 to output 2 on all levels, and input 7 to output 3 on all levels.

An input number of 0 means the output connection is to be left *unchanged*.

An input number of ë-ë (dash) means the output is to be *disconnected*. If the router does not support disconnected outputs, the output connection will be left unchanged.

Any input or (implied) output number may be specified as long as it exists on at least one level. No connection will be made on any level on which an input or (implied) output number does not exist. If the requested connection has an output or input number that isn’t mapped to a physical connector (on virtual-mapped routers) on one or more levels, those levels are simply not changed.

If “U2” is in effect (see “U” command), the response will include one or more V, Y, or X commands to report the new status of the outputs. The response will be the same as if

“O” commands were issued for the outputs immediately following the “Z” command. No response is generated if this command is being used to define a salvo.

“D”: Delay vertical sync intervals

The command "**D**" is used to delay before continuing execution of the commands that follow. It must be followed by a number giving the number of vertical sync intervals by which to delay. If the number is 1, the delay will be to the VERY NEXT vertical sync interval. If the number is 0, no delay occurs. The number must be no larger than 255. Note that this command will also delay the time at which the remaining command responses and the trailer character are returned to the host.

For example, the command:

** Y1,5 D200 D100 Y1,6 S !!

says that input 5 is to be connected to output 1 on all levels, then a delay of 300 (=200+100) sync intervals is to occur, then input 6 is to be connected to output 1 on all levels, then a status response is to be returned.

It is generally recommended that the host computer be responsible for timing the initiation of commands, rather than using this command to do the job. The host computer can simply send the appropriate commands at the appropriate times. The "P" and "T" commands described below can aid in ensuring that lengthy connect sequences aren't delayed due to the time it takes to send them to the router.

“T”: Trigger a Salvo

The command "**T**" is used to trigger a previously set up *salvo* (set using the "**P**" command above). It must be followed by a register letter from A to Z or a register number from 1 to 256 giving the *register* to be triggered.

For example, the command:

** TB D180 TC !!

says to trigger salvo register B (same as 2), delay 180 sync intervals, then trigger salvo register C (same as 3). When the register is triggered, this means that the connect commands stored in it take effect.

If a salvo is triggered and it attempts to connect a locked output or port, or a disallowed input/output pair, or a port to itself, the salvo trigger operation is aborted, no crosspoint changes are performed, and an error is reported: “ERROR Salvo Has Locked Xpts”.

“P”: Preset a Salvo

The command "**P**" is used to set up a *salvo*, which is a series of connect commands for later execution with the "**T**" command. It must be followed by a register letter from A to Z or a register number from 1 to 256 giving the *register* into which the connect sequence is to be stored, followed by zero or more *connect commands* (V, W, X, Y, or Z), followed by a "~" (tilde) character.

Registers A-Z are the same registers as 1-26. The letter designators are allowed to shorten up the command sequence slightly, so that “T” commands can be sent in compact form if one of the first 26 registers is used.

For example, the command:

** PB X2,5,0 Z7 ~ !!

says that two connect commands (output 2 to input 5 AFV, and output 1 to input 7 AFV) are to be stored into salvo register B (i.e. register 2). Another example:

** P239 Y5,7 ~ !!

says that one connect command (output 5 to input 7 AFV) is to be stored in salvo register 239.

Only *supported connect commands* (those connect commands whose command letters appear in the "I" command response) may follow the register letter up to the tilde character. The connect commands do not take effect until the register is *triggered* using the **"T"** command below.

The maximum allowed number of connect commands is determined by the particular router. In all cases where this command is implemented, there is guaranteed to be space available to store at least two complete switch matrices AT ONE LEVEL. If more connect commands are received than there is space available to store them, the error response string "FULL ERROR Salvo Space Full" is sent to the host, and only the first part of the salvo is stored. For example:

** FULL ERROR Salvo Space Full !!

says that the salvo request filled memory and the salvo could not be completely stored.

“B”: Output Lock inquiry or change

The command "**B**" requests that lock information for the specified output be returned to the host, and optionally that the lock status of that output be changed. Whenever the router receives a “B” command, it sends one back.

