Instruction Manual

Tektronix

Grass Valley Series 6000
Compact Signal Management System

TP3529-02 A1

First Printing: November 1996

Customer Support

Tektronix Grass Valley Products is committed to providing the most responsive and professional product support available. We have a fully staffed, highly trained support team ready to respond to anything from a simple question to an emergency repair. Support is available via telephone or email. For new and updated customer support documents, as well as new product information, check the Tektronix web site and Grass Valley's web page.

Telephone Numbers

North America
(800) 547-8949
Fax: (530) 478-3181

Elsewhere
Distributor or sales office from which equipment was purchased.

Web Addresses

Grass Valley Email Support
GVGSERVICE@tek.com

Grass Valley Web Page
http://www.tek.com/Grass_Valley

Tektronix Web Site
http://www.tek.com

Postal Addresses

Mail
Tektronix Grass Valley Products
P.O. Box 1114
Grass Valley, CA 95945

Shipping
Tektronix Grass Valley Products
400 Providence Mine Rd.,
Nevada City, CA 95959

Tektronix, Inc., Video and Networking Division, P.O. Box 1114 Grass Valley, California 95945 U.S.A.

Grass Valley Group Inc.
P.O. Box 1114
Grass Valley, CA 95945
916-478-3800
916-478-3187

Grass Valley Group

EC Declaration of Conformity

We

Tektronix Holland N.V.
Marktweg 73 A
8444 AB HEERENVEEN
THE NETHERLANDS

declare under sole responsibility that the

Models Series 6000
SMS-C1604V 16X4 Analog Video Router
SMS-C1616V 16X16 Analog Video Router

manufactured by the Grass Valley Group, a Tektronix Company meets the intent of Directive 89/336/EEC for Electromagnetic Compatibility and the Low Voltage Directive 73/23/EEC.

89/336/EEC EMC Directive
EN 50081-1
EN55022 Class A Radiated and Conducted Emissions

EN 50082-1 Immunity

IEC 801-2	Electrostatic Discharge Immunity
IEC 801-3	RF Electromagnetic Field Immunity
IEC 801-4	Electrical Fast Transient/Burst Immunity

73/23/EEC Low Voltage Directive
EN 60950 "Safety of Information Technology Equipment"

Sophia Meyer — 9/5/95
Sophia Meyer, (Acting) Product Line Manager — Date

Sophia Meyer — 9/5/95
Sophia Meyer, Quality Manager — Date

10/3/95
Jaap Meijer, EC Representative — Date

Grass Valley Group Inc.
P.O. Box 1114
Grass Valley, CA 95945
916-478-3800
916-478-3187

Grass Valley Group

EC Declaration of Conformity

We

Tektronix Holland N.V.
Marktweg 73 A
8444 AB HEERENVEEN
THE NETHERLANDS

declare under sole responsibility that the

Models Series 6000
SMS-C1616DV 16X16 Digital Video Router
SMS-C3232DV 32X32 Digital Video Router
SMS-CMXY 16 Button Programmable XY Control Panel
SMS-CXY XY Programmable XY Control Panel

manufactured by the Grass Valley Group, a Tektronix Company meets the intent of Directive 89/336/EEC for Electromagnetic Compatibility and the Low Voltage Directive 73/23/EEC.

89/336/EEC EMC Directive
EN 50081-1
EN55022 Class A Radiated and Conducted Emissions

EN 50082-1 Immunity

IEC 801-2	Electrostatic Discharge Immunity
IEC 801-3	RF Electromagnetic Field Immunity
IEC 801-4	Electrical Fast Transient/Burst Immunity

73/23/EEC Low Voltage Directive
EN 60950 "Safety of Information Technology Equipment"

Sophia Meyer
Sophia Meyer, (Acting) Product Line Manager — 9/5/95 Date

Sophia Meyer
Sophia Meyer, Quality Manager — 9/5/95 Date

Jaap Meijer, EC Representative — 10/3/95 Date

Grass Valley Group Inc.
P.O. Box 1114
Grass Valley, CA 95945
916-478-3800
916-478-3187

Grass Valley Group

EC Declaration of Conformity

We

Tektronix Holland N.V.
Marktweg 73 A
8444 AB HEERENVEEN
THE NETHERLANDS

declare under sole responsibility that the

Models Series 6000
SMS-C1604AA 16X4 Analog Audio Router
SMS-C1616AA 16X16 Analog Audio Router
SMS-C32X32A 32X32 Analog Audio Router
SMS-C16BPS 16 Button Per Source Control Panel
SMS-C32BPS 32 Button Per Source Control Panel

manufactured by the Grass Valley Group, a Tektronix Company meets the intent of Directive 89/336/EEC for Electromagnetic Compatibility and the Low Voltage Directive 73/23/EEC.

89/336/EEC EMC Directive
EN 50081-1
EN55022 Class A Radiated and Conducted Emissions

EN 50082-1 Immunity
IEC 801-2 Electrostatic Discharge Immunity
IEC 801-3 RF Electromagnetic Field Immunity
IEC 801-4 Electrical Fast Transient/Burst Immunity

73/23/EEC Low Voltage Directive
EN 60950 "Safety of Information Technology Equipment"

Sophia Meyer — 9/5/95
Sophia Meyer, (Acting) Product Line Manager — Date

Sophia Meyer — 9/5/95
Sophia Meyer, Quality Manager — Date

10/3/95
Jaap Meijer, EC Representative — Date

Contents

Important Safeguards and Regulatory Notices

Section 1 — Introduction

Section 1—Introduction (continued)

Section 2 — Installation

Section 3 — SMS-6000 Configuration Editor

Section 4 — Control Panels

Section 5 — Maintenance

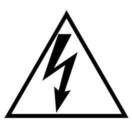
Appendix — Remote Control Protocol

List of Illustrations

List of Tables

Important Safeguards and Regulatory Notices

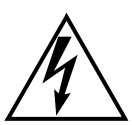
Information on the following pages provides important safety guidelines for both Operator and Service Personnel. Specific warnings and cautions will be found throughout the manual where they apply, but may not appear here. Please read and follow the important safety information, noting especially those instructions related to risk of fire, electric shock or injury to persons.



WARNING

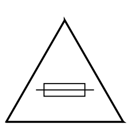
Any instructions in this manual that require opening the equipment cover or enclosure are for use by qualified service personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

Symbols and Their Meanings

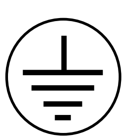


The lightning flash with arrowhead symbol, within an equilateral triangle, alerts the user to the presence of “dangerous voltage” within the equipment’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle alerts the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the equipment.

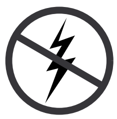


The fuse symbol indicates that the fuse referenced in the text must be replaced with one having the ratings indicated.



This symbol represents an internal protective grounding terminal. Such a terminal must be connected to earth ground prior to making any other connections to the equipment.

This symbol represents an external protective grounding terminal. Such a terminal may be connected to earth ground as a supplement to an internal grounding terminal.



CAUTION

This equipment contains static sensitive components. Use anti-static grounding equipment whenever handling or servicing modules and components. When circuit modules are removed from the frame, place them on a flat static-controlled surface. Failure to follow this precaution can result in component damage due to electrostatic discharge.

Danger

- Electrical potential is still applied to some internal components even when the power switch / breaker is in the off position. To prevent electrical shock when working on this equipment, disconnect the AC line cord from the AC source before working on any internal components.
- A residual voltage may be present immediately after unplugging the system due to slow discharge of large power supply capacitors. Wait 30 seconds to allow capacitors to discharge before working on the system
- <Specify any other dangerous conditions that apply to this equipment here.>

Warnings

- Heed all warnings on the unit and in the operating instructions.
- Do not use this equipment in or near water.
- Disconnect ac power before installing any options.
- The attachment plug receptacles in the vicinity of the equipment are all to be of a grounding type, and the equipment grounding conductors serving these are to be connected to earth ground at the service equipment.
- This equipment is grounded through the grounding conductor of the power cord. To avoid electrical shock, connect the power cord to the equipment and plug it into a properly wired receptacle before connecting the equipment inputs and outputs.
- Route power cords and other cables so that they are not likely to be damaged.
- Disconnect power before cleaning. Do not use liquid or aerosol cleaners; use only a damp cloth.

- Dangerous voltages exist at several points in this equipment. To avoid personal injury, refer all servicing to qualified personnel.
- Do not wear hand jewelry or watches when troubleshooting high current circuits, such as the power supplies.
- During installation, do not use the door handles or front panels to lift the equipment as they may open abruptly and injure you.
- To avoid fire hazard, use only components of the the specified type, voltage and current rating as referenced in the appropriate parts list. Always refer fuse replacement to qualified service personnel.
- To avoid explosion, do not operate this equipment in an explosive atmosphere unless it has been specifically certified for such operation.
- Have qualified personnel perform safety checks after any completed service.
- To reduce the risk of electric shock, ensure that the two power supply cords are each plugged into a separate branch circuit.
- If equipped with redundant power, this unit has two power cords. To reduce the risk of electric shock disconnect both power supply cords before servicing.

Cautions

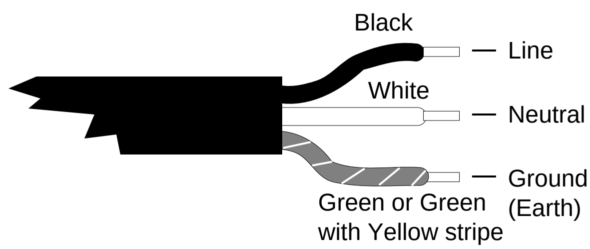
- To prevent damage to equipment when replacing fuses, locate and correct the trouble that caused the fuse to blow before applying power.
- Verify that all power supply lights are off before removing the power supply or servicing equipment.
- Use only specified replacement parts.
- Follow static precautions at all times when handling this equipment.
- Leave the back of the frame clear for air exhaust cooling and to allow room for cabling. Slots and openings in the cabinet are provided for ventilation. Do not block them.
- The front door is part of the fire enclosure and should be kept closed during normal operation.
- To prevent damage to this equipment read the instructions in this document for proper input voltage range selection.
- Circuit boards in this equipment are populated with surface mount and ASIC components. Special tools and techniques are required to safely and effectively troubleshoot and repair modules that use SMT or ASIC components. For this reason, service and repair of Grass Valley products incorporating surface mount technology are supported only on a module exchange basis. Customers should not attempt to troubleshoot or repair modules that contain SMT components. Teltrpmox assumes no liability for damage caused by unauthorized repairs. This applies to both in- and out-of-warranty products.

Power Cord Notices

North American Power Supply Cords

This equipment is supplied with a molded grounding plug (NEMA 5-15P) at one end and a molded grounding receptacle (IEC 320-C13) at the other end. Conductors are color coded white (neutral), black (line) and green or green / yellow (ground).

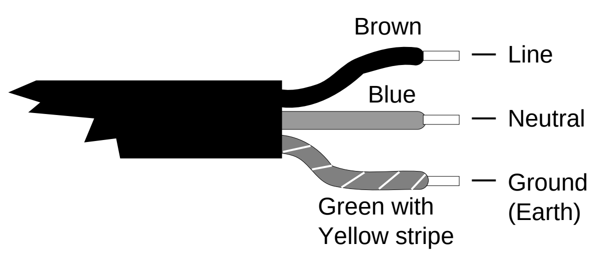
Operation of this equipment at voltages exceeding 130 Vac will require power supply cords which comply with NEMA configurations.



NOTE: The illustrated U.S. cord is for 110/125 Vac only.
For 220 Vac, the line cord has two hot lines and no neutral.

International Power Supply Cord

This equipment is supplied with a molded grounding receptacle (IEC 320-C13) at one end and stripped conductors (50 / 5 mm) at the other end. Conductors are CEE color coded—light blue (neutral), brown (line) and green / yellow (ground). Other IEC 320 C-13 type power supply cords can be used if they comply with the safety regulations of the country in which they are installed.



NOTE: This international cord is for both 110 and 220 Vac.
Europe uses single- or 3-phase 230 Vac, with one hot line and one neutral.

1 Introduction

Description

The Series 6000 Compact Signal Management System has been designed with the smaller routing switcher applications in mind. In sizes of 1RU, 2RU, or 3RU, it accommodates matrices from 16 x 4 to 32 x 32.

With the Series 6000, you can mix serial composite and component digital video in the same frame. And you can combine routing matrices of different formats to build a multiformat system that meets your exact needs.

This section describes the features of the Series 6000 and how to apply them in your own particular application. A Series 6000 system is illustrated in Figure 1-1.

3529-00

Figure 1-1. Series 6000 Compact Signal Management System

The System

The Series 6000 system comprises video, audio and control level (RS422) routers, all based on the standard block size of 16 inputs to 16 outputs. Video and audio matrices are housed in separate rack-mount frames complete with power supply and microprocessor control.

Units are stacked together to provide multiple levels. For example, a system could be provided with serial digital, composite video, three levels of component video, four levels of audio, time code and RS422.

Remote control panels are usually supplied as part of a system and these are connected back to the frames by a single coax **Quick-Link Bus** through each of the frames and remote control panels in the system.

The Frame

The frames are of solid construction and house plug-in modules. The main router modules — video, audio or control level — are located on the left-hand side and the power supply module(s) on the right.

The plug-in modules are positively locked in place to prevent them from coming loose when installed in a mobile vehicle. Yet they can be easily removed from the front of the frame by removing the front panel / local control panel and releasing the modules held in place by special quick release handles. The modules may be removed while the unit is under power.

Analog Video Routing

The Series 6000 analog video matrix is suitable for wideband applications.

There are two 1RU frames, 16x4 and 16x16. The 3RU 32x32 matrix is built from four 16x16 modules. These are organized in pairs so that each pair provides 32x16 (32 inputs to 16 outputs). The pair of modules is bolted together with connectors between them, and slides into the frame as a pair. The upper module of the pair is fully loaded but the lower module contains only the input and crosspoint stages. The upper module of the pair routes inputs 1–16 and the lower module inputs 17–32.

Two of these 32x16 pairs of modules are used to build up a 32x32 matrix. The upper pair of modules routes outputs 1–16 and the lower pair outputs 17–32.

In a single frame, there is no redundant power supply available. Dual power supplies can be installed in the 3RU frame.

Signal Path

The signal path has been designed to be as short as possible which reduces the variations in path length between channels and maintains the overall transparency through the router so important in broadcast applications where multiple passes through equipment are required.

Inputs

The video inputs are terminated in 75Ω.

The main video module contains input buffers which have a high input impedance to aid the return loss performance and an output capable of driving the bank of crosspoint switches. The buffers can operate in two modes: DC restored for use with composite signals or component signals with sync present.

Alternatively the buffers can be set to operate in a DC coupled mode for use with RGB or color difference signals which have no sync component. The mode is selected by the user for each input by jumper links on the main plug-in video module. This means that a single video matrix can handle a mixture of composite and component inputs.

The DC restorer is a feedback sync tip restorer which prevents any crushing of the sync signal.

Crosspoints

The video crosspoint matrix consists of an array of 16x1 surface mount assemblies. Sixteen of these assemblies are required to provide a matrix of 16x16 on each matrix module.

Outputs

The video modules have output amplifiers built on thick film hybrid circuits. They incorporate adjustment controls for gain and high frequency response which are factory set.

Serial Digital Video Routing

The serial digital video matrix is capable of handling signals in the following formats:

- 143Mb/s D2 NTSC composite
- 177Mb/s D2 PAL composite
- 270Mb/s D1 component
- 360Mb/s D1 component

Signal Path

The signal path is differential throughout to optimize waveform symmetry and reduce crosstalk, which is important for transmission down long cables.

Inputs

The video inputs are terminated in 75Ω.

The serial video signal passes through an input receiver circuit built onto a plug-in SIMM socket so that extra channels can be added in the field. These circuits provide equalization for losses, mainly at high frequencies, to serial video signals which have travelled down long cables. This equalization is varied automatically to suit the length and type of video cable used.

The circuit then locks an oscillator to re-clock the signal so that the correct pulse widths and timings are regenerated. The circuit can be set to any of the standards mentioned above, each input being programmed into the setup of the system, either at the factory or from a PC using the SMS-6000 Configuration Editor. The phase-locked loop is designed to minimize the jitter on the signal.

Crosspoints

A single crosspoint chip selects the 16 inputs to the 16 outputs. It is rated to operate to over 1Gb/s ensuring minimum degradation of edge speeds and symmetry.

Outputs

The output amplifiers are designed to drive 75Ω video cables.

Analog Audio Routing

In the 1RU frame, the main analog audio matrix module provides a dual channel 16x16 matrix. The 16x4 stereo audio is also a 1RU frame. This matrix fits in a 1RU frame, which supports only a single power supply.

In the 2RU frame, two 16x16 matrix modules are used to make a 32x16 matrix. The main (lower) audio router module routes inputs 1–16 and the submodule inputs 17–32. The output stages and their gain adjustments are installed on the (upper) submodule for accessibility. Two 32x16 pairs of modules are used to build up a 32x32 mono audio matrix. Dual power supplies can be installed in this frame. Two frames are used for stereo.

Inputs

The inputs are electronically balanced. This provides a high common mode rejection ratio over a wide frequency range. Also, the balance is maintained even if the source is floating. Some designs of electronically balanced inputs cause the input lines to become unbalanced which can cause an increase in crosstalk if the input cables are unscreened and run together over long distances.

The input and output connectors are 50-pin D connectors.

The signals are filtered to reduce out-of-band high frequency signals and re-balanced for internal use. The use of balanced circuitry throughout is of immense value to the overall quality of performance. It improves virtually every measured parameter by at least a factor of 2 compared to a similar unbalanced design.

Crosspoints

The matrix uses balanced 4x4 crosspoint chips. These exhibit excellent signal path performance together with minimal crosstalk and switching noise.

Outputs

The only adjustment in the audio path is the output gain control. It offers a ±2dB gain control and is mainly provided to allow the gain to be adjusted up slightly if the outputs are terminated in 600Ω. As this is now an unusual practice, the insertion gain is factory set for unity into a load of 10kΩ.

AES/EBU Digital Audio Routing

The AES/EBU digital audio matrix is capable of handling signals in the following formats:

- 32KHz broadcast standard; NICAM
- 44.1KHz compact disk
- 48KHz AES/EBU standard

It can be supplied equipped for 16x16 or 32x32.

Inputs

The audio inputs are transformer-coupled and normally terminated in 110Ω.

The audio signal passes through an input receiver circuit which locks an oscillator to re-clock the signal so that the correct pulse widths and timings are regenerated. The circuit automatically sets to any of the standards mentioned above. The phase-locked loop is designed to minimize the jitter on the signal.

Inputs 1–16 are installed on the main matrix module and Inputs 17–32 on a submodule.

Crosspoints

A single crosspoint chip has the capacity to switch 32 inputs to the 32 outputs.

Outputs

The output drivers are normally arranged to drive 110Ω lines.

The module has the capability of 32 outputs, but for systems with 16 outputs it is installed with only 16 output stages.

Data Routing

A solid state router is used mainly for machine control, such as to assign VTRs to an edit controller. RS422 uses four wires with one pair used for the transmit signal and the other pair for the receive, so the router handles both a forward and a reverse signal path through the matrix. It can be supplied equipped for 8x8 or 16x16.

Inputs

The RS422 inputs are terminated in 110Ω. Inputs 1–8 are installed on the main matrix module and Inputs 9–16 on a submodule.

Crosspoints

A single crosspoint chip has the capacity to switch 16 inputs to the 16 outputs.

Outputs

The output drivers are designed to drive 110Ω lines.

The module has the capability of 16 outputs, but for systems with 8 outputs it is installed with only 8 output stages.

Control System

The microprocessor-based control system activities are:

- Read buttons and update displays on both local and remote control panels
- Respond to data received through the computer port
- Update the router crosspoint switches
- Handle the communications between different switching levels such as audio and video frames

The system is shipped with a "basic" configuration. A customer may change this configuration to fit their specific requirements using the configuration software. This configuration is normally stored in an NVRAM inside the Master unit (see below).

The control system maintains its status in a battery-backed memory so that when the unit is powered down the router remembers its current settings and on powering up again it switches the unit to those settings. The non-volatile RAM which stores this information is located inside the Master unit of the system (see below).

Configuration Switches

There are a number of switches provided which are used to configure the system to suit your own requirements. They are briefly described below, but for more details and a procedure for how to set them up, refer to **Section 2: Installation.**

Address Switch

A rotary "hex" switch in each frame and panel determines its unique address in the system. This ensures that each frame and each panel has a different code allowing the communications down the coaxial **Quick-Link** to distinguish different units. A frame and a panel **can** share the same code. The firmware can tell from permanent links on the boards which ones are panels and which ones are frames.

DIP Switches

There are four positions available on the DIP switch at the front of the crosspoint modules. They operate in the same way for video and audio crosspoint modules. Refer toTable 1-1 for the correct settings of the DIP switch for either a master frame or a slave frame.

Table 1-1. Dip Switch Settings

DIP Switch Position	Master Frame	Slave Frame
1	UP	UP
2	DOWN	UP
3	DOWN	UP
4	UP	UP

Control Bus Quick-Link

The Quick-Link used to interconnect the panels and frames uses a single coaxial cable.

The Quick-Link is daisy-chained from one panel to the next and between the frames. Messages are sent by injecting signal currents onto the link, to be received by all the other panels or frames on the line. The link is terminated with 75Ω at both ends.

A *hex* switch in each frame and panel sets the identity of each so that they are correctly addressed by the control system. Up to 16 panels and 16 frames can be supported. Local control panels can be optionally mounted on any 1RU frame (except 32 x 32 AES / EBU 1RU frame) to increase total panel count to 32.

Two BNC sockets are provided on the frames fed from a single driver / receiver. Thus short lengths of coax cable can be used to interconnect the frames in a multi-frame system by looping through the frames. The panels use one BNC connector and a T-piece to *tap off* the Quick-Link into the panels. In this way a panel can be removed from service without the Quick-Link being interrupted, even momentarily.

A total run of 500 meters (1641 ft.) of video cable can be used between panels and the frames.

As part of the fault diagnosis system, detectors are provided in the frame and panels to identify faults. If either one or both terminations has been omitted or if the cable is too loose and risks communication errors then these are highlighted by the control system with LEDs on the front of the router module. These features are very useful at installation as it enables the cable and its terminations to be verified.

Computer Ports

The computer port is used to connect to dumb terminals or to computers. An IBM 80486, or higher, is recommended. At a minimum the users should have the following:

- IBM PC, PS/2 or 100% compatible
- MS–Dos 3.3 or higher
- 4MB RAM
- 1 MB hard disk required
- RS232 Serial Port
- MS or compatible mouse

NOTE: *Run setup from DOS or there may not be sufficient memory to use the text editor.*

Serial Interface SMS–CSI

The Serial Interface can be used to enable a computer to be used with the SMS-6000 Configuration Editor, or for remote control applications. It is an option which is installed in the master frame.

Normally this option is installed at the factory prior to shipment. The instructions below are for use if the option is supplied after shipment of the main unit.

Installation

Remove the serial interface submodule from its packing. Check that its pins are straight and undamaged. Set the jumpers on the Serial Interface module. Follow the steps listed below.

Installation in Matrix Frames

1. Unplug the power.

2. Unscrew the front panel retaining screws. The blank panel can then be removed. If a local control panel is mounted on the frame, disconnect the ribbon cables from the front of the matrix module. Release the retaining latches to withdraw the ribbon cable plugs and remove the panel.

3. Use the release catches at the sides of the matrix module to release the locks which hold the module in place. Then pull the catches outwards to eject the module from its edge connectors.

4. Remove the module and carefully place it on an anti-static surface.

5. Position the serial interface submodule over the matrix module using the hole as a guide.

CAUTION

If the module is positioned incorrectly, damage may result to both assemblies.