In routers that support the “B” command, the router reports changes to output lock status using the “B” command, not the “G OUTPUT_LOCK” command.

When an output is locked, it cannot be routed to a new input unless the password sent using the “K” command matches the password used to lock the output.

In virtual-mapped routers, this command applies lockouts to *virtual destinations* rather than *physical outputs*, so the word “output” should be replaced with “destination” in this command description.

If the “password” and “lock” arguments are both 0, this is a query for lock status of the specified output. A “B” command is sent to report the lock status.

If the “password” argument is not 0, this is a request to change the lock status of the specified output. After changing the lock status, a “B” command is sent to report the new lock status, so a response occurs regardless of which form of the “B” command is sent to the router.

When requesting that lock status be changed, if “lock” is 0, this is a request to unlock the output, and if “lock” is 1, this is a request to lock the output. An attempt to lock an output that is already locked, or to unlock an output that is already unlocked, fails, as does an attempt to unlock an output using a password that is different from the password that the output was locked with and is not the administrator password. Any use of a password larger than 9999 also fails. In any of those cases, the output lock status remains unchanged and an error response is generated. The “B” command response will indicate that the output still has the same lock state as before.

In the “B” command response that is sent by the router, the “password” argument is the current lock password for the output (1-9999), or is 0 if the output is not locked, and the “lock” argument is 0 if the output is not locked, or 1 if it is locked.

When locking an unlocked output, the specified password is recorded by the router as the lock password for that output. When unlocking a locked output, the specified password is compared by the router to the lock password for the output. If they match, or if the specified password is the administrator password, the output is unlocked, else it remains locked. Attempting to lock an already-locked output, or unlock an already-unlocked output, has no effect on the lock state of that output.

Whenever a *take* is done, the router checks to see if the specified output for the *take* has been locked. If so, the current password of the control port that sent the *take* request (as set with the “K” command) is compared to the outputs lock password. If they match, the *take* is allowed, but if not, the *take* has no effect. The *administrator password may NOT be used in lieu of the outputs lock password to do a take,* so if a controlling device sends the administrator password in a “K” command, that will not permit the device to reroute locked outputs (but it can use the administrator password to unlock locked outputs using the “B” command).

Output lockouts apply on *all levels.* On virtual-mapped routers, a level may be left out of a lockout by making sure the level is unmapped for the destination being locked.

As with all router configuration parameters, the output lockout data is stored in non-volatile storage and thus is retained across router power-ups. When a router is first initialized at the factory, all outputs are set to be unlocked.

This command provides the same functionality as the “G OUTPUT_LOCK” command. This command, which was added at router software version V5.06, is preferred over that command. Note that the output lock version number is not present in this command. Since output lock status changes frequently, it is not really useful to cache output lock status for outputs, so the output lock version number is not really useful.

For example, to request whether or not output 21 is locked:

** B21,0,0 !!

The response might be:

** B21,0,0 OK !!

indicating that output 21 is NOT locked. Or, the response might be:

** B21,6741,1 OK !!

indicating that output 21 is locked with password 6741. To clear this lockout:

** B21,6741,0 !!

To lock output 96 using password 439:

** B96,439,1 !!

If successful, the response would be:

** B96,439,1 OK !!

If output 122 becomes locked using password 235, the following change report would be sent by the router:

** B122,235,1 !!

“F”: Field Delay

The command "**F**" is used to specify the delay between the time a crosspoint change request is received by the router and the time the crosspoint switch actually occurs. It must be followed by a number giving the number of video fields of delay desired. If the number is smaller than the smallest delay that the router can handle, the smallest delay is used instead. If it is larger than the largest delay the router can handle, the largest delay is used instead. Note that this command does not cause a delay in command processing, as the “D” command does.

To understand this command more fully, consider the way that router software will typically handle a crosspoint command. The last character of the command string, the final “!” (exclamation) character, is received somewhere in a particular video field, call it video field 7. The router parses the command string and, for each crosspoint it contains, it puts the crosspoint in a buffer that is marked to be delivered to the crosspoint hardware on a particular video field. Suppose that previously, an “F5” command has been received. Then crosspoint commands whose final “!” command string character was received on video field 7 would be placed in a buffer that is marked to be delivered to the crosspoint hardware at video field 13 (7+5+1=13).