---

6. Line the pins over the sockets and push the submodule down gently and evenly so that all pins enter the sockets at the same time. Push firmly to completely seat the submodule.

7. Reinstall the matrix module in the frame. Press the module in firmly to seat it in its connector.

8. Reconnect the power.

Setup

RS422 or RS232 Mode

This is the hardware standard supported by the Computer Port. Set it to suit the computer or terminal to be used by moving jumper links on the Serial Interface module. Position the module so that the large chip is top left.

Depending on which Serial Interface module you have the jumper settings are as follows:

Set jumpers LK1-5 toward the front of the frame for RS422
toward the rear of the frame for RS232

or

Set the single jumper to the left for RS232 or to the right for RS422 as indicated on the module

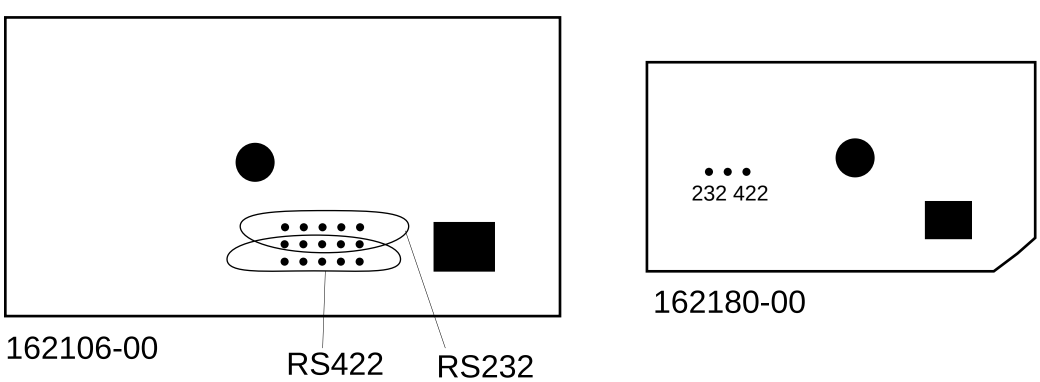


Figure 1-2. Serial Interface Jumper Setiings

Baud Rate and Data Format

The emulation mode used by the computer interface is set to VT100 or compatible at the factory. The baud rate is set to 9600 with 8 data bits, 1 stop bit, and no parity.

External Connections

The wiring of the connectors is different for RS232 and RS422.

The frame has been built to minimize RF emissions. It is important you use *tin and dimple* D type connectors with metallized shells connected to the shield of external cables in order to achieve low RF emissions from this equipment. The shells are fixed with screwlocks with 4–40 UNC threads.

The RS232 Interface Cable

The interface connector on the router is a 9-pin D socket. The cable between the PC and the router only needs to use TX, RX, and GND as shown in Table 1-2.

Table 1-2. RS232 Cable Connections

Computer 9-Pin D Socket	Router 9-Pin D Plug
2 (RXD)	7 (TXD)
3 (TXD)	3 (RXD)
5 (GND)	6 (GND)

Computer 25-Pin D Socket	Router 9-Pin D Plug
3 (RXD)	7 (TXD)
2 (TXD)	TX–3 (RXD)
7 (GND)	6 (GND)

NOTES: *The SMS-6000 Configuration Editor requires an RS232 Connection.*

Remote control can be performed with either the RS232 or the RS422 format.

The interface connector on the router is a D9 socket using Table 1-3 pinouts.

Table 1-3. RS232 and RS422 Cable Connections

RS232		RS422	
Pin #	**Signal**	**Pin #**	**Signal**
1	GND	1	GND
2	RTS	2	TX–
3	TXD	3	RX+
4	0V	4	RX 0V
5	24V High	5	24V High
6	0V	6	TX 0V
7	TXD	7	TX+
8	CTS	8	RX–
9	not used	9	not used

Table 1-4 pinout is normally used on personal computers, but check your own computer's documentation.

Table 1-4. Personal Computer Cable Connections

9-Pin D Connector		25-Pin D Connector	
Pin #	**Signal**	**Pin #**	**Signal**
1	DCD	2	TXD
2	RXD	3	RXD
3	TXD	4	RTS
4	DTR	5	CTS
5	GND	6	DSR
6	DSR	7	GND
7	RTS	8	DCD
8	CTS	20	DTR
9	RI	22	RI

Local Control Panel SMS–CMXY-LP

This panel is available only on 1RU frames, (except the 32 x 32 AES / EBU 1RU frame). The design of the panel is similar to that of the SMS–CMXY remote panel.

The SMS–CMXY-LP panel can be installed to the front of the frame. This saves an extra rack unit when a panel is required adjacent to the rack, perhaps for engineering use and, because it shares the electronics hardware in the main unit, it is of lower cost than the SMS–CMXY remote panel.

This panel has the capability to control all 16 inputs, 16 outputs and four signal levels, and has a **lock** feature to protect established routes. Refer to **Section 4: Control Panels and Operation** for details of how it is used.

Power System

1RU frame, can have only a single power supply, whereas 2 or 3RU frames have the option of dual supplies to protect against the failure of one of the supplies or, the loss of incoming AC power on one power bus. There are two AC power connectors so that a backup supply can be fed from a completely separate power lead, thereby offering maximum protection against loss of power. The AC connectors are located on the rear panel and incorporate a fuse and adjacent voltage selector for convenience during installation.

A traditional transformer system in the rear of the matrix frame is used to step down the mains voltage to around 20 volts AC. On the plug-in power module the AC voltages are rectified and smoothed to produce raw DC rails of 20–30 volts. Low voltage switching techniques are then used to convert the raw DC into the smooth DC voltages used on the router modules. This method has the benefit of low heat generation without the high stress of mains voltages on the components found in traditional switch-mode designs. These features both contribute to high reliability.

CAUTION

Different modules need different power rails and these rails are selected by jumper links on the power module. If the incorrect module is plugged into a frame, then permanent damage may be caused to the main module. Some modules are installed with a linearly regulated third (+12V) rail to drive a cooling fan.

A standby switch at the front of each Power Supply (PS) module enables the DC power to be switched off but **does not disconnect the mains power.**

Cooling Fan - 1RU frame

On some frames a cooling fan installed on the right-hand side of the frame draws cool air from the side and expels it through the vents along the left-hand side of the frame. The Power Supply module provides the 12V DC supply for this purpose, which is not switched by the standby switch on the PS module so the fan will always run when the power cord is plugged in.

Cooling Fan - 3RU frame

The cooling fan installed in the rear of the frame draws cool air from the rear and expels it through the vents along the left-hand side of the frame. It is powered from both power modules, so that if either fails then it continues to run. The Power module provides the 12V DC supply for this purpose, which is not switched by the standby switch on the PS module so the fan will always run when the power cord is plugged in.

Ground and Power Fail Alarms

A terminal strip is provided on some units to select how the system is grounded.

Separate connections are provided on the rear of audio frames for:

- TECH 0V — Internal technical 0V
- GND — To ground pin of power connector and to the external metalwork
- O/P SCREENS — The 16 shield pins on the two Output connectors are connected together and to this pin
- I/P SCREENS — Connection to the shield pins of the two Input connectors

---

CAUTION

The TECH 0V must be connected to an ***earth*** *ground in order to operate the equipment safely.*

The equipment is shipped from the factory with the TECH 0V and GND linked together to ensure that the electronics hardware is properly grounded.

The input and output shields terminals are provided to avoid the problems of ground loops caused by differences in the ground potentials on the shields (screens) of the input cables and the output cables. It is common to connect the O/P SCREENS to GND at the driving end, but some installers prefer to connect I/P SCREENS to GND instead. However it is inadvisable to connect **both** sets of shields to GND.

On the 3RU video frame the terminal strip has the following connections:

- TECH 0V — Internal technical 0V
- GND — To ground pin of power connector and to the external metalwork
- POWER FAIL — Pair of contacts held closed, so long as both power supplies are installed, switched on and working

---

CAUTION

The TECH 0V must be connected to an ***earth*** *in order to operate the equipment safely.*

The equipment is shipped from the factory with the TECH 0V and GND linked together to ensure that the electronics hardware is properly grounded.

Remote Control Panels

Refer to **Section 4: Control Panels** for details of the control panels and their operation. The following points apply to most panels.

General Points

Remote panels are used to indicate current crosspoint connections and to make new selections at various locations to suit the user. Most panels are connected to the frame via the Quick-Link coaxial link. The identity of each panel is determined by the unique setting of a rotary hex switch in each panel.

Each panel is set up to operate in a particular way by the *system configuration* located in the master frame of the system. This determines, for instance, which destinations can be controlled from each panel. The rotary hex switch mentioned above serves to route the correct setup to each panel.

Panels are powered from a local 115V / 230V mains supply.

Specifications

Specifications are subject to change without prior notice.

Table 1-5. Analog Video Specifications

Video Inputs	
Nominal Signal Level	
Video signal	1V p-p
Sync pulses	2V p-p
Subcarrier	1V p-p
Maximum Signal Level	
DC restored inputs video signal	+6dB
DC restored inputs sync pulses	2.5V p-p
DC coupled inputs video or Subcarrier	±–0.7V
Impedance	75Ω terminating
Return loss to 5.5 MHz	40dB
DC on input (DC restored)	±3V
Video Outputs	
Impedance	75Ω
Return loss to 5.5 MHz	35dB
DC on output †	±50mV
Insertion Gain	
Insertion gain	±0.1dB
Gain spread between inputs	±0.05dB
Adjustment range	±0.5dB
Linear Distortion	
HF response 15KHz to 5.5MHz	±0.1dB
5.5 to 10MHz	±0.2dB
10MHz to 30MHz	+0.5, –1.0dB
above 30MHz	smooth roll off
HF adjustment at subcarrier	±0.5dB
LF response, tilt at 50/60 Hz	±0.5%
2T pulse	0.25%K
2T pulse/bar ratio	0.25%K

Table 1-5. Analog Video Specifications - (continued)

Linear Distortion (continued)	
2T bar slope	0.25%K
Y-C gain inequality	±0.5%
Y-C delay inequality	±5ns
Non-Linear Distortion	
Differential gain (10–90% APL)	0.15%
Differential phase (10–90%APL)	0.15°
Luminance non-linearity	0.2%
C-Y intermodulation	0.5%
Dynamic gain (Y, C, syncs)	0.5%
Transient gain (Y, C, syncs)	1%
Propagation Delay	
Path length	13ns typical
Timing spread at 4.43MHz one output all outputs	 ±1° ±2°
Crosstalk/Noise	
Crosstalk, to 5.5MHz worst case	60dB, 30MHz version
Noise to 5.5MHz	–70dB rms
Video spikes at switching	±20mV
Switching Reference	
Signal level 1V p-p	±3dB 1–4V pulses
Impedance	75Ω looping
DC on input	±1V
Switching occurs on lines	7/320 to 11/324, field or frame rate, jumper selectable

Table 1-5. Analog Video Specifications - (continued)

Power	
Rear panel voltage selector	90–132V 50/60Hz 180–264V 50/60Hz
Power consumption (1RI)	25 watts
Power consumption (3RU)	90 watts
Connector (1RU)	IEC with retaining latch
Connector (3RU)	IEC with retaining latch, backup optional
Power fail alarm output Both Power Supplies good One Power Supply failed or absent	screw terminals closing relay contact, rated at 250mA, 50V open relay contact
Technical & chassis ground (3RU only)	screw terminals
Control	
Quick-Link to remote panels	75Ω video cable 500M (1641 ft) max length
Computer port RS232/RS422	D9 socket
Mechanical	
Height	1RU, 1.75 in (44mm) 3RU, 3.5 in (133mm)
Width	19 in rack mount
Depth	19.75 in (500mm)
Weight	1RU, 13.5 lb (6Kg) 2RU, 26.5 lb (12Kg)
Environmental	
Ambient Temperature Operating and storage Specification maintained	 0–40°C 20–30°C
Humidity	10–90% non-condensing

† In the DC coupled mode the DC on the output is specified with the input terminated in 75Ω. In the DC restored mode the specification refers to the black level when the sync amplitude is 300mV.

Table 1-6. Analog Audio Specifications

Audio Inputs	
Signal level	0dBu nominal, +24dBu maximum
Impedance	20KΩ
Common Mode Rejection 20Hz to 3KHz 3KHz to 20KHz	 –80dB, –100dB typical –60dB, –70dB typical
Common Mode Level	+30dBu maximum with no signal
Audio Outputs	
Impedance	40Ω balanced
DC on output	±50mV
Signal Path	
Impedance	±0.1dB
Frequency Response 20Hz to 20KHz to 150KHz	±0.25dB 3dB
Relative delay between two routes	1 µs
Total harmonic distortion –10dBu to +20dBu, 20Hz to 20KHz	 0.02%, 0.01% typical
Crosstalk 20Hz to 20KHz	–90dB worst case, –105dB typical
Noise 20Hz to 20KHz	–85dBu rms unweighted, –90dBu typical
Power	
Rear panel voltage selector	90–132V 50/60H 180–264V 50/60Hz
Power consumption	1RU, 25 watts 2RU, 50 watts
Connector	1RU, IEC with retaining latch 2RU, IEC with retaining latch, backup optional
Power fail alarm output Both Power Supplies good Power Supply failed or absent	screw terminals closing relay contact, rated at 250mA, 50V open relay contact
Technical and chassis ground, cable shields	screw terminals

Table 1-6. Analog Audio Specifications - (continued)

Control	
Quick-Link to remote panels	75Ω video cable 500M (1641 ft) max length
Computer port RS232/RS422	D9 socket
Mechanical	
Height	1RU, 1.75 in (44mm) 2RU, 3.5 in (88mm)
Width	19 in rack mount
Depth	19.75 in (500mm)
Audio Connectors	50-pin D connector
Weight	1RU, 13.5 lb (6Kg) 2RU, 22.25 lb (10Kg)
Environmental	
Ambient Temperature Operating and storage Specification maintained	 0–40°C 20–30°C
Humidity	10–90% non-condensing

Table 1-7. Serial Digital Video Specifications

Video Input	
Signal level	800mV p-p, nominal
Impedance	75Ω terminating
Return loss, 5 to 270 MHz	15dB, 16dB typical
DC on input	±3V
Cable equalization at 270Mb/s	250M (820.25 ft), 300M (984.5 ft) typical Belden 8281, PSF 1/2 150M (492.25 ft), 200M (656.25) typical PSF 1/3
Video Outputs	
Signal level	800mV ±–10%
Impedance	75Ω
Return loss, 5 to 270MHz	15dB
DC offset	±0.5V
Rise/fall time into 75Ω resistive load, 20 to 80%	0.6 to 0.9ns
Jitter	500ps p-p max
Switching Reference	
Signal level	1V p-p ±–3dB or 1–4V pulses
Impedance	75Ω looping
DC on input	±1V
Switching occurs on lines	7/320 to 11/324, field or frame rate, link selectable

Table 1-7. Serial Digital Video Specifications - (continued)

Power	
Rear panel voltage selector	90–132V 50/60H 180–264V 50/60Hz
Power consumption	1RU, 30 watts 3RU, 60 watts
Connector	1RU, IEC with retaining latch 2RU, IEC with retaining latch, backup optional
Power fail alarm output Both power supplies good One power supply failed or absent	screw terminals closing relay contact, rated at 250mA, 50V open relay contact
Technical and chassis ground	screw terminals
Control	
Quick-Link to remote panels	75Ω video cable 500M (1641 ft) max length
Computer port RS232/RS422	D9 socket
Mechanical	
Height	1RU, 1.75 in (44mm) 3RU, 3.5 in (133mm)
Width	19 in rack mount
Depth	19.75 in (500mm)
Weight	1RU, 13.5 lb (6Kg) 3RU, 22.25 lb (10Kg)
Environmental	
Ambient Temperature Operating and storage Specification maintained	 0–40°C 10–30°C
Fan-cooled by drawing cool air from right-hand side (1RU) or rear (3RU) of frame and exhausting the warm air from the left-hand side.	
Humidity	10–90% non-condensing

Table 1-8. AES/EBU Digital Audio Specifications

VAES/EBU Input	
Sample rates	32, 44.1, 48KHz
Impedance	10Ω ±20% transformer coupled
Signal level	0.2–7V p-p
DC on input	±50V
AES/EBU Outputs	
Rise/fall times into 110Ω resistive load	5–30ns
Jitter	<20ns
Signal Level	2–7V p-p
Impedance	110Ω transformer coupled
DC isolation	±50V
Power	
Rear panel voltage selector	90–132V 50/60Hz 180–264V 50/60Hz
Power consumption	15 watts
Connector (1RU frame)	IEC with retaining latch
Connector (2RU frame only)	IEC with retaining latch, backup optional
Power fail alarm output (2RU frame only) Both power supplies good One power supply failed or absent	screw terminals closing relay contact, rated at 250mA, 50V open relay contact
Technical and chassis ground, cable shields(screens)	screw terminals

Table 1-8. AES/EBU Digital Audio Specifications - (continued)

Control	
Quick-Link to remote panels	75Ω video cable 500M (1641 ft) max length
Computer port RS232/RS422	D9 socket
Mechanical	
Height	1RU, 1.75 in (44mm)
Width	19 in rack mount
Depth	19.75 in (500mm)
Weight	13.5 lb (6Kg)
Audio Connectors	50-pin D connector
Environmental	
Ambient Temperature Operating and storage Specification maintained	 0–40°C 10–30°C
Humidity	10–90% non-condensing

Table 1-9. RS422 Control Level Specifications

RS422 Signal Input	
Impedance	10Ω
Maximum baud rate	1Mbaud
RS422 Signal Outputs	
Signal Level	2–7V p-p
Impedance	110Ω
Rise/fall times into 110Ω resistive load	5–30ns
Power	
Rear panel voltage selector	90–132V 50/60H 180–264V 50/60Hz
Power consumption	15 watts
Connector	IEC with retaining latch
Control	
Quick-Link to remote panels	75Ω video cable 500M (1641 ft) max length
Computer port RS232/RS422	D9 socket
Mechanical	
Height	2RU, 3.5 in (88mm)
Width	19 in rack mount
Depth	19.75 in (500mm)
Weight	22.25 lb (10Kg)
Environmental	
Ambient Temperature Operating and storage Specification maintained	 0–40°C 20–30°C
Humidity	10–90% non-condensing

2 Installation

Introduction

This section describes how to install your Series 6000. The system has been designed with the aim of being quick and simple to install.

Unpacking

Remove the equipment carefully from the boxes and check against the Packing List supplied with each unit. This shows what items have been shipped against your order and includes all options. Any error should be reported immediately. After you have unpacked the equipment, please save all the packing material as this could be useful in the future if the unit needs to be returned for maintenance.

Check each item supplied for transit damage. Any damage should be reported in detail. You must state the serial number of the unit (to be found on the rear, side or base of each unit).

Locate the power cords suitable for your country and verify that the equipment has been set to the correct mains (line) voltage.

NOTE: *Remote panels are mains powered and must also be checked.*

Instructions are to be found later in this section on how to change the voltage.

Physical Installation

Remote Panels

Remote control panels are designed to fit into standard 19 inch equipment racks. Panels can be mounted at any angle.

Panels are designed to fit into horizontal desks with a minimum of depth to allow for knee room. Refer to **Section 4: Control Panels** for the depth of the panels.

Equipment Frames

All frames are designed to be mounted in standard 19 inch equipment racks. Standard panels are 5.15 in (130mm) deep plus connectors.

When preparing for installation keep in mind that the modules are plugged in from the front and extra space is required for the modules to mount on an extender module. Allow at least 31.5 in. (800mm) clearance at the front for maintenance.

The depth of the frame is 19 in. (485mm) plus connectors from the front of the equipment rack. In addition allowance must be made for the numbers of cables to be installed at the rear of the frame.

Cooling

Power dissipation in most frames is relatively low and cooling is achieved by natural convection through the sides of the frame. However the 1RU Serial Digital Video Router is fan cooled, drawing cool air in from the right-hand side of the frame and expelling it at the left-hand side of the frame.

It is important that the ventilation slots in the lid of the this unit are not obstructed; it is perfectly acceptable to install a control panel or another shallow unit immediately above the unit but not another frame.

In the interests of long term reliability it is advisable, where possible, to leave a 1RU gap or to fit a unit with a depth of less than .78 in (200 mm) above every fourth frame.

The 3RU Video Router and 3RU Serial Digital Video Router are also fan cooled, drawing cool air in from the rear of the frame and expelling it at the left-hand side of the frame.

In all cases **it is important to keep the apertures clear of obstructions** eg cables.

If a 1RU frame is fitted into a mobile vehicle, it is strongly recommended that some type of rear support should b e used to prevent bending. The support bar should be designed to fitthe depth of the equipment racks.

Electrical Connections

Refer toFigure 2-1 through Figure 2-6 on page 12 and page 13 for the rear view of the frames when making the electrical connections to each frame.

Video Inputs and Outputs

These connections are made using standard 75Ω video coaxial cable. A high quality cable such as Belden 8281, PSF1/2 or PSF1/3 or equivalents should be used for optimum performance. It is both important and good practice that cables are properly supported and not *hanging* on the connectors as this can put unnecessary stress on the connectors and possibly reduce their working life.

The video inputs are terminated in 75Ω within the equipment. The video outputs are single 75Ω outputs.

Video Reference

The Ref input is a looping input. Any video signal with standard syncs may be used as a reference signal to determine when crosspoints are switched during vertical (picture) blanking. While a burst is not required the use of color black is the most commonly available signal and is preferred. This can be looped through into a video input of the unit.

Mixed sync pulses of 2V amplitude may also be used. 4V pulses can be used but a modification is required to the main video router module and involves the addition of a single 4.7K 5% resistor, labeled R126.

If no reference signal is connected then the unit will switch at random intervals at a rate of about 40Hz.

NOTE: *If one of the looping input connectors is not used then a 75Ω terminator plug must be fitted on the unused connector, otherwise the level on the line will be twice that expected and may cause incorrect operation of equipment attached to this line.*

Audio Inputs and Outputs

The connections of the audio signals to the equipment are made using 50-pin connectors. One connector is used for each 16 inputs and another for each 16 outputs. The same type or polarity of connector is used for inputs and outputs.

The 16x4 and 16x16 stereo audio routers are 1RU high. One pair of connectors is for the Channel I inputs and outputs (that is, mono operation) and a second pair for the Channel II inputs and outputs for the second (stereo) audio level.

The 32x32 mono audio analog matrix is a 2RU frame. Two frames are used for stereo. One pair of connectors is provided for Inputs 1–16 and 17–32 and a second pair labeled “Outputs 1–16 B” and “Outputs 17–32 B” for Outputs 1–16 and 17–32. The connectors labeled “Outputs 1–16 A” and “Outputs 17–32 A” are reserved for special applications.

The 32x32 AES / EBU digital audio frame outputs are assigned to rear connectors as follows:

Outputs 1-16: “Outputs 1-16A”

Outputs 17-32: “Outputs 1-16B”

The mating halves of these connectors are plug types and available as options. They are not supplied as standard because many customers wish to buy their connectors in bulk and prepare the cables in advance of the equipment being shipped.

Each connector has three pins for each signal: signal hot (+), signal cold (–) and shield (screen). The same pattern of wiring is used on all four connectors, (Input 1 is wired the same as Output 1). All the connectors on the rear of the frames are sockets. Table 2-1 on page 5 and Table 2-1 on page 6 list the connector pinouts for these cables.

The input and output cable screen (shield) pins are wired together inside the frame and to a pair of screw terminals on the rear of the frame. This enables the installer to choose whether the input and / or output signal cable shields are grounded or not. It is sound audio practice not to ground the shields at both ends, as sometimes hum can be introduced due to ground potential differences.

For the correct audio input pinouts, refer to Table 2-1.

Table 2-1. Audio Input Pinouts

Pin	Signal	Pin	Signal	Pin	Signal
1	Gnd			34	Src 1+
2	Src 2+	18	Src 1–	35	Gnd
3	Gnd	19	Src 2–	36	Src 3+
4	Src 4+	20	Src 3–	37	Gnd
5	Gnd	21	Src 4–	38	Src 5+
6	Src 6+	22	Src 5–	39	Gnd
7	Gnd	23	Src 6–	40	Src 7+
8	Src 8+	24	Src 7–	41	Gnd
9	Gnd	25	Src 8–	42	Src 9+
10	Src 10+	26	Src 9–	43	Gnd
11	Gnd	27	Src 10–	44	Src 11+
12	Src 12+	28	Src 11–	45	Gnd
13	Gnd	29	Src 12–	46	Src 13+
14	Src 14+	30	Src 13–	47	Gnd
15	Gnd	31	Src 14–	48	Src 15+
16	Src 16+	32	Src 15–	49	Gnd
17	Gnd	33	Src 16–	50	Gnd

For the correct audio output pinouts, refer to Table 2-2.

Table 2-2. Audio Outputs Pinouts

Pin	Signal	Pin	Signal	Pin	Signal
1	Gnd			34	Dst 1+
2	Dst 2+	18	Dst 1–	35	Gnd
3	Gnd	19	Dst 2–	36	Dst 3+
4	Dst 4+	20	Dst 3–	37	Gnd
5	Gnd	21	Dst 4–	38	Dst 5+
6	Dst 6+	22	Dst 5–	39	Gnd
7	Gnd	23	Dst 6–	40	Dst 7+
8	Dst 8+	24	Dst 7–	41	Gnd
9	Gnd	25	Dst 8–	42	Dst 9+
10	Dst 10+	26	Dst 9–	43	Gnd
11	Gnd	27	Dst 10–	44	Dst 11+
12	Dst 12+	28	Dst 11–	45	Gnd
13	Gnd	29	Dst 12–	46	Dst 13+
14	Dst 14+	30	Dst 13–	47	Gnd
15	Gnd	31	Dst 14–	48	Dst 15+
16	Dst 16+	32	Dst 15–	49	Gnd
17	Gnd	33	Dst 16–	50	Gnd

Data Matrix

For the correct pinouts for the Data Matrix refer to Table 2-3. Wiring of the signal conforms to RS422 standard. Mating connectors are available as options, (SMS-CDRC). Ensure that the cable screen is grounded to minimize RFI emissions.

Table 2-3. Data Matrix Pinouts

Input Pins	Signal	Output Pins	Signal
1	GND	1	GND
2	TXA	2	RXA
3	RXB	3	TXB
4	RX 0V	4	TX 0V
5	Not Used	5	Not Used
6	TX 0V	6	RX 0V
7	TXB	7	RXB
8	RXA	8	TXA
9	GND	9	GND

Control — Quick-Link

All the frames and remote control panels are connected by a single coaxial link called **Quick-Link**. This link uses standard 75Ω coaxial cable daisy-chained from frame to frame and panel to panel. Each end of the link must be terminated in 75Ω. A pair of connectors is fitted to the frames and the link looped through them; but just one connector is fitted on the panels and a T-connector is needed to tap off the **Quick-Link**. In this way a panel can be removed from service and replaced without disrupting the link, even temporarily.

This daisy chain method ensures the best transmission quality of the control signals down the cable. Short cuts which might save cable, such as running stubs to some panels are not recommended as this may under certain circumstances cause data errors. The maximum cable stub length is 19.75 in (500mm). The maximum cable length is shown in the Specification in **Section 1: Introduction** of this manual

The system can support up to 16 panels and 16 frames. Each unit connected to the **Quick-Link** has its own *ident* switch which is set up as part of the system setup. The extra Quick-Link connectors on the 3RU Video frame are not currently supported.

Remote Control

RS232/422 Computer Port

The connectors (9-pin D-type sockets) for the computer ports are fitted on the rear of each frame. some Most units have just one connector, but the 3RU video and serial frames have four connectors of which only one, **Serial 4** port, is supported at present.

Joystick Override

Joystick or camera microswitch override is provided as a standard feature on most control panels and is accessed on the PARALLEL port. For the correct pinouts for the Joystick Override refer to Table 2-4.

NOTE: *The mating connector is a 9-pin D-type socket, use a tin and dimple type with a grounded metal shell to prevent RFI emission from the equipment.*

Table 2-4. Joystick Override Pinouts

Input Pins	Signal
1	Camera 1
2	Camera 2
3	Camera 3
4	Camera 4
5	Camera 5
6	Camera 6
7	Camera 7
8	Camera 8
9	GND

By default the eight cameras are assigned to be the first eight inputs of the matrix, but it is possible for them to be mapped to any input using the SMS-6000 Configuration Editor.

Power

CAUTION

IEC connectors are used to supply power to frames and panels alike. The ground pin of each connector must be connected to a solid ground to ensure proper grounding of the metalwork.

Equipment is often supplied with a power cord suitable for wiring into a plug of the user's choice. Please wire the plug using the color code below:

- Brown — Live (Line or Phase)
- Blue — Neutral (Return)
- Green / Yellow — Earth (Ground)

WARNING

Some of the frames are fitted with screw terminals so that the CHASSIS and TECHNICAL ground can be wired to different ground points. The equipment is shipped with a wire link fitted between these terminals. If the link is disconnected then it is imperative for personal safety that a proper ground connection is established.

Setting the Power Line Voltage in the Frames

The voltage must be checked and if necessary set prior to inserting the power cord.

The 220V (or 230V) setting is suitable for both 220V and 240V countries. The 110V (or 115V) setting is suitable for 100V and 120V countries. Refer to the technical specifications in **Section 1: Introduction** for the voltage ranges permitted.

1. Remove the power cord(s).
2. Use a small screwdriver to loosen the voltage selector / fuse holder by prying from above.
3. Pull out the fuse drawer. The main fuse is clearly visible, (there may also be a spare).
4. Some equipment uses a voltage selector in which a single voltage is visible through a small window, in which case follow step 4a below. Other equipment uses a voltage selector in which two voltages are visible, in which case follow step 4b below.
    a. Remove the voltage selector insert from the main fuseholder and select the required voltage setting. Replace it in the fuseholder. Fit the correct fuse and replace the fuseholder, pushing until it snaps into place.
    b. Rotate the drawer so that the correct power line voltage can be read (and the incorrect is upside down). Fit the correct fuse and replace the fuseholder, pushing until it snaps into place.
5. Plug the power cord into the equipment.
6. Repeat the procedure if there is a backup supply.

Setting the Power Line Voltage in the Panels

Some panels are fitted with power connectors equipped with voltage selectors, labeled 115V / 230V; if so follow the procedure above for the frames. If not follow the procedure below.

WARNING

Check that the factory voltage setting are suitable for your country prior to inserting the power cord. The top cover must be removed and a soldering iron used in order to alter the power line voltage setting if necessary. As it affects personal safety this should be performed by qualified personnel only.

---

1. Remove the power cord(s).

2. Remove the top cover from the unit by removing the screws.

3. Pull off the shroud and inspect the transformer for the correct wiring:

   a. For 110V–120V, the two 110V windings should be connected in parallel.

   b. For 220V–240V, the 110V and 130V winding should be connected in series.

4. If not correct, unsolder the wires from the transformer primary terminals and solder them as indicated in step 3.

5. Replace the top cover.

6. Use a small screwdriver to loosen the fuse holder by prying from above. Pull out the fuse drawer. The fuse is clearly visible with a spare, inside the drawer. Fit the correct fuse to suit the power line voltage in your country. Replace the drawer.

7. Plug the power cord into the equipment.

Frame and Parallel I/F Rear Views

Figure 2-1 through Figure 2-6 illustrate the rear view of the frames and control panels.

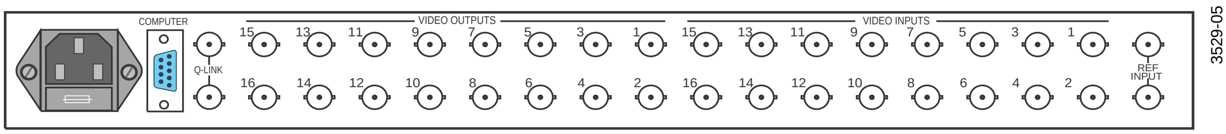


Figure 2-1. 16x4 and 16x16 Video Frame

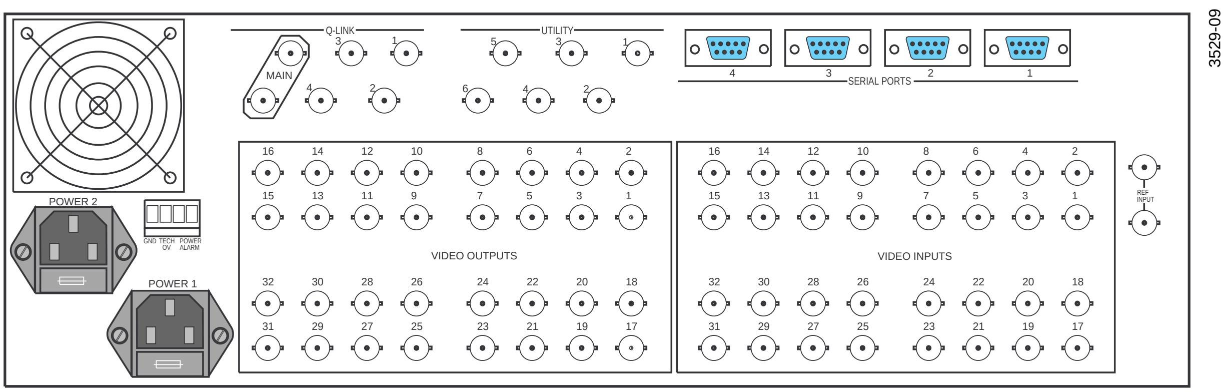


Figure 2-2. 32x32 Analog Video Frame

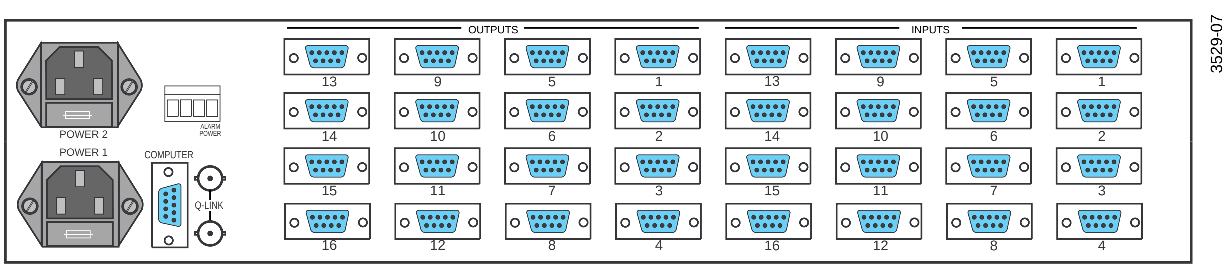


Figure 2-3. Data Matrix Frame

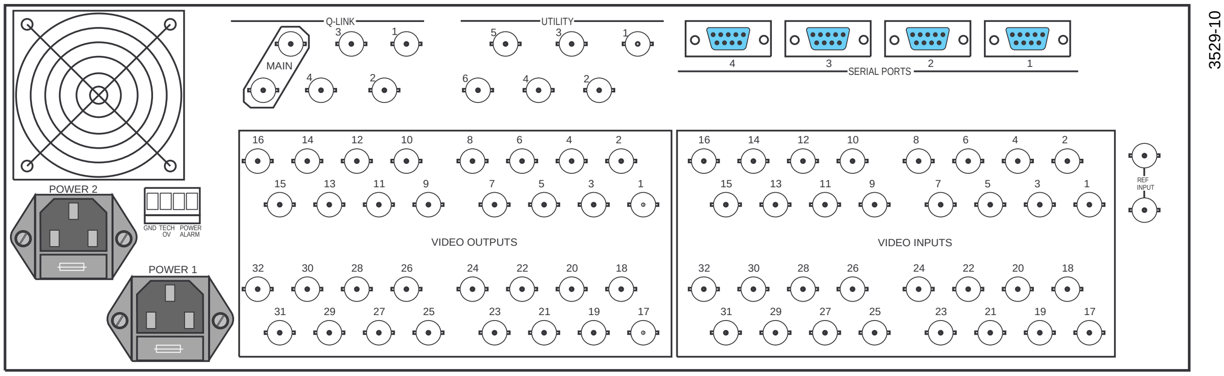


Figure 2-4. 32x32 Serial Frame

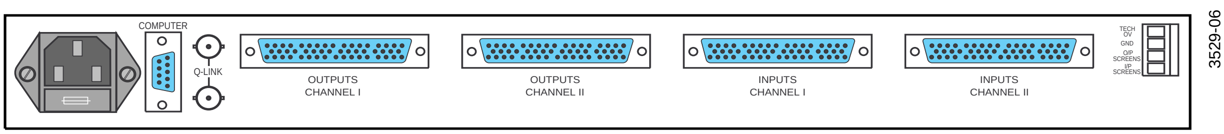


Figure 2-5. 16x4 and 16x16 Audio Frame

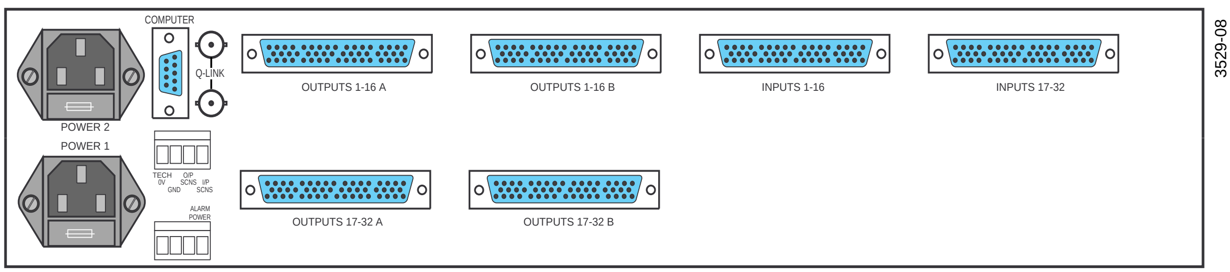


Figure 2-6. 32x32 Audio Frame

Configuring the Frame

The system comes factory-configured but can be changed to suit your own particular requirements. This sub–section describes how to do this for the video and audio frames. The next sub –section covers the same processes for the remote control panels.

NOTE: *The rotary hex and DIP switches are read only at power up or following a RESET. If you make any changes you must press the RESET button so that the new settings are acted upon.*

Analog Video Matrix Module

Input Coupling Mode

Normally there are DC restorers on each video input. They restore the sync tips (the lowest part of the signal) to a voltage of –300mV so that irrespective of the DC or average picture level of the incoming signal the DC of the black level on the output will be constant.

This is fine for composite video signals, but for component video signals, Pr (V) and Pb (U) have the potential for signal content both above and below black level. A DC restorer is not suitable for such signals and the signal is DC coupled through the matrix. Each of the restorers can be jumpered in or out of circuit. The jumpers are located near the edge connector by the input capacitors and hybrids. For each input there are two links.

With the module placed with the extractors levers nearest you and the edge connectors furthest away:

Set the jumpers vertical for composite signals and horizontal for component signals. A diagram on the module is located near to the jumpers to clarify.

Sometimes it is important to change the TV line in the vertical blanking interval during which the routing switcher makes its crosspoint switches. The analog video module provide this feature. Any line from 7/320 to 11/324 may be selected using the three jumper links LK6, 7, 8. The diagram on the circuit board shows the positions of the jumper links.

It is also possible to choose whether to permit switching on every TV field or just on the first field of each picture. This can be important in certain editing applications.

The factory settings for NTSC are line 10/273 and every field. For Pal they are line 7/320 and every field.

Serial Digital Video Matrix Module

Input Standards

The router is capable of handling up to four different input standards (143Mbs, 177Mbs, 270Mbs, and 360Mbs) depending on which SIMMs are installed. Current SIMMs (Quartz PCB) are capable of 270Mbs operation only. Multi-standard SIMMs are under development. Each input can be set to any of these standards which are programmed into the setup of the system, either at the factory or from a PC using the configuration program.

TV Line Switching

Sometimes it is important to change the TV line in the vertical blanking interval during which the routing switcher makes its crosspoint switches. Any line from 7 / 320 to 11 / 324 may be selected using the three jumper links LK6, 7, 8. The diagram on the circuit board shows the positions of the jumper links.

It is also possible to choose whether to permit switching on every TV field or only on the first field of each picture. This can be important in certain editing applications.

The factory settings for NTSC are line 10 / 273 and every field. For Pal they are line 7 / 320 and every field.

Frame Priority

One crosspoint matrix module in the system must be set as master and the others as slaves. **This is very important as there will not be proper communications unless this rule is followed.** The master frame contains the configuration NVRAM and the non-volatile RAM to store the complete matrix status.

The master and slave DIP switch settings are as follows:

Table 2-5. Dip Switch Settings

DIP Switch Position	Master Frame	Slave Frame
1	UP	UP
2	DOWN	UP
3	DOWN	UP
4	UP	UP

Press the RESET button to initiate the new settings.

Address Switch

The rotary hex switch just to the left of the ribbon cable is used to set the unique address of the matrix module in the frame. The purpose of the switch setting is to ensure that each matrix module in a frame has a different code. This is necessary so that in a multi-frame system each frame is updated with the correct crosspoint information.

A small screwdriver is needed to fit the slot and make the selection. Rotate the switch which has 16 positions from 0 through 9, then A through F (hexadecimal notation).

1. Rotate the switch to the desired position.

2. Press the RESET button to initiate the new setting.

Buzzer

The buzzer fitted on most matrix modules is used to provide warnings when certain buttons are pressed on an optional locally-mounted control panel. This can be enabled or disabled by moving a jumper link adjacent to the buzzer.

Configuring Remote Control Panels

The main software configuration determines how each panel functions. However there are a few functions set on the panels by the user. This section describes how to alter them.

Refer to Figure 2-7 through Figure 2-10 on page 18 for the front view of the control panels.

NOTE: *The rotary hex and DIP switches are read only at power up or following a RESET. If you make any changes you must press the RESET button so that the new settings are acted upon.*

Panel Address

Panels connected directly to the Quick-Link are fitted with a rotary *hex* switch to set the unique address of the panel.

The user must configure these addresses before operating the system.

If you have more than one panel in your system then you must set each panel to have a different code. If this is not done then the panel communications down the coaxial Quick-Link cannot function properly. Also the master unit will not be able to download a configuration for the panels. Normally equipment is shipped with these addresses set sequentially to match the number of panels in the system.

Buzzer

Most panels are fitted with a buzzer to provide warnings when certain buttons are pressed on an optional locally-mounted control panel. This can be enabled or disabled by moving a jumper link adjacent to the buzzer.

Control Panel Front Views

Figure 2-7 through Figure 2-10 illustrate the front view of the control panels.

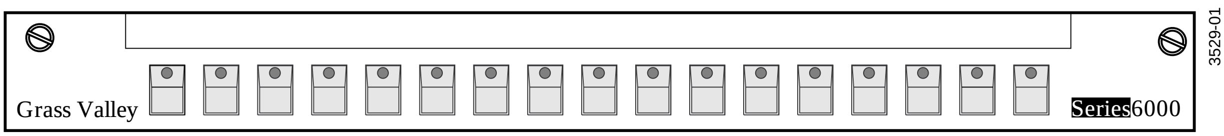


Figure 2-7. C16 Button Per–Source Control Panel

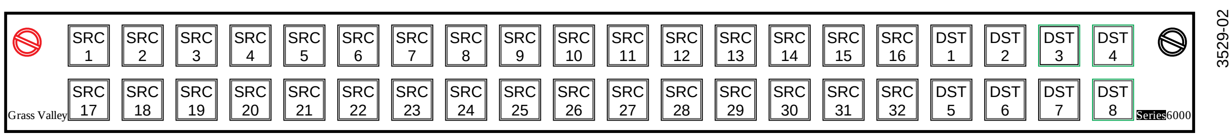


Figure 2-8. C32 Button Per-Source Control Panel

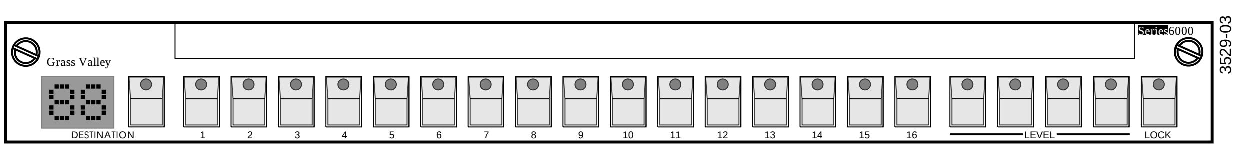


Figure 2-9. CMXY Control Panel

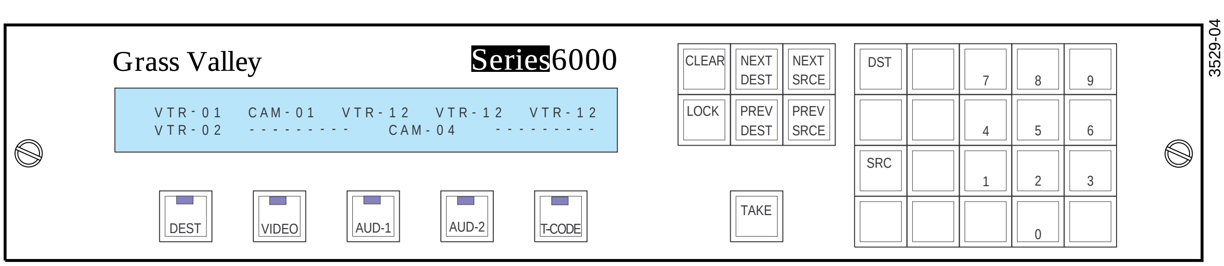


Figure 2-10. CXY Control Panel

3 SMS-6000 Configuration Editor

On-Line Documentation

This section is available on-line using the ***HELP*** button on the SMS-6000 Configuration Editor window. The document uses Acrobat Reader to display the section and to allow hyperlinks within the document. Acrobat Reader has an on-line help file available for people unfamiliar with the tools and commands used by Acrobat.

The Table of Contents is hyperlinked. Additional hyperlinks within the document are shown by blue underlined text. For best viewing adjust the magnification to fit your screen for size and readability, recommended magnification is 100%.

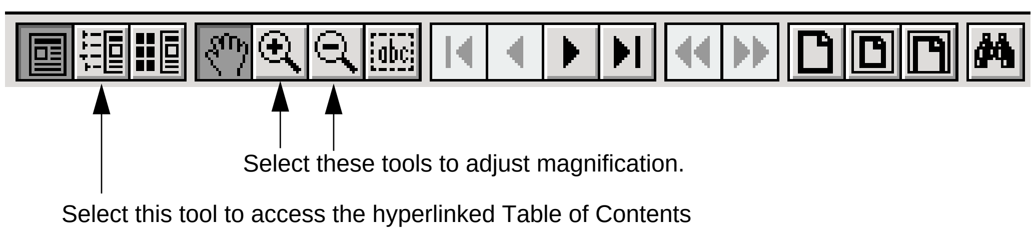


Figure 3-1. Acrobat Reader Tool Bar

Overview

The SMS-6000 Configuration Editor allows the creation of configuration files on a Windows PC platform for the SMS-6000 Signal Management System. These configuration files can be downloaded to the router and/or saved to disk.