To understand the reason for adding 1 in the previous sum, consider an “F0” command: it would ask for output at the very next video field, field 8 in our case. So, it is necessary to add the “F” argument plus 1 to the field number on which the crosspoint command is received to get the field number at which the crosspoint will be output.

A typical router will have a minimum delay that is between 1 and 2 fields. Suppose a crosspoint command is received just before a vertical field mark. The software may be able to prepare the crosspoint data and send it to the hardware when that vertical field mark occurs, but the hardware itself typically has a one-field delay in it, so the soonest that such a crosspoint would switch would be one field (plus a little) from when it was received. If the command were received towards the beginning of a field rather than the end of a field, the delay would be closer to two fields. Industry parlance is to call this a one-field delay, because only *full fields* of delay are counted.

The *delayfields* argument of this command takes into account the hardware delay. So, if a router has a minimum delay, including the hardware delay, of one full field, as described in the previous paragraph, then a *delayfields* value of 1 causes this minimum delay to be used. A *delayfields* value of 0 will also cause this minimum delay, because the router uses its minimum if a smaller value is specified. A *delayfields* value of 2, however, will add one more field to the minimum possible delay. Thus, *delayfields* specifies the *number of full fields* of delay between end-of-crosspoint-command-string-received and crosspoint-switch-occurs. Note that the actual minimum value of *delayfields* depends on the particular router model.

Routers typically have a limit to the number of crosspoint commands they can process in one field. First, there is an inherent delay in *sending* the command to the router, but beyond that, the router requires time to parse the command and buffer up the crosspoint data, plus it requires time to deliver the buffered data to the hardware when the desired video field arrives. Each individual router has documentation to describe its limitations on how many crosspoints it can process in a given amount of time.

Larger values for *delayfields* give the router more time to process commands. Although the long-term average number of crosspoints that can be processed per unit of time is unchanged, a larger *delayfields* value can improve router performance during a short burst of many crosspoint commands. For example, suppose a large number of crosspoint commands is sent to the router in a single large command. If *delayfields* is small, the router typically wonít have time to parse and process all these crosspoint commands and place the data in the crosspoint delivery buffer before the target video field arrives. By

making *delayfields* larger, the user can give the router more time to process the crosspoint commands.

If too many crosspoint commands are received and the router is not able to process them fast enough, it will output the crosspoint connections as soon as it can. Unexpected delays in crosspoint output are a sign that the router is being pushed beyond its limits.

The *fielddelay* value applies to the *entire router,* not just to the control port on which the “F” command is received. It is therefore recommended that a single value be settled on for the *fielddelay* value, rather than changing the value constantly depending on needs. Once changed, the router records the value in non-volatile memory and uses it each time it is powered up, so it is only necessary to change it one time.

Even though a crosspoint isnít changed until the *fielddelay* time has elapsed, the router records the new crosspoint state *immediately upon receiving the crosspoint change request,* so a controlling device may receive a report of a crosspoint change before the change has actually taken effect, and this is more likely to happen the larger *fielddelay* is. Since routers currently make no guarantees about when they will report a crosspoint change anyway, this behavior is usually of no concern. There is a case where this could cause problems. If the *fielddelay* value were to be changed while two different devices were changing the same output, it is possible for the router to report the incorrect input value for that output. This would happen if the earlier device that changed the output did so before the *fielddelay* value was changed, and the later device that changed the output did so after the *fielddelay* value was reduced but soon enough that its input value would be sent to the crosspoint hardware before that of the earlier device. A bit later, the earlier deviceís input value is sent to the crosspoint hardware, but the router has recorded the later deviceís input value as being the one in effect. To prevent this scenario, we recommend that an appropriate *fielddelay* value be chosen, set, and left alone.

Here is an example of an “F” command:

** F5 Y1,5 X2,6,3 !!

This says that input 5 is to be connected to output 1 on all levels and input 6 is to be connected to output 2 on level 3, after a delay of 5 fields from the beginning of the field that follows receipt of the “!” character.

Commonly Used Switching Commands

This section contains the most commonly used switching commands. These commands are explained in detail in the proceeding section and are merely meant as a “short cut” for programmers.