SMS CFGSW Configuration Software 170234-000

System Software Version 1.0	159398-00
Acrobat Reader Version 2.0	159366-00

Installation

After completing the installation process, Windows will be restarted. Please close all open applications before beginning the installation.

1. Place the Series 6000 System Software disk (159398-00) in the A: disk drive.

2. From the Program Manager in Windows chose ***RUN*** under the ***FILE*** menu.

3. Type **`A:\INSTALL`** in the Command Line box.

   Follow the directions on the screen to install the SMS-6000 Configuration Editor and the on-line documentation. The installation program will make a directory on the hard disk drive (C:\sms6ce).

NOTES: *If you have Acrobat Reader 2.0 or higher already installed on your computer it is not necessary to install this version.*

In order to access the on-line documentation using the **HELP** *buttons in the SMS-6000 Configuration Editor, Acrobat Reader needs to be in a directory named C:\acroread.*

---

4. Put the Acrobat Reader disk (159366-00) in the A:disk drive.

5. From the Program Manager in Windows chose ***RUN*** under the ***FILE*** menu.

6. Type **`A:\SETUP`** in the Command Line box.

   This will install Acrobat Reader in a directory on the hard disk drive (C:\acroread).

Total disk space required is approximately 3.5 megabytes.

NOTE: *After the configuration process is completed the SMS-6000 Configuration Editor may be removed from the PC's drive by deleting the C:\sms6ce directory. Acrobat Reader may be removed by deleting the C:\acroread directory.*

Configuring the SMS-6000 Router

To configure or reconfigure your SMS6000 Router, you will:

1. Create a new configuration, or open and / or copy an existing one (see page 3-3).

2. Create (or change, if desired) the configuration items (see page 3-4) in this order:

   Frames

   Virtual Matrices

   Levels

   Sources and Destinations

   Panels

3. Save the configuration (see page 3-23) to disk, if desired.

4. Download the configuration to your SMS6000 Router (see page 3-24).

Examples

The configuration for every system is unique to that system; therefore, your configuration will be unique. To aid in configuring a system, we will use examples of possible configurations.

Create a New Configuration, or Open and/or Copy an Existing One

- To create a new configuration, click on ***FILE***, then ***NEW***.
- To Open an existing configuration, click on ***FILE***, then ***OPEN***.
- To Copy an existing configuration (without destroying the original), open the configuration, then click on ***FILE***, then ***SAVE AS***, and give it a new name.

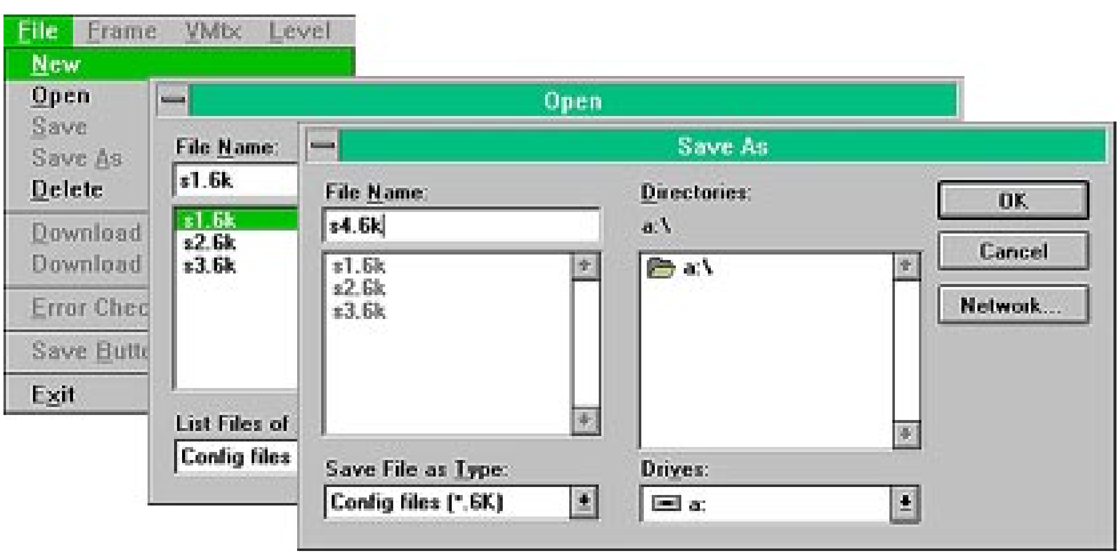


Figure 3-2. File, Open, and Save As Windows

Create (or Change, if Desired) the Configuration Items

The configuration hierarchy is as follows:

Control Panels are configured to Take **Sources** to **Destinations**, which have inputs and outputs on one or more **Levels**, each of which is made up of one or more **Virtual Matrices**, each of which contains some or all of the crosspoints in a **Frame**.

Therefore, the configuration should be done in the proper sequence beginning with the **Frames**, then **Virtual Matrices**, **Levels**, **Sources** and **Destinations**, and finally the **Control Panels**.

Pre-Configuration Information

In order to make configuration proceed as smoothly as possible, make a written list of the names and addresses of the components of your system: Frames, Virtual Matrices, Levels, Sources, Destinations, and Control Panels. This list will help you design your system to make the best use of your existing equipment.

Names

Frames, Sources, Destinations, Control Panels and other components of the SMS-6000 Configuration Editor all have Names. Names are essential to the configuration and operation of the SMS-6000.

Please observe the following SMS-6000 Naming Convention

- Names must be six or fewer characters in length.
- Names are case sensitive. For example, the system will interpret CAM1 as a different name from Cam1.
- Spaces in names are discouraged. If you want to use a space in a name, use an underscore or a hyphen.

Levels

There are 3 types of Level:

Simple—This Level encompasses an entire Frame and a Take on this level will only change a single crosspoint (or the Left and Right crosspoints on a Stereo Audio Frame).

The vast majority of Levels will be Simple.

Partial Frame—This Level is one of two or more in the same Frame.

Custom Multi-Xpt—A Take on this Level can change two or more crosspoints; the Level may span multiple Frames.

Levels can be both Partial Frame and Custom Multi-Xpt; for example; a Component Analog Video level could take up 1½ frames for its R, G & B virtual matrices.

Virtual Matrices

The Virtual Matrix is a software construct created to allow you to:

- Split a single Frame into more than one Level; each block of crosspoints will form one Virtual Matrix.
- Set up any Frame in such a way that a Take on a given Level will change more than one crosspoint (for example, the R, G and B crosspoints on a Component Analog Video Level; the R, G and B blocks of crosspoints will form 3 Virtual Matrices).

The configuration of most Frames, will only require one Virtual Matrix.

Simple Frames, Virtual Matrices, Levels, Sources, and Destinations

1. Select ***NEW*** to create a configuration file.

2. Configure your Simple (see page 3-4) Frames:
    a. Select ***FRAME*** to access the Frame Actions window.
    b. Select ***NEW*** to access the New Frame window.
    c. Select the appropriate Frame Type.
    d. Default Frame Name and Address will appear (you can change the Address and Frame Name if desired).
    e. Select ***OK*** to return to Frame Actions window.

NOTES: *Stereo Analog Audio Frames should be configured as Simple Frames.*

*Serial Video Frames can contain GVG PCB Input Simms, Quartz PCB Input Simms, or both types of Simms on a single frame (newer frames contain only GVG PCB Input Simms). If your frame has mixed Simms; click on **SET MIXED TYPES**; then check all Inputs that contain Quartz Simms.*

*Data matrix frames allow the frame's “disconnect” behavior to be configured. Normally, if you select a source that lacks the Data Matrix level, and Take it to a destination that has the Data Matrix level, the Take will not affect the status on the Data Matrix level of the destination. If the **DISCONNECT IF SOURCE LACKS INPUT** checkbox is checked, this same Take will cause a disconnect on the Data Matrix level of the destination (even though the disconnect occurred, the “taken” source will still appear as status on this level of the destination).*

---

3. When configuring more than one Frame of the same type:
    a. Highlight an existing Frame entry in the Frame Actions window.
    b. Select ***COPY***. The Frame Name, Address, and Type will appear with defaults.
    c. Select ***EDIT*** to change the default information for a copied Frame, if desired.

4. Repeat steps 2 and 3 until all Simple Frames have been entered.

5. Select ***CLOSE*** to return to SMS-6000 Configuration Editor window.

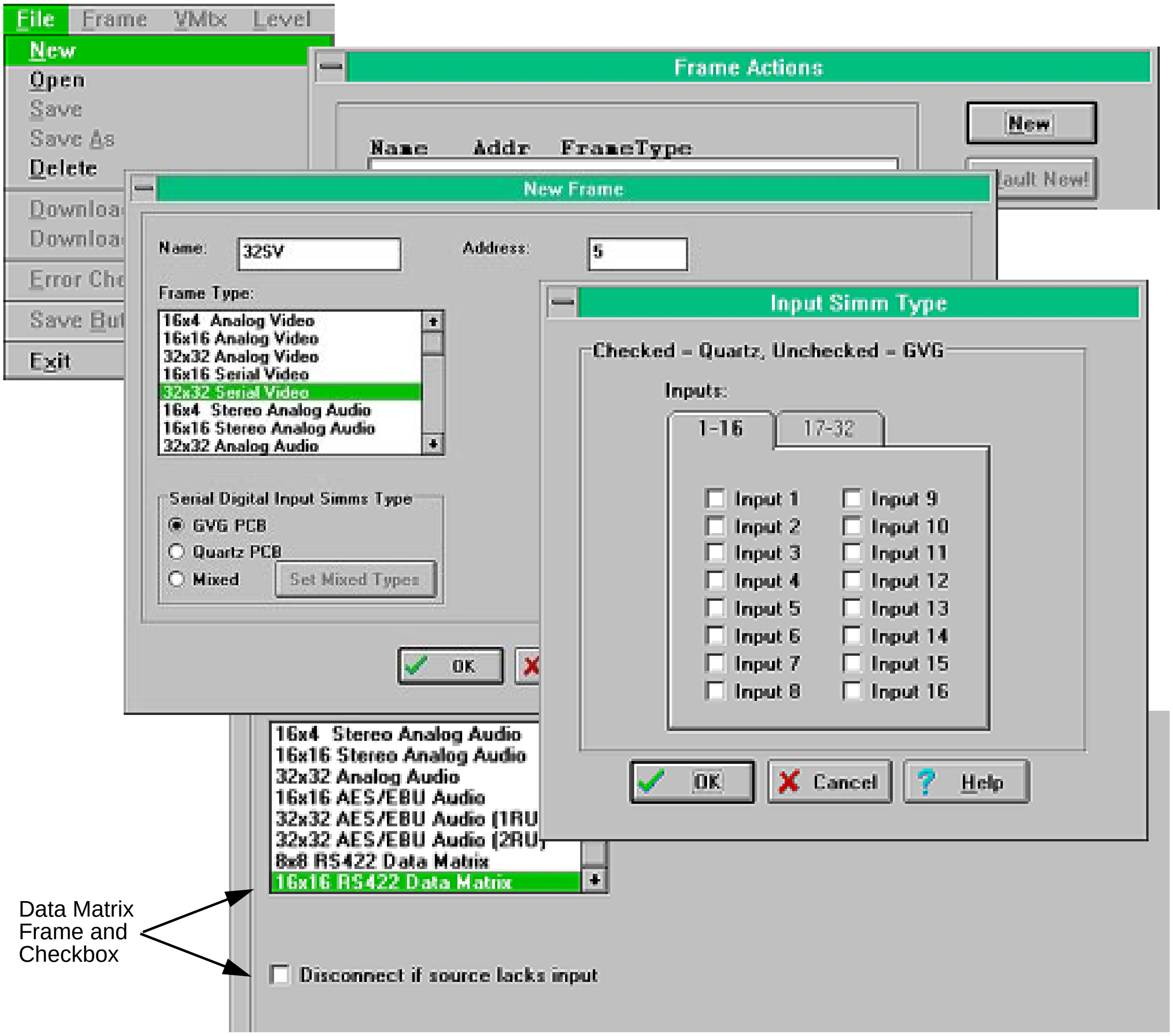


Figure 3-3. Creating a New Serial Video or Data Matrix Frame

6. Select ***VMTX*** to access the Virtual Matrix Actions window.

7. Select ***DEFAULT NEW*** to create Virtual Matrices (see page 3-5) for the configured Frames.

NOTES: *A Serial Video Frame will need to have its Virtual Matrix edited for signal type.*

A Stereo Analog Audio Frame is configured as a single Virtual Matrix.

---

8. Select ***CLOSE*** to return to the SMS-6000 Configuration Editor window.

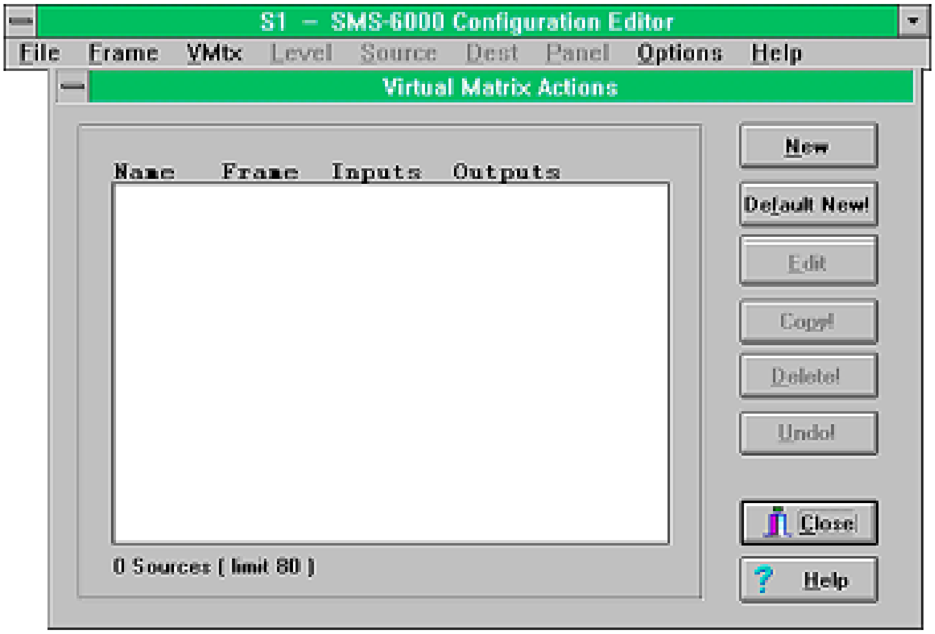


Figure 3-4. Virtual Matrix Actions Window

9. Select ***LEVEL*** to access the Level Actions window.

10. Select ***DEFAULT NEW*** to create Levels (see page 3-4) for the newly configured Virtual Matrices.

11. Select ***CLOSE*** to return to the SMS-6000 Configuration Editor window.

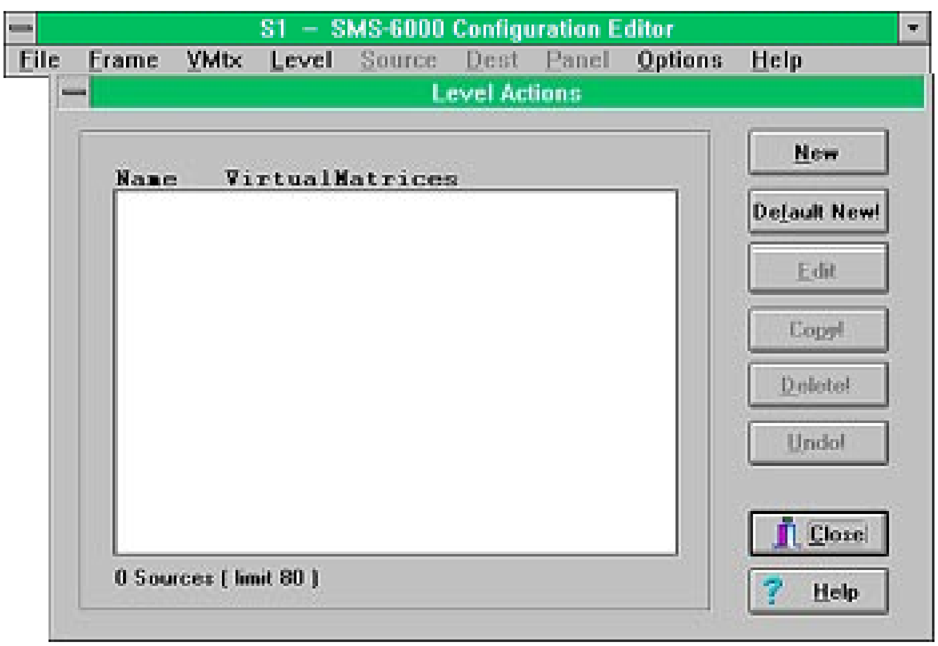


Figure 3-5. Level Actions Window

If you want Sources and Destinations to contain all of your Simple Levels (see page 3-4) but no Partial Frame or Custom Multi-Xpt ones (if any):

12. Select ***SOURCE*** to access the Source Actions window.

13. Select ***DEFAULT NEW*** to create Sources.

14. Select ***CLOSE*** to return to the SMS-6000 Configuration Editor window.

15. Select ***DEST*** to access the Destination Actions window.

16. Select ***DEFAULT NEW*** to create Destinations.

17. Select ***CLOSE*** to return to the SMS-6000 Configuration Editor window.

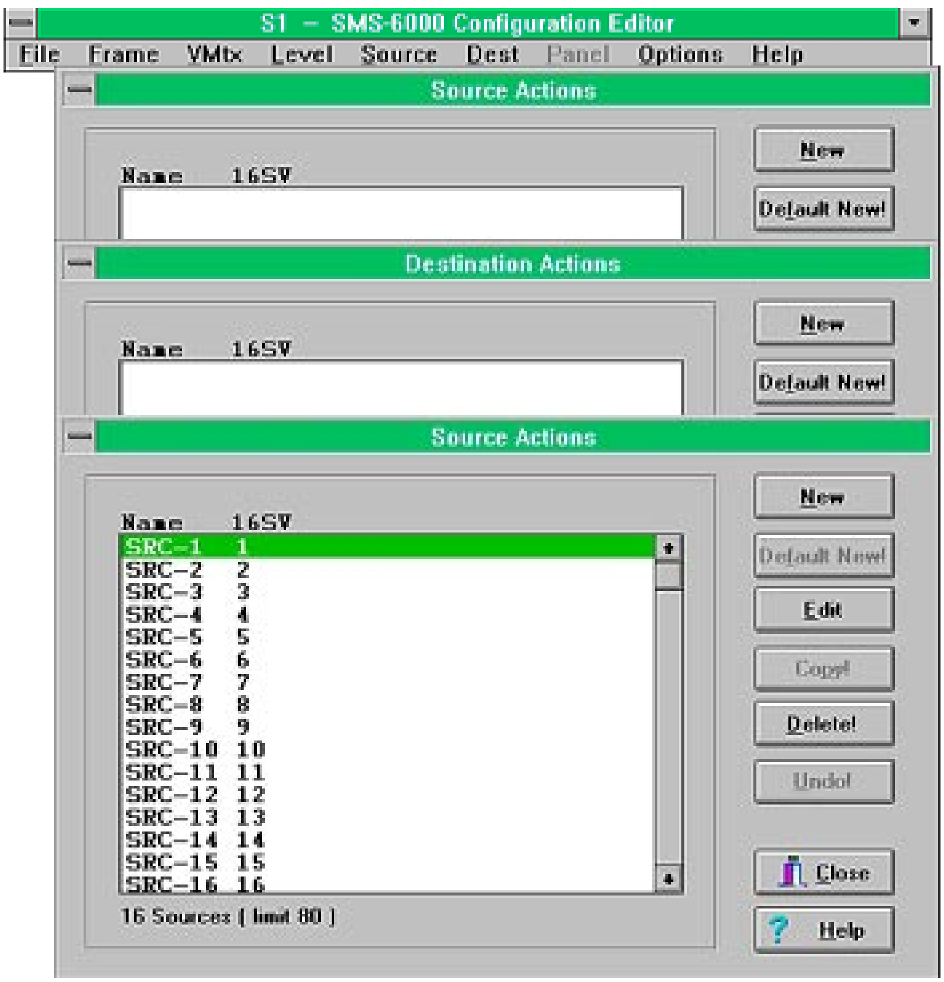


Figure 3-6. Source and Destination Actions Windows

Partial Frame and Custom Multi-Xpt: Frames, Virtual Matrices, and Levels

1. Configure your Partial Frame (see page 3-4) and Custom Multi-Xpt (see page 3-4) Frames by selecting ***FRAME*** to access the Frame Actions window, then ***NEW*** to access the New Frame window.
2. Select the appropriate Frame Type.

   Default Frame Name and Address will appear (you can change the Address and Frame Name if desired).

NOTES: *Stereo Analog Audio Frames should be configured as Simple Frames.*

Serial Video Frames can contain GVG PCB Input Simms, Quartz PCB Input Simms, or both types of Simms on a single frame (newer frames contain only GVG PCB Input Simms). If your frame has mixed Simms; click on ***SET MIXED TYPES****; then check all Inputs that contain Quartz Simms.*

Data matrix frames allow the frame's "disconnect" behavior to be configured. Normally, if you select a source that lacks the Data Matrix level, and Take it to a destination that has the Data Matrix level, the Take will not affect the status on the Data Matrix level of the destination. If the ***DISCONNECT IF SOURCE LACKS INPUT*** *checkbox is checked, this same Take will cause a disconnect on the Data Matrix level of the destination (even though the disconnect occurred, the "taken" source will still appear as status on this level of the destination).*

---

3. Select ***OK*** to return to Frame Actions window.
   When configuring more than one Frame of the same type:
   a. Highlight Frame entry in the Frame Actions window.
   b. Select ***COPY***. The Frame Name, Address, and Type will appear with defaults.
   c. Select ***EDIT*** to change the default information for a copied Frame, if desired.
4. Repeat steps 2, 3, and 4 until all Partial Frame and Custom Multi-Xpt Frames have been entered.
5. Select ***CLOSE*** to return to SMS-6000 Configuration Editor window.

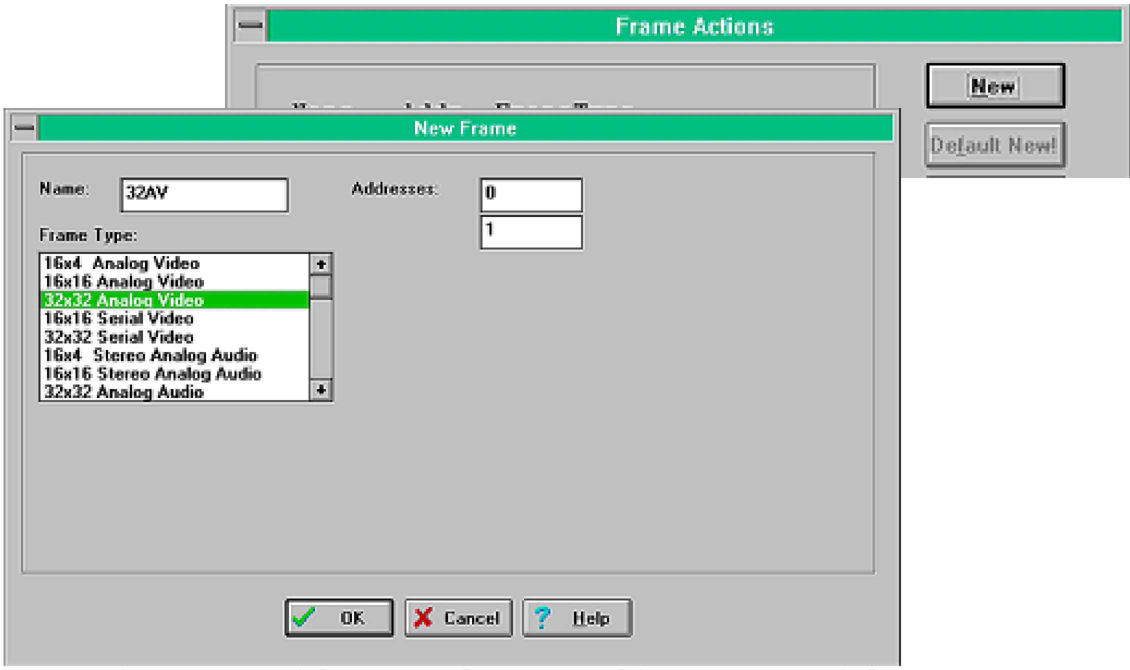


Figure 3-7. Partial Frames and Custom Multi-Xpts Frames Windows

6. Select ***VMTX*** to access the Virtual Matrix Actions window.
7. Configure Virtual Matrices [see page 3-5 (blocks of crosspoints within a Frame)] for all Frames that are either Partial Frame (contain more than one Level) or Custom Multi-Xpt [contain more than one block of crosspoints expected to switch on the same Level (e.g., R and G might be in a single Frame)].
   a. Select ***NEW*** to access New Virtual Matrix window.
   b. Select ***FRAME***.
   c. Enter Name.
   d. If selected frame is a Partial Frame (see page 3-4) click on ***SPLIT FRAME?*** You will need to assign Inputs and Outputs in the fields.