“Y” Command- All Levels

The “Y” command switches all levels (i.e. video and audio).

For example;

**Y2,8!!

This string says that input 8 is to be connected to output 2 on all levels.

“X” Command- Specify Levels

Using the “X” command requires that a level is specified.

For example;

**X8, 3, 2!!

This string says that a connection is to be made between output 8 and input 3 on level 2. If a level number of “0” is used, all levels are switched.

“V” Command- Connect Levels

The “V” command is followed by an output number, a comma, and an input number for each level, up to the number of levels on the router.

For example;

**V12, 7, 8, 9!!

This string says that connections are to be made to output 12 from input 7 on level 1, input 8 on level 2, and input 9 on level 3.

Chapter 9

Warranty

A. General

Buyer assumes all responsibility for ascertaining the suitability of Sierra Video (hereinafter "SVS") products for Buyer's intended use. No product sold by SVS is designed or manufactured for use in any manner or under any conditions other than those described in SVS's instruction manuals and other printed material for each particular product. If any product is used or applied in a manner or under conditions not specifically authorized by such written materials or if any product is used by unqualified or improperly trained personnel, Buyer agrees that SVS shall have no liability of any kind arising from such use, and Buyer agrees to indemnify and hold SVS harmless from any claims of third parties arising from such use, and Buyer shall provide SVS with counsel of SVS's choice to defend against such claims.

B. Limited Warranty

1. This limited warranty applies only to the original purchaser and is non-transferable. This limited warranty begins on the date of purchase and will be in effect for seven (7) years for new equipment and for three (3) years for "Factory Refurbished" equipment. Power Supplies and fans are warranted for three (3) years from the date of purchase for new equipment and two (2) years for “Factory Refurbished” units, from the date of purchase.
Buyer must obtain a Return Material Authorization ("RMA") number from SVS prior to returning a product for repair. If, in SVS' sole discretion, the product is found to be defective during the term of this warranty, SVS will at its option: (a) provide free replacement parts, and/or (b) repair the unit at an SVS facility. During the warranty period, SVS will make every reasonable effort to support critical emergencies by supplying no-cost loan equipment while the defective unit is being repaired. SVS will provide replacement parts and/or factory service at no charge. Buyer bears the cost of shipping products returned to SVS under this warranty. SVS will bear the cost of shipping repaired products or replacement parts to the Buyer.

This limited warranty shall not apply to any of SVS's goods which have been altered or which have been subjected to misuse, mishandling, improper storage or negligence. The aforementioned provisions do not extend the original warranty period of any goods which have been replaced by SVS. This limited warranty shall not apply to any goods not of SVS's manufacture, Buyer to be entitled only to the warranty set forth in the original manufacturer's limited warranty.

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2. SVS's liability hereunder on any claim of any kind, except as set forth herein for any loss, injury to person or property or damage, shall in no case exceed the price allocable to the goods which give rise to such claim.

3. In no event shall SVS be liable for any damages or injuries to person or property if any goods do not meet the above limited warranty, including, without limitation, incidental expenses or consequential or special damages, except as set forth in such limited warranty. The foregoing states the exclusive remedy of Buyer and the exclusive liability of SVS for any breach of the foregoing limited warranty.

C. Cancellation

Except as provided in paragraph B immediately above, all sales are final, and Buyer may cancel this order or return products only upon written consent of SVS.

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In the event of a breach of any of the terms hereof, the non-breaching party shall be entitled to recover all of its costs, fees, and expenses, including, without limitation, reasonable attorney's fees, from the breach party incurred as a result of such breach, regardless of whether or not a suit is actually filed to enforce the terms hereof.

The provision hereof shall be governed by the laws of the State of California (excluding its choice of law provisions).

The headings are for convenience only and do not limit or amplify the terms and provisions hereof.

In case any one or more of the provisions set forth herein shall be held to be invalid, illegal, or unenforceable in any respect, the validity, legality, and enforceability of the remaining provisions contained herein shall not in any way be affected or impaired thereby.

No waiver, alteration, or modification of any of the provisions hereof shall be binding unless in writing and signed by an authorized Officer of SVS.

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