NOTES: *A Serial Video Frame will need to have its Virtual Matrix edited for signal type.*

A Stereo Analog Audio Frame is configured as a single Virtual Matrix.

---

   e. If selected Frame is a Serial Digital Frame you will need to select Signal Type.
   f. Select ***OK*** to return to Virtual Matrix Actions window.
8. Select ***DEFAULT NEW*** to create one Virtual Matrix (see page 3-5) for each Frame that still does not have a Virtual Matrix.
9. Select ***CLOSE*** to return to the SMS-6000 Configuration Editor window.

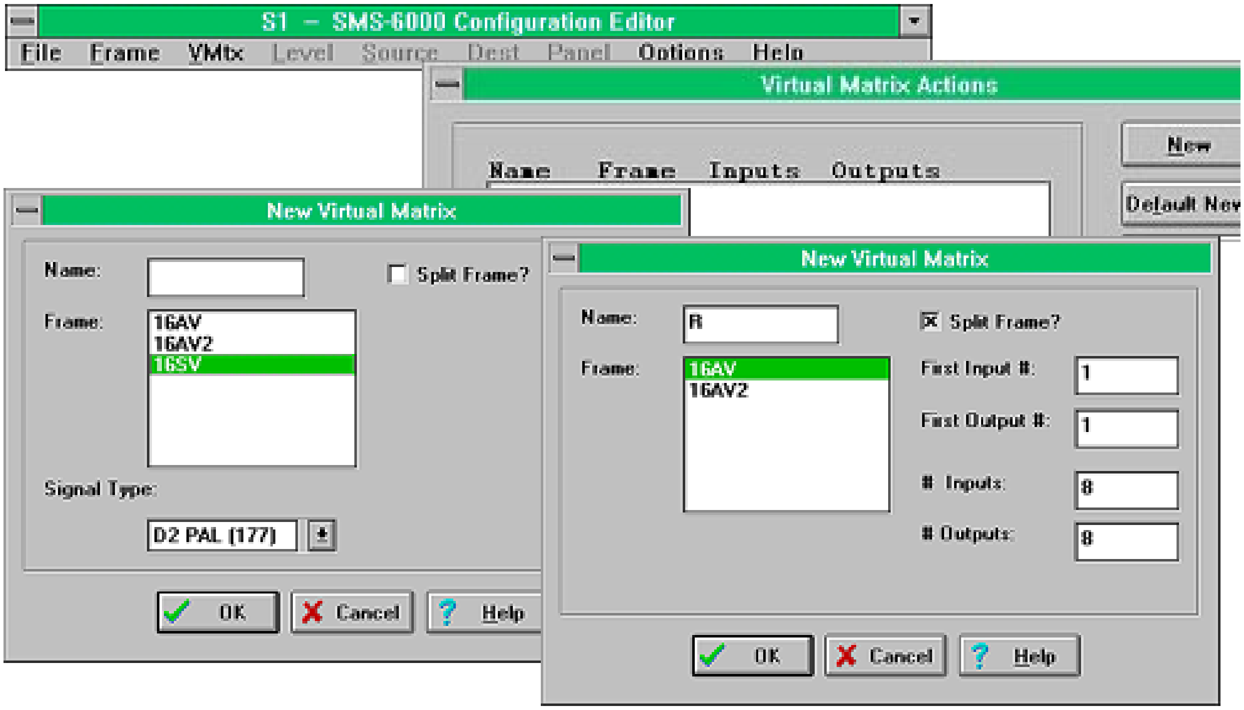


Figure 3-8. Partial Frame and Multi-Xpt Frames Virtual Matrices Windows

10. Select ***LEVEL*** to access the Level Actions window to configure any complex levels.
11. Select ***NEW*** to Access the New Level window.
12. Select one or more Virtual Matrices that will belong to this level.
13. Enter Level Name.
14. Select ***OK*** to return to Level Actions window.
15. Repeat until all Levels are configured.
16. Select ***CLOSE*** to return to SMS-6000 Configuration Editor window.

NOTE: *You can select a block of contiguous items by holding down the mouse button and dragging or select non-contiguous items by clicking on them.*

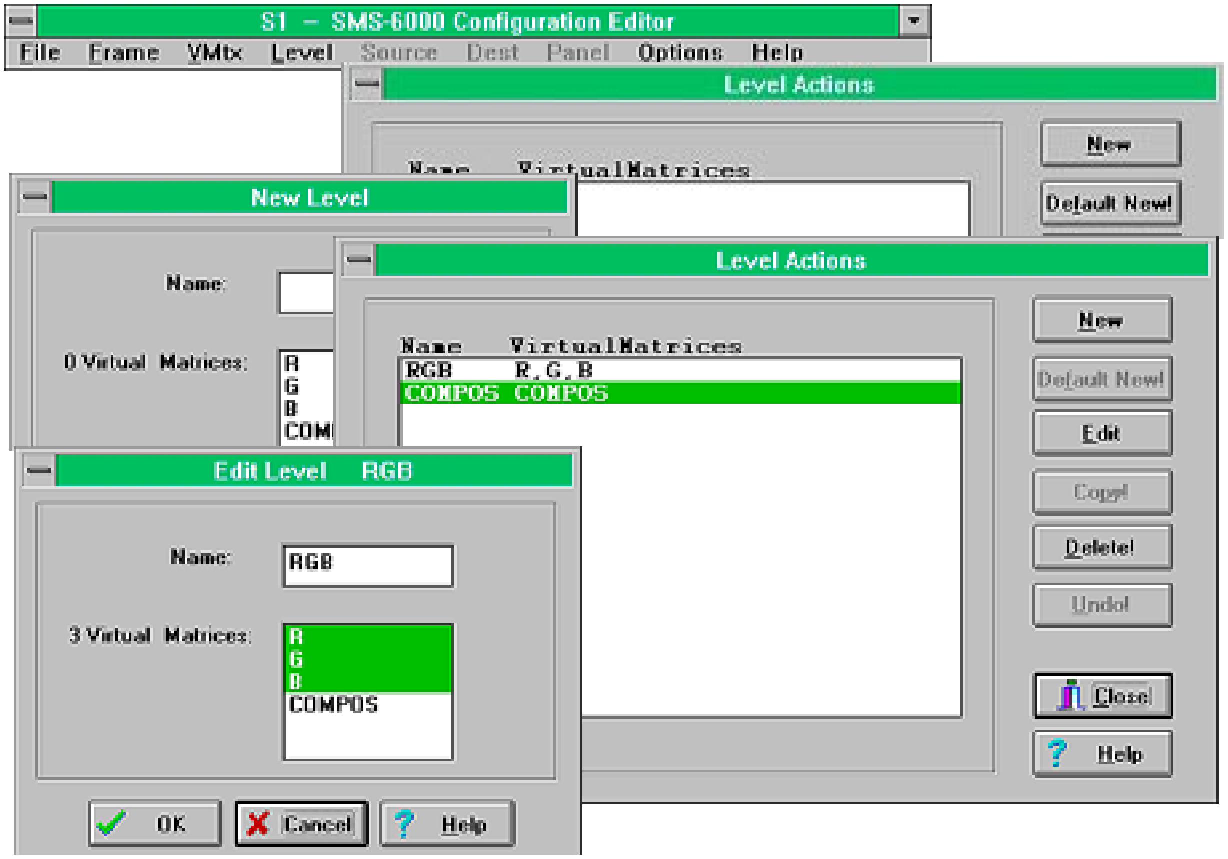


Figure 3-9. Partial Frame and Custom Multi-Xpt Levels Windows

Sources and Destinations

The configuration process is the same for both Sources and Destinations. The only variation is that Inputs are assigned to Sources and Outputs are assigned to Destinations.

1. Select ***SOURCE*** or ***DEST*** to access the Source Actions or Destination Actions window.

For each group of Sources or Destinations:

2. Select ***NEW***.
3. Create one Source or Destination, named xxx1, where xxx is the name of the group.

   Remember the 6 character limit (see page 3-4)—if you will have 10 or more Sources or Destinations in the group, the group name should be 4 characters or less.
4. Select the Level/s you want for this Source or Destination.
5. To assign Inputs or Outputs:
   a. Select ***SET/VIEW INPUTS*** or ***SET/VIEW OUTPUTS.***
   b. Enter the physical connector number(s).

NOTE: *The first free Input or Output is assigned as a default if you choose to skip this step.*

You can create up to 80 Sources and 80 Destinations.

Data Matrix Frames require that the 80th source be unconfigured. This 80th Source will become the IDLE Source. This does not affect the configuration of the other 79 Sources.

6. Click on ***OK*** to return to the New / Edit window.
7. Click on ***OK*** to create this Source or Destination and return to the Actions window.
8. Click on ***COPY*** to increment the inputs / outputs for creating the next source / destination of this group.
9. Repeat steps 3 to 9 until the group is complete.
10. Repeat steps 2 to 9 for the next group.

If you used Default New to create your Sources/Destinations and only want to change the name of a group:

11. Highlight all the default entries of the group **except** for the first entry.
12. Select ***DELETE*** to remove the entries.
13. Highlight the remaining Source / Destination of the group in the Actions window.
14. Select ***EDIT***.
15. Change the Name.
16. Click on ***OK*** to return to Actions window.
17. Click on ***COPY*** to increment the inputs / outputs for creating the next source / destination of this group.
18. Click on ***CLOSE*** to return to SMS-6000 Configuration Editor window, when finished configuring all Sources / Destinations.

IMPORTANT!

It is very important that the configuration of all **Frames**, **Virtual Matrices**, **Levels**, **Sources**, *and* **Destinations** *(including all names) is completed before* **Control Panels** *are configured*

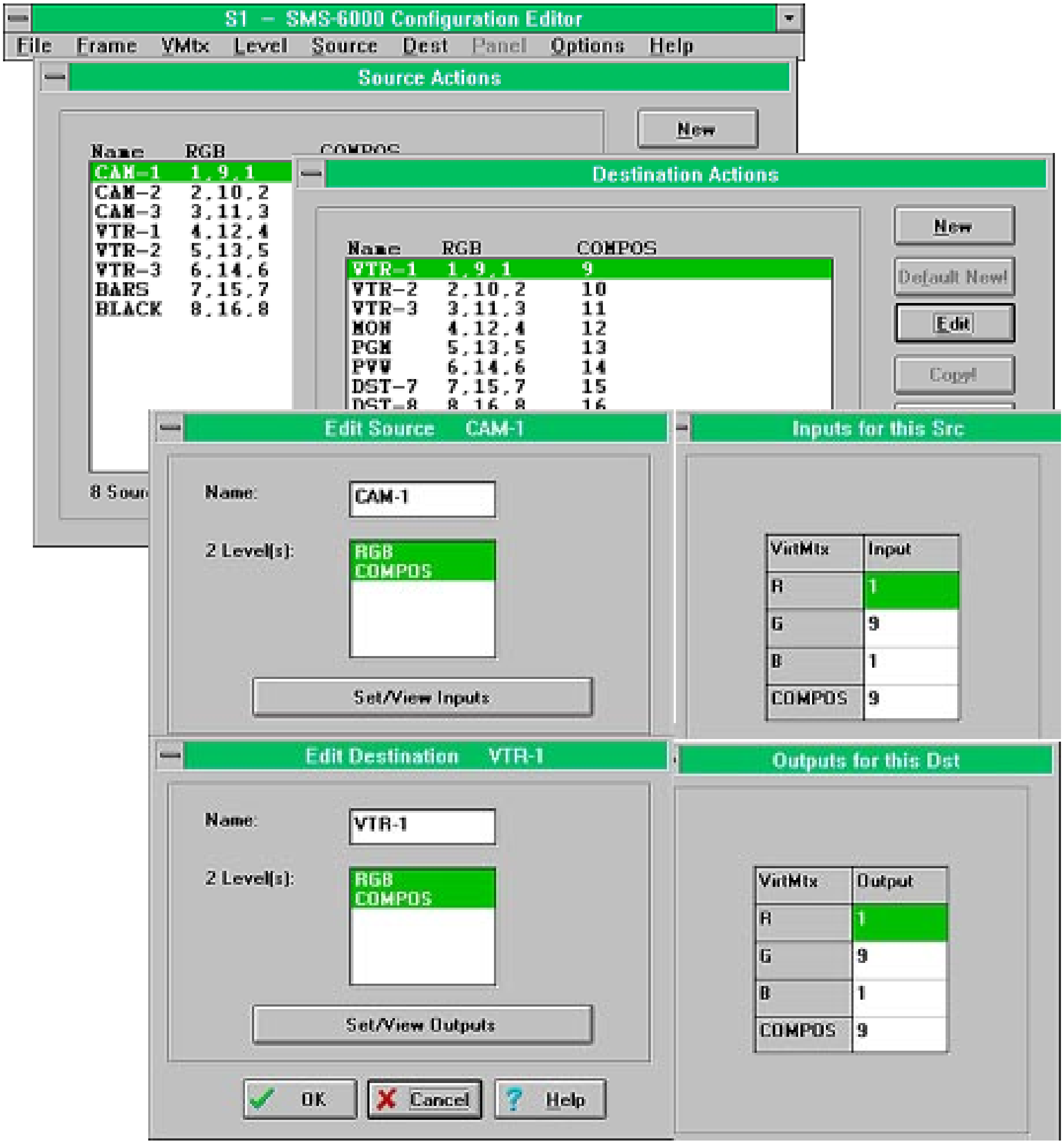


Figure 3-10. Partial Frame and Custom Multi-Xpt Sources and Destinations Windows

Panel Configuration

The SMS-6000 offers a choice of control panels:

- 16BPS Panel (see page 3-16)—16 button-per-source
- 32BPS Panel (see page 3-17)—32 button-per-source
- MiniXY Panel (see page 3-19)
- XY Panel (see page 3-20)

The maximum number of panels on the SMS-6000 is 16.

All Panel Types

Source, Destination and Level names (see page 3-4) on the buttons are abbreviated to 3 characters in the SMS-6000 Configuration Editor; to view the full name, click on the button.

The color of a button indicates its type (i.e., Source Button, Destination Button, or Level Button.) The default color: button type relationship can be changed in the Options-> Button Colors (see page 3-27) window accessed from the SMS-6000 Configuration Editor window.

You can only change the type of a button in the 32BPS panel (see page 3-17).

If you have more than one panel of the same type, that you want to configure similarly, create and configure the first one, then click on ***COPY*** to automatically create and configure the second.

Remember the 6 character limit (see page 3-4)—if you will have 10 or more panels of the same type the first name should be 5 characters or less.

1. Select ***PANEL*** to access the Panel Actions window.
2. Select ***NEW***.
3. Select Panel Type.
4. Click on ***OK***.

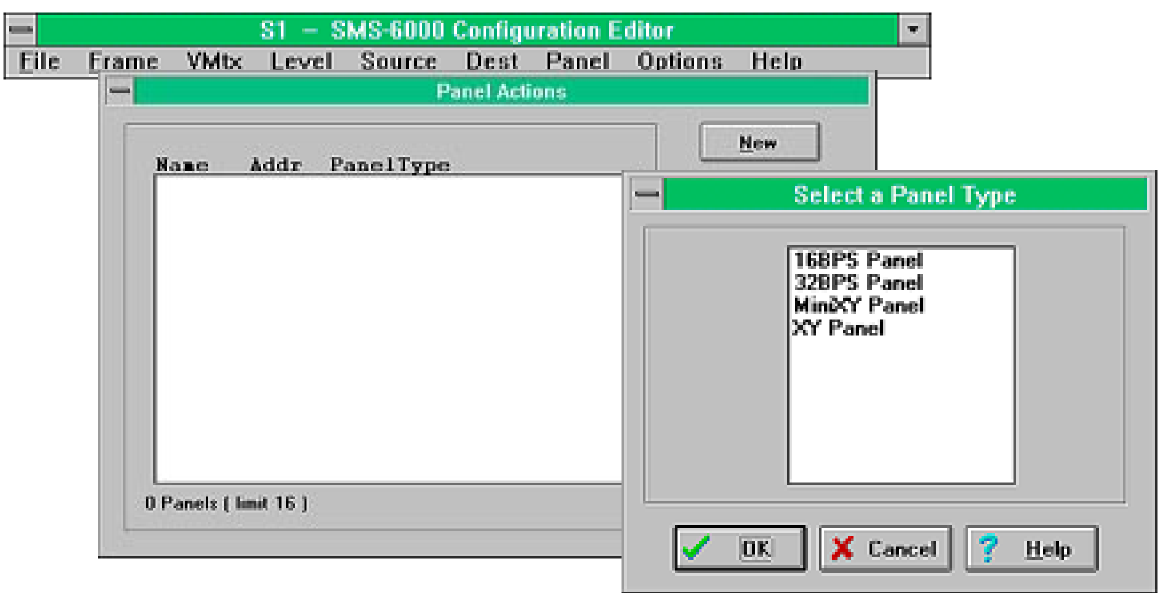


Figure 3-11. Panel Windows

16BPS Panel

The BPS 16 Panel is configured to take any 16 sources to a single destination on a given level or set of levels.

1. Enter Panel name if desired.
2. Default address appears, change if desired.
3. Select a Source button to access drop-down combobox of available Sources and assign sources.
4. Use drop-down combobox to assign Default Destination.
5. Select Level.
6. Use drop-down combobox to assign Lock Type (see page 3-23).

NOTE: *Joystick Information can be entered at this point. The Joystick window is the same for several panels. Please refer to the Joystick (see page 3-22) section of this document.*

Select ***OK*** or ***CANCEL*** to continue.

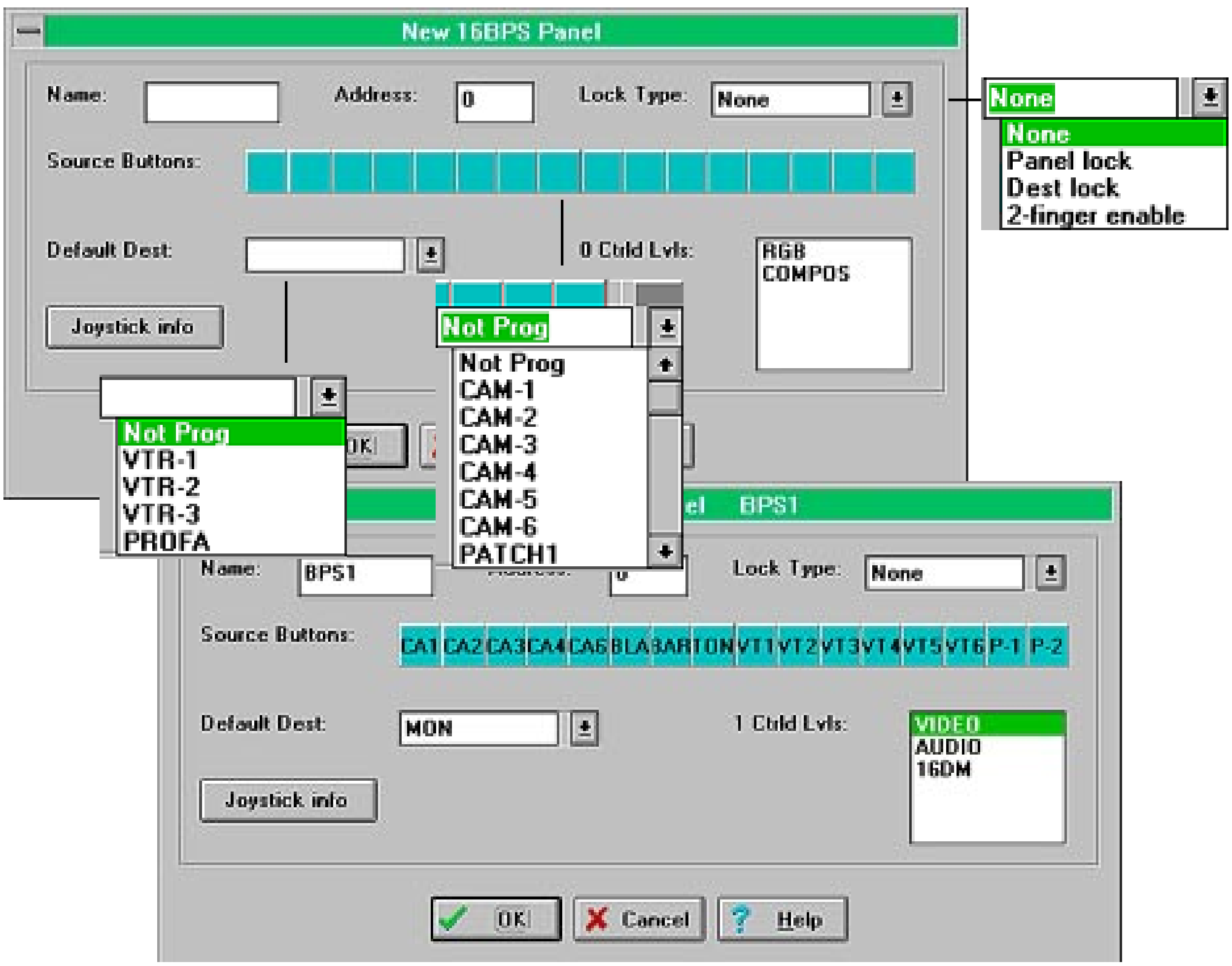


Figure 3-12. 16BPSPanel

32BPS Panel

32BPS is so named because it can be set up to control 32 Sources & 8 Destinations, but it need not be--could have 20 Sources & 20 Destinations, or 32 Sources 6 Destinations & 2 Levels, or whatever adds up to 40 buttons.

This panel uses buttons that can be re-labelled to reflect changes in your system and LED status indicators for easy reading.

When you create a new 32BPS panel, the “Set button types” window appears, allowing you to change the default button types if desired. To bring up this window later, go to the lower right section of the 32BPS dialog box and click on the button type you want to change.

1. Select either Source, Destination, Level, or Lock in the Set Type to: subpanel. The selected button type will appear in “Click on button to change its type to:”
2. Select any button in the panel and it will change to your selected button type.
3. Select ***OK*** or ***CANCEL*** to return to New / Edit 32BPS window.
4. Enter Panel name if desired.
5. Default address appears, change if desired.
6. Select a Source button to access drop-down combobox of available Sources and assign sources.
7. Select a Destination button to access drop-down combobox of available Destinations and assign destinations.
8. Use drop-down combobox to assign Default Destination.
9. Select Levels.
10. If Lock was assigned to a button, use drop-down combobox to assign Lock Type (see page 3-23).

NOTE: *Joystick Information can be entered at this point. The Joystick window is the same for several panels. Please refer to the Joystick* *(see page 3-22)* *section of this document.*

Select ***OK*** or ***CANCEL*** to continue.

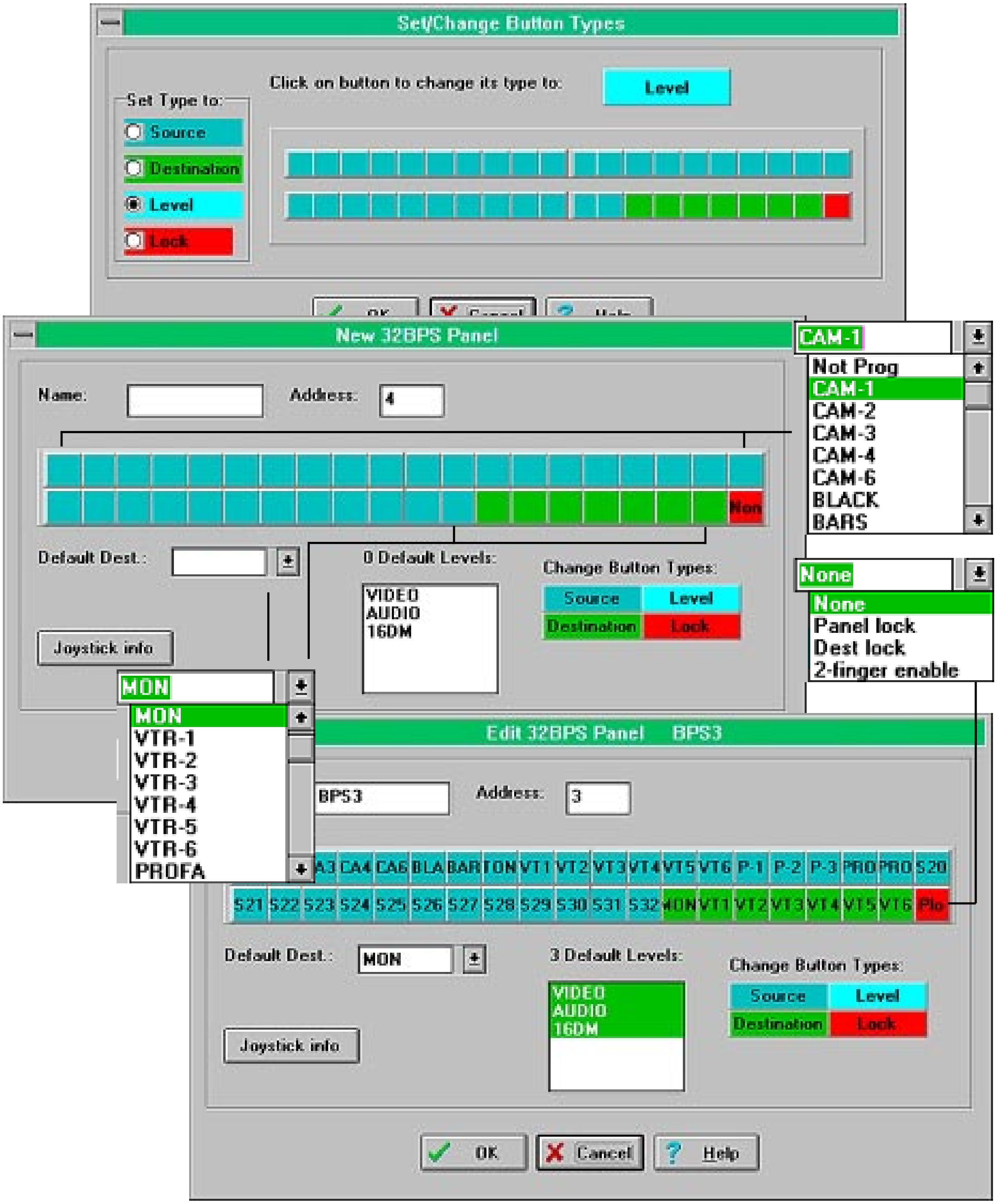


Figure 3-13. 32BPS Panel Windows

MiniXY Panel

The Mini XY Panel has 16 SELECT buttons to choose from the 16 sources (inputs) and 16 destinations (outputs). They are shared between source and destination selection. Here the appearance of the panel has been modified for the SMS-6000 Configuration Editor to show two separate sets of 16 buttons each, for sources and destinations.

The MiniXY Panel has ***limited*** functionality; it can only control the first 16 sources, the first 16 destinations, and the first 4 levels. To toggle control of any of these items, click on the button representing it.

1. Enter Panel name if desired.
2. Default address appears, change if desired.
3. Click on Destinations or Sources to enable / disable for a total of 16 Destinations and Sources.

   Destinations, Sources, and Levels are set by the configuration done in the Level, Source, and Dest menus.
4. Use drop-down combobox to assign Lock Type (see page 3-23).

NOTE: *Joystick Information can be entered at this point. The Joystick window is the same for several panels. Please refer to the Joystick* *(see page 3-22)* *section of this document.*

---

5. Select ***OK*** or ***CANCEL*** to Continue.

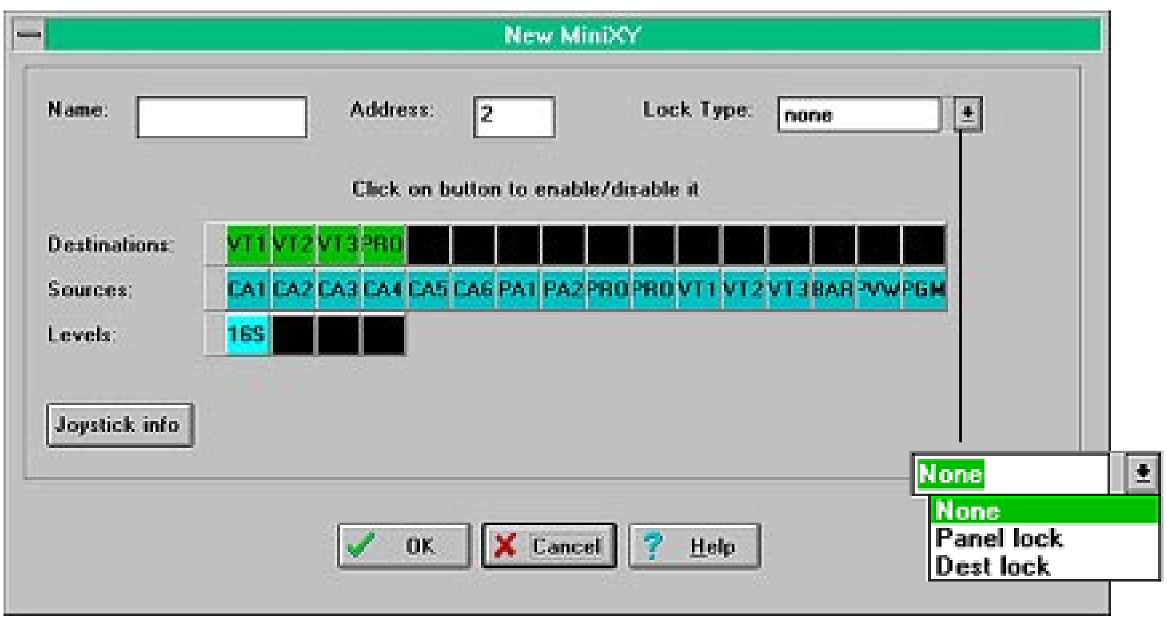


Figure 3-14. Mini XY Panel Window

XY Panel

The keypads of the XY Keypad Panel can be configured in the arrangement most convenient for you. The two Suffix arrangements are Calculator or Telephone (with or without the characters A-F). Calculator is the more common choice.

1. Enter Panel name if desired.
2. Default address appears, change if desired.
3. Use drop-down comboboxs for Default Destination and Lock Type (see page 3-23). Levels are set by the configuration done in the Level menu.
4. Select a keypad button to assign a prefix to a key. In the text window enter the desired prefix.
5. Select ***REMOVE CHOP KEY*** to remove the Chop from the panel.
6. Select ***MOVE/SET CHOP KEY*** to move or add the Chop.

NOTE: *Joystick Information can be entered at this point. The Joystick window is the same for several panels. Please refer to the Joystick* *(see page 3-22)* *section of this document.*

---

7. Select ***OK*** or ***CANCEL*** to Continue.

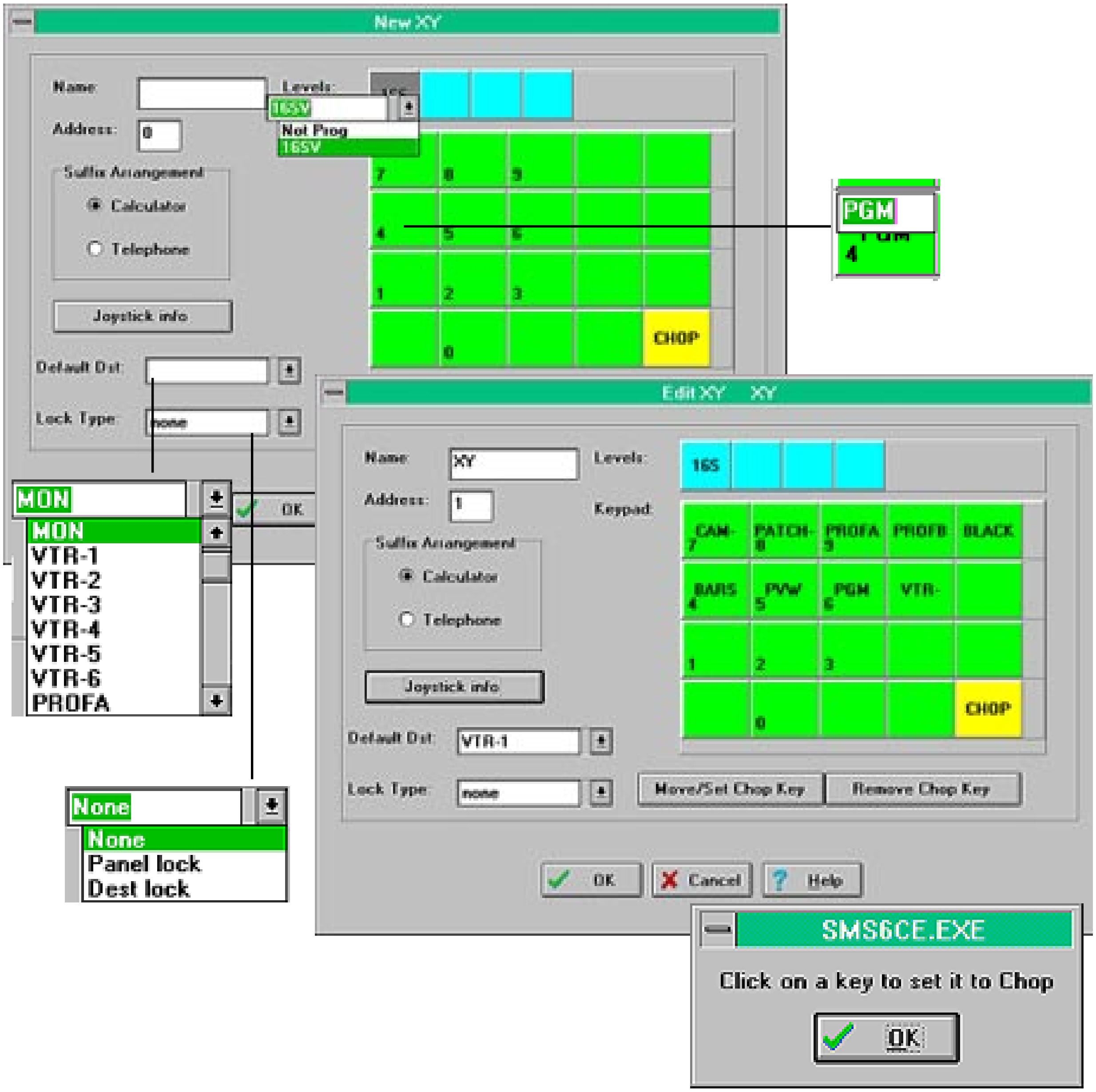


Figure 3-15. XY Keypad Panel Windows

Joystick

The Joystick Override is used for remote source selection, for example, in order to match the color balance of several cameras. When the Joystick is pressed, the associated source is switched to the destination specified in the Joystick Override window. When the Joystick is released, the panel will revert to the previous selection made by the control panel.

1. Select ***JOYSTICK INFO*** on the 16BPS (see page 3-16), 32BPS (see page 3-17), MiniXY (see page 3-19), or XY Panel (see page 3-20) to access the Joy Stick Override window.

2. Select a Source button to access drop-down combobox of available Sources and assign sources to Pins.

3. Use drop-down combobox to assign Destination.

4. Select Level.

5. Select ***OK*** or ***CANCEL*** to Continue.

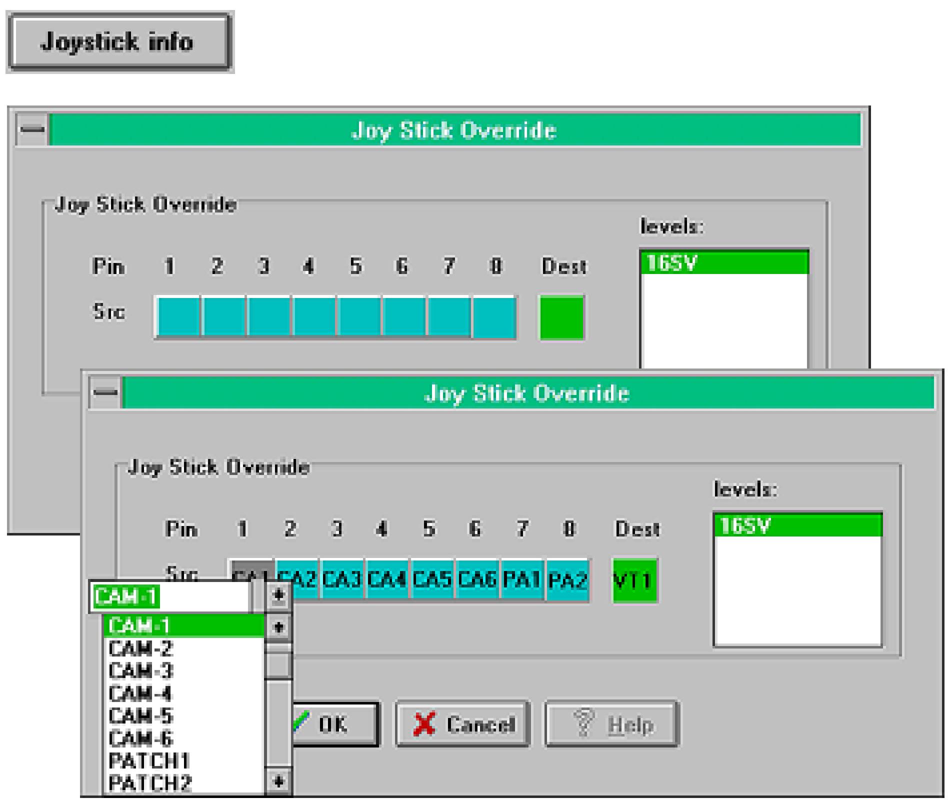


Figure 3-16. Joy Stick Override Window

Lock Types

MiniXY and XY Panels have: None, PanelLock, and DestLock
16BPS and 32BPS Panels have: None, PanelLock, DestLock, and 2-Finger Enable

- **DestLock**—This lock is active only for a particular Destination. To select it:

  a. The ***DESTINATION*** to be locked is made active

  b. The ***LOCK*** button is pushed.

  Now, attempting to select any button on the originating panel (other than the ***LOCK*** button or ***DESTINATION*** select button) will result in a beep and have no effect. The operator has the choice of making any or all Destinations locked on the originating panel. All other panels on the Q-link are unaffected.
- **PanelLock**—This locks the panel originating the lock for all destinations. Attempting to select any button on the panel (except ***LOCK***) results in a beep and no effect. All other panels on the Q-link are unaffected.
- **2-Finger Enable**—To do a Take, hold down the ***LOCK*** button with 1 finger & press the ***SOURCE*** button with another.

Save the Configuration

1. Select ***FILE***.
2. Select ***SAVE*** (for a edited file) or ***SAVE AS*** (for a new file).
3. Enter File name (if needed for a new file).
4. Verify that Directory / Drive is the one where you want to save the file.
5. Verify that Save File as Type says Config files.
6. Click on ***OK***.

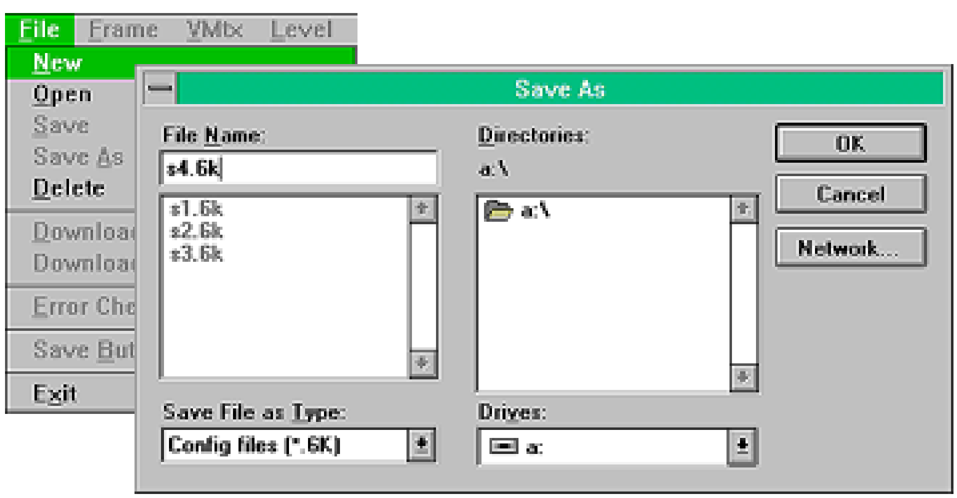


Figure 3-17. Save Configuration Windows

Download the Configuration to Your SMS-6000 Router

1. Verify that there is a RS232 serial connection between one of the PC's serial (COM) ports and the Master Frame's serial port.

NOTES: *Section 2 Installation, sub-section Configuring the Frame in the Series 6000 Compact Signal Management System manual, covers the Installation and set-up of the frames.*

Serial I/F links must be set for RS232.

---

2. From the SMS-6000 Configuration Editor, verify the Comm Parameters (see page 3-27).
   a. Select ***OPTIONS***.
   b. Select ***COMM PARAMETERS***.
   c. Settings should be:

      Com Port: is the Com Port actually connected

      Com Speed: 9600 baud

      Parity: none

      Data Bits: 8+1

3. The configured addresses for Frames and Panels match their actual rotary hex switch setting.

   If you change this setting, press the Reset button on the Frame or Panel.

NOTE: *Compare the Frame and Panel rotary hex addresses to their configured addresses by checking the Frame Actions and Panel Actions windows*

---

4. One and only one control board, on one and only one frame, is set to be the Master.

   The dip switch settings on the Master are Switch 1-up, Switch 2-down, Switch 3-down, and Switch 4-up. On Slave boards all dip switches are set in the up position.

   Reset frame after changing dip switch settings.

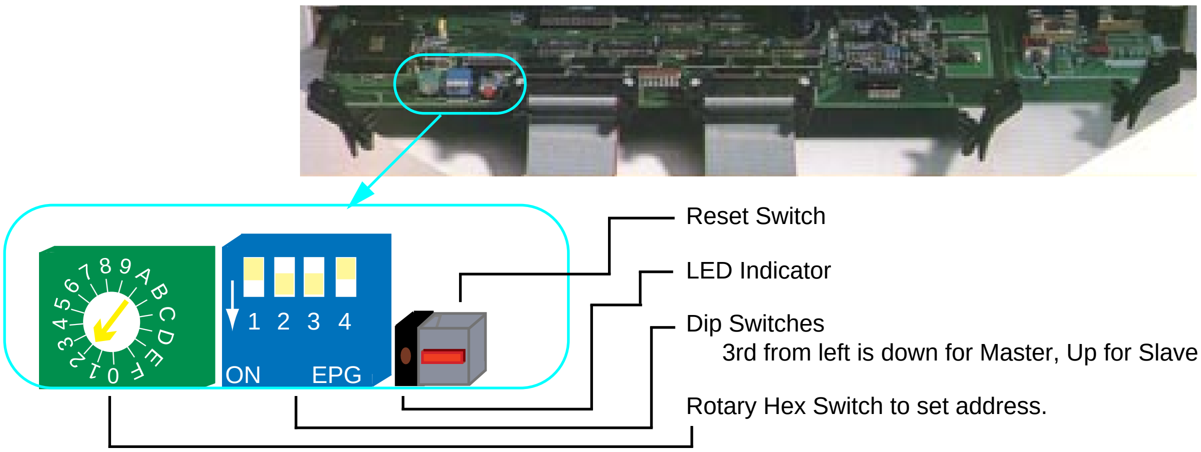


Figure 3-18. Rotary, Dip, and Reset Switches

5. Open a configuration if there is no configuration currently open.
   a. From the SMS-6000 Configuration Editor, select ***FILE***.
   b. Select ***OPEN***.
   c. Select desired configuration file from directory.
   d. Click on ***OK***.

6. Download the configuration.
   a. From the SMS-6000 Configuration Editor, select ***FILE***.
   b. Select ***DOWNLOAD***.
   c. A window showing download status appears. The download takes roughly a minute or two, depending on file size.

After the download is complete, the SMS6000 Router will come up with the new configuration.

If you can't connect to the router, double-check the conditions in step 1, or try connecting to a different serial port on the master frame.

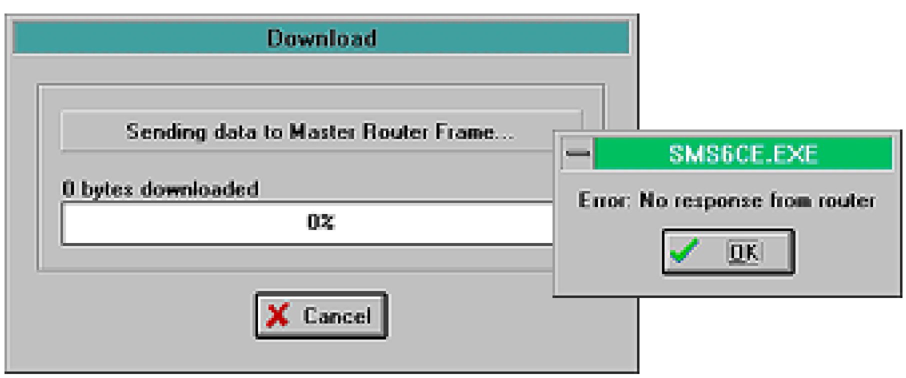


Figure 3-19. Download Status and Error Windows

Miscellaneous

Welcome

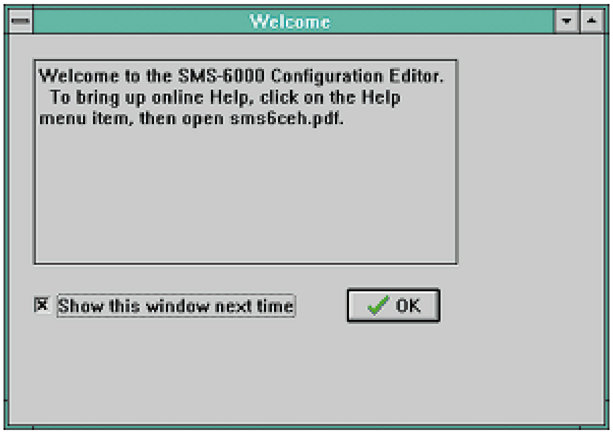


Figure 3-20. Welcome Window

The Welcome window will appear when the SMS-6000 Configuration Editor is loaded.

File Menu

Figure 3-21. File Menu

The File menu has the following unique features:

- ***DOWNLOAD TO FILE*** this selection is for future use.
- ***ERROR CHECK CONFIG*** does a thorough error check of the entire configuration. It is recommended that you use this feature if you have any doubts about the consistency of the configuration.
- ***SAVE BUTTON LABELS TO FILE*** is used to create a text file of the Button Labels. This text file can be used in an application such as Excel to create custom button labels.

Actions Windows Buttons

All Actions windows have the following buttons:

- ***NEW*** to add a new item.
- ***DEFAULT NEW*** to add default entries.
- ***EDIT*** to modify an existing item.
- ***COPY*** to copy an existing item.
- ***UNDO*** to undo the last entry.
- ***CLOSE*** to close the Action window.
- ***HELP*** to access the on-line documentation.

NOTE: *Whenever a button appears gray on the screen that function is not available.*

Figure 3-22. Action Windows Buttons

Delete Confirmation Window

When you choose ***DELETE***, the Delete Confirmation window will automatically appear. You will be asked to confirm your decision to delete the current item.

Figure 3-23. Delete Confirmation Window

Exit

EXIT will close the SMS-6000 Configuration Editor. If you try to exit the SMS-6000 Configuration Editor after creating a new file or making changes to an existing file the following confirmation window will appear:

Figure 3-24. Exit Confirmation Window

Options Menu

Comm Parameters

The Comm Parameters window shows the system default. You may change these parameters.

Button Colors

You may change the colors of the Source, Destination, Level, Lock, Chop, or Prefix Buttons using buttons colors window.

1. Select which button you want to change color.
2. Select the new color from the Basic Colors or Custom Colors in the Color window.
3. Select button and click to assign colors as desired.
4. Select ***OK*** or ***CANCEL*** to continue.

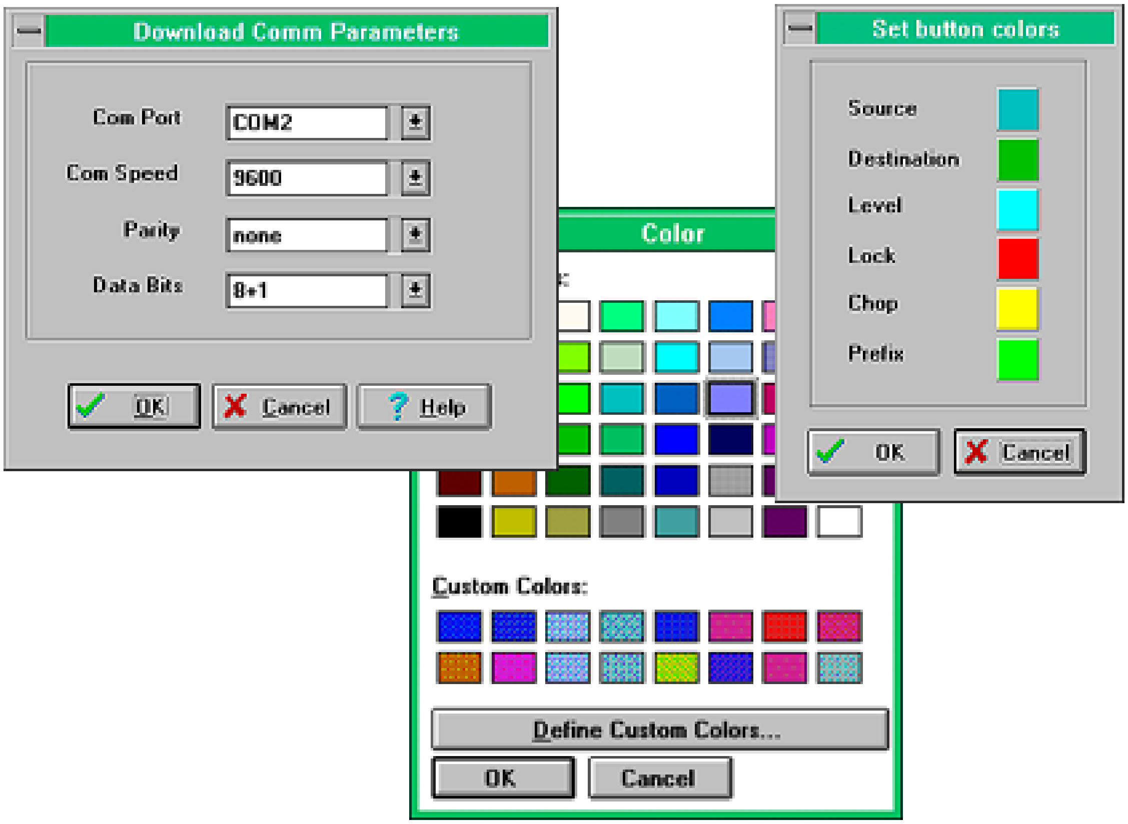


Figure 3-25. Comm Parameters and Button Colors Windows

Help Location

The Help Information window displays the file names and path used to access the on-line documentation.

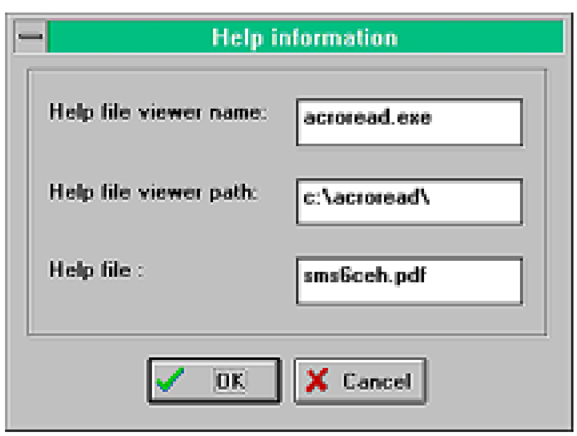


Figure 3-26. Help Information Window

Help Menu

About

The About window displays the current version of software for the SMS-6000 Configuration Editor you are using.

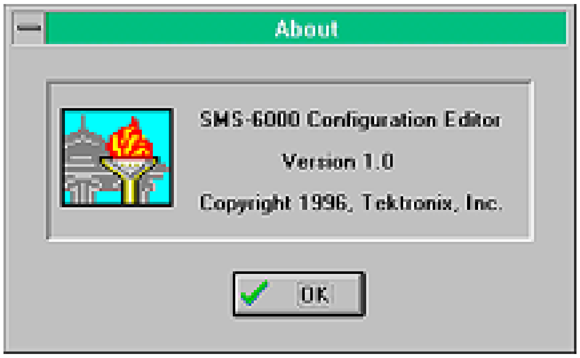


Figure 3-27. About Window

Help

The ***HELP*** button loads Acrobat Reader. In the Open Window select **SMS6CEH.PDF**. After loading the on-line documentation you may minimize the help window and return to the SMS-6000 Configuration Editor.

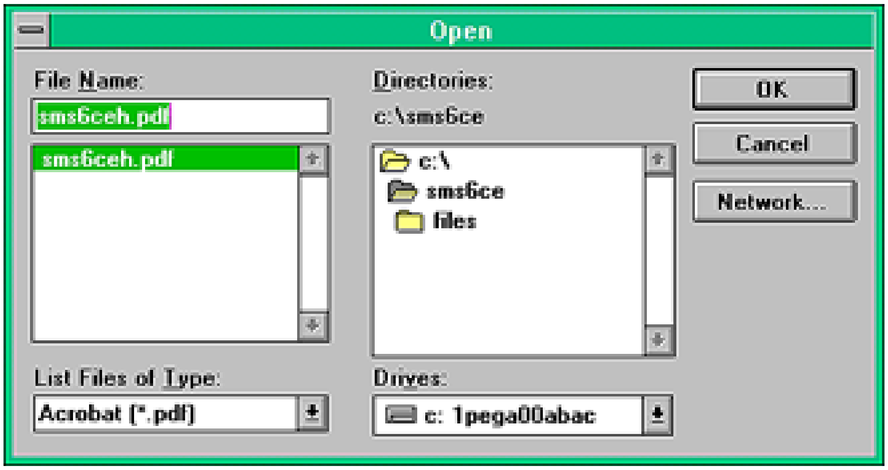


Figure 3-28. Open Window for On-Line Documentation

4 *Control Panels*

Introduction

Once the system has been fully installed you can start to use it. This section describes the Series 6000 control panels and their operation.

SMS–CMXY Control Panel

The SMS–CMXY (Mini-XY) panel can be supplied as a remote control panel or as a local control panel (SMS CMXY-LP) which fits the front of a 1RU matrix frame. The SMS–CMXY Control Panel is illustrated in Figure 4-1.

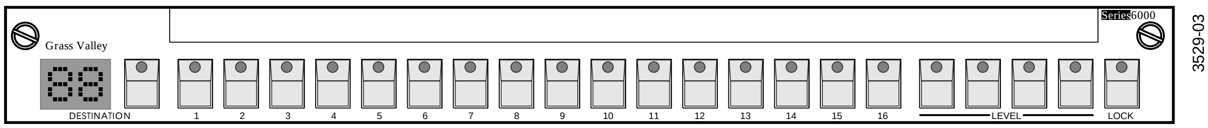


Figure 4-1. SMS–CMXY Control Panel

Description

This panel has 16 SELECT buttons to choose the 16 sources (inputs) and 16 destinations (outputs). They are shared between source and destination selection using a further switch to engage the *destination select* mode. A dual seven segment LED display is used to show the destination which is currently being controlled.

Designation Strip

A slide-in designation strip may be used to label both sources and destinations by easy-to-remember names above the SELECT buttons. It can also be used to show the names of the breakaway levels in use.

Computer Port

The computer port is not available with the current version of firmware.

Operation

All of the buttons can be configured to operate in different ways, so the description that follows is for the factory default configuration. However, users may alter the configuration to their specific requirements.

Destinations

Press the DESTINATION button to engage the *destination select* mode. The LED in this button lights and the LEDs in the SELECT buttons light to show which destinations can be selected; so if destinations 5, 6, 7 and 8 are allowed to be selected from the panel then all these four LEDs will light up. This *menu* acts as a warning to show that the panel is in an unusual mode, otherwise the operator might be confused as to whether the panel is in source or destination mode.

Press one of the lit SELECT buttons to choose a new destination. The number corresponding to the button pressed is transferred to the numeric display to show the current destination, and the source currently selected to that destination is shown by one of the LEDs in the select buttons.

Sources

When the destination has been selected, pressing a source button initiates the *take* or *cut* of that source.

Breakaways

Four buttons are provided to enable breakaway selections of signal levels such as video, audio 1, audio 2, and time code. These buttons can be labeled to suit each application using the designation strip. The system configuration determines which buttons are active, i.e., which breakaways are allowed. For example, in a video only system the left hand LED only would be lit, and in a video and single level (mono) audio system a breakaway may be required, in which case the left two buttons would be used.

If the breakaways are allowed, then when a new destination is selected, all the level buttons light up denoting the *married* mode in which all switching levels are switched simultaneously. This is the normal condition. If a breakaway selection is required then press the buttons to deselect the levels which are **not** required to switch. Then press a SELECT button to choose a new source on the breakaway level.

If a breakaway is selected then source LEDs flash to denote that a breakaway condition exists. If all four levels are selected to different source signals then three of the LEDs flash while the fourth is steady. To find out which source LED corresponds to a particular signal level, select the desired level (by deselecting the other levels) and the steady LED is the source selected on that level of the matrix.

Note that if more than one level is lit then the steady LED corresponds to the left-most lit level button.

Lock

This button allows you to protect a source / destination selection. The LOCK button locks the panel or other panels from making further selections. The lock mode can function in several ways; it is possible to lock your *own* panel, or *all other* panels or even *all* panels; further, when you press the LOCK button it can lock just the current destination or it can lock all destinations. The choice of lock modes is set in the software configuration.

1. Press the button once to lock the selection / panel. The LED lights to show that the panel is locked.

2. Press the button again to unlock the selection / panel.

3. The panel remembers the lock status so that when a destination is locked and this destination is reselected then the lock button will light to show that this destination is locked.

Trace

Sometimes you may want to take a signal source out of service, but you are not sure if it is being used anywhere. The **Trace** feature allows you to check quickly to which destinations a particular source is being sent.

1. Select the **lock** mode.

2. Press and hold the SELECT button for the source you wish to trace. Note that the LED does not light up.

3. After about half a second the SELECT buttons will light to show you all the **destinations** to which the source is currently being routed.

4. Release the button when you have finished and the panel will revert to its normal mode, although you must exit the **lock** mode before you can make new crosspoint selections.

Chop

This feature is useful for engineering checks and system alignment of gains and phasing. In this mode the output switches rapidly between two inputs. Note that you can select **chop** mode only when a single breakaway is selected. The output remains in chop mode until any button on the panel is pressed, or until a source is changed on the current destination by another control panel or by an external computer.

Joystick or Microswitch Override

This feature is used for matching the color balance of several cameras. Microswitches in the joysticks of camera control units are pressed by the engineer conducting the line-up to select the camera in use onto the line-up monitor. It overrides the current selection made on a remote panel. When the microswitch contact is released the override selection reverts to the previous selection made on the conventional panel.

Each control panel can support up to eight cameras. The user indicates in the software configuration which inputs of the matrix are selected by the joystick contacts. Normally video only is selected by the joystick, but there is no limitation placed by the system and any level may be selected.

1. Press and hold the joystick to make an override selection.

2. Release the joystick to return to the previous selection made by the panel.

3. If two or more joystick buttons are pressed, they queue or stack with the last press taking priority.

SMS–C16BPS Control Panel

The SMS–C16 Button-Per -Source Control Panel is illustrated in Figure 4-2.

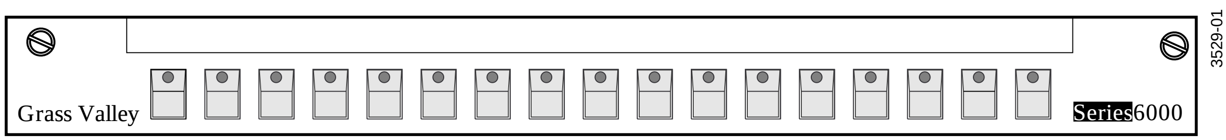


Figure 4-2. SMS–C16BPS Control Panel

Description

This panel has 17 buttons, 16 are used to select the sources (inputs) and one button is used as a Lock / Enable function. There are no breakaways on this panel. Refer to **Section 3: Configuration Editor** of this manual for details of how to set up the Lock and Enable modes.

Designation Strip

A slide-in designation strip may be used to label sources with easy-to-remember names above the buttons.

Operation

The destination and the levels controlled by this panel are determined by the setup of the system and can be changed using the SMS-6000 Configuration Editor, if supplied.

Sources

Press the required source button to select a new source.

Chop

If two source buttons are held down then the output switches rapidly between the two inputs.

NOTE: *The chop affects all levels the panel has been configured to control*

This feature is useful for engineering checks and system alignment of gains and phasing.

Joystick or Microswitch Override

This feature is used for matching the color balance of several cameras. Microswitches in the joysticks of camera control units are pressed by the engineer conducting the line-up to select the camera in use onto the line-up monitor. It overrides the current selection made on a remote panel. When the microswitch contact is released the override selection reverts to the previous selection made on the conventional panel.

Each control panel can support up to eight cameras. The user indicates in the software configuration which inputs of the matrix are selected by the joystick contacts. Normally video only is selected by the joystick, but there is no limitation placed by the system and any level may be selected.

1. Press and hold the joystick to make an override selection.

2. Release the joystick to return to the previous selection made by the panel.

3. If two or more joystick buttons are pressed, they queue or stack with the last press taking priority.

SMS-CXY Control Panel

The SMS-CXY Control Panel is illustrated in Figure 4-3.

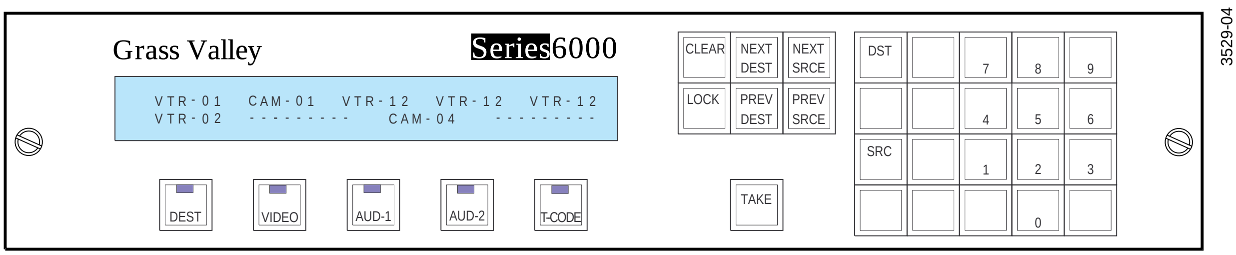


Figure 4-3. SMS-CXY Control Panel

Description

This panel uses a keypad with 20 keys to select sources and destinations and a green vacuum fluorescent display to show both **in use** and **preset** selections.

The keys may be labeled with the names of sources, destinations and breakaway levels printed onto plain paper using a laser printer.

The vacuum fluorescent display has a lifetime of around 5 years continuous usage. In many systems there will be long periods of time when the panel is not in use, so a *sleep mode* blanks the display if there is no activity on the panel. In most applications this will extend significantly the working life of the display.

Operation

All of the buttons can be configured to operate in different ways, so the description that follows is for the factory default configuration. However, users may alter the configuration to their specific requirements.

Keypad

Source and destination names are entered using a single or two step process. The data is entered into the **preset** lower section of the display. The first press selects the name of the source / destination, e.g., CAM; subsequent presses select the number, e.g., 12, to give the overall source name CAM12. The names of the sources and destinations and how they are assigned to physical inputs and outputs of the matrix is determined by the setup of the system.

Clear

If an error is made during entry of names on the keypad, press the CLEAR button to clear the display.

Destinations

To enter the **destination select** mode press the left-hand button (DEST) under the display; the LED in this button lights. Then select a new destination using the keypad. The name is built up in the lower **preset** section of the display. When you are satisfied with the new destination, exit the **destination select** mode by pressing the (DEST) button again, or by pressing the TAKE button. The new destination is transferred to the **in use** upper section of the display, alongside its current source selections.

Sources

When you have left the **destination select** mode you can select the source. The source name is built up in the display in the same way as for destinations.

Take Button

When the desired source is selected into the **preset** section of the display, press the **TAKE** button to make a cut to the new source.

Breakaways

Four buttons are provided to enable breakaway selections of signal levels, such as video, audio 1, audio 2, and time code. These buttons can be labeled to suit each application. The system setup determines which buttons are active and which breakaways are allowed.

Lock

This button allows you to protect a source / destination selection. When you press the LOCK button it can lock just the current destination or it can lock all destinations. The choice of lock modes is set in the software configuration.

1. Press the button once to lock the panel. The green display shows that the panel is locked.

2. Press the button again to unlock the panel.

Chop

This feature is useful for engineering checks and system alignment of gains and phasing. In this mode the output switches rapidly between two inputs. Note that you can select chop mode only when a single breakaway is selected.

To enter chop mode, select valid sources in both the **in use** and **preset** sections of the display. Then press the CHOP button.

The output remains in chop mode until any button on the panel is pressed, or until a source is changed on the current destination by another control panel or by an external computer.

Sleep Mode

In this mode the vacuum fluorescent display is blanked during periods of inactivity to extend its working life. If this mode has been switched on, then the display is automatically blanked after there has been no change on the panel for more than one hour. The panel automatically exits the sleep mode if any button on the panel is pressed or if another panel changes the current destination on the panel.

Joystick or Microswitch Override

This feature is used for matching the color balance of several cameras. Microswitches in the camera control units are pressed by the engineer conducting the line-up to select the camera **in use** onto the line-up monitor. It overrides the current selection made on a remote panel. When the microswitch contact is released the override selection reverts to the previous selection made on the conventional panel.

Each control panel can support up to eight cameras. The user indicates in the software configuration which inputs of the matrix are selected by the joystick contacts. Normally video only is selected by the joystick, but there is no limitation placed by the system and any level may be selected.

1. Press and hold the joystick to make an override selection.

2. Release the joystick to return to the previous selection made by the panel.

3. If two or more joystick buttons are pressed, the latest press takes priority.

SMS-C32BPS Panel

The SMS-C32 Button-Per-Source Control Panel is illustrated in Figure 4-4.

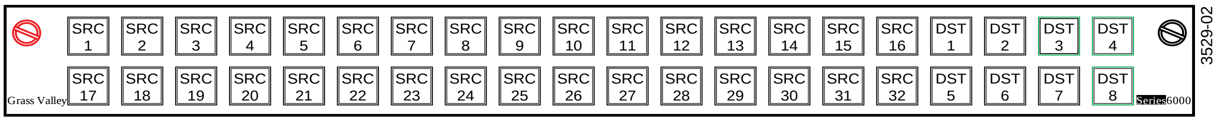


Figure 4-4. SMS-C32BPS Control Panel

Description

This panel uses buttons with relegendable caps and status indication by LEDs to ensure a long life. There are 40 switches which can be used for the selection of sources, destinations, breakaways and lock functions.

There are many modes in which the panel can operate, determined by the SETUP of the system. Some examples are:

- 16 X 16 XY with breakaways and lock
- 32 X 1 with breakaways and lock
- 32 X 2 with a row of buttons for each destination and with breakaways and lock
- 32 X 8 XY without breakaway or lock

Camera microswitch override is included on the rear of each panel which is 1RU high.

Operation

The destination and the levels controlled by this panel are determined by the configuration of the system and can be changed using the SMS-6000 Configuration Editor. In this way the buttons are re-configurable so any of the buttons can perform any function. The operations below covers all the facilities which can be used.

NOTE: *All of the operations may not be available, due to the set up, for example; a 32 X 8 panel does not have any buttons left for lock or breakaway function.*

Destinations

Press one of the destination buttons to choose a new destination. Its button then lights up to confirm the selection and a source button also lights up to show the currently selected source.

Sources

Press the required source button to select a new source.

Breakaways

Buttons nay be configured, using the SMS-6000 Configuration Editor, to enable breakaway selections of signal levels such as video, audio 1, audio 2 and time code.

If the breakaways are allowed, then normally all the level buttons light up denoting the *married* mode in which all switching levels are switched simultaneously. If a breakaway selection is required then press the button to deselect the levels which are not required to switch. Then press a source button to choose a new source on the breakaway level.

NOTE: *If more than one level is enabled, the source status indicated is that of the level of the left button.*

Lock

This button allows you to protect a route that you have selected. The lock mode can be configured to function in several way but, by default, it locks its own panel dependently or each destination.

Press the LOCK button once to lock the route / panel. The button lights to show that the panel is locked.

Press the button again to unlock the route / panel.

The panel remembers the lock status so that when a destination is locked and this destination is reselected then the lock button will light to show that this destination is locked.

Joystick or Microswitch Override

This feature is used for matching the color balance of several cameras. Microswitches in the joysticks of camera control units are pressed by the engineer conducting the line-up to select the camera in use onto the line-up monitor. It overrides the current selection made on a remote panel. When the microswitch contract is released the override selection reverts to the previous selection made on the conventional panel.

Each control panel can support up to eight cameras. The software configuration of the system determines which inputs of the matrix are selected by the joystick contacts. Normally video only is selected by the joystick but there is in fact no limitation placed by the system and any level may be configured to be selected.

Press and hold the joystick to make an override selection.

Release the joystick to return to the previous selection make by the panel.

If two or more joystick buttons are pressed, then the past press takes priority.

5 *Maintenance*

Module Removal and Replacement

The modules in the frame can be removed for maintenance. Unscrew the two front panel catches and lower the front panel. Note that the Local Control Panel, if fitted, is attached to the plug-in modules by a pair of ribbon cables. Switch off the unit with the standby / on switch (left off or standby) at the front of the power module. Open the latches of the ribbon cable connectors and disconnect the panel.

A blank front panel, usually with a **power on** indicator board, is fitted to most units not having a control panel. It is attached to the power supply module by a flying lead which can be detached from the power supply module by pulling upwards. Do not allow the blank front panel to hang by the lead as this may apply excess stress to the lead and cause premature failure.

The plug-in modules can be removed using the handles. These handles act as levers to aid removal and insertion of the modules plus they incorporate a locking mechanism to prevent the modules coming loose, especially useful in a mobile application. Pull the handles to initially release the lock and then to withdraw the module.

When replacing the module it is essential to ensure that the handles are wide open as you push the module into the guides until the resistance of the edge connectors is felt. Then push evenly on the handles to push the module securely in place.

Faults

Finding Faults

Experience shows that the most common faults are the simplest. This section describes some of the most likely faults to be encountered in this equipment and how to rectify them.

Initial Checks

Before assuming that there is a fault in the routing system, check the equipment connected to the system and its cabling to ensure that the signals and power are reaching the equipment correctly.

Fuses

These are probably the most likely part to fail during the equipment's life.

If there is no sign of life from the frame or panel check the mains / power fuse. This is located inside a drawer in the mains / power inlet socket. To check the fuse unplug the power cord, open the drawer and check the rating. If defective, replace the fuse with the value marked on the serial number on the unit. Push the drawer in place and plug the power cord in again.

If one or more of the two left-hand pilot LEDs in the power module is out then check the DC fuses. These are located on the power module. Remove the front panel of the frame and withdraw the module after first releasing the module lock on the handle. Replace any defective fuses with ones of the correct rating. Replace the module in the frame locking it in place.

The DC fuse for the remote panel can be accessed by removing the panel from its installation. Unplug the Quick-Link T-piece and then the power cord, remove the top cover and check the fuse. If defective, replace the fuse with one of the correct rating. Replace the cover and re-install.

Reset Microprocessor

A green LED on the matrix modules and the remote control panels denotes that the microprocessor is running by flashing once a second. If this is not the case try pressing the RESET pushbutton. The adjacent red LED shows briefly the reset condition.

Visual Inspection

Many faults can be located by visual checks. Unplug the modules. Check the condition of the gold edge connector fingers (see below). Check that all the components fitted in sockets are correctly seated. Refit the modules ensuring that they are locked in place. Remove the cover of the unit and check that internal cables are securely plugged in.

Edge Connector Contacts

Despite the gold plating of edge connector contacts they may collect dust and grease which can degrade the contact. When you remove a module check that the fingers are clean, free of grease and undamaged. If necessary clean the fingers with a clean cloth and a solvent-based cleaner such as alcohol. Take care not to get the solvent on plastic parts as it can cause damage. Avoid touching the clean edge connector contacts with your fingers.

Configuration

Check that the equipment is correctly configured including any hardware jumpers. Refer to **Section 2: Installation**.

Common Faults

Below are some of the most common problems encountered.

Frame

1. Quick-Link has not been terminated properly. One end at least **must** be terminated in 75Ω.

NOTE: *The system is **functional with long cables only if both ends have been terminated.***

---

2. Two frames have the same address (hex) switch setting.

3. Two frames or no frame have been set as the master.

4. A DIP or address switch has been changed but the RESET has not been pressed to **activate** the new setting.

Remote Control panel

1. The Quick-Link has not been terminated properly. One end at least **must** be terminated in 75Ω.

2. Two panels have the same address switch setting.

Further Fault Finding

Further fault finding will usually involve the use of schematic diagrams and optional extender modules.

This should be done by an experienced technician. Parts lists and schematic diagrams for all the electronic modules are to be available in an optional Parts Lists and Drawings Package.

Alignment

The equipment is carefully aligned before shipment and, through the use of modern high stability components, conservative design and low heat dissipation, it should not be necessary to undertake any adjustments. However should it be necessary to change a component it may then be necessary to make an adjustment. However even then it is most unlikely that the complete unit would need to realigned. We recommend that you adjust only what you have to and use other channels as a guide to what to expect. The procedure below describes how this should be done. Any realignment should be done only by a technician trained in the use of the test equipment below and of video alignment procedures.

There are three ways to access the adjustment controls:

1. Use the optional Extender Module so that the module is accessible. While this is useful to set the gains it will not give satisfactory results when setting the analog video frequency response or with serial digital video routers. This is available as an option mainly for fault finding rather than as an aid for alignment.

2. If there is access from above the frame you can remove the top cover to expose the controls. This is an accurate method.

3. A third method which is time consuming but can be accurate is to unplug the module, make a minor adjustment without being able to see the results, to replace the module and measure the result, repeating the process until satisfactory results are obtained. Fortunately you will probably only have to adjust one channel and a high degree of accuracy can be achieved with patience. As an aid, the adjustment controls are arranged so that a clockwise rotation of the control increases the parameter being set.

Analog Video Matrix

Equipment

2 channel 100MHz oscilloscope

TV vectorscope

TV waveform generator with the following:

- Line rate monochrome signal such as grey scale or window,
- Sweep (to 40MHz) or multi-burst (to 10MHz)
- Color bars

Module Extenders (optional equipment)

75Ω cable, T-pieces, barrel and terminations

Only two parameters are adjusted for each output channel of the router. These are insertion gain and high frequency response.

Insertion Gain

This method uses a two channel oscilloscope to subtract the input signal to the matrix from the output signal of the matrix which shows a flat trace if the insertion gain is correct. This avoids the use of very sophisticated equipment and yet is very accurate.

1. Connect a cable from the output of the test signal generator, via a T-piece through Channel 1 of the oscilloscope, into Input 1 of the matrix. Connect a second cable from Output 1 of the matrix to Channel 2 of the oscilloscope terminating it at the oscilloscope in 75Ω.

2. Set the test signal generator to give a 1V p-p monochrome composite waveform of a simple signal, such as grey scale or window. Set the matrix so that Input 1 is routed to all outputs. Observe the two waveforms on the oscilloscope. When these are satisfactory, disconnect the leads to the matrix and join them together with a 75Ω barrel or T-piece connector. Set the vertical amplifiers of the oscilloscope so that the waveforms fill the screen as far as possible. Set the oscilloscope to invert one trace and add it to the other. This should result in a flat trace. If not, adjust one or other vertical gain slightly to optimize the flatness of the waveform.

3. Now reconnect the cables to the matrix. Ignoring the vertical spikes which are caused by timing errors, any deviation from flatness is as a result of an insertion gain error. The labeling on the module clearly shows the two rows of adjustment controls.

4. Adjust the GAIN potentiometer for Output 1 for optimum flatness. Repeat for each output in turn.

Frequency Response

For accurate frequency response measurements a sweep generator with a sweep to 20MHz is needed to ensure that the response rolls off correctly above 10MHz, and 40MHz on wideband systems where the bandwidth is set to 30MHz. Also a set of differential probes (which measure at the input and the output of the matrix) is needed to cancel out the effects of input cabling. However not all customers will have access to such equipment so the procedure below may be used, but while this will produce satisfactory results it may not meet specification especially above 6MHz.

Connect a short cable from the output of the test signal generator into Input 1 of the matrix. Connect Output 1 of the matrix to the oscilloscope terminating it at the oscilloscope in 75Ω.

Set the test signal generator to give a 1V p-p composite sweep or multiburst waveform. Set the matrix so that Input 1 is routed to all outputs.

Observe the waveform on the oscilloscope. When it is satisfactory, disconnect the leads to the matrix and join them together with a 75Ω barrel or T-piece connector. Set the vertical amplifier of the oscilloscope so that the waveform fills the screen as far as possible. The waveform should be flat. If not you will have to make mental allowances for minor deviations. Now reconnect the cables to the matrix. Any (new) deviation from flatness is as a result of a frequency response error.

Adjust the HF potentiometer for Output 1 for optimum flatness. Repeat for each output in turn as necessary. After you have finished the adjustments, check that he timings have not been affected.

Normally if the response has been correctly set the timing or phase will also be satisfactory. Use a vectorscope to check the phase and a color bar generator to feed the matrix. Lock the vectorscope to an external signal (not to the measured output) and observe the phase angle at each output and check for deviations. If there are excessive errors then either repeat the above tests or adjust the HF potentiometer for optimum phase.

Audio Matrix

Equipment

2 channel 20MHz oscilloscope

Audio signal generator providing 0dBu at 1KHz.

Audio Level Meter

Module Extenders (optional equipment)

Only the insertion gain of each output channel of the router can be adjusted.

Insertion Gain

The matrix modules have been factory set for unity gain when driving into a 10KΩ load so it is unlikely that the modules will need to be adjusted during installation. In the event of the module requiring alignment in the field, such as due t, component replacement etc., simply adjust the output level to match the input level using a 1kHz (approx) tone at a level of about 0dBu.

Serial Digital Video Matrix

Equipment

TV Picture monitor with serial inputs or D/A converters for the relevant TV standard.

TV waveform generator with a smooth full field picture or preferably one showing the split field pathological test for the relevant TV standard.

Length of video cable or a cable clone set to 250M (820.25 ft) of 8281 or PSF1/2 cable, optional.

Input Standard Phase-Locked Loops

Allow at least 15 minutes for the circuits to reach normal operating temperature. These adjustments cannot be made on an extender.

Connect the router output to a picture monitor, and the input to be adjusted to a signal of the appropriate TV standard. Set the router to receive at that standard, Refer to the instructions of the SMS-6000 Configuration Editor.

The input stages are mounted on SIMM modules: Input 1 on the left of the module through to Input 16 on the right.

To adjust the phase-locked loop follow the steps below:

1. Adjust for lock.
2. Adjust clockwise until lock is lost.
3. Adjust counterclockwise until lock is re-gained.
4. Adjust counterclockwise a further half (1/2) turn.

Routine Maintenance

The only items requiring routine maintenance are the cooling fans fitted in some matrix frames.

Cooling Fans

A fan is used in the 3RU frames and in the serial digital video matrix in a 1RU frame. The 3RU frame has a filter and this should be cleaned periodically. The fans used are rated at 50,000 hours so expect to replace them after five years. There is no monitoring of the fan so it is recommended that the fan is replaced during a period of routine maintenance rather than waiting for the fan to fail. However the equipment will continue to run without the fan in ambient temperatures of up to 35°C but extended use without the fan may reduce the life of other components in the unit.

3RU Frame

The fan is located at the rear of the frame above the AC power inlets.

Cleaning the Filter

The filter is accessible from the rear. Turn the catch on the plastic cover a quarter turn, pull it off and remove the filter. Clean the filter by shaking it to remove the dust or by washing it in warm water if necessary. Once it is clean and dry replace the filter in the cover and into the frame.

Replacing the Fan

WARNING

This requires the frame to be removed from the equipment rack and the top cover removed. This should be undertaken only by a qualified technician.

Uncable the frame and remove it to a work bench. Remove the top cover. Unplug the modules and store them safely in an anti-static environment.

Remove the rear motherboard assembly. First remove the two screws at the rear of each side of the frame. It is not necessary to touch those in the base of the frame.

Ease the motherboard assembly back to allow access to the cables. Detach the cables noting carefully their positions, especially the AC power inlet terminals.

Lift the motherboard assembly free from the frame and lay it on a bench.

Remove the four screws holding the fan to the inner motherboard. It is **strongly recommended** that you do not separate the inner and outer motherboards as re-assembly is difficult.

Replace the fan with one of similar rating.

To install the fan into the frame follow the above sequence in reverse.

WARNING

Take great care that the AC power inlet terminals are connected to the correct terminals.

1RU Frame

The fan is located at the right-hand side of the frame just behind the power module and its motherboard. There is no filter for the fan.

Replacing the Fan

WARNING

This requires the frame to be removed from the equipment rack and the top cover to be removed. This should be undertaken only by a qualified technician.

Uncable the frame and remove it to a work bench. Remove the top cover. Unplug the modules and store them safely in an anti-static environment.

Remove the two screws at the side of the frame to release the fan and its bracket from the frame. To increase access it may also be necessary to remove the power transformer mounting screw so as to move it slightly. Unplug the fan from the connector on the motherboard, first noting its position and orientation. Unscrew the fan from its bracket.

Replace the fan with one of similar rating.

To install the fan into the frame follow the above sequence in reverse

---

WARNING

Take great care that the AC power inlet terminals are connected o the correct terminals.

Replacing Parts

If a part is to be replaced then a qualified technician should perform the work. The printed circuit boards in this equipment frequently use trace widths of 0.012 in. which can easily be damaged if proper care is not taken.

Also many of the devices are sensitive to static and precautions should be taken to minimize such risks. Work on circuit board modules should be undertaken on conductive rubber mats to avoid physical and static damage.

Most integrated circuits are not socketed, except for devices which might require replacement during the life of the equipment (such as EPROMs). The reason for this is two fold. Firstly, in the signal path sockets can degrade the HF performance in the video circuitry. Secondly, sockets contribute to product unreliability: they are an extra component in the chain and are generally less reliable than the chips whose replacement they are intended to facilitate.

If a chip or other component has to be replaced the leads should be cut off with fine cutters on the component side. The leads can then be heated with a soldering iron and removed one at a time. Remove excess solder with solder wick or solder sucker until the hole is clear. Alternatively, the use of special pumped de-soldering stations is strongly recommended.

If the new component is an IC then a socket should normally be used as the risk of damage to the traces of the circuit board would increase rapidly if it were to be replaced again in the future, outweighing the inherent risks of the socket itself. The exception to this rule is if in the video path the component is removed very cleanly and the pads at the holes look in good condition then the chip may be fitted and soldered in place. Otherwise it is better to use a socket and tolerate the small degradation in performance that might result.

When removing a component such as EPROM from a socket pull it out straight and evenly a little at a time to avoid bending the leads. A small flat bladed screwdriver is an excellent tool for this task.

When placing a component in a socket ensure that the leads are straight and that they are all lined up in the socket before pushing it in evenly and firmly. If the leads of a chip have become badly bent they may fracture when they are straightened. In this case the device must be replaced with a new one.

Devices in large square sockets (PLCC sockets) can only be removed with a special tool. Do not attempt to remove devices without this tool as you may damage the socket which would be difficult to replace without damaging the circuit board.

A

Appendix

Remote Control Protocol

Introduction

This document specifies a protocol suitable for simple control of a Series 6000 routing system by a computer. As the protocol is ASCII text based, remote changes can be made using a terminal or a computer running terminal emulation software.

For most applications only the .S command will be required to set crosspoints, with the .I or .L command to interrogate crosspoints. The .#01 command may be used at system start up to check the RS232/RS422 link.

System Setup

The DIP switches located on the master frame module, must be set as shown in Table A-1. The port will then respond only to messages of the correct format. A reply is generated only after a (cr).

Table A-1. Dip Switch Settings

DIP Switch Position	Master Frame	Slave Frame
1	UP	UP
2	DOWN	UP
3	DOWN	UP
4	UP	UP

The port operates at 9600, 8 data bits, no parity, and 1 stop bit. RS232 or RS422 are link-selectable on the computer port daughter card PC106 (LK1–LK5). Toward U3 is RS422. Away from U3 is RS232. Other baud rates and parity options can be factory selected.

At 9600 baud the system can cope with an overall crosspoint set rate of one change approximately every 35µs.

The interface connector on the equipment is a 9–pin D socket using the following pinout. The interface cable only needs to use TX, RX, and GND. The 24V supply is reserved for Series 6000 equipment only. Refer to Table A-2.

Table A-2. RS232 and RS422 Cable Connections

RS232		RS422	
Pin #	**Signal**	**Pin #**	**Signal**
1	CHASSIS	1	CHASSIS
2	RTS	2	TX–
3	RXD	3	RX+
4	N/C	4	RX GND
5	24V High	5	24V High
6	GND	6	TX GND
7	TXD	7	TX+
8	CTS	8	RX–
9	24V LOW	9	24V LOW

The pinouts in Table A-3 are normally used on personal computers, but check your own computer's documentation.

Table A-3. Personal Computer Cable Connections

9-Pin D Connector		25-Pin D Connector	
Pin #	**Signal**	**Pin #**	**Signal**
1	DCD	2	TXD
2	RXD	3	RXD
3	TXD	4	RTS
4	DTR	5	CTS
5	GND	6	DSR
6	DSR	7	GND
7	RTS	8	DCD
8	CTS	20	DTR
9	RI	22	RI

Commands

All characters used should be in upper case. Values in { } brackets are variable fields. Values in () brackets are non printable characters, i.e., carriage return (cr). No space or tab characters are used. All crosspoint numbering starts from one (1) and not zero (0). The (cr) character is ASCII carriage return (code 0D hex).

Some examples are given of “C” code suitable to output messages. These are intended only to clarify the command structure. They assume a separate “C” routine RS232_printf which is similar to the standard printf but is output directed to the RS232 serial port of the host computer.

Set crosspoint Message

This allows a crosspoint to be set and uses the command format:

```
S{level}{dest},{srce}(cr)
```

The legal levels are V,A,B,C, D, E, F, G. Refer to Table A-4.

Table A-4. Sample Commands

Typical Command	Matrix Level	Typical Use
.SV1,2(cr)	level 1	video
.SA2,4(cr)	level 2	audio
.SB4,1(cr)	level 3	audio
.SC31,12(cr)	level 4	control/time code
.SD 1,2(cr)	level 5	video
.SE 2,3(cr)	level 6	video
.SF3,4(cr)	level 7	audio
.SG4,5(cr)	level 8	audio

The router will reply with a .U{level}{dest},{srce}(cr) message. Reply B (cr) is returned if the connection is barred (locked). The error message .E(cr) is returned if the command is not recognized. Refer to Table A-5.

Table A-5. Sample Replies

Send	Reply
.SV001,002(cr)	.UV001,002(cr)
.SC9,3(cr)	.UC009,003(cr)
.SZ1,1(cr)	.E(cr) /* unknown level */
.MA1,1(cr)	.E(cr) /* unknown command */

Multiple levels can be set by including more level identifiers in the message, see Table A-6.

.

Table A-6. Multi-level Command Examples

Message	Level
.SVA1,2(cr)	level 1,2
.SAC1,2(cr)	level 2,4
.SCV1,2(cr)	level 4,1
.SVABC1,2(cr)	level 1,2,3,4
.SVABCDEFG1,2	level 1-8

The router will reply with a .U{level}..{level}{dest},{srce}(cr) message. The levels in the reply are always in the order V,A,B,C. Refer to Table A-7.

Table A-7. Sample Reply — Multi-level

Send	Reply
.SBA1,2(cr)	.UAB001,002(cr)

Example “C” code to set a crosspoint on levels 1, 2, & 3.

```
level = “VAB”; /* levels to be controlled */
dest = 5;* matrix output */
srce = 2; /* matrix input */
RS232_printf(".S%s%d,%d\r", level, destination, source);
```

Free (Unlock) System, Level, Or Destination

This allows the specified level or destination to be cleared (unlocked). Refer to Table A-8.

Table A-8. Unlock Commands & Replies

Code	Description	Reply
.F--(cr)	Free or unlock system	.A(cr)
.F{level}-(cr)	Free or lock by level	.A(cr)
.F-{dest}(cr)	Free or lock by destination	.A(cr)

Interrogate Crosspoint Setting

This allows a single destination to be interrogated to find the current source routed to it:

```
.I{level}{dest}(cr)
```

The router replies with:

```
.A{level}{dest},{srce}(cr)
```

Example "C" code to interrogate a crosspoint on levels 1, 2, & 3.

```
level = "V";/* levels to be controlled */
dest = 5;/* matrix output */
RS232_printf(".I%s%d\r", level, destination);
```

Crosspoint Settings

This command allows a block of up to 8 crosspoint settings to be interrogated. The command has 2 formats. In both cases the command specifies a level and start destination. The router replies with a list of up to 8 connections. Less than 8 connections are returned if the maximum destination (16, 32, or 24) is exceeded, or the search conditions are not met.

Format (1): List from the specified destination showing current sources.

```
L{level}{dest},-(cr)
```

The router replies with:

```
.A{level}{dest},{srce}{level}{dest},{srce}... {level}{dest},{srce}(cr)
```

Example ‘C’ code to list crosspoint (format 1).

```
level = “V” /* levels to be controlled */
dest = 5; /* matrix output */

RS232_printf(".L%s%d,-\r", level, destination);
```

Format (2): List from the specified destination only those destinations currently connected to the specified source.

```
.L{level}{dest},{srce}(cr)
```

The router replies with:

```
.A{level}{dest},{srce}{level}{dest},{srce}... {level}{dest},{srce}(cr)
```

Example ‘C’ code to list routes (format 2).

```
level = “V”;/* levels to be controlled */
dest = 5;/* matrix output */
srce = 2;/* matrix input */

RS232_printf(".L%s%d,%d\r", level, destination, source);
```

Special Commands

All the values in brackets {xx} are two digit hexadecimal numbers. Refer to Table A-9.

Table A-9. Special Command Listing

Code	Command Meaning
#01(cr)	Test if router is connected. The router replies with (.)(A)(cr).
#12,{xx}(cr)	Reset router. This can be used after re-configuration. The xx parameter is optional and causes all destinations to be set to source xx.
#23(cr)	Halt vertical interval switching. This allows complex salvos to be set up to occur in one vertical interval
#34(cr)	Restart vertical interval switching. As above.
#45,{xx}(cr)	Return Quick-Link status of device xx. .Axx ,01 = on-line.Axx,02 = off-line.Axx ,03 = this unit

Responses

Acknowledge

Acknowledge is used as a no error response to some messages:

```
.A(cr)
```

Errors

If an error is detected in any sequence prior to a (cr), the matrix replies with:

```
.E(cr)
```

Power Up

At power up or reset the matrix outputs a (cr) .P(cr) to inform a remote computer that the matrix is now on-line.

Update

If any crosspoints are changed in the matrix, either by remote panels or the remote control protocol, the matrix replies with an update message for each crosspoint changed.

```
.U{level}{dest},{srce}(cr)
```

Examples

Note that (cr) ASCII carriage return (code 0D hex). Refer to Table A-10.

Table A-10. Examples of Various Commands/Replies

From Computer	From Router	Description
	(cr).P(cr)	power on or reset
.SV003,001(cr)	.UV003,001(cr)	set destination-3 to source-1 on level-1
.SV3,1(cr)	.UV003,001(cr)	set destination-3 to source-1 on level-1
.SVAB02,001(cr)	.UVAB002,001(cr)	set destination-2 to source-1 on levels-1,2,3
.SZ1,3(cr)	.E(cr)	level Z not allowed
.SB45,12	.E(cr)	destination too large
.IV1(cr)	.AV001,001(cr)	get status of level-1 destination-1
.IA3(cr)	.AA003,002(cr)	get status of level-2, destination-3
.IVABC9(cr)	.E(cr)	only one level can be interrogated
.LV5,-(cr)	.AV005,002V006,009V007,010V008,031V009,001V010,001V011,017V012,003(cr)	get status of level-1 destination-5 to destination-12
.LB1,1(cr)	.AB001,001B007,001B(cr)	only destination-1 and destination-7 using source-1
	.UV007,003(cr)	system change by a control panel or another computer interface
.#01(cr)	.A(cr)	check to see if router connected
.?0C40(cr)	.A0C40,02,34,7F,2D,20,20,20,0D(cr)	read of system setup data
.!328E,01,02,56,7F(cr)	.A328E,01,02,56,7F (cr)	write of system setup